1112 Manatee Avenue West
Bradenton, FL 34205
purchasing@mymanatee.org

Solicitation Addendum

Addendum No.:	2
Solicitation No.:	21-TA003586JH
Project No.:	6099860
Solicitation Title:	Lockwood Ridge Road at Shopping Center Intersection Improvements
Addendum Date:	February 11, 2021
Procurement Contact:	Jeb Hayter Procurement Agent

IFBC 21-TA003586JH is amended as set forth herein. Responses to questions posed by prospective bidders are provided below. This addendum is hereby incorporated in and made a part of IFBC 21-TA003586JH

ADD:

BID ATTACHMENT 5 – GENERATOR CABINET AND TRAFFIC INFRASTRUCTURE DESIGN GUIDE.

The Bid Attachment 5- Generator Cabinet and Traffic Infrastructure Design Guide, is hereby incorporated as a separate attachment to the IFBC.

QUESTIONS AND RESPONSES:

Q1. **Please confirm the Contractor is to furnish the generator under pay item 639-4-6. Or is the County supplying the generator?**

R1. The project / contractor will need to furnish and install the generator cabinet foundation and cabinet housing, not the generator.

Q2. Please provide details on the required generator and housing:
Housing material type (steel aluminum, concrete, etc.).
Dimensions on the housing and on the concrete pad.

R2. See Bid Attachment 5- Generator Cabinet and Traffic Infrastructure Design Guide

Q3. **Is the generator gasoline powered, diesel or natural gas?**

R3. This is just the cabinet foundation and cabinet housing, No generator.

NOTE:
Items that are ~~struck through~~ are deleted. Items that are <u>underlined</u> have been added or changed. All other terms and conditions remain as stated in the IFBC.

INSTRUCTIONS:
Receipt of this addendum must be acknowledged as instructed in the solicitation document. Failure to acknowledge receipt of this Addendum may result in the response being deemed non-responsive.

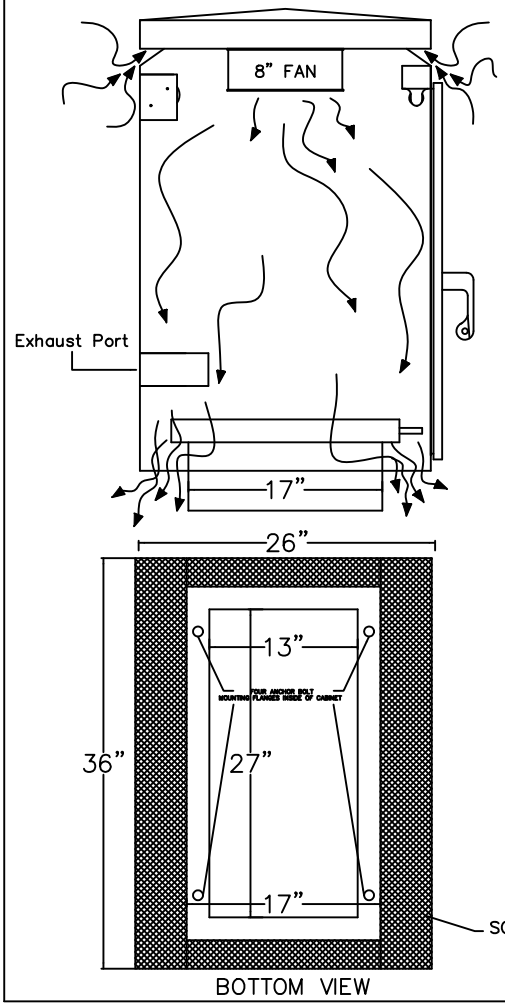
END OF ADDENDUM

AUTHORIZED FOR RELEASE

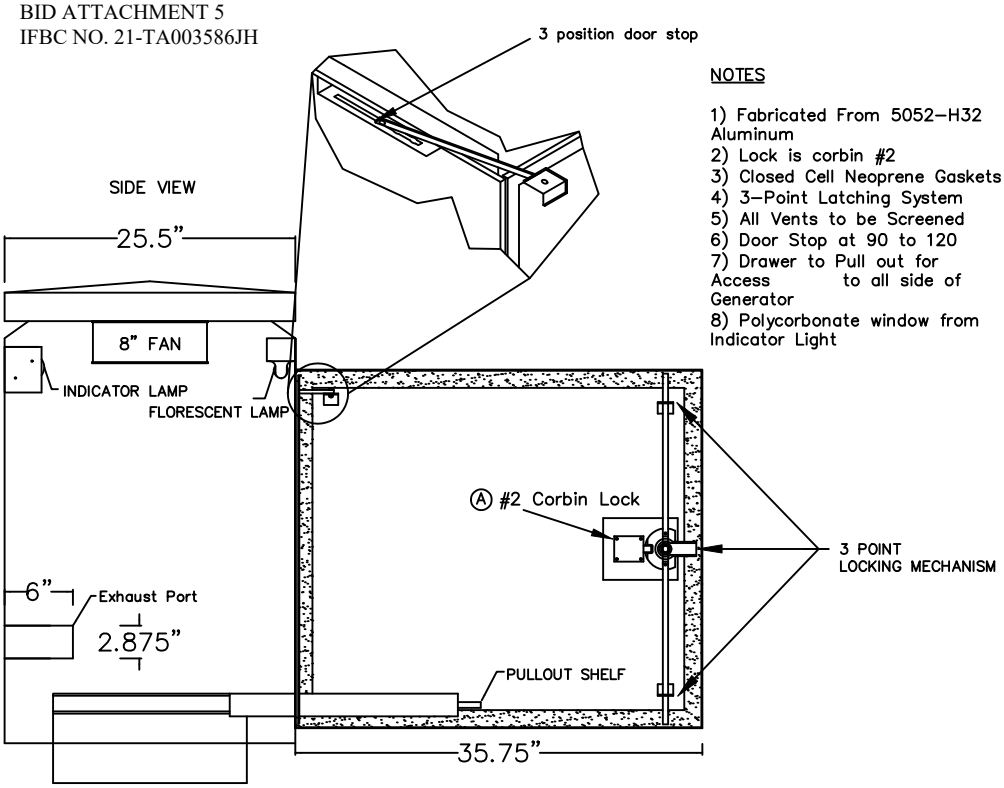
Jacob Erickson, MBA, CPPO, NIGP-CPP

Digitally signed by Jacob Erickson, MBA, CPPO, NIGP-CPP
Date: 2021.02.11 08:50:36 -05'00'

BID ATTACHMENT 5
IFBC NO. 21-TA003586JH



BOTTOM VIEW

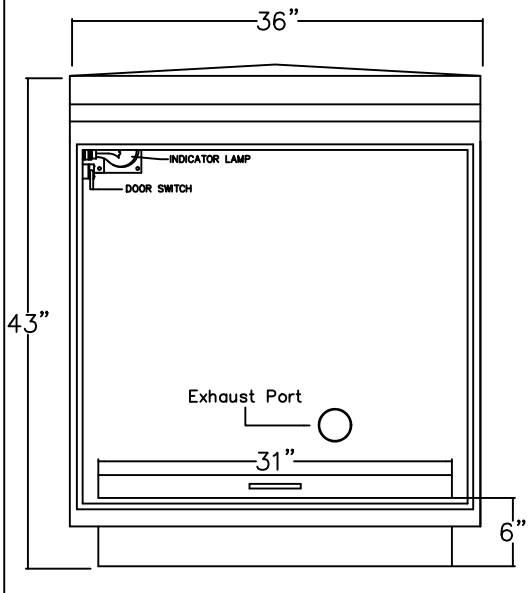


INSIDE VIEW

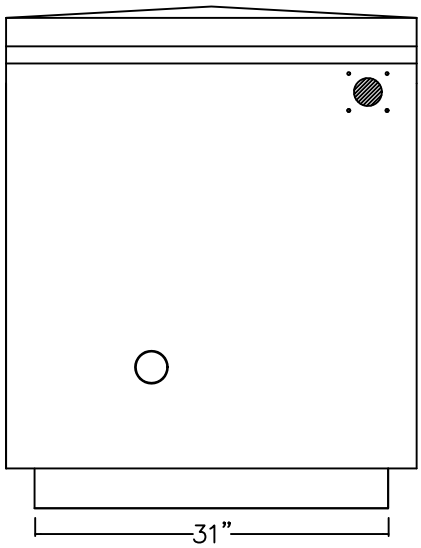
NOTES

1) Fabricated From 5052–H32 Aluminum
2) Lock is corbin #2
3) Closed Cell Neoprene Gaskets
4) 3–Point Latching System
5) All Vents to be Screened
6) Door Stop at 90 to 120
7) Drawer to Pull out for Access to all side of Generator
8) Polycorbonate window from Indicator Light

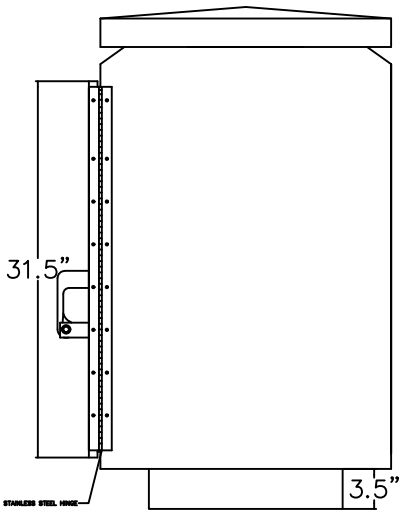
ORIGINAL DATE: 1/05		TRANSPORTATION CONTROL SYSTEMS 1030 86th Street Tampa, Florida 33619 (813) 630–2800	
REVISION DATE:			
DRAFTSMAN	C. STATHAM	TITLE: Specification for a emergency generator enclosure	
CHECKER	S. GILLIS	CUSTOMER:	
DRAFT. SUPV.	J.S.G.		
DESIGNER	J.S.G.	LOCATION:	
ENGINEER	J.GILLIS		
SCALE:	N/A	SALES ORDER # / PRINT # / REVISION	
		PROJECT # / SHEET 2 OF 2	



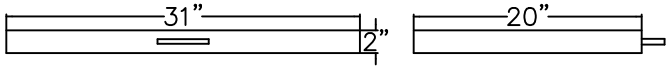
FRONT VIEW WITHOUT DOOR



BACK VIEW



SIDE VIEW



PULLOUT SHELF

ORIGINAL DATE: 1/05		TRANSPORTATION CONTROL SYSTEMS 1030 86th Street Tampa, Florida 33619 (813) 630–2800	
REVISION DATE:			
DRAFTSMAN	C. STATHAM	TITLE: Specification for a emergency generator enclosure	
CHECKER	S. GILLIS	CUSTOMER:	
DRAFT. SUPV.	J.S.G.		
DESIGNER	J.S.G.	LOCATION:	
ENGINEER	J.GILLIS		
SCALE:	N/A	SALES ORDER # / PRINT # / REVISION	
		PROJECT # / SHEET 1 OF 2	

TRAFFIC INFRASTRUCTURE DESIGN GUIDE

MANATEE COUNTY PUBLIC WORKS DEPARTMENT

TRAFFIC DESIGN DIVISION

REVISED APRIL 2018

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TABLE OF CONTENTS

1.0 INTRODUCTION

The purpose of this guide is to provide instruction for practices and standards used in the design and construction of Manatee County Traffic Infrastructure. It does not supersede any other standard reference document used in the design of traffic infrastructure.

This guide describes typical design expectations and material requirements for new and/or modified installations of traffic/pedestrian signals, Advanced Traffic Management Systems (ATMS), traffic signs, and pavement markings.

Manatee County's Public Works Director, County Traffic Engineer, or designee will interpret this guide, as needed, for application and resolution of any conflicts.

2.0 GENERAL REQUIREMENTS

2.1 ENGINEERING STUDY

A. All traffic control infrastructure to be installed on any roadway in Manatee County shall be on the basis of an engineering study prepared by a professional engineer in accordance with the FHWA MUTCD.

B. For new traffic signal installation requests, at an intersection or for a pedestrian mid-block crossing, a traffic signal warrant analysis signed and sealed by a licensed professional engineer registered in the state of Florida needs to be approved by the Traffic Design Division.

C. A signal warrant is a minimum condition for which a signal may be installed. However, satisfying a warrant does not mandate the installation of a traffic signal. A warranting condition indicates that justification can be supported and the final decision for approval is made by the County Traffic Engineer.

2.2 STANDARD REFERENCES

A. Plans shall be prepared at a minimum in accordance with the latest editions of the following standard reference documents:

- Manatee County Land Development Code
- Manatee County Traffic Signal Design Guide
- Federal Highway Administration (FHWA) Manual on Uniform Traffic Control Devices (MUTCD)
- Florida Department of Transportation (FDOT) Standards Plans for Road Construction
- FDOT Design Standards
- FDOT Developmental Design Standards
- Florida Green Book
- FDOT Traffic Engineering Manual
- FDOT Plans Preparation Manual
- FDOT Basis of Estimates Manual
- FDOT Approved Products List (APL)
- National Electric Code

B. All materials proposed to be used in the traffic infrastructure installation shall be listed in the APL.

2.3 SUBMITTAL REQUIREMENTS

A. Submit an electronic version of the plans in Adobe Acrobat (.pdf) format to the Traffic Design Division for review and approval. The Traffic Design Division will coordinate with Traffic Operations Division for the plan review. After the first submittal, all subsequent submittals must include a letter with responses to review comments.

B. Upon receipt of an approval by e-mail from Manatee County Traffic Design Division staff, submit three (3) 24"x36" signed and sealed copies of traffic infrastructure plans, specifications, estimates, and clearance calculations to:

Manatee County Traffic Design Division
(Attn: Mr. Vishal S. Kakkad, P.E., PTOE)
2101 47th Terrace East
Bradenton, Florida 34203

C. All traffic infrastructure and structural plans and shop drawings, specifications, estimates, and clearance interval calculations shall be signed and sealed by a licensed professional engineer registered in the state of Florida.

2.4 FDOT MINIMUM TECHNICAL REQUIREMENTS

The following are excerpt specifications outlined in Attachment 'A' - FDOT Minimum Technical Requirements ATMS Design Build Criteria Package for Manatee County Advanced Traffic Management System Phase II, dated April 5, 2012.

2.4.1 LOCAL CONTROLLER SOFTWARE

This section specifies requirements associated with the local software for the operation and control of the traffic signal controllers. This section shall detail requirements for:

- Display Interface
- Programming
- Actuated Control
- Detector Calls
- Coordination
- Flashing Operations
- Preemption and Priority
- TOD Clocks
- Logging and Diagnostics
- Communication Protocol
- NTCIP Compliance of the Controller Database
- Traffic-Responsive Control
- Adaptive Control

2.4.2 REFERENCED DOCUMENTS

- DEPARTMENT Minimum Specifications for Traffic Control Signal Devices (MSTCSD)
- DEPARTMENT Roadway and Traffic Design Standards (RTDS)

2.4.3 GENERAL

Shall provide local controller software (firmware) for a Naztec Model 980-A2100 signal controller of a release version specified by Manatee County. The Local Software (LS) shall be able to be integrated as part of the ATMS and perform in accordance with project requirements. Software upgrades shall be provided at no additional cost.

2.4.4 APPLICABLE STANDARDS

The LS shall adhere to open architecture standards including the NTCIP. It shall be possible to use NTCIP protocol to communicate between the local intersection controller and ATMS.Now.

2.4.5 FUNCTIONAL REQUIREMENTS

A. The LS shall be easily updated without the removal of any memory device from the controller.
B. The LS shall be stored in flash memory devices.
C. The LS shall provide dimming functionality that meets the requirements of NEMA TS 2 Section 3.9.2.
D. The LS shall include an Ethernet® port driver to address the Ethernet® circuit.
E. LS internal drivers shall allow communications with the central system using the selected

protocol and shall be fully functional when connected to the ATMS Ethernet® network.

F. Access to controller functions, data and status information shall be available using a portable computer.
G. The LS shall include a variable to store intersection location name. This variable shall be viewable from the front panel display. This item shall be part of the database and chosen system protocol.
H. Upon restoration of power, the software shall follow the start-up sequence specified in the DEPARTMENT's specifications.

2.4.5A DISPLAY INTERFACE

1. The LS shall support a character, menu-driven alphanumeric interface as a minimum.
2. Dynamic displays shall be provided to show the operational status of the controller.
3. It shall be possible to place vehicle, pedestrian, and preemption calls from the keyboard while displaying status information.
4. The display shall show the status of each per phase, per ring and per unit inputs and outputs.
5. The display shall provide status of vehicle and pedestrian indications in combination with vehicle calls.
6. The display shall provide coordination status display including command source, pattern, cycle count, and other coordination parameters.
7. The display shall provide preemption and bus priority status and parameters.
8. The display shall provide overlap outputs.
9. The display shall provide time-base status display.
10. The display shall provide coordination sync status.
11. The display shall provide measure of effectiveness (MOEs) of the current MOE period.
12. The display shall provide the status of each of the force-offs and permissive periods.
13. The display shall provide auxiliary I/O provided by the unit.
14. The display shall provide detector activities, status, and measurements.
15. The display shall provide MMU status.
16. The display shall allow controller programming using the interface menus.
17. The display shall provide for overwriting the current plans and turning controller circuits on or off. These functions shall be through firmware and controller interface rather than physically switched wired inputs.
18. English language and traffic engineering terminology shall be used in programming.
19. The display shall include context-sensitive help screens. The help screens shall be easy to navigate and brief.
20. The LS shall have built-in dynamic communication displays for the cabinet SDLC (Synchronous Data Link Control, IBM Corp., Document GA27-3093-3) communications as well as status screens for any additional communication ports involved in external system communications.

The SDLC screens shall compile statistic of individual response frames, poling, and other data exchange processes.

21. The display shall have a screen that displays the current running revision of controller firmware.
22. The LS shall include user programmable logic for “Stop Ahead” advanced warning logic and output.

2.4.5B PROGRAMMING

1. Programming display menus shall aid the operator in entering data from the front panel keyboard.
2. It shall be possible to update timing plans using a portable computer.
3. A portable site license shall be included.
4. It shall be possible to update timing plans from the central location through the selected communication system. It shall be possible for controller data transfers to be done:

    a. From the TMC via ATMS.Now
    b. From the front panel keyboard; and
    c. By transferring an EEPROM data module from one controller to another or through a USB memory drive or other similar memory device.

5. Access levels to controller programming functions shall be provided for operation security. The LS shall provide the ability to copy all timing plan data from one phase to another. The LS shall provide the ability to copy coordinated pattern parameters from one pattern to another. It shall be possible to store a backup database in non-volatile memory or in a portable hand-held device. A function shall allow transferring the backup database to the active database. The LS shall provide a print function that allows the printing of controller data detector failures and event logs.

2.4.5C ACTUATED CONTROL

1. The phase sequence of the controller shall be able to be altered by time of day or external alternate sequence command.
2. It shall be possible to implement phase sequence changes without hardware restart.
3. Software shall be programmable to correspond with any standard operating procedure (SOP) listed within index 17870 of the DEPARTMENT’s standards and any agency-defined SOP.
4. The LS shall provide for a minimum of four rings of operation.
5. The LS shall provide for a minimum of four barriers.
6. The LS shall provide for a minimum of 16 phases.
7. The LS shall provide two selectable maximum greens per phase based on either TOD or external input. Dynamic maximum green extension shall be provided up to a maximum limit

based on the number of max-outs in successive cycles.

8. The interval timing minimum, range, and maximum shall be as specified in the DEPARTMENT's specifications and modified herein.
9. The LS shall allow both single and dual entry operations. The operator shall be able to select a preferred non-conflicting phase to be activated from the ring with no existing call.
10. The LS shall allow omit a yellow display when a specified phase is timing yellow clearance.
11. The LS shall allow the operator to reverse the lead-lag sequence.
12. The software shall allow a minimum of 16 overlaps. These shall be individually programmable from the controller keyboard.
13. The LS shall provide the capability of pedestrian overlap.
14. The LS shall allow inhibiting the re-service of left-turns within the same group.
15. Guaranteed minimum interval values shall be specified at time of purchase and not allowed to be changed for minimum green, walk, pedestrian clearance, yellow, or all-red.
16. At least two vehicle extension intervals shall be provided and shall be selectable by time-of-day.
17. The LS shall allow the operator to program inhibiting a specific phase when another specific phase is active.
18. The LS shall allow delaying the pedestrian walk interval by a programmable amount after the vehicle green begins timing.
19. The LS shall allow redirecting pedestrian outputs of a phase to another phase.
20. The LS shall allow returning to the yellow interval of the specified startup phase.
21. The LS shall allow the end of pedestrian clearance to time with the yellow clearance interval.
22. The LS shall allow enabling red rest on a phase-by-phase basis.
23. The LS shall provide a programmable conditional service feature. When selected, the controller shall re-service an odd-numbered phase once normal service to that phase has been completed if enough time for additional service exists on the concurrent even phase.
24. The LS shall allow specifying simultaneous gap-out of adjacent rings before crossing the barrier.
25. The LS shall provide an approved method of preventing the left-turn trap condition. The method shall be submitted to the DEPARTMENT and Manatee County for approval.
26. For each phase, the software shall have an option to allow the phase to rest in walk when there is no serviceable conflicting call at the end of timing the walk.
27. The LS shall permit power-up start to be programmed by phase and interval. Start intervals shall be green, yellow, or red.
28. The LS shall provide the following additional selectable pedestrian functions:

    a. Pedestrian clearance protection during manual control; and
    b. Pedestrian clearance through yellow or through yellow and red clearance.

2.4.5D DETECTOR CALLS

1. The LS shall be able to support the use of at least 32 vehicle detector inputs per intersection.
2. The LS shall be able to support the use of at least 8 pedestrian detector inputs per intersection.
3. The operator shall be able to assign any detector input to any of the phases, such that when the input is active it places a call on the phase.
4. The LS shall allow specifying locking/non-locking memory for a phase operation.
5. The LS shall allow the operator to program a call extension (in tenths of a second unit).
6. The LS shall allow the operator to program a delay on the recognition of the call (in tenths of a second unit).
7. The LS shall have a call delay inhibit per phase that is active during the associated phase green.
8. The LS shall be able to store traffic volumes from specified input channels for reporting purposes.
9. The LS shall be able to store occupancy on green, red, and yellow separately from all detector channels.
10. The LS shall allow programming a minimum, soft, pedestrian, and a maximum recall for a phase.
11. On a per-phase basis, the software shall have an option to allow last car passage operation and the vehicle to receive the passage time regardless of the point in time of the maximum green interval.
12. On a per-phase basis, the software shall have an option to provide a full vehicle extension interval when a phase gaps out.
13. The LS shall perform vehicle and pedestrian detector diagnostics.

2.4.5E COORDINATION

1. The coordination function shall be provided as a standard feature with no need for additional modules or software.
2. The LS shall allow a minimum of 24 different patterns of cycle length and offset combinations.
3. The LS shall allow a minimum of 12 individual splits for a maximum of 16 phases per table.
4. The LS shall allow any phase in the table to be specified as the coordinated phase.
5. The LS shall allow a phase omit or recall to be applied to any phase in the split table.
6. The LS shall be capable of issuing force-off commands to each phase. It shall be capable of floating and fixed point force-offs.
7. The LS shall provide for short-way, long-way, and dwell transition method between timing plans.
8. The LS shall accommodate a force-off value for each phase provided for each split plan.
9. The LS shall accommodate a permissive period for each phase provided for each split plan.

10. The LS shall be capable of referencing the local offset point to either the start or the end of the coordinated phase's green interval.
11. The LS shall provide a hold on the coordinated phase until it forces off.
12. If the return hold is not set for a pattern, the LS shall provide an Early Yield parameter for each phase that controls when the coordinated phase may yield to the non-coordinated phase.
13. The LS shall verify that the sum of split times in each active ring equals the programmed cycle length.
14. The LS shall verify that the split times are adequate to serve minimum vehicle and pedestrian phase times.
15. The LS shall verify that the sum of the split times on the same side of the barrier in each ring is equal.
16. The LS shall allow manual pattern override.
17. Coordination shall be possible based on internal time clock commands, manual operator input, or external system interconnect.
18. For each pattern, it shall be possible to exclude up to 16 phases from short-way transition.
19. The coordinated phase(s) shall operate as non-actuated when coordinated. The coordinator shall provide for a single release from the coordinated phase(s) to the remaining phases in sequence.
20. The coordinator shall provide a free mode of operation, where all coordination is removed. Free mode operation shall be selectable by coordination commands, by external input or by keyboard entry.
21. The LS shall allow manual override of the current coordination command from the keyboard. The manual command shall allow selection of any coordination pattern to be in effect.

2.4.5F FLASHING OPERATION

1. The LS shall have an option to start in the flashing mode. The length of this flashing time interval shall be programmable.
2. Each indication shall be capable of being flashed at 50% cycle on and off and shall comply with MUTCD flash requirements.
3. The operator shall be able to select any phase as the flash exit phase or entrance phase
4. The flash phase shall be programmable to be either green or yellow.
5. The LS shall ensure minimum green and pedestrian clearance time of the current phase before switching to automatic flash input.
6. A set of exit yellow and all-red intervals shall be displayed after automatic flash.
7. After the exit yellow and red, the unit shall return to the flash exit phase.
8. The LS shall allow each output to be flashed red or yellow.
9. Flashing shall be controlled by either setting the voltage monitor output to be FALSE or by flashing through the load switch driver outputs.

10. The LS shall support a “soft flash” that allows the controller to flash through the load switches rather than using mechanical flash transfer relay method.

2.4.5G PREEMPTION AND PRIORITY

1. The preemption and bus priority shall be a standard feature and shall not require an additional module or additional software.
2. The logic for controlling railroad, bridge, and fire preemption in addition to bus priority signal sequences and timing shall follow DEPARTMENT practices.
3. The controller shall have a minimum of six preemption routines with different priorities. Each is programmable to run a predefined sequence of intervals.
4. Preemption algorithm, intervals, sequences, and operations shall be submitted for review prior to the commencement of construction.
5. Each preemption routine shall provide a locking and non-locking memory feature for preemption calls. In the non-locking mode, if a call is received and dropped during the delay time, the preemption call shall not be serviced.
6. A programmable delay time shall be provided to inhibit the start of the preemption sequence and the bus priority sequence. This interval shall begin timing upon receipt of a preemption or priority call. Delay time shall be programmable from 0-255 seconds in one second increments.
7. Programmable extend time interval shall be provided to stretch the call duration from the point of termination of the actuation. This shall be programmable from 0-255 seconds in one second increments.
8. Programmable duration time intervals shall be provided to control the minimum that the preemptor remains active. This shall be programmable from 0-255 seconds in one second increments.
9. Programmable maximum call time intervals shall be provided to control the maximum time that a preemptor remains in control. This shall be programmable from 0-255 seconds in one second increments and shall be inhibited when set to zero.
10. Signal displays in effect at the beginning of a preemption sequence shall not be terminated unless the respective green/walk has been in effect for a minimum time.
11. A phase shall advance to pedestrian clearance if it has timed the minimum green/walk interval at the beginning of a preemption sequence.
12. The controller shall support a minimum of four (4) programmable transit priority sequences.
13. Transit priority calls shall be non-locking.
14. Depending on the point in time of the transit priority call, the LS shall implement one of the following actions:
    a. Early green; and
    b. Green extend.

15. With early green, no vehicle or pedestrian phase may be skipped and vehicle and pedestrian minimums may not be shortened to serve bus priority.
16. Minimum time interval to serve consecutive transit priority calls for the same approach shall be programmable by a range of 0 to 30 minutes.
17. It shall be possible to enable and disable transit priority by time of day.

2.4.5H TOD CLOCK

1. The TOD clock shall be easily set to the year, month, day of the month, day of week, hour, minute, and seconds.
2. The clock shall be used for all time-based control functions.
3. The TOD clock shall adjust automatically for US Daylight Savings Time (DST).
4. The TOD clock shall perform an automatic calendar adjustment for leap year.
5. The LS shall include a time-based scheduler that automatically selects a TOD schedule using the system time-base.
6. The LS shall provide the capability to program a minimum of 255 different traffic and/or auxiliary events over a 99 year period.
7. The LS shall allow setting the time using the controller keyboard or downloading the time from a central or portable computer.
8. LS time-based coordination shall use a yearly program with 53 programmable weeks.
9. The LS shall include a minimum of 30 holiday or exception day programs. Holiday programs shall be either floating or fixed.

2.4.5I LOGGING AND DIAGNOSTICS

1. The LS shall provide logging capability as required herein. For all logging types, the oldest log shall be replaced first if memory overflows.
2. The LS shall allow the logging of detector measurements including volume, occupancy, and speed (including speed trap capabilities).
3. The detector logging interval shall be selectable between 5 and 60 minutes.
4. It shall be possible to enable detector logging based on TOD.
5. The LS shall include a detector failure log capable of storing a minimum of 100 detector failures. All detector diagnostic failures shall be recorded in the detector failure log. Detector failures shall include absence of calls, locked calls, erratic or chattering inputs, open loop, shorted loop, and excess change.
6. The LS shall allow MOE logging on a per-pattern or programmable time interval basis. The MOEs shall include, but are not limited to:
    - Green utilization;
    - Force-offs;
    - Vehicle volume;
    - Pedestrian calls;
    - Stop delay;
    - Average green, and
    - Gap-outs.

7. These logs shall also be viewable through the controller front panel display and up-loadable to the central ATMS.
8. The LS shall include event-logging capability of storing up to 100 data and time-stamped events (failures and status). The LS shall also log a "resume normal event" when applicable. The logs shall be viewable at the front panel display and shall be uploaded to the TMCS for central processing, logging, and display. The log shall be in easy to read text format. The events shall include:

    - Checksum failure;
    - Manual control enable active;
    - Conflict monitor flash;
    - Uniform code flash;
    - Soft flash;
    - Cabinet flash
    - User defined alarms;
    - Preemption active by run;
    - Vehicular detector failure by channel (locked call, constant call, chatter);
    - Pedestrian detector failure by channel (constant call);
    - Database change;
    - SDLC fault;
    - Power out;
    - Brown out (low voltage);
    - Auxiliary user programmable alarms;
    - Self-test diagnostics failure;
    - Cycling fault;
    - Cycling failure;
    - Coordination fault;
    - Coordination failure;
    - Cabinet door open;
    - Watchdog failure;
    - I/O failure;
    - Start-up failure;
    - Preempt /run number active;
    - EEPROM module failure;
    - Time-based coordination enable; and
    - Reset real-time clock.

9. The LS shall provide a log of the keyboard access to the controller. The log shall include a list of the last 30 keyboard security code entries. The LS shall have a log of a minimum of 120 pattern changes. The LS shall include automatic and operator initiated diagnostics of all controller and detector operation. Detector diagnostics plans shall be selectable on TOD basis. In case of a detector failure, the associated phase shall be placed in minimum recall, maximum recall, or soft recall. The status of each of the following functions shall be transmitted on a second-by-second basis to the central software:

    - Green and yellow status for all phases and overlaps;
    - Walk and pedestrian clearance status for all phases;
    - Vehicle and pedestrian detector status;
    - Phase termination status;
    - Local time;
    - Coordination status;

- Command source;
- Sync or transitioning status of coordinator;
- Conflict flash status;
- Local flash status;
- Preempt activity and calls;
- Volume and occupancy data for a minimum of eight (8) system detectors;
- Speed data from a minimum of two (2) speed detectors; and
- Status of user defined alarms.

10. The LS shall have a diagnostic for critical SDLC faults. The LS shall display the identity of the BIU that is at fault as well as the response frame that triggers the fault. The LS shall process MMU response frame details as outlined in the 2003 TS 2 Specifications. At a minimum, the cause of an MMU flash event shall be displayed at the controller front panel display and uploaded to the TMCS.

2.4.5J COMMUNICATION PROTOCOL

The LS shall support at a minimum the NTCIP 1201 and 1202 mandatory objects, as well as the vendor's full optional MIB, and the successful equipment supplier's propriety protocol, if it has its own. It shall be possible to use the protocol that provides the highest degree of functionality on a communication channel by channel basis.

2.4.5K NTCIP COMPLIANCE OF THE CONTROLLER DATABASE

1. Shall provide all mandatory objects as specified in NTCIP 1202, Version 02.16, and "Object Definitions for Actuated Signal Controller Units". Shall determine and list in the Technical Proposal which non-mandatory objects can be supplied to the DEPARTMENT at no additional cost for software development. The software shall implement all mandatory objects of all mandatory conformance groups as defined in NTCIP 1202, Version 02.16, and "Object Definitions for Actuated Signal Controller Units", including:

    - Phase Conformance Group
    - Detector Conformance Group
    - Volume Occupancy Report Conformance Group
    - Unit Conformance Group
    - Special Function Conformance Group
    - Coordination Conformance Group
    - Time Base Conformance Group
    - Preemption Conformance Group
    - Ring Conformance Group
    - Channel Conformance Group
    - Overlap conformance Group

2. The software shall implement all mandatory objects of all optional conformance groups as defined in NTCIP 1201, Version 02.24 “Global Object Definitions”, including:

    - Database Management Conformance Group
    - Time Management Conformance Group
    - Time Base Event Schedule Conformance Group
    - Report Conformance Group

3. It is the desire of the DEPARTMENT to implement the following optional objects as defined in NTCIP 1201, Version 02.24 “Global Object Definitions”:

    - globalSetIDParameter
    - dbMakeID
    - eventLogOID
    - eventConfigAction
    - eventClassDescription

4. It is the desire of the DEPARTMENT to implement the following optional objects as defined in NTCIP 1202, Version 02.16, “Object Definitions for Actuated Signal Controller Units”.:

    - unitRedRevert
    - phaseDynamicMaxLimit
    - phaseDynamicMaxStep
    - phaseControlGroupTable
    - ringControlGroupForceOff
    - vehicleDetectorQueueLimit
    - vehicleDetectorFailTime
    - vehicleDetectorReportedAlarms
    - alarmGroupTable
    - specialFunctionOutputTable
    - preemptMinimumGreen
    - preemptMinimumWalk
    - preemptEnterPedClear
    - preemptState
    - preemptControlTable
    - ringControlGroupMax2
    - ringControlGroupMaxInhibit

5. The standardized range is defined by a size, range, or enumerated listing indicated in the object’s SYNTAX field and/or through descriptive text in the object’s DESCRIPTION field of the relevant standard.

2.4.5L TRAFFIC RESPONSIVE CONTROL

The LS shall fully support the Traffic-Responsive (TRSP) requirements of the ATMS Central Software in Section 3.0.

2.4.5M TRAFFIC ADAPTIVE CONTROL

The LS shall fully support the adaptive control requirements of ATMS Now.

2.5 PERFORMANCE REQUIREMENTS

The TOD clock shall be maintained within +/- 0.005% as compared to WWV standards.

2.6 CONTROLLER CABINET ASSEMBLY

This section defines the requirements associated with the ATMS Controller Cabinet Assemblies. System components detailed in this section include:

- Controller Cabinet
- Wiring and Communications
- Power
- Detector Rack
- Specialized Cabinets

2.6.1 REFERENCED DOCUMENTS

- DEPARTMENT Standard Specifications for Road and Bridge Construction (SSRBC)
- DEPARTMENT Minimum Specifications for Traffic Control Signals and Devices (MSTCSD)
- DEPARTMENT Roadway and Traffic Design Standards (RTDS)
- MCDOT Signal Construction and Cabinet Specifications

2.6.2 GENERAL

Shall contain a detailed listing of all cabinet equipment and controller hardware intended for use as part of the project.

2.6.3 APPLICABLE STANDARDS

2.6.3A CABINET COMMUNICATIONS

1. The traffic Signal Controller Cabinet shall adhere to all requirements as defined in this document, all applicable DEPARTMENT standards, as well as industry standards including:

- ADA
- ANSI
- ASTM
- EIA Standards 170, 232, 422, 250C, 485, and 568
- FCC Part 15, Class A
- IEEE
- ICEA
- IMSA
- ISO 9001
- MIL-STD-454
- MIL-STD-810E Method 509 Procedure 1 – exterior salt atmospheres
- NEC
- NEMA
- NEMA-4
- NTSC
- UL 1449
- UL 1778

2. The Ethernet® 10/100BaseTX port shall meet the Category 5 specifications; and shall be compliant with the EIA and TIA requirements as detailed in the EIA/TIA-568-A standard pinouts. All Category 5 unshielded twisted pair (UTP)/shielded twisted pair (STP) network

cables shall comply with the EIA/TIA-568-A standard. Each cabinet shall be ISO 9001 certified at the time of bid letting.

2.6.3B WIRING AND COMMUNICATIONS

1. The Cabinet Assembly shall meet the following minimum requirements for wiring and communications:

    a. All cabinet wiring shall conform to the NEC.

2.6.4 DESIGN REQUIREMENTS

1. Shall size the Cabinet appropriate to fit all the equipment installed within the cabinet at each particular location. The Cabinets shall be sized to space the equipment appropriately to ensure ease of access to the proposed equipment and to ensure proper ventilation for the proposed equipment to operate within the respective operating temperature range. The Cabinet design shall be submitted for approval by the DEPARTMENT.

2. The Cabinets shall be completely weatherproof to prevent the entry of water. All Cabinets and door exterior seams shall be continuously welded and all exterior welds shall be smooth. Pole- or structure-mounted Cabinets shall be provided with one full-size door to provide access to the Cabinet. All base-mounted Cabinets shall have two (2) full-size doors. Pole-mounted Cabinets shall have a front door only.

3. The Cabinets shall be complete and prefabricated with all internal components and equipment, including back and side panels, front and back doors (as applicable), terminal strips, cabling and harnesses, surge protection for power and communication circuits, power distribution blocks or assemblies, shelves, connectors and all mounting hardware necessary for installation of equipment. The Cabinets shall be standardized assemblies and must meet applicable requirements of the DEPARTMENT'S Minimum Specifications for Traffic Control Signal Devices (latest version).

2.6.4A CONTROLLER CABINET

1. Controller Cabinets shall be seamlessly integrated with the design, construction and materials deployed for the project. The Controller Cabinet shall meet the following minimum design requirements:

    a. The Controller Cabinet shall be TS2 Type 1, as defined in the NEMA TS2 2003 standard specification.
    b. Only cabinets that are included in the DEPARTMENT's APL shall be accepted.
    c. The DESIGN-BUILD FIRM shall provide certification numbers of the DEPARTMENT's TERL.
2. Controller Cabinets shall be designed, furnished and installed to house any combination of the following ATMS field hardware:

- Signal controllers (and controller support hardware);
- Loop detectors/amplifiers;
- CCTV camera equipment;
- Ethernet® edge switch;
- Ethernet® routing (hub) switch;
- UPS (hubs and CCTV camera locations);
- Non-intrusive system detection;
- Video encoder;
- Terminal server;
- TVSS; and
- Video detection equipment.

3. The location of the Controller Cabinets shall be:

    a. Mounted on new foundations, or on existing concrete foundations where feasible (see Section 7.2);
    b. Outside the clear zone or behind guardrail (guardrail shall not be installed solely to protect cabinets);
    c. Within the existing DEPARTMENT right-of-way;
    d. Not in conflict with existing surface or subsurface features;
    e. Convenient, safe and accessible for maintenance personnel;
    f. Not in conflict with known future widening projects, intersection improvement projects and/or utility improvement projects;
    g. Convenient to power sources and field devices; and
    h. In compliance with ADA and MUTCD standards.
    i. Away from storm drains, collection ponds or other natural water retention areas

2.6.4B WIRING AND COMMUNICATIONS

1. The following requirements shall be included for all wiring and communications to, from and within all Controller Cabinet Assemblies:

    a. All connector harnesses shall be wired into the cabinet back-panel circuitry.
    b. A load resistor shall be installed between the AC (common) and the signal field wiring terminal for Y, G and W indications.
    c. All inputs and outputs of the flashing beacon controller shall be terminated on a terminal strip that is easily accessible from the front side of the back panel.
    d. Cabinets shall use addressable rack-mounted Bus Interface Units (BIUs) as the interface between the Cabinet facilities and the controller.

2.6.4C POWER

1. The following requirements shall be included with all Controller Cabinet Assemblies:

    a. The Controller Cabinet power supply shall reference to the AC line frequency.
    b. The Controller Cabinet shall have a three-wire “GFCI”, protected by a 15A circuit breaker.

c. The Controller Cabinet's main circuit breaker shall be 15A for Type 1 & 2 and 30A for Types 3, 4, and 5.
d. The Controller Cabinet shall provide three separate grounding circuits: AC neutral, earth ground, and logic ground.

2. The neutral and equipment grounding termination bars shall be electrically isolated, or isolated by removal of a single bonding jumper. The neutral and grounding termination bars shall each have the capacity to accommodate a minimum of 36 individual conductors.

3. This terminal bus capacity shall ensure that only one conductor per individual pressure screw termination is available. Neutral conductors in signal cabinets shall be labeled, individually terminated, and may not share a single pressure screw termination.

2.6.4D DETECTOR RACK

1. The following requirements shall be included at all locations where existing or proposed inductive loop detection is present:

   a. Detectors shall be in the rack-mounted configuration only.

   b. Detector rack chassis shall be 6" (H) by 8.5" (D) maximum.

   c. The detector rack shall run on 12VDC power.

   d. The detector rack shall comply with the NEMA 2003 TS 2 technical standard.

2.6.4E UNINTERRUPTABLE POWER SUPPLY (UPS) FOR STATE ROAD INTERSECTIONS

1. Shall install new UPS units at all signalized intersections located on state roads that do not currently have an existing UPS. Each location shall include a UPS designed to provide an 8 minimum hour run time at 450 watts. This shall include the air conditioning unit, all other supporting cabinet electrical equipment and signal heads. Shall install each UPS unit in accordance with manufacturer's specifications and shall be fully compatible with the County's existing UPS equipment and software.

2. The UPS shall be remote controllable via UPS manufacturer provided network management hardware installed at each of the UPS cabinets. The UPS units shall be compatible with the County's central software. The UPS shall be capable of communicating via SNMP and shall communicate via an integrated Ethernet port.

3. UPS shall have a terminal for connecting the UPS to a Transient Voltage Surge Suppression (TVSS) surge protection device.

4. The UPS, batteries and all supporting UPS equipment shall be installed in a dedicated weatherproof cabinet, attached to the outside of the controller cabinet. The cabinet,

cabinet attachment design and UPS design shall be submitted to and approved by the DEPARTMENT prior to approval of the design.

2.6.5 FUNCTIONAL REQUIREMENTS

2.6.5A CONTROLLER CABINET

1. Controller Cabinets shall be provided in five (5) standard sizes:

    a. Size 1 shall have minimum inside dimensions of 13" x 10" x 11" (H X W X D).
    b. Size 2 shall have minimum inside dimensions of 27" x 15" x 12" (H X W X D).
    c. Size 3 shall have minimum inside dimensions of 32" x 20" x 14" (H X W X D).
    d. Size 4 shall have minimum inside dimensions of 48" x 29" x 16" (H X W X D).
    e. Size 5 shall have minimum inside dimensions of 54" x 38" x 24" (H X W X D).

2. Size 5 cabinets shall be required at all signalized intersections. No other size may be used at these locations unless approved by the DEPARTMENT. Cabinet sizes 1, 2, 3 and 4 shall be designed and provided with hardware suitable for pole-mounting. Cabinet sizes 4 and 5 shall be designed and provided with hardware suitable for base-mounting. Two anchor bolts shall be provided for Size 4 cabinets, and four for Size 5. Doors for cabinet sizes 3, 4 and 5 shall have a three-point latching system. Type 2 cabinets shall be provided with one adjustable shelf; Type 3, 4, and 5 two shelves. Each Controller Cabinet shall also meet the following requirements:

    a. The Cabinet shall be constructed of 5052 sheet aluminum with a minimum thickness of 1/8".
    b. The Cabinet shall be provided with a hinged, water-tight, latching door allowing access to 80% of the cabinet's front area.
    c. Cabinets shall be provided with a main door lock, Corbin No. 15481RS or equivalent, which shall open with a No. 2 key, Corbin No. 1R6380 or equivalent.
    d. All Cabinets shall be vented.
    e. Cabinets shall be provided with a thermostatically-controlled ventilation fan.
    f. Police switches shall be provided for cabinet sizes 3, 4, and 5. A "Manual Jack" On/Off police switch shall be provided for these Cabinets to advance from one phase interval to another. The hinged, water-tight police panel containing the switches shall be located in the bottom half of the door of pole-mount cabinets, and the top half of base-mount cabinets. The police panel shall have the following minimum dimensions: 4" x 8" x 2.5" (H X W X D)
    g. Interior service switches shall be provided for Cabinet sizes 3, 4, and 5. A "Signals On/Off" service switch shall be provided for these cabinets. An "Auto-flash" service switch shall be provided for the cabinets. A "Controller On/Off" service switch shall be provided for the

above Cabinets. An "Auxiliary Power On/Off" service switch shall be provided for the above Cabinets. A "Vehicle Detector" service switch shall be provided for the above Cabinets for each phase.

h. The Cabinet shall include police panel access door with MCE switch and jack, Flash/Auto switch.
i. Each Cabinet shall be provided with one MCE push button and two sets of cabinet keys.
j. The Cabinet shall be provided with terminals and facilities necessary to accommodate six preemption calls. The controller firmware and BIU mapping shall be “turn key” ready for preemption call signal input and activation.
k. The Cabinet shall be installed with internal illumination (fluorescent light and door switch), fan with adjustable thermostat control and 14” x 20” X 1” industry standard air filter.
l. The Cabinet shall be provided with an automatic transfer switch, where a generator cabinet isn’t already installed.
m. A minimum of six (6) user defined and priority programmable alarm input facilities mapped into terminals and facilities BIU.
n. The cabinet shall include 16 load switch bays and a jumper kit for termination of unused relay and load switch sockets.

3. Connection terminations shall be labeled and easily accessible. Two of these alarm inputs are reserved for the UPS alarm circuits. These items shall be supported by the Manatee ATMS and the chosen protocol. The signal bus flash string shall be easily rewired (programmed) from the front side of the terminals and facilities back panel. Flash transfer relay contacts shall have a minimum switch rating of 20 amps at 120/140 volts AC. The Controller Cabinet Assembly shall include the following switch and switching functions:

   a. Tech Flash (UCF) and AUTO,
   b. Equipment Power ON OFF switch (for Controller, MMU, power supply, BIU and auxiliary control equipment),
   c. Signal Bus ON OFF switch, Stop time switch to freeze sequence (Stop time/Auto).

4. The Cabinet shall also provide preemption run test switches. The power distribution and protection breakers shall be so arranged so that non-critical items can be de-energized for service. The Controller Cabinet shall be provided with a neutral bus that can accommodate a minimum of 36 individual conductors under individual pressure screw terminations. This bus shall be used solely for the terminations of field wiring neutrals. The Cabinet shall have an equipment grounding bus of equivalent conductor termination capacity. This bus shall have a factory installed main bonding jumper that is easily removed for non-service equipment applications. Cabinet prints shall clearly note that removal of this jumper is

necessary when a main bonding jumper is installed ahead of the Cabinet (separate disconnect).

5. All system level communications equipment at traffic signal controller locations shall be "hot swappable". The intention of this requirement is to maintain traffic signal operation during routine communications maintenance and repair operations. All modems and communications equipment shall be external to the signal controller when this option is available.

6. All Cabinet switching functions detailed in this section shall be functional as an integrated part of the proposed/selected local controller firmware.

7. All Cabinets shall have a convenience receptacle for general use. This receptacle shall be GFCI protected. The receptacle shall be a duplex device and it shall not be used to power any cabinet equipment. A non-GFCI outlet shall be installed to accommodate the each edge switch.

2.6.5B WIRING AND COMMUNICATIONS

1. The Cabinet Assembly shall meet the following minimum requirements for wiring and communications:
   a. All inputs and outputs of the controller shall be terminated on easily accessible terminal strips in the front of the cabinet terminal and facilities back panel.
   b. A wiring diagram shall be provided for each Cabinet.
   c. One BIU shall be required for the 6 and 12 position load bay, two for the 16 position load bay.
   d. BIUs shall have two (2) status indicators for adequate voltage and communications.
   e. BIUs shall utilize a dual row 64-pin female DIN 41612 Type B connector.
   f. The Cabinet load bay shall accommodate either six, 12 or 16 load switch positions, plus an additional position for the flasher.
   g. The Cabinet shall comply with the NEMA TS 2 2003 V2.06 technical standard.

2.6.5C POWER

1. The Cabinet Assembly shall meet the following minimum requirements for power:

   a. Cabinets shall be provided with a 20W (min.) fluorescent lamp.
   b. Transient and or surge suppression shall be provided on all incoming power, detector field wiring, signal field wiring and communications circuits that enter and terminate within the Cabinet Assembly.
   c. Transient and surge protection shall be easily accessible and readily replaceable.
   d. Non soldered screw pressure connections shall be used whenever feasible.

e. The Cabinet shall provide an optical isolation for pedestrian detector and remote interconnect inputs.

2.6.5D DETECTOR RACK

1. The Cabinet Assembly shall meet the following minimum requirements for detector racks:

    a. Cabinets shall accommodate up to four (4) racks with 16 channels and one BIU per rack.
    b. Detectors shall be self-tuning upon power-up.
    c. All detector output shall be independent, isolated solid-state output.
    d. Detector cards shall utilize 44 terminal, double row, 0.156" contact spacing and Cinch Jones card edge connector 50-44-A-30M or equivalent, vertically centered.
    e. The Cabinet shall be equipped with a minimum of one detector rack, one detector BIU, and protected termination points for 16 inductive loops.
    f. The Cabinet shall come equipped with sufficient two-channel inductive loop detectors to support the number of installed loops for the particular intersection under consideration.
    g. Type F (quadrupole) loops and loops that exceed 6 foot in any dimension shall not share an inductive loop input channel with other loops.
    h. The Cabinet shall come with an additional RS-485 SDLC connector pre-wired and ready for future expansion.
    i. Cabinet detector racks do not need to be wired for delay override since the controller LS is required to support delay detector operations through software function.
    j. Cabinet vehicle and pedestrian test switches shall be three position switch, normal, constant call and no call.

2.6.6 PERFORMANCE REQUIREMENTS

2.6.6A CONTROLLER CABINET

1. The components such as surge suppressors and power distribution shall operate properly within the ambient temperature limits of -40° F to 158° F and meet the ambient temperature range, relative humidity, applied power, shock and vibration range of NEMA TS 2. The Cabinets shall be equipped with TVSS lightning and surge protection described separately in DEPARTMENT ITS Supplemental Specifications – Section 785. The cabinets shall be rated NEMA 4.

2.6.6B WIRING AND COMMUNICATIONS

1. The Cabinet Assembly shall meet the following minimum requirements for wiring and communications:

    a. Communications from the controller via the BIU to Cabinet facilities shall use the SDLC communications protocol with a bit rate of 153,600 bps.

b. BIUs shall run on 24VDC power +/- 2 VDC.

2.6.6C POWER

1. The Cabinet Assembly shall meet the following minimum requirements for power:

    a. The Cabinet power supply shall provide 12VDC, 24VDC, and 12VAC power.
    b. Transient protection shall be provided for the loop lead-in inputs. It shall limit the surge voltage to 25V when subjected to 300A surges. It shall protect against repetitive 400A surges with an 8 x 20 micro second waveform.
    c. Transient protection shall be provided for the signal and interconnect wiring terminals. It shall limit the surge voltage to twice the peak operating voltage of the circuit. It shall protect against repetitive 1000A surges with an 8 x 20 micro second waveform.
    d. Transient protection shall be provided for the main AC power input on the load side of the Cabinet circuit breaker. It shall limit the surge voltage to 500K peak. It shall protect against repetitive 20 kA surges with an 8 x 20 micro second waveform.
    e. Cabinet AC power shall be distributed through a radio interference suppressor. The suppressor shall provide a minimum attenuation of 50 decibels.

2.6.6D DETECTOR RACK

1. The Cabinet Assembly shall meet the following minimum requirements for the detector rack:

    a. Detector response time shall be not more than 100 msec.

2.6.7 MATERIAL REQUIREMENTS

2.6.7A WIRING AND COMMUNICATIONS

1. The Cabinet Assembly shall meet the following minimum requirements for wiring and communications:

    a. All Cabinet wiring shall be copper.
    b. Terminal strip connections shall be screw- or compression-type.
    c. All wiring and communications shall comply with the NEMA 2003 TS 2 technical standard.

2.6.7B POWER

1. The Cabinet Assembly shall meet the following minimum requirements for power:

    a. Cabinet shall be provided with a copper alloy ground busbar for a #6 AWG copper wire, located adjacent to the power panel.

2.6.8 CONSTRUCTION REQUIREMENTS

2.6.8A SPECIALIZED CABINETS

1. Specialized cabinets that fall outside the dimensions outlined in the 2003 TS 2 Standard may be designed to accommodate special installation requirements such as a communication hub but must be approved by the DEPARTMENT prior to design and construction. Specialized cabinets shall come with adequate cooling for the equipment installed and have an adjustable high temperature alarm that is accommodated by ATMS.Now, and capable of being monitored by an operator in the TMC control room.

2.6.8B DOCUMENTATION

1. One copy of manual documentation shall be supplied for each item purchased. Shall include a minimum of three sets of cabinet prints. The Cabinet shall have an inside door-mounted cabinet form for documentation of field wiring. This form shall be of substantial material that shall withstand ultraviolet radiation and moisture. It shall be capable of being permanently annotated with a Sharpie® style permanent marker. This form shall allow for filling in phase and detector mapping data as it applies to the specific installation. The document shall include entry places for intersection name, phase directions and other field related data. Every Cabinet delivered and installed shall have this form and a single duplicate filled out completely and accurately at the time of the initial inspection. One (1) copy shall be installed within the Controller Cabinet and the other copy shall become the property of the DEPARTMENT. This form shall be presented to the DEPARTMENT for approval prior to its field inspection.
2. The Cabinet shall also include one (1) hard copy of the basic controller operational data, prior to the initial inspection. The Cabinet shall have all DEPARTMENT required product data permanently documented on the inside of the cabinet door. This shall include DEPARTMENT certification numbers, date of cabinet manufacture, purchase order number, cabinet print number, and cabinet serial number.

3.0 DESIGN SUBMITTAL PROCESS

3.1 PROJECT GENERAL NOTES

A. Pursuant to the Florida Statutes, Chapter 316, also referred to as the Florida State Uniform Traffic Control Law, all traffic infrastructure (signalization, signing, marking, etc) in Manatee County shall meet or exceed the latest revisions of the FDOT Roadway and Traffic Standards and Specifications, the FHWA MUTCD, and the Manatee County Highway and Drainage Standards.

B. The intended purpose of the traffic supplemental specifications as contained herein are to provide further clarification to the federal and state documents heretofore identified as well as setting the procedures for the preferred manufacturer and installation of various traffic control devices in Manatee County.

C. When FDOT and Manatee County specifications differ, Manatee County specifications take precedence if they are more stringent. Manatee County traffic signal specifications will be supplied to the contractor by the Project Management Division.

D. Applicants with proposed projects with Preliminary Site Plans/General Development Plans/ Final Site Plans that are submitted for review must resolve any conflicts between their proposed construction and any Traffic Infrastructure.

E. FDOT Bid item 639-1-ABC (electrical power service) shall include the cost of all special impact connection fees charged by local power companies for electrical service connection.

3.1.1 PRIOR TO CONSTRUCTION

A. Contact Manatee County Public Works Department before starting work, checking for updates on standards or other information.

B. Contractor shall supply all material submittals to Manatee County transportation maintenance prior to construction for approval.

C. Prior to ordering materials, the signal contractor shall contact the traffic management division through the Public Works Department and verify current color codes to be used for signal and interconnect cable.

D. The contractor shall provide a Warranty/Maintenance Bond for Signal Installation in accordance with FDOT Specification Section 611-5. The contractor is responsible for coordinating Bond Requirements with Jane Oliver, Manatee County Public Works Senior Administrative Specialist, at (941) 708-7450, ext. 7613.

E. The contractor is responsible for coordinating Right-of-Way Use Permits with Matt Merucci, Manatee County Public Works Infrastructure Inspection Officer, at (941) 708-7450, ext. 7342.

F. The location of utilities shown on the plans are approximate only. The exact location shall be determined by the contractor, via Sunshine 811, in coordination with underground and overhead utilities, a minimum of 48 hours prior to digging.

G. At least five (5) business days prior to beginning construction, the contractor shall notify the following departments to inform them of construction operations:

Manatee County Traffic Operations Division	Manatee County Traffic Design Division
Mr. Aaron Burkett	Mr. Vishal Kakkad
(941) 708-7509	(941) 749-3500

H. The contractor shall notify utility owners of any excavation or demolition activity through Sunshine 811 and shall also notify those utility owners/agencies listed within or impacted by these plans not less than two (2) full business days in advance of beginning construction on the job site.

I. 48 hours prior to contract start date, the contractor shall notify the following agencies in writing giving the location, start date and emergency numbers for afterhours repairs:

Florida Highway Patrol	Manatee Sherriff's Office
Post Office BOX 20009	515 11th Street West
Bradenton, Florida 34203	Bradenton, Florida 34205
(941) 751-7646	(941) 747-3011

3.1.2 DURING CONSTRUCTION

A. The contractor shall have an IMSA Certified Level II (electronics or electrical technician) on the job side at all times while work is being performed. All signal installation technicians shall have a minimum of IMSA Level I certification. Certification of all technicians shall be provided to the County prior to beginning work.

B. When a contractor is working on a signal in an intersection (installing conduit in the street, removing existing signal equipment) installing signal equipment, loops, home runs or turning on of new signals where a lane is closed, the project manager may require an off duty law enforcement officer to direct traffic. The hourly rate of pay for an off-duty law enforcement officer can be obtained from the local law enforcement office. The cost of the officer shall be thresponsibility of the contractor.

C. The contractor shall contact the local power company for their assistance in performing all necessary work under power lines at signal pole(s), such as the installation of span wire, signal cable, fiberglass insulators, and signal poles.

D. The contractor shall notify the appropriate utility companies at least 72 hours in advance of pole setting operations where conflict with overhead electrical conductors is expected and in all cases where joint use poles are called for.

E. At locations where, underground utilities are in close proximity to the signal pole foundation or conduit run, as determined by the engineer, the contractor will hand dig the first 48 inches of the hole for the pole foundation or the conduit run.

F. The contractor is to de-water the pole foundation excavation if the elevation of water is higher than the elevation of the pole base.

G. The contractor shall be responsible for contacting the local power company providing electrical power to determine if a service processing fee is required. Any fee shall be included as part of payment for the electrical power service assembly. The contractor shall be responsible for obtaining all permits and inspections of the electrical service.

H. All materials, equipment, and other contractor supplied items shall be installed and maintained according to the manufacturer's recommendation, unless specifically directed otherwise by Manatee County.

I. Contractor shall coordinate pavement markings and signage work with scheduling of signal activation. The signal shall not be fully activated until all proposed stop bars, crosswalks, ramps, and pavement removal work is complete. The existing stop signs shall be removed upon full signal activation.

J. The contractor shall provide and maintain two portable 4' x 8' variable-message signs (VMS) for a period of two weeks. The VMS will be located at an appropriate distance in advance of each approach to the new signalized intersection as specified by the maintaining agency's engineer. The VMS will be provided (1) week prior to the scheduled activation in full color operation and shall remain in place for one (1) week following activation. Cost of furnishing VMS to be included under the associated pay item for Maintenance of Traffic.

1. Prior to activation, the VMS sign shall be:

(Panel One – Line 1) "Traffic"	(Panel Two – Line 1) "Activated"
(Panel One – Line 2) "Signal"	(Panel Two – Line 2) "On Day"
(Panel One – Line 3) "Will Be"	(Panel Two – Line 3) "Month X

2. Substitution for the Word “Day” shall be as follows:

Sunday as “Sun”	Thursday as “Thur”
Monday as “Mon”	Friday as “Fri”
Tuesday as “Tues”	Saturday as “Sat”
Wednesday as “Wed”	

3. Substitution for the Word “Month” shall be as follows:

January as “Jan”	July as “Jul”
February as “Feb”	August as “Aug”
March as “Mar”	September as “Sep”
April as “Apr”	October as “Oct”
May as “May”	November as “Nov”
June as “Jun”	December as “Dec”

4. Substitution for the Word “XX” shall be as follows:

   a. The numerical day of the month, from one (1) to thirty-one (31).

   b. Dates less than ten (10) shall be preceded by a zero (0); example: “Jan 03” for January 3rd.

5. After the turn-on, the VMS shall be changed to

(Panel One – Line 1) “Traffic”	(Panel Two – Line 1) “Now”
(Panel One – Line 2) “Signal”	(Panel Two – Line 2) “Active”

Panel Two, Line 1 and Line 2, shall flash three (3) times before reverting to Panel One.

3.1.3 INFRASTRUCTURE MAINTENANCE DURING CONSTRUCTION

A. The prime contractor shall be responsible for the signal maintenance, timing and operation of any and all signals and signage from the commencement to the acceptance of the project (i.e.: existing loops cut, system communication terminated, lane or pavement modifications, pedestrian modifications, traffic signal school flasher, warning flasher, roadway lighting, count stations, and any other traffic related device located within the construction zone). Manatee County will assist in providing existing system times when possible.

B. The signal contractor shall be available to respond to trouble calls twenty-four hours a day, seven days a week for the duration of the project. The prime contractor shall provide contact numbers for the signal contractor to the traffic management division at commencement of project. Furthermore, within two hours of notification or documented attempted notifications, the signal contractor shall be on site making needed repairs or

modifications. Failure to meet the time requirements shall give the County, at its discretion, the right to request assistance from the Manatee County Sheriff's department to control traffic for the period of time until the contractor responds and makes the needed repairs, the cost for the Manatee County Sheriff's office shall be the responsibility of the prime contractor.

C. Existing signalization shall remain in place to the extent possible, including vehicle actuation and pedestrian signal operation, and shall be used for maintenance of traffic as required.

D. All actuated phases shall be maintained during the project with the use of video or microwave detectors or the installation of loops within 48 hours from when they were damaged.

E. The contractor shall maintain communication between the intersection and the computerized signal system, via dedicated Verizon telephone lines through the duration of the project and for any additional costs related to maintaining communications. The county will clearly mark the Verizon service or county interconnect point prior to the contractor doing any work at the intersection. The contractor will contact the Public Works Department one week prior to any work which may cause disruption of phone or interconnect service to establish a temporary service point. The contractor will be responsible for coordinating such field modifications with Verizon or the traffic management division.

F. The contractor shall maintain temporary vehicle detection on all approaches throughout construction until Manatee County accepts the project. Any damage to the existing detection system at an intersection must be restored within twenty-four (24) hours at no additional cost to the County. Manatee County Traffic Operations Division will assist as needed whenever possible.

3.2 DESIGN GUIDELINES

3.2.1 TRAFFIC SIGNALS

3.2.1A TRAFFIC SIGNAL SUPPORTS

A. Effective March 1, 1995, in conformance with FDOT mast arm policy, all new signals installed in Manatee County west of I-75 shall be supported by mast arms with the signal head(s) vertically installed and rigidly attached to the mast arm, unless otherwise approved by the project engineer.

B. All mast arm poles are to be galvanized and non-painted. Any painted, decorative or non-standard mast arm pole will require an executed maintenance agreement prior to final acceptance of the traffic signal.

C. Mast arms shall be constructed of one continuous section up to 50’ (15.24 m) in length and of a two section construction from 50’ (15.24 m) to 1 00’ (30.49 m) in length.

D. The elevation of the top of the mast arm base(s) shall be six inches (15.24 cm) above existing grade. If located directly behind sidewalk, at sidewalk grade.

E. Item 700-11-ABC (Electronic Display Sign), shall include sign assembly and mounting hardware only. All signs shall require block numbers.

F. Internally illuminated signs shall be rigidly attached to the mast arm as shown on the plans.

G. Only one mast arm per quadrant should be designed and the mast arm should be perpendicular to the vehicle approach. Variations may be approved by the Traffic Design Division on a case-by-case basis.

H. The design shall also include all possible future signal head and sign load data (such as protected left turn indication, flashing yellow arrow indication, no u-turn sign, etc.) on the Mast Arm Tabulation Sheet.

I. All conflicts with overhead utilities must be resolved and applicable clearance from transmission lines must be provided.

J. Existing traffic signal equipment must be shown on the plan sheet (i.e. – spanwires, existing heads, poles, etc.).

3.2.1B ELECTRICAL SERVICE

A. Electrical service disconnects and meters are to be placed on a service pole/pedestal (a distance of 10’ minimum from controller assembly) when using mast arms and/or steel poles.

B. The cable for the electric service shall be brought into the cabinet foundation using a 2” conduit.

C. Either a Pole Mounted or a Ground Mounted Service Installation shall be specified for each new traffic signal.

D. Provide one photocell outside the respective disconnect box for the internally illuminated street name signs and luminaires.

E. Electrical service disconnect is 100 amp, comprising of a six (6) circuit disconnect box with three circuit breakers – one 40 amp/120 volt for controller cabinet, one 15 amp/120 volt for internally illuminated street name signs and one 15 amp/120 volt for future use.

F. Grounding: All ground rod equipment shall be bonded together to form an integrated grounding system using #6 AWG THHN copper wire. The upper end of all ground rods shall be 18 inches below ground elevation. Mark ground rod locations with permanent marker such as an epoxy sticker located on the nearest curb and provide as-built drawings with the location of ground rods marked. Grounding conductor must be #6 or larger insulated copper. Equipment shall not be placed into operational service until the associated grounding system has been inspected and approved by a member of the Manatee County Traffic Operations staff.

G. Install a meter can housing in conjunction with the service disconnect on all new or rebuilt service points for traffic signal, roadway lighting, and ATMS projects. Meter cans in FPL service areas will have a blank cover installed in lieu of a meter. Meter cans in PRECO service areas will require a meter installation by PRECO.

H. Use aluminum rigid above-ground conduit for Electrical Power Service.

I. The contractor shall be responsible for coordinating with the local power company to provide any “temporary only” service and shall be responsible for costs of all special connection fees charged by the local power company.

3.2.1C BONDING AND GROUNDING

A. Bond and ground all traffic control devices in accordance with latest edition of the FDOT Standard Specifications for Road and Bridge Construction Section 620.

B. The power service assembly and riser shall be included into the intersection bonding network.

C. All ground rod equipment shall be bonded together to form an integrated grounding system using Solid #6 AWG copper wire.

D. Exothermic bonds shall be used in conjunction with solid conductors only.

E. The upper end of all ground rods shall be 18 inches below ground elevation.

F. Mark ground rod locations with permanent marker such as an epoxy sticker located on the nearest curb and provide as-built drawings with the location of ground rods marked.

G. Equipment shall not be placed into operational service until the associated grounding system has been inspected and approved by a member of the Manatee County Traffic Operations staff.

3.2.1D CONDUCTOR INSTALLATION AND COLOR CODES

A. Use a minimum of 7 conductor signal cable for signal heads and pedestrian heads. Include note that specifies that the contractor shall contact the Manatee County Traffic Engineering Division to verify current color codes for signal cable.

B. Conductor count size for traffic signal cable shall ensure each phase is provided a minimum of two (2) spare conductors.

C. The designer shall provide a traffic signal intersection wiring diagram.

D. Conduit count and sizes shall be provided to ensure conduit fill capacity is not exceeded and conduits designated as spares do not need to be utilized to accomplish the initial construction.

E. The cabinet field wiring, including signal head wiring and lead-ins, (cables neutrals and spares) shall be identified for direction and or phase with clearly marked weatherproof tags. The proposed tagging system shall be in accordance with the FDOT's standard specifications. White and white with a black will be used as a neutral only.

F. All electrical wiring, including roadway loop wire and shielded lead-in cable, shall comply with all appropriate provisions of the latest edition of the national electrical code published by the national fire protection association.

G. The loop wire shall be I.M.S.A. 51-3 or equivalent type XHHW high density cross-linked polyethylene insulated wire, rated for 600 volts. Detector lead-in cable shall be I.M.S.A. 50-2 or equivalent.

H. All loops shall have individual lead-ins to the cabinet. Loop splices shall be crimped, soldered and shrink wrapped to FDOT Specifications.

I. No home runs shall be cut in the roadway. All home runs shall be in conduit.

3.2.1Di MAST ARM WIRING COLOR CODE

1. Mast arm intersection 3 section requires 7 conductor (cables must be identified in cabinet).

Terminal Block Number	Wire Color Code	Field Assignment
1	Red	Red
2	Amber	Amber
3	Green	Green
4	Black	Spare
5	Blue	Spare
11	White/Black	Side Neutral
12	White	Main Neutral

2. Mast arm intersection 5 section requires 9 connector (cables must be identified in cabinet).

Terminal Block Number	Wire Color Code	Field Assignment
1	Red	Red
2	Amber	Amber
3	Green	Green
4	Black	Amber Arrow
5	Blue	Green Arrow
6	Red/Black	Spare
7	Green/Black	Spare
11	White/Black	Side Neutral
12	White	Main Neutral

3.2.1Dii SPAN WIRE INTERSECTION WIRING COLOR CODE

Terminal Block Number	Color Code	3 Section Main & Side	5 Section Main/ 3 Section Side	3 Section Main/ 5 Section Side	Main Protected	Side Protected
1	Red	Main Red	Main Red	Main Red	Main Red	Main Red
2	Amber	Main Amber	Main Amber	Main Amber	Main Amber	Amber Arrow
3	Green	Main Green	Main Green	Main Green	Main Green	Green Arrow
4	Black	Spare	Amber Arrow	Spare	Spare	Spare
5	Blue	Spare	Green Arrow	Spare	Spare	Spare
6	Red/ Black	Side Red	Side Red	Side Red	Red Arrow	Side Red
7	Amber/ Black	Side Amber	Side Amber	Side Amber	Amber Arrow	Side Amber
8	Green/ Black	Side Green	Side Green	Side Green	Green Arrow	Side Green
9	Black/ White	Spare	Spare	Amber Arrow	Spare	Spare
10	Blue/ Black	Spare	Spare	Green Arrow	Spare	Spare
11	White/ Black	Side Neutral	Side Neutral	Side Neutral	Side Neutral	Side Neutral
12	White	Main Neutral	Main Neutral	Main Neutral	Main Neutral	Main Neutral

3.2.1Diii PEDESTRIAN SIGNAL WIRING COLOR CODE

1. 5 conductor one direction (pedestrian call button shall be I.M.S.A. 50-2 or equivalent using the black as call and white as logic ground). Spares should be terminated in head.

Red	Don't Walk
Amber	Spare
Green	Walk
White/Black	Side Neutral

White	Main Neutral

2. 12 conductor two direction (pedestrian call button shall be I.M.S.A. 50-2 or equivalent using the black as call and white as logic ground). Spares should be terminated in appropriate head.

Red	Don't Walk (Main)
Amber	Spare (Main)
Green	Walk (Main)
Black	Spare (Main)
Blue	Spare (Main)
Red/Black	Don't Walk (Side)
Amber/Black	Spare (Side)
Green/Black	Walk (Side)
Black/White	Spare (Side)
Blue/Black	Spare (Side)
White/Black	Side Neutral
White	Main Neutral

3.2.1E PULL BOXES AND CONDUIT

A. Pull boxes are to be polymer type (Quazite or equivalent).

B. All pull boxes and splice boxes shall have traffic bearing lids with a minimum load rating of 20,000 lb.

C. Pull boxes shall be placed behind curb and gutter. If there is no curb and gutter, pull boxes shall be placed a minimum of 7 feet from the edge of pavement.

D. Standard pull box dimension shall be 17" X 30" X 12" and the lid shall be stamped "MANATEE COUNTY TRAFFIC SIGNAL" on the cover.

E. Use a minimum of 7 conductor signal cable for signal heads and pedestrian heads.

F. The contractor shall contact the Manatee County Traffic Engineering Division to verify current color codes for signal cable.

G. Minimum of four PVC schedule 40 conduits (2.0 inch min. dia.) shall be installed for all directions at the intersections of all thoroughfare roadways per the direction of the Manatee

County's Traffic Engineer. Additional signal inter-connect conduit may be required between intersections at the direction of Manatee County.

H. Pull boxes and splice boxes are to be polymer type (Quazite or equivalent). All pull boxes and splice boxes shall have traffic bearing lids with a minimum load rating of 20,000 lb.

I. Pull boxes shall be placed behind curb and gutter. If there is no curb and gutter, pull boxes shall be placed a minimum of 7 feet from the edge of pavement.

J. Standard pull box dimensions shall be 17" X 30" X 12" and the lid shall be stamped "MANATEE COUNTY TRAFFIC SIGNAL" on the cover.

K. Provide the number of conduits where directional bore is being used. Label each conduit type (high voltage (poles/lighted signs, signal heads, pedestrian features), low-voltage (loops/video, interconnect, service wire), and spares) where applicable. Determine the number needed per intersection with two (2) spare conduits unless specified otherwise

L. A spare 2" (5.08 cm) underground conduit run shall be provided for each signal pole. The conduit shall be capped in a pull box.

3.2.1F CONTROLLER, CABINET, HARDWARE AND FOUNDATION

A. Traffic signal controller, controller cabinet and associated hardware shall meet current Manatee County Specifications. See Appendix 'A' for details.

B. Contact Manatee County Traffic Design Division prior to ordering controller assembly to confirm equipment compatibility.

C. All traffic signal controllers shall be NEMA TS2 Type 1 as described in the 2003 NEMA Standard Publication.

D. The cabinet shall be compatible with the Manatee County computerized traffic signal system, FDOT Bid item number 670-5-ABC (actuated solid state controller assembly). This cabinet shall include an ACP 340 surge protector. The cabinet shall have a "Manatee County" compatible communications interface panel installed and wired by the contractor unless directed otherwise by the engineer.

E. The controller supplied with the cabinet shall be a Trafficware (Naztec) 980 ATC. The Trafficware (Naztec) 980 ATC controller shall come equipped with four (4) serial ports, one (1) Ethernet port and one (1) USB port. Contact Manatee County Traffic Design Division prior to ordering controller assembly to confirm equipment compatibility.

F. All traffic signal controller cabinets supplied, should be Type V5 as shown in Table 7-1 of the 2003 NEMA Standard TS2 publication (W 4430" x H 5448" x D 2616").

G. If two detector racks are necessary (greater than 16 sensors), a size Type V6 cabinet shall be provided.

H. All signal controller cabinets shall have a front and back access door.

I. Controller cabinets should be wired for SOP 10 regardless of the proposed signal operation at the intersection. However, the controllers shall be programmed according to the proposed SOP as shown on the traffic signal plan.

J. All controller cabinet door diagrams shall reflect the current, correct data and documentation.

K. Provide one (1) uninterruptable power supply (UPS) Model No. Alpha FXM 1100 equipped with an Ethernet port. All UPS's shall support SNMP (protocol) for remote monitoring and management.

L. The UPS shall be mounted to the side of the traffic signal controller cabinet in a manner that does not obstruct access to nearby traffic signal equipment.

M. The project is to furnish and install a complete UPS assembly that includes a cabinet and batteries that meet county specifications.

N. Controller cabinet foundations shall be built to the latest FDOT Standards. One foundation for both the traffic controller cabinet and generator cabinet can be designed if there are no right-of-way restrictions and if intersection sightlines are clear.

O. The mounting surface of the controller cabinet concrete foundation shall be atleast 2' above surrounding grade and at a minimum the same elevation as the center of the of the roadway or greater.

P. The controller cabinet should be oriented to ensure the main cabinet door will open away from oncoming traffic.

Q. The controller cabinet shall be located away from drainage ditches, swales, apex of curves. The designer shall make every attempt to locate the controller cabinet in an effort to minimize exposure to errant vehicles.

3.2.1G SIGNAL HOUSINGS AND AERIAL HARDWARE

A. Align all proposed vehicular signal heads per FDOT Standards.

B. Near side heads will be required on an approach if proposed distances between the stop line and the corresponding opposing signal heads exceed those specified by the MUTCD.

C. Use aluminum louvered back plates on all vehicular signal heads. All back plates shall include a 2" yellow reflectorized (Type III reflectivity) outer edge border.

D. All cinch jones connectors will be removed. Signals will be wired directly to terminal block in aerial disconnect span wire mount installations and inside the yellow section of the signal head in mast arm installations.

3.2.1H PEDESTRIAN SIGNALS AND DETECTION

A. Place all pedestrian vehicle detector poles per MUTCD Figures 4E-3 and 4

B. Pedestrian ramp designs, pushbutton heights and orientation shall comply with the latest American Disabilities Act (ADA) requirements and with the latest FDOT standards.

C. All pedestrian signal heads shall be 16" international symbol countdown LED type.

D. Use breakaway aluminum square base with aluminum doors for pedestrian pedestals.

E. Use locking collars for mounting pedestrian signal heads to pedestrian pedestals.

3.2.1I VEHICLE DETECTION

A. Stop bar vehicle detection shall be Radar Detection using Wavetronix Matrix Sensor.

B. Consultation with the manufacturer shall occur during the design process to ascertain the suitability and proper placement of the detection equipment.

C. The system installer shall leave a minimum of 30 inches of spare cable at each bracket. The slack shall be neatly formed into a loop and secured to the sensor.

D. A minimum of 10 feet of sensor cable slack shall be neatly stored at each pull box location with a conduit run.

E. Identify the location of the radar detection sensor clearly on the Mast Arm Tabulation Sheet.

F. The Stop bar vehicle presence detection shall be Radar detection using Wavetronix Matrix Sensor at all locations unless otherwise approved by Traffic Engineering Division.

G. In addition to stop bar presence detection, Advance Vehicle Detection shall be provided for all major street approaches to enable data collection to support Purdue/Utah Automated Signal Performance Measures (SPMs). The Wavetronix SmartSensor Advance shall be used for advance vehicle detection, unless otherwise approved by Traffic Engineering Division.

H. Clearly identify the location and the dimensions of all radar detection zones. The leading edge of all zones shall be two feet ahead of the stop line.

1. Detection Zone Sizes

    a. Minor street left-turn and through movements are 6' x 40'

    b. Major street left-turn and right-turn movements are 6' x 40'

c. Major street through movements are 6’ x 20’

I. Include the delay times for each detector zone on the signalization plan sheet.

1. Left-turn movements unprotected by a median – 3 seconds of delay
2. Right-turn movements – 8 seconds of delay

J. If radar detection is not feasible, consult with the Traffic Engineering Division to determine other suitable alternative.

K. If the Department approves the use of inductive loop detection:

1. Use 6' x 40' Type “F” loops for minor streets.
2. Loops shall extend 2 feet in front of the stop bar (stop bar presence detection).
3. Main street passage loops shall be 6’ x 6’ type “B” (3 turn wrap). The design engineer shall determine the appropriate setback (according to speed limit) for all main street passage loops.
4. All loop wires must be XHHW-I.M.S.A. specification 51-3.
5. Cut straight lines.
6. 2” minimum slot cover.
7. Angle corners as shown in diagrams 509, 511 & 513.
8. Center loops in lanes.
9. Push wire down with non-metallic tool being careful not to damage insulation.
10. Pull wire snug, but not overly tight at corners.
11. Cut lead-in slot at a right angle to the lanes, no diagonal cuts across the Intersection shall be allowed.
12. Reference FDOT specification for sealant, excluded steep asphalt.
13. Preformed loops must be preapproved by the traffic management division.
14. Lead-ins shall be a continuous run from the far pull box into the cabinet.
15. Only one loop shall be allowed per lead-in.
16. A separate lead-in slot shall be used for each loop.
17. XHHW lead-ins shall be used for each loop.

18. All home-runs shall meet I.M.S.A. specification 50-2.
19. No more than two belden lead-ins may be placed in same slot.
20. Splices between the loop and lead-in shall be made only in pull boxes.
21. All splices shall be crimped and soldered.
22. Use FDOT approved water tight methods.
23. Pull boxes must be a minimum of 7' from edge of pavement, if no curb is present. Pull box may be located directly behind a raised curb.
24. All conduit shall be buried a minimum of 36" below grade, if in a traffic area or under a roadway.

L. Plan Sets shall include the following note:

1. *The contractor shall install and maintain temporary vehicle detection for all approaches and phases throughout the construction project. The detection devices shall be properly installed, programmed and tuned to ensure proper operation. The contractor shall make all adjustments and repairs as needed to ensure the detection is properly functioning throughout the project or until the permanent detection is installed and until Manatee County accepts the project. Any damage to the existing detection system at an intersection must be restored with twenty-four (24) hours at no additional cost to the County.*

3.2.1J SIGNAL TIMING, PHASING AND COORDINATION

A. FYA – include all new Flashing Yellow Arrow requirements

1. Controller programming
2. MMU requirements
3. Cabling requirements

B. All electronic traffic control equipment, including but not limited to, Traffic Controllers, Malfunction Management Units, Bus Interface Units, vehicle detectors, and pedestrian detectors and processors shall be fully programmed, contain the proper software and firmware type and version and , be fully functioning and operating prior to signal turn on, and acceptance.

C. All parameters on the controller timing chart included within a traffic signal plan must be completed. The yellow and all-red clearance intervals and the pedestrian clearance intervals

for all the movements/approaches must be calculated according to the procedures outlined in the FDOT Traffic Engineering Manual and MUTCD.

D. Round all proposed timing intervals (i.e. Yellow Clearance, All-Red) to the nearest 0.5 second.

E. Provide justification of lead-lag phasing if it is proposed.

F. Controller cabinets shall be wired for SOP 10 regardless of the proposed signal operation at the intersection. However, the controllers shall be programmed according to the proposed SOP as shown on the traffic signal plan.

G. Flashing Yellow Arrow Policy:

1. Right Turn: Protected in overlap, flashing with concurrent phase
2. Left Turn: Four section head with mast arm sign
3. Adjacent Through Movements with pedestrian calls
4. Concurrent through movements have same Yellow plus All-Red timing.

3.2.1K SIGNS

A. Internally Illuminated signs shall meet the minimum design and installation requirements outlined within the latest edition of the FDOT Standard Specifications for Road and Bridge Construction Section 699.

B. Internally illuminated street signs shall be single panel, LED type, and rigidly mounted to the mast arm. Refer to Appendix A-1 for additional information.

C. All signs shall be rigid-mounted, single-panel, mounted on mast arms. Use one sign per approach mounted on the mast arm near the upright.

D. IISNS installation is standard for all full color signals.

E. When a cross street is known by both route number and a local name, use of the local name is preferred on the IISNS since the route number is identified on route markers along the route.

F. Installation of the photoelectric cell for the IISNS is to be outside the traffic signal electrical service disconnect.

G. Conductors for IISNS Street name signs at signalized intersections shall be internally illuminated with photo cells at each sign connected to a dedicated 15 Amp/120 Volt Circuit Breaker inside the electrical service disconnect box for the intersection.

H. Signs shall be illuminated with LED's.

I. Contractor shall provide illuminated sign specifications to include system operating wattages.

J. Signs should be designed as with a range of 4' through 8' in length with 1' increments.

K. Signs should be designed with a 3" radius.

L. All block numbers shall be verified by the Address Coordinator of the local jurisdiction.

M. 1-Line Internally Illuminated Street Name Signs to be 2'-0' in height, using 8" E-mod lettering (upper/lower case).

N. 1-Line Internally Illuminated Street Name Signs shall have 1" borders.

O. 2-Line Internally Illuminated Street Name Signs shall be 2'-6" in height, using 8" E-mod lettering (upper/lower case) for street names and 6" E-mod lettering for block numbers.

P. Note that signs on FDOT-maintained roadways are to be designed with a 2' height per Section 2.2.4 (2) of the FDOT Traffic Engineering Manual (January 2012 revision).

Q. 2-Line Internally Illuminated Street Name Signs shall have ½" border to accommodate block numbers and signs with letters like g, p, y. etc. Street names and block numbers will be provided by Traffic Engineering Division during review.

3.2.1L UNINTERRUPTABLE POWER SUPPLY

A. Provide (1) one uninterruptable power supply (UPS) Model No. Alpha FXM 1100 equipped with an Ethernet port. All uninterruptable power supplies shall support SNMP protocol for remote monitoring and management.

B. The UPS shall be sized to accommodate the maximum connected load. The battery bank shall be sized to provide a minimum 4 hours run time under full load.

C. The UPS shall come equipped with its own NEMA enclosure.

D. The UPS enclosure shall be mounted to the side of the traffic signal controller cabinet in a manner that does not obstruct access to nearby traffic signal equipment.

E. The designer shall specify that the project is to furnish and install a complete UPS assembly that includes a cabinet and batteries that meet county specifications.

F. The contractor shall submit a complete set a material as builts to the Department for approval prior to material procurement

G. UPS batteries shall not be housed inside the controller cabinet.

H. The uninterruptible power supply (ups) shall provide uninterruptible reliable emergency power to a traffic intersection control cabinet in the event of a power failure or interruption for a period of time designated by the agency. The transfer from utility power to battery power shall be seamless and shall not interfere with the normal operation of the traffic controller, conflict monitor or any other peripheral devices within the traffic control system. The ups system (which may also be specified as a battery back-up system or BBS) shall be comprised as noted below:

I. The system shall be capable of providing power for full run-time operation for an intersection, flashing mode operation for an intersection and a combination of both full and flash operations. The unit shall have all the necessary control contact available (for details refer to item 2 in this specification) in order to allow the user to select the most suitable mode combination based on the specific implementation.

J. The ups shall have an Ethernet port interface available to allow user programming of certain operational parameters in order to ensure compatibility with the specific intersection control equipment as deployed. The Ethernet port interface shall be a standard interface compatible with a PC and shall be mounted on the front of the ups unit.

K. The system shall be designated for outdoor applications and meet the environmental requirements as is standard in the traffic industry. The temperature requirements that the ups shall conform to shall be:

1. UPS -37C TO +74C
2. Power Transfer Switch -37C TO +74C
3. Manual Bypass Switch -37C TO +74C
4. Batteries -37C TO +74C

L. The uninterruptible power supply shall provide a minimum of four (4) hours of full run-time operation for an intersection's active output capacity whether LED, incandescent or any combination of both lighting technologies.

M. The UPS/BBS shall have both certification and approvals for electrical safety UL-1778, CSA-107.1, EMI immunity FCC class A.

N. UPS shall provide the user with 5 sets of panel-mounted potential free contacts and be clearly labeled so as to identify the use of each contact.

O. One set of contacts shall be energized whenever the unit switches to battery power. This set of contacts (NO, NC, & COM) shall be labeled or marked "ON BAT".

P. The second and third set of contacts (NO, NC, & COM) shall be energized whenever the battery voltage approaches approximately 40% (user field programmable via RS232 interface) of remaining battery capacity. Contacts shall be labeled or marked “LOW BAT”.

Q. The fourth and fifth set of contacts (NO, NC, & COM) shall be energized two hours after the unit switches to battery power. This feature can be enabled/ disabled via the RS 232 interface. Contacts shall be labeled or marked “timer”.

R. The UPS system shall include a manual bypass switch so that ups field replacement can be on a “hot -swap” basis.

S. An optional power transfer switch (PTS) shall be available to be used in applications where normal operation exceeds the maximum ups output capacity and a “red flash” back-up implementation is used.

T. UPS/BBS shall be compatible with all of the following types of intersection control equipment for full operation, flash operation or a combination of such. Actual mode of implementation is achieved via usage of the control contacts and dependent on the specific equipment configuration supported at the intersection.

    1. NEMA TS-2 controllers and cabinets

    2. VMS (variable message signs)

U. Complete UPS system including batteries shall fit pedestal or base mounted cabinets specifically designed to house the ups, 4 each 1 100 AH sealed lead/acid batteries and PTS. The cabinet shall be fabricated from the same material as the controller cabinet and contain its own 100 CU. FT. Per minute, thermostatically control fan and filter.

V. The UPS switchover characteristics shall be field programmable in order to be compatible with the specific intersection control equipment deployed. The following programmable controls shall be available (factory default values shown):

    1. Line detection-low line cut -off (100V */-3)

    2. Line detection-low line return (105V +/-3)

    3. Line detection-high line cut -off (130V +/-3)

    4. Line detection-high line return (128V +/-3)

    5. Return to line mode after re-qualification (128V +/-3)

W. UPS shall be equipped to prevent a malfunction feedback to the cabinet or from feeding back to the utility service per UL 1778, section 48 “back-feed protection test”.

X. UPS shall have lightning surge protection compliant with IEEE/ANCI C.62.41.

Y. The UPS shall be capable of being shelf, rack-mount, or swing-tray mounted.

Z. All necessary hardware for mounting (shelf angles, rack, shelving, harness, etc.) shall be included in the bid price for the UPS.

AA. External battery cabinets may be used to meet adequate environmental and physical requirements.

BB. The UPS shall include a display (status monitor) and/or meter to indicate current battery charge status and conditions.

CC. UPS shall be easily installed and replaced (complete turnkey system with all necessary hardware) and shall not require any special tools for installation.

DD. UPS shall include a reset able front -panel event counter display to indicate the number of times the ups was activated, and a front -panel hour meter to display the total number of hours the unit has operated on battery power.

EE. UPS inverter module shall include a serial port allowing field programmability of input/output voltage values, self-testing, communications and diagnostics. Software to retrieve data, troubleshoot and program the ups system shall be ASCII format and be included as a part of the system.

FF. Individual batteries shall be 12V type and shall be easily replaced and commercially available off the shelf.

GG. Batteries shall be extreme temperature, deep cycle, sealed prismatic lead-calcium based AGM/VRLA (absorbed glass mat/valve regulated lead acid) batteries.

HH. Batteries shall be certified to operate over a temperature range of -25 degrees “C” to + 74 degrees “C”.

II. The batteries shall be provided with appropriate interconnect wiring and a corrosion resistant stationary or swing-out mounting tray and/or brackets appropriate for the cabinet into which they will be installed.

JJ. Batteries shall indicate maximum recharge data and recharging cycles.

KK. Recharge time for the battery, from protective low cut -off to 80% or more of full battery charge capacity, shall not exceed twenty (20) hours.

LL. The battery system shall consist of a temperature compensated switch mode charger (-4mV/C/CELL, microprocessor controlled). It shall also include a high temperature cut-off point 50C +/-3 above which all battery charging operations will be suspended.

MM. Manufacturer shall provide a two (2) year factory-repair warranty for parts and labor on the ups.

NN. Manufacturer shall have field service technicians trained in traffic control technology available, and that can be reached via a toll-free service line.

OO. Input specifications

1. Normal input voltage 120VAC, single phase
2. Input voltage range 100VAC TO 130VAC
3. Input frequency 60Hz (+/ -5%)

PP. Output specifications

1. Nominal output voltage 120VAC (875 watts) 2KVA (1500 watts)
2. Output frequency 60Hz (+/-5%)
3. Voltage wave form sine
4. Efficiency 95-97%

3.2.1M GENERATOR CABINET

A. The contractor must provide the cabinet for the portable emergency generator.

B. When specified, traffic controller cabinets shall be wired for auxiliary generator operation for use in periods of long power outages.

C. The controller power panel shall contain a dual 40 amp circuit breaker with a mechanical device to allow only one (1) circuit breaker to be set at any one time. The mechanical device shall require that both circuit breakers be placed in the off position before a transfer from one breaker to the other can occur.

D. The controller cabinet shall have a power input connector located on the side of the cabinet, closest to the cabinet power panel. The connector shall be stainless steel with a screw-on protective dust cover; the dust cover shall be hinged to the connector.

E. For purposes of standardization, the cabinet connector shall be a MARINCO 6371 E1 male, rated for 50 amps at 125 volts, 3 wire.

F. The mating female connector shall be a MARINCO 6360CRN with MARINCO 7715CRN dust cover and locking ring.

G. The female half of the connector need not be furnished unless specifically required by the plans and specifications.

H. A tamper resistant red indicator light shall be placed on the outside of the cabinet, as shown on the plans that will illuminate when the normal utility power is restored, and the cabinet is running on the stand-by generator.

3.2.1N TRAFFIC SIGNAL SUPPORTS

A. Effective march 1, 1995, in conformance with FDOT mast arm policy, all new signals installed in Manatee County west of I-75 shall be supported by mast arms with the signal head(s) vertically installed and rigidly attached to the mast arm, unless otherwise approved by the project engineer.

B. Mast arms shall be constructed of one continuous section up to 50’ (15.24 m) in length and of a two section construction from 50’ (15.24 m) to 1 00’ (30.49 m) in length.

C. The elevation of the top of the mast arm base(s) shall be six inches (15.24 cm) above existing grade. If located directly behind sidewalk, at sidewalk grade.

D. Item 700-11-ABC (Electronic Display Sign), shall include sign assembly and mounting hardware only. All signs shall require block numbers.

E. Internally illuminated signs shall be rigidly attached to the mast arm as shown on the plans.

F. The cabinet shall be compatible with the Manatee County computerized traffic signal system, FDOT Bid item number 670-5-ABC (actuated solid state controller assembly). This cabinet shall include an ACP 340 surge protector. The cabinet shall have a “Manatee County” compatible communications interface panel installed and wired by the contractor unless directed otherwise by the engineer.

G. The controller cabinet base shall be at least 2’ high and the same elevation as the center of the roadway or greater. The cabinet door shall open towards or parallel to the right -of-way line and away from traffic.

H. All signals shall have mast arm supports. ; All mast arm poles are to be galvanized, non-painted.

I. Any painted, decorative or non-standard mast arm poles will require an executed maintenance agreement prior to final acceptance of the traffic signal.

J. Mast Arms shall be constructed of one continuous section up to 50 feet in length or of a two section construction from 50 feet to 100 feet in length.

K. The dDesigner must is responsible for ensureing that there will be no conflict with overhead utilities and that applicable clearance from transmission lines can be provided.

L. Show existing traffic signal equipment on the plan sheet (i.e., spanwires, existing heads, poles, etc.)

M. When designing mast arm supports, the designer should use one mast arm per quadrant and the arm should be perpendicular to the approach. Variations may be approved by the Traffic Engineering Division on a case-by-case basis. The design shall also include all possible future signal head and sign load data (such as protected left turn indication, flashing yellow arrow indication, no u-turn sign, etc.) on the Mast Arm Tabulation Sheet.

3.2.1O LIGHTING

A. All lighting and internally illuminated sign power circuits shall be fed directly from the power service. These circuits shall not be wired into the controller cabinet service panel.

B. All lighting circuits are non-critical loads and shall not be energized via the uninterruptable power supply during power outages.

C. Luminaires shall be installed on all proposed mast arm signal poles unless the project includes a new or existing lighting system.

D. A lighting analysis may be submitted that may justify the installation of luminaires on less than four (4) mast arm poles. Manatee County and other stakeholder entities shall review the lighting analysis and the resulting traffic signal design.

E. Luminaire types must be approved by Manatee County Traffic Design Division. Use 250W/100W GE M-250A2 POWR/DOOR High Pressure Sodium Luminaire with cutoff optics. The luminaire should have a Type III distribution with a photometric curve number GE 177285.

F. Luminaires may be shielded as necessary to ensure that there is no nuisance light.

G. Lighting conductors shall be sized appropriately per the latest edition of the NEC. Voltage drop calculations shall be provided with the material submittals prior to ordering conductors.

    1. Use 250 W High Pressure Sodium Luminaire (IES 35-451002) designed for medium/full cutoff Type III distribution, auto regulated type ballast wired for 120 V operation. Wire all signal mounted luminaires and illuminated street name signs at an intersection to one (1) photoelectric cell installed on the service disconnect.

H. Traffic signals installed with lighting shall include photometric design with the plan set for review and approval.

I. The plan set shall also include shop drawings for each lighting arm.

3.2.1P OTHER

A. Emergency Vehicle Pre-Emption Devices (Opticoms) are not presently installed at Manatee County Traffic Signals.

3.2.2 ADVANCED TRAFFIC MANAGEMENT SYSTEMS

3.2.2A GENERAL NOTES

A. ITS plans must be prepared in accordance with the latest version of the FDOT Plans Preparation Manual and the latest version of the FDOT Design Standards.

B. All ITS/ATMS supported equipment, hardware, and software shall be compatible with Manatee County's ATMS infrastructure and shall be approved by the County Traffic Engineer prior to procurement and installation

C. Applicants with proposed projects with Preliminary Site Plans/General Development Plans/ Final Site Plans that are submitted for review must resolve any conflicts between their proposed construction and ATMS infrastructure (i.e., fiber optic conduit/cable, CCTV, and MVDS).

   1. Proposed relocation work shall not include any additional or new splices.

   2. Fiber optic cable shall be replaced from existing splice point to existing splice point (splice point locations may exceed the limits of the proposed construction).

   3. All Fiber Optic Cable route markers shall be relocated as needed.

   4. Provide a plan sheet showing proposed / new fiber optic cable (FOC) location for approval by Manatee County Traffic Engineering Division.

D. Controller cabinets shall be fully compatible with Manatee County's ATMS software (Trafficware (Naztec)'s ATMS.NOW). The cabinets shall come equipped with a Ruggedcom switch model number RSG920P (6GK6092-0PS23-0BA0-Z A05+B05+C02+D02). This switch needs an external power supply model number Ruggedcom RPS 1300 to power the Power-Over-Ethernet (POE) ports.

3.2.2B FIBER OPTIC CABLE

A. Use pre-terminated patch panels with SC connectors at all device and controller cabinets.

B. If the need to connect the proposed signal to the County's ATMS network is identified by the Traffic Engineering Division, signal plans shall include a fiber optic splicing detail. The splicing detail shall clearly show all fiber splices, buffer tubes, termination points and fiber counts. Manatee County Traffic Engineering Division will provide network infrastructure details, as needed.

C. Use staggered splices within the orange buffer tube to connect to the existing Manatee County ATMS network.

3.2.2C CONDUIT AND PULL BOXES

A. Fiber optic pull boxes and splice boxes are to be polymer type (Quazite or equivalent). All pull boxes and splice boxes shall have traffic bearing lids with a minimum load rating of 20,000 lb.

B. Fiber optic pull box dimensions shall be 24" X 36" X 36" and the fiber optic splice box dimensions shall be 30" X 60" X 48". Fiber optic pull and splice box lids shall be stamped "MANATEE COUNTY FIBEROPTIC SYSTEM" on the cover.

C. Fiber optic pull boxes should be placed at the following locations unless otherwise directed by the Engineer:

1. Every 500 feet in a continuous straight conduit section if no fiber optic splice is required.
2. At a maximum of 1,000 feet in metropolitan areas.

D. Fiber optic splice boxes should be placed at the following locations unless otherwise directed by the Engineer:

1. Every 2,500 feet in a continuous straight conduit section if no fiber optic splice is required.
2. At a maximum of 1,000 feet in metropolitan areas.

E. Specify 50 foot coils of slack fiber optic cable in each pull box and splice box.

F. Use 2 (2") conduit for new communications.

G. Install locate wire or metal tape so that conduit can be physically located in the future.

H. Use #14 XHHW Pull Wire in the conduits. At least two (2) feet of pull wire shall be accessible.

I. Specify that contractor shall provide bore logs for new conduit installation by directional bore.

3.2.2D LOCATE SYSTEMS

A. All fiber optic conduit installations shall include a complete facility locate marking system to include:

1. Above ground route markers
2. Curb mounted marker tabs

3. Electronic utility locate system

B. The utility locate marking system shall adhere to the latest edition of the FDOT Standard Specifications for Road and Bridge Construction.

3.2.2E CCTV CAMERAS

A. Provide a CCTV camera if the design intersection is designated for a CCTV camera in the latest Manatee County ATMS Master Plan. Contact Manatee County Traffic Engineering Division for more information.

B. Use a Bosch VG5-Autodome ITS1080P-30x4.

1. Power for the CCTV camera must be in a separate conduit from the Ethernet and low voltage connections.

2. Mount the camera at a height of 39 feet aboveground.

3. Communication between the CCTV cabinet and the switch in the controller cabinet shall be via direct fiber.

4. The system installer shall leave a minimum of 30 inches of spare cable at each camera bracket. The slack shall be neatly formed into a loop and secured to the camera. A minimum of 10 feet of video cable slack shall be neatly stored at each pull box location within a conduit run. A minimum of 30 feet of slack shall be available for each new video detection cable run.

3.2.2F MVDS (MICROWAVE VEHICLE DETECTION SYSTEM) UNITS

A. MVDS units should be located at least 300 feet upstream of the stop line on the intersection approach.

B. MVDS units should be connected whenever possible to the electrical service point and switch at the nearest traffic signal.

3.2.2G COMMUNICATION HUB

3.2.2H DYNAMIC MESSAGE SIGNS

3.2.3 SIGNS

3.2.3A GENERAL NOTES

In general, all traffic signs facing the same direction of travel along a given section of roadway should have a minimum spacing of 100 feet between signs so as to increase driver awareness and recognition.

3.2.3B SIGN SUPPORTS AND HARDWARE

A. All signs shall have galvanized non painted U-Channel supports.

B. Any non-standard color or design for traffic sign supports will require an executed maintenance agreement prior to final acceptance of the signs.

C. All stop, yield and school series signs shall be manufactured using 3M diamond grade reflective sheeting or approved equal.

D. The following traffic signs may be manufactured using 3M engineer grade reflective sheeting or approved equal, unless otherwise specified:

1. All one way signs
2. All parking series signs
3. Pushbutton and walk guidance
4. Stop here on red sign
5. OM reflector series using the 9 dot raised reflectors

E. All warning signs, except the following:

1. Large arrow sign (48 inches by 24 inches)
2. Stop ahead sign
3. Advisory speed plate and supplemental legend

F. All other traffic signs shall be manufactured using 3M hi-intensity reflective sheeting or approved equal, unless otherwise specified.

G. Blanks shall be domestic aluminum alloy, type 6061-T6, with a thickness of .080 and be treated by alodine 1200E process.

3.2.3C STREET NAME SIGNS

A. Blanks shall be a minimum of 9 inches in height by the appropriate length from 30 inches to 48 inches in 6 inch increments.

B. The background shall be 9 inches in height by the appropriate length, manufactured with at least 3M hi-intensity reflective sheeting or approved equal, unless higher grades of sheeting are specified.

C. The foreground shall be 8 inches in height by the appropriate length so as to maintain a 1/2 inch border around the sign face.

D. Letter heights and series for street names, prefixes (when used), suffixes and block numbers (when used) shall be as follows:

   1. The street name shall be 7 inch, B series, upper/lower case (such as Childs St. or Bentley Ave.) standard. A minimum size to 5 inch, B series may be used to accommodate unusually long or cumbersome names.

   2. Prefixes and suffixes shall be 7 inch, B series, upper/lower case, Standard. Minimum sizes to 2 inch, series B, upper case may be allowed as noted above.

   3. Block numbers shall be 2 inch, series B, unless otherwise specified.

E. Each street name shall be manufactured using two (2) aluminum street name sign blanks (figure 553-A provides an example for the 30 inch and the 36 inch blanks), mounted back to back on a galvanized steel twist bracket (figure 553-B), using pop rivets to secure the sign. The center holes shown in figure 553-A secure the street name sign blank back to back pair to the bracket and the end holes secure the blanks to each other for rigidity.

F. In cases where numbers comprise the street name, such as 3RD ST, the street name sign shall be manufactured so that RD is as follows: 3RD St. in this (and similar situations), the RD shall be 2 inch, series B, upper case only.

G. Street name sign blank lengths shall be determined by the number of letters and numbers in the street name as follows:

   1. 1-6 letters - 30 inch

   2. 7-8 letters - 36 inch

   3. 9-10 letters - 42 inch

   4. 11-12 letters - 48 inch

5. For 13 or more letters, letter size and series as noted above, may be adjusted to allow the name to fit on the 48 inch blank.

H. In order to provide clarification as to which roadways in Manatee County are publicly maintained (public) and privately maintained (private), public roadways shall have a green background with white letters, numbers and borders and borders and private roadways shall have a Blue background with white letters and numbers.

I. Where names are used, the block numbers shall be included under the name.

J. In general, all street name sign assemblies are mounted on top of a standard galvanized U-channel post. In most cases, the street name sign assembly will be mounted in combination with a stop sign so as to reduce the number of sign fixtures in the field.

3.2.3D NO PARKING SIGNS

A. The standard size for parking series signs (for example, “NO PARKING ANY TIME”, “NO PARKING 7-8:30 AM, M-F”, etc.) for Residential, Commercial and Industrial areas is 12 inches x 18 inches and shall feature arrows to define the extent of the regulated zones. The signs shall be erected at a 45 degree angle relative to approaching traffic.

B. Spacing between successive parking series signs should be not less than 100 feet or more than 300 feet to assure adequate notification to the motorist of the regulated zone.

C. where practicable and to reduce the amount of mounting fixtures, parking series signs may be combined with other signs such as speed limit signs, lane control signs (such as “right lane must turn right”), or school series signs. Inasmuch as parking series signs are mounted at a 45 degree angle relative to approaching traffic, the mounting fixture for the combined signs shall be a circular pipe-post as defined in the FDOT standard indices.

D. The standard size of the parking series signs for Rural areas is 18 inches x 24 inches. The signs shall be erected perpendicular to the roadway facing the direction of travel.

E. Spacing is subjective; successive signs need to be spaced as far apart as practicable to minimize over signing but close enough to facilitate motorist identification of the regulated zone.

3.2.3E SCHOOL ZONES

A. Within the same school zone where multiple crosswalks are installed along the same roadway 400 feet or less apart, the “school” pavement legend, the school ahead sign, and (when used), the static school speed limit sign shall not be installed between the crosswalks.

B. Within the same school zone where multiple crosswalks are installed along the same roadway that are more than 400 feet apart, the “school” pavement legend, the school ahead sign and (when used), the static school speed limit sign shall be installed.

C. Along the same roadway, only one set of school speed limit flashers shall be installed. Additional static school speed limit signs may be installed as defined above in A and B.

D. The installation of reduced speeds at signalized crosswalks and intersections is neither recommended nor encouraged. However, in accordance with FDOT policy, topic number 750-01 0-027-H “establishing school zones and school crossings”, effective May 3, 2006, upon a request from the local government, a reduced speed zone will be used at school crossings at signalized intersections at locations adjacent to or near school property if justified by an engineering study.

E. The school ahead sign with the “school” pavement legend shall be installed a minimum of 300 feet in advance of a school crosswalk for speeds up to 45 mph. FDOT standard index 17344 applies for speeds greater than 45 mph.

3.2.3F SPEED LIMIT SIGNS

3.2.3Fi RESIDENTIAL, COMMERCIAL AND INDUSTRIAL AREAS

A. The speed limit sign shall be erected on the first property line if not less than 1 do feet from the extended curb line or edge of road of the nearest intersecting roadway.

B. If the first property line is less than 100 feet, the speed limit sign shall be erected on the second property line, provided that the second property line is 300 feet or less from the extended curb line or edge of road of the nearest intersecting roadway.

C. Where the first property line exceeds 300 feet, the speed limit sign may be erected not less than 1 do feet or more than 300 feet from the extended curb line or edge of road of the nearest intersecting roadway.

D. If additional speed limit signs are needed to further remind motorists periodically of the applicable speed limit, such signs shall be installed beyond intersections as defined above. Spacing between successive speed limit signs should not be less than 1100 feet or more than 1500 feet along roads within residential areas. In general, for spacing of successive speed limit signs in commercial and industrial areas and/or along minor arterial roads or above, spacing should be as defined for speed limit signs along roads in rural areas.

E. The speed limit sign shall be erected at least 100 feet from other traffic signs facing the same direction of travel. Examples include the regulatory end school zone sign followed by a speed limit sign at the end of a school zone or the no outlet warning sign placed at an intersection entering a residential area followed by a speed limit sign.

3.2.3Fii BY RURAL AREAS

A. The speed limit sign shall be erected as defined in A(1) through A(3) above.

B. Additional speed limit signs installed along roads should be spaced not less than 2400 feet or more than 2800 feet between successive signs.

3.2.4 PAVEMENT MARKINGS

A. Include Station and Offset information and dimensions for all Pavement Markings (i.e. stripes, symbols, crosswalks, stop bars).

B. Show lane configuration and striping information for all legs.

C. Use lane widths specified by Section 400 of the 2007 Manatee County Highway, Traffic, and Stormwater Standards and Section 4.3 of the American Association of State Highway and Transportation Officials (AASHTO) “Green Book”.

D. Clearly identify existing pavement markings and signs that are to remain and that are to be removed.

E. Clearly identify any interim lane configurations and corresponding pavement markings and signs.

F. Include the following note for projects located at intersections that were not previously signal controlled:
   1. Contractor shall coordinate pavement markings and signage work with the scheduling of signal activation. The signal shall not be fully activated until all proposed stop bars, crosswalks, ramps, and pavement removal work is complete. The existing stop signs shall be removed upon full signal activation.

G. Clearly identify proposed pavement markings and signs (mast arm-mounted and ground-mounted) for the ultimate lane configuration.

H. If applicable, provide an AutoTURN exhibit that illustrates that vehicles can safely perform simultaneous left-turn movements from opposing approaches.

4.0 INSPECTION AND FINAL ACCEPTANCE PROCEDURES

4.1 INITIAL INSPECTION PROCESS

A. The contractor must notify the Traffic Design Division via the Project Manager at least five (5) business days in advance to schedule the initial power service and/or traffic signal inspection.

B. Prior to scheduling the initial traffic signal inspection, the contractor shall deliver three hard-copy sets of As-Built Record Drawings, two sets of IMSA inspection forms (OTDRs for Fiber Optic Projects), and one compact disc of Record Drawings in Adobe Acrobat (.pdf) and AutoCAD (.dwg) format to:

Manatee County Traffic Design Division
(Attention: Mr. Mukunda Gopalakrishna, P.E., PTOE)
2101 47th Terrace East
Bradenton, Florida 34203

4.2 PUNCH LIST

A. Upon completion of the inspection, the Department will provide a detailed punch list spreadsheet to the project manager for distribution to the contractor.

1. The contractor shall address and respond to all punch list items noted on the spreadsheet.

2. Once the punch list items are deemed to be resolved by the contractor, they will submit a copy of the completed punch list to the Traffic Engineering Division. A re-inspection will then be scheduled.

3. If the punch list items are not accepted by Traffic Engineering Division, Traffic Engineering Division will send a new punch list to the project manager for distribution to the contractor.

4. This process will be repeated until all of the punch list items are accepted by Traffic Engineering Division.

5. Inspections for Power Services follows the same process.

4.3 FINAL ACCEPTANCE

A. Upon passing the final inspection the contractor shall send a written request to the Public Works Department and to the Public Works Department to transfer maintenance from the

contractor to Manatee County. Manatee County shall respond within 5 working days to establish a time table for the transfer of maintenance responsibility.

B. Unless otherwise noted, all removed equipment except concrete poles shall be turned over to Manatee County and delivered to the traffic management division, located at 2904 12th street court east, Bradenton, Florida, 34208, as directed by the engineer. Concrete poles shall be disposed of by the signal contractor in areas provided by the contractor.

C. Acceptance procedures will generally follow those set forth in Section 611 of the FDOT Specifications.

FDOT Standard Specifications Library

4.4 TRANSFER OF MAINTENANCE

A. Transfers of Maintenance will be coordinated between the project manager and Manatee County Traffic Engineering Division.

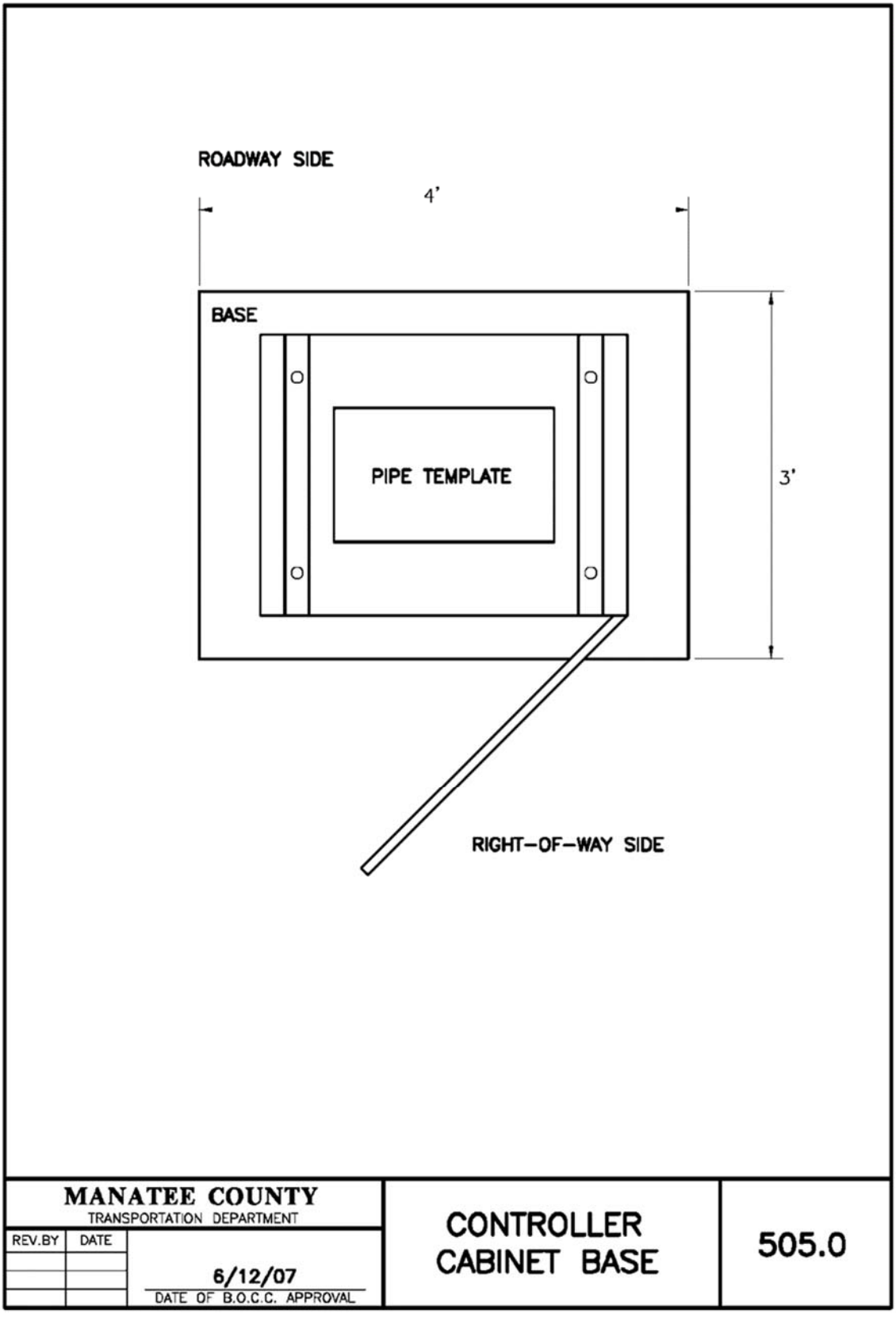
B. After all the punch-list items have been addressed by the contractor, and final inspection performed by the county staff successfully, the contractor is to submit a signed copy of the *Traffic Signal Transfer of Maintenance* form with appropriate fields completed.

C. A completed *Traffic Signal Transfer of Maintenance – checklist form*, to be signed by the Traffic Design Division Manager and the Traffic Operations Division Manager, acknowledging that they do not have any objections to the acceptance of the traffic signal for maintenance. This signed checklist form has to accompany the Traffic Signal Transfer of Maintenance form for the Deputy Director's signature to complete the transfer of maintenance.

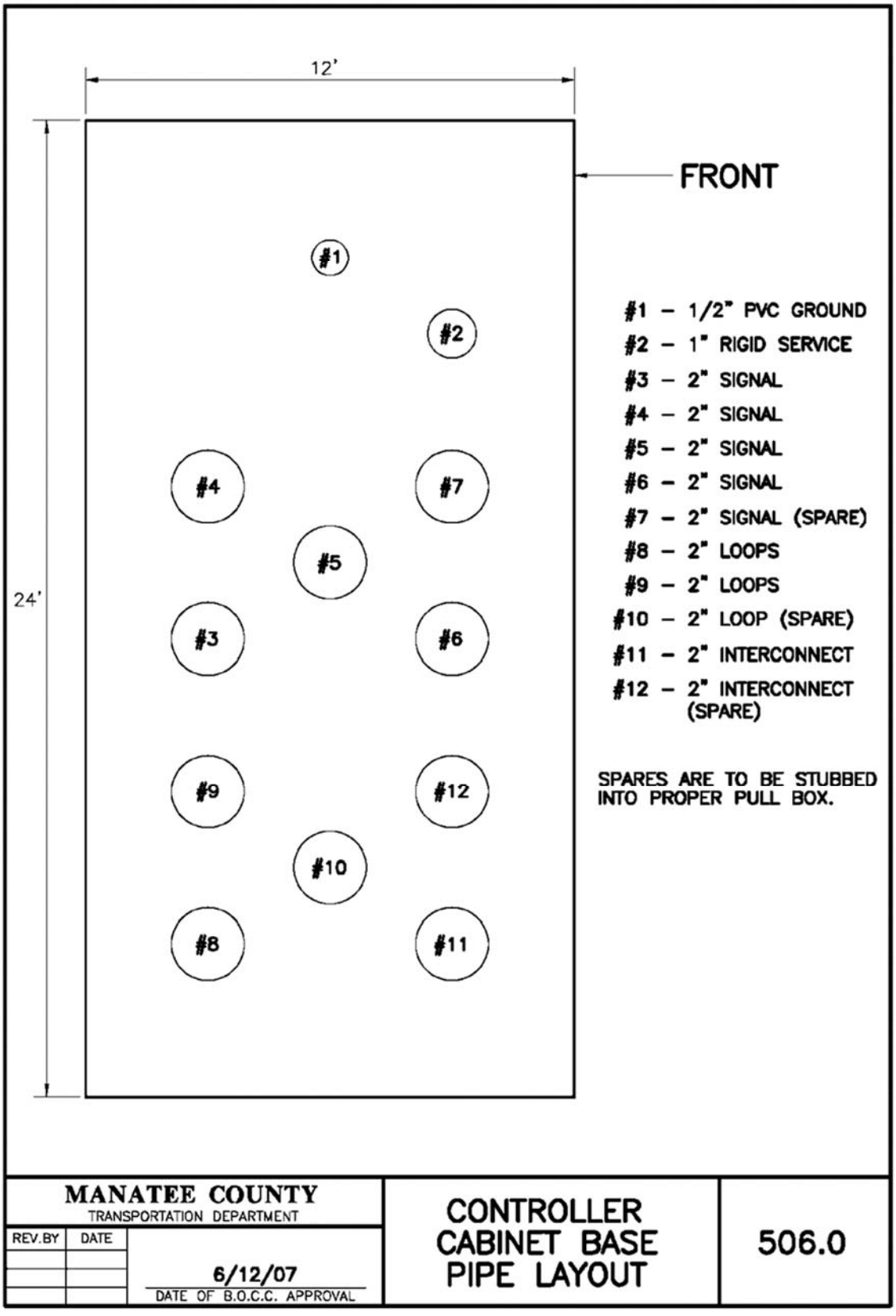
5.0 APPENDIX

i. Sheet 505.0, Controller Cabinet Base
ii. Sheet 506.0, Controller Cabinet Base Pipe Layout
iii. Sheet 508.0. Typical Detector Loop & Pull Box Locations
iv. Sheet 509.0. Type “B” 6’x6’ Detector Loop
v. Sheet 510.0. Type “B” Detector Loop Dimensions
vi. Sheet 511.0. Type “F” 6’x25’ Detector Loop Dimensions
vii. Sheet 512.0. Type “F” 6’x25’ Detector Wiring Diagram
viii. Sheet 513.0. Type “F” 6’x40’ Detector Loop Dimensions
ix. Sheet 514.0. Type “F” 6’x40’ Detector Loop Wiring Diagram
x. Sheet 515.0. Detector Loop Lead-In Installation
xi. Sheet 518.0. Meter Electrical Service Installation
xii. Sheet 519.0. Disconnect Electrical Service Installation
xiii. Sheet 520.0. Meter Installation Height Requirements
xiv. Sheet 521.0. Disconnect Installation Height Requirements
xv. Sheet 522.1. Alt. Power Supply Requirements UPS/Generator
xvi. Sheet 522.2. Alt. Power Supply Requirements UPS/Generator
xvii. Sheet 553.2. Street Name Signs (Ground Mounted) Hardware/Material Specifications (Figure A)
xviii. Sheet 553.3. Street Name Signs (Ground Mounted) Hardware/Material Specifications (Figure B)
xix. Controller Cabinet Specifications
xx. FDOT Minimum Technical Requirements

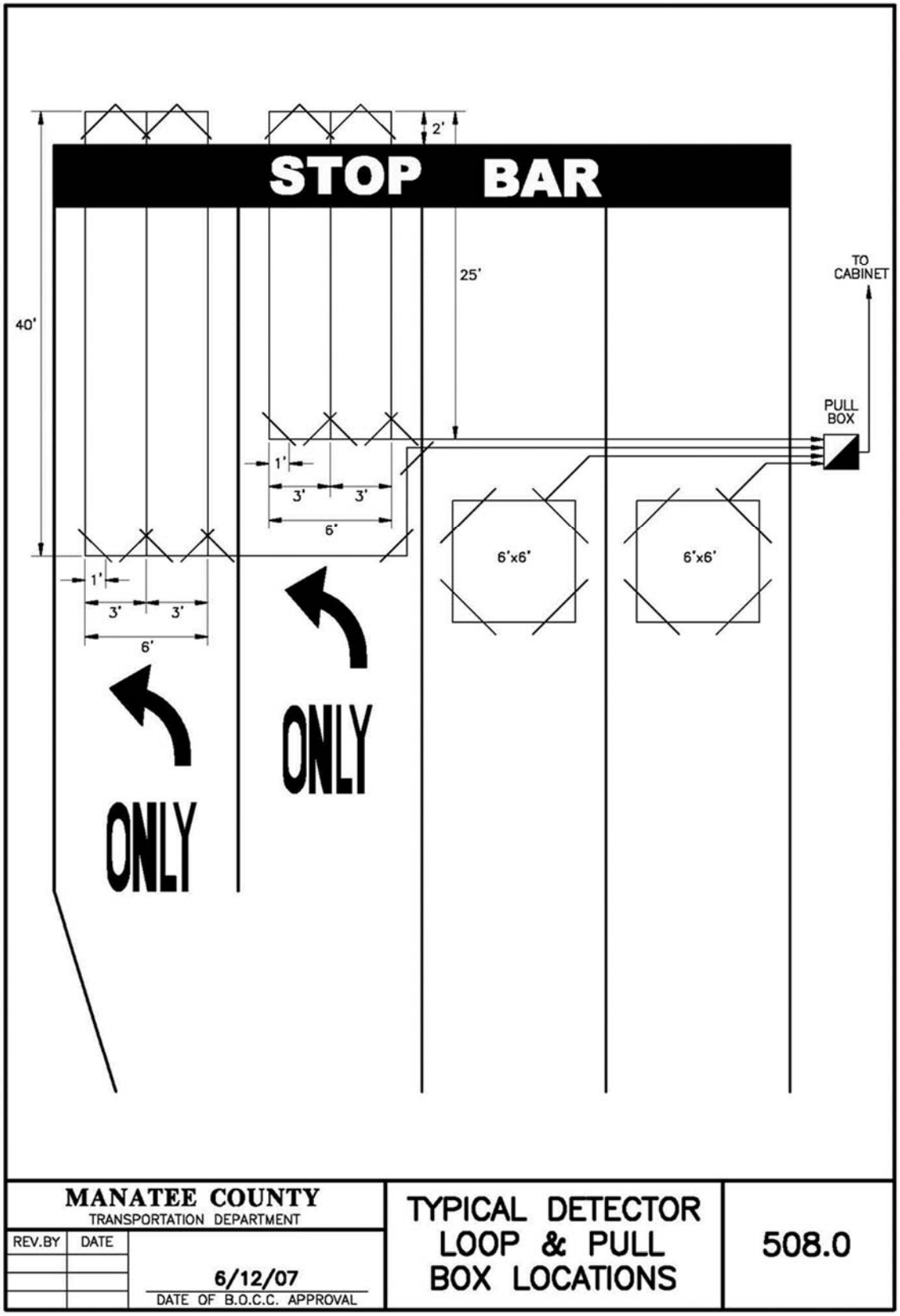
A. Sheet 505.0, Controller Cabinet Base



B. Sheet 506.0, Controller Cabinet Base Pipe Layout

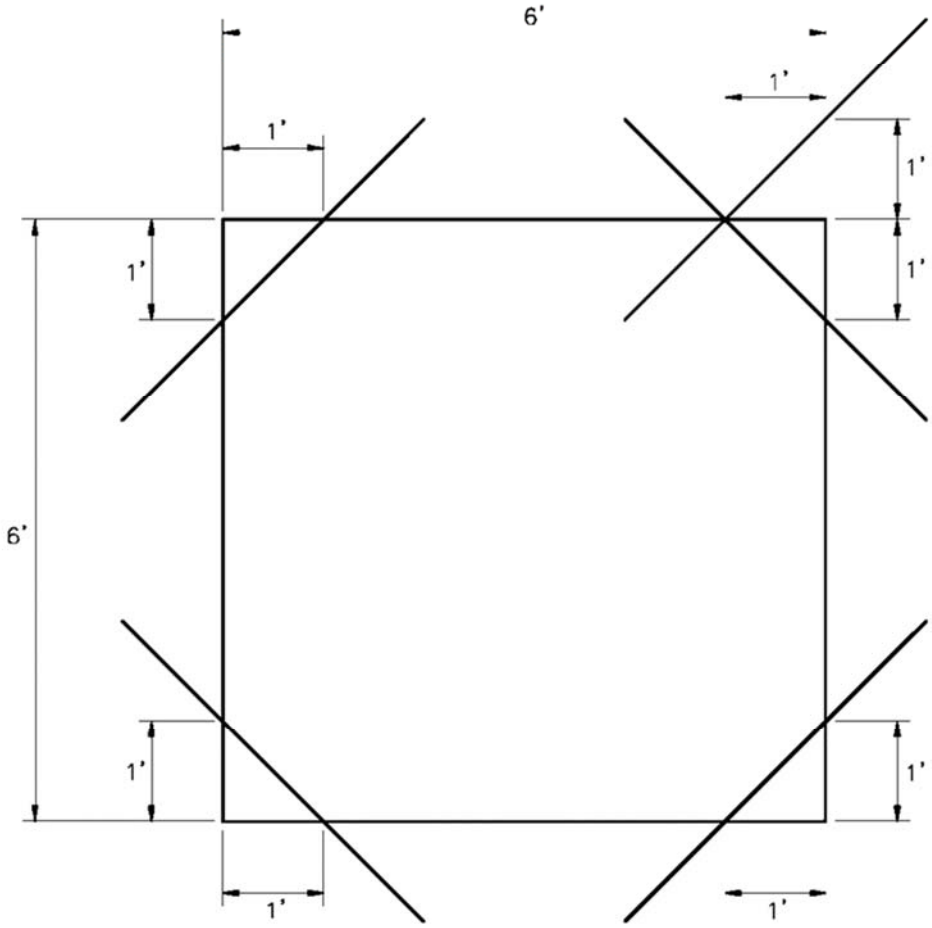


C. Sheet 508.0. Typical Detector Loop & Pull Box Locations



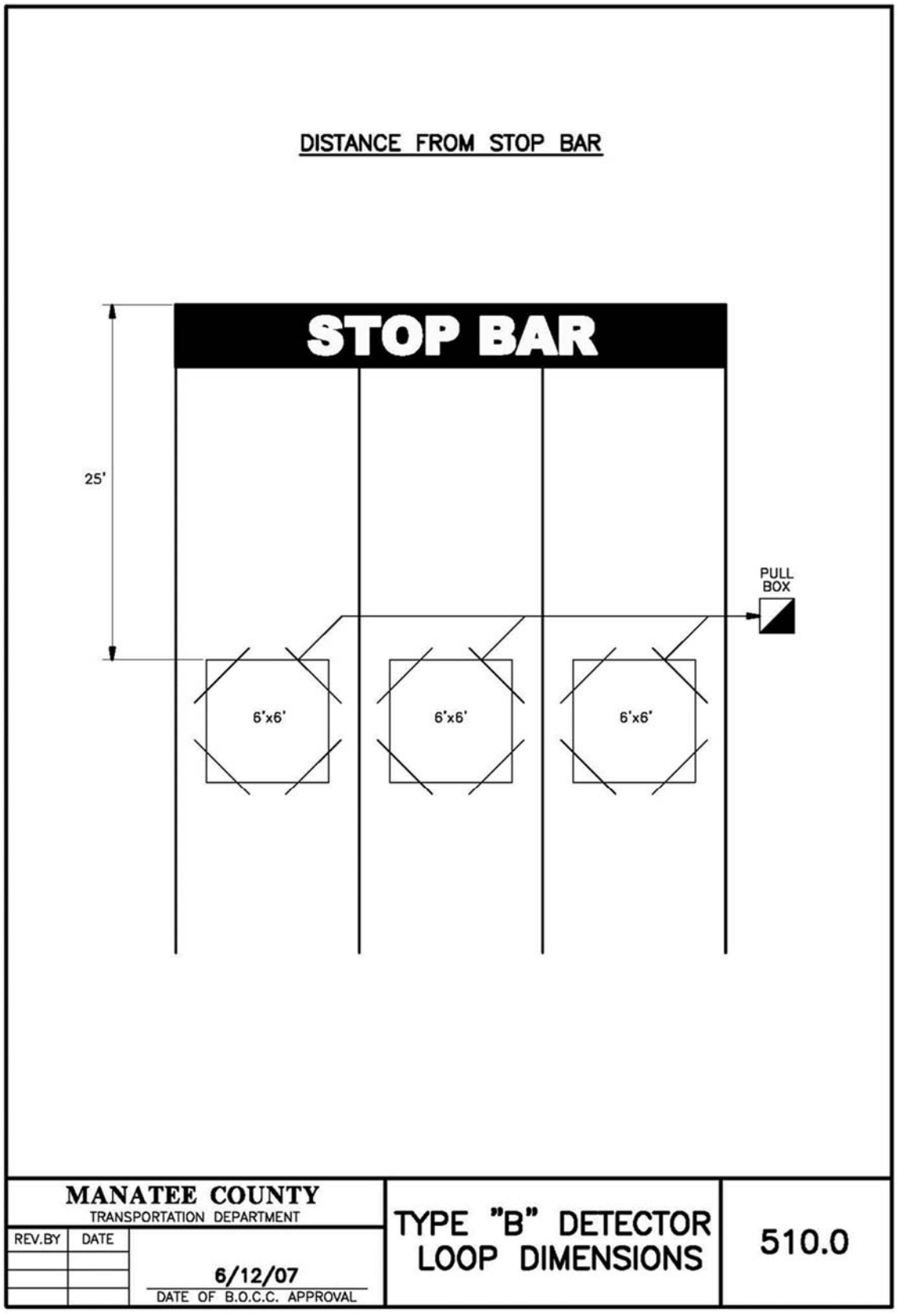
D. Sheet 509.0. Type “B” 6’x6’ Detector Loop

1) LEAD–IN FROM TOP.
2) THREE TURNS OF XHHW PER LOOP.

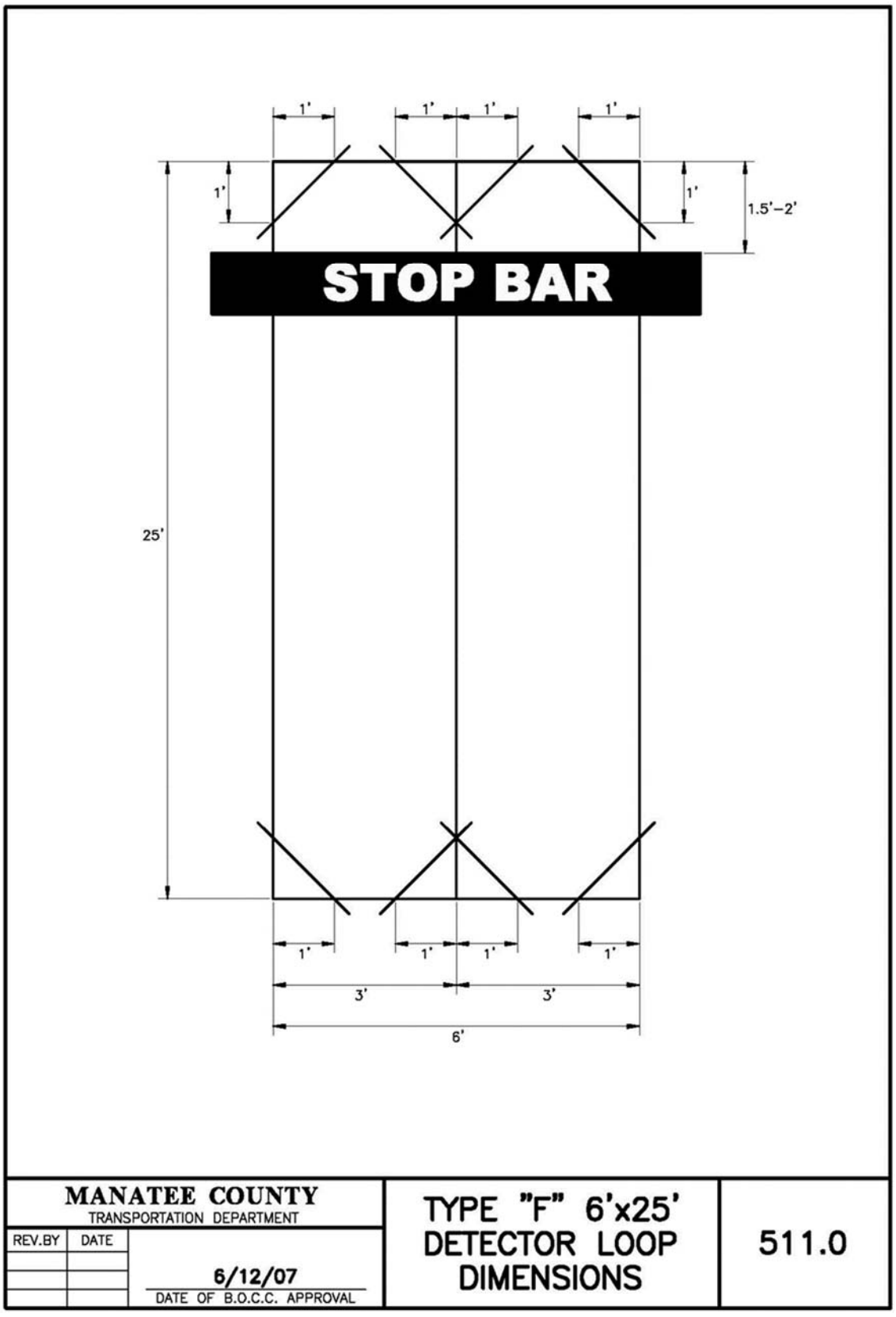


MANATEE COUNTY TRANSPORTATION DEPARTMENT			TYPE "B" 6'x6' DETECTOR LOOP	509.0
REV. BY	DATE	6/12/07 DATE OF B.O.C.C. APPROVAL		

E. Sheet 510.0. Type “B” Detector Loop Dimensions



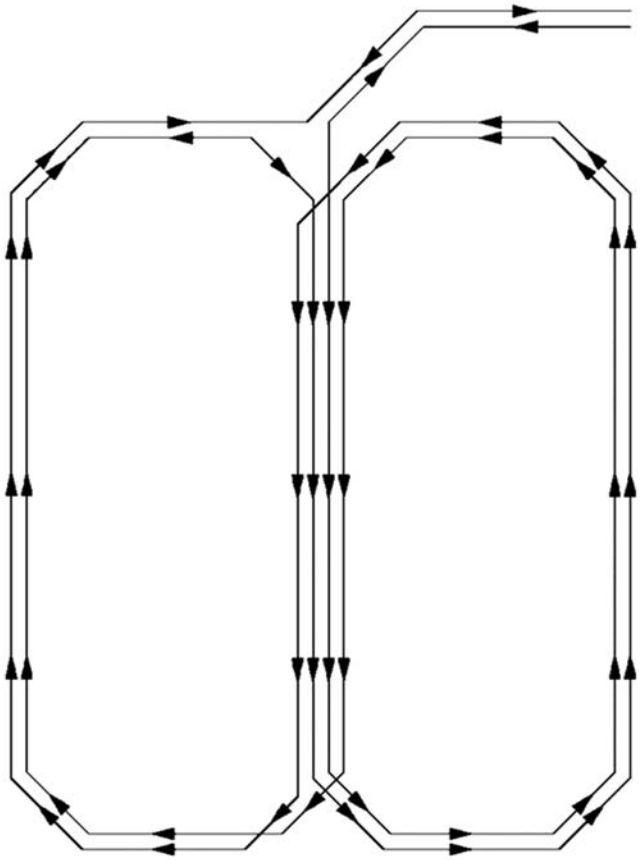
F. Sheet 511.0. Type “F” 6’x25’ Detector Loop Dimensions



G. Sheet 512.0. Type “F” 6’x25’ Detector Wiring Diagram

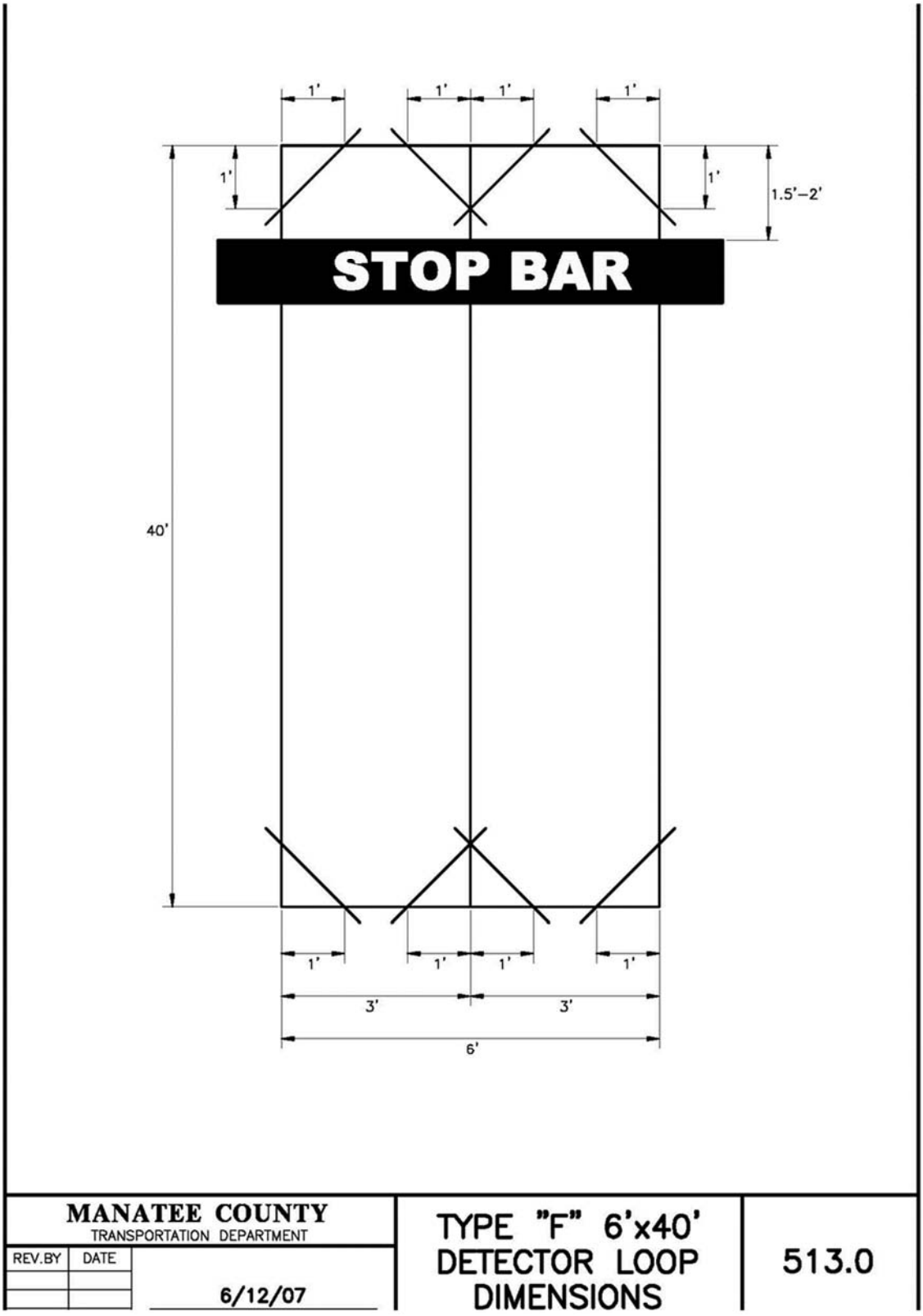
TYPE "F" 6'x25' DETECTOR LOOP WIRING DIAGRAM

1) TYPE "F" LOOP WITH LEAD–IN FROM CENTER.
2) FOUR WIRES IN CENTER SLOT MUST GO IN SAME DIRECTION.
3) TWO WIRES IN OUTSIDE SLOTS MUST GO IN SAME DIRECTION.



MANATEE COUNTY TRANSPORTATION DEPARTMENT			TYPE "F" 6'x25' DETECTOR LOOP WIRING DIAGRAM	512.0
REV.BY	DATE	6/12/07 DATE OF B.O.C.C. APPROVAL		

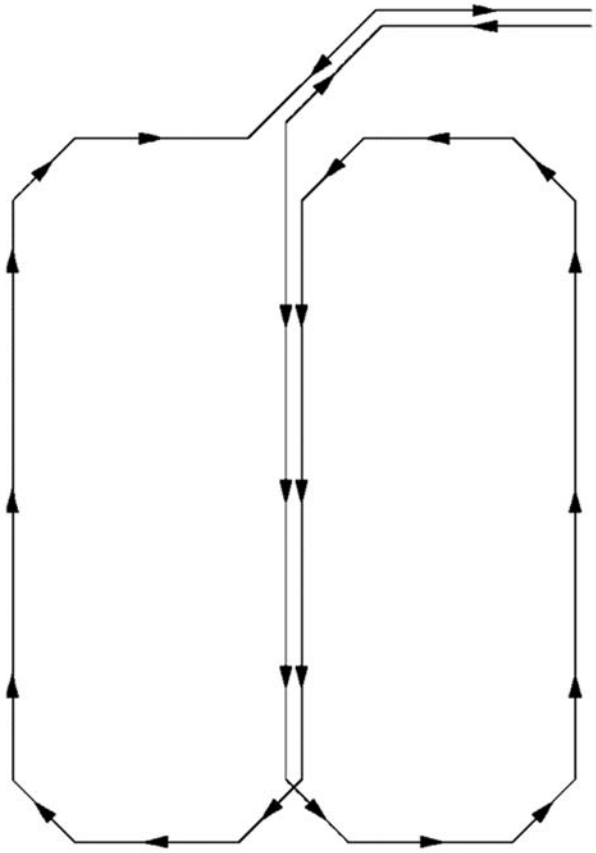
H. Sheet 513.0. Type “F” 6’x40’ Detector Loop Dimensions



I. Sheet 514.0. Type “F” 6’x40’ Detector Loop Wiring Diagram

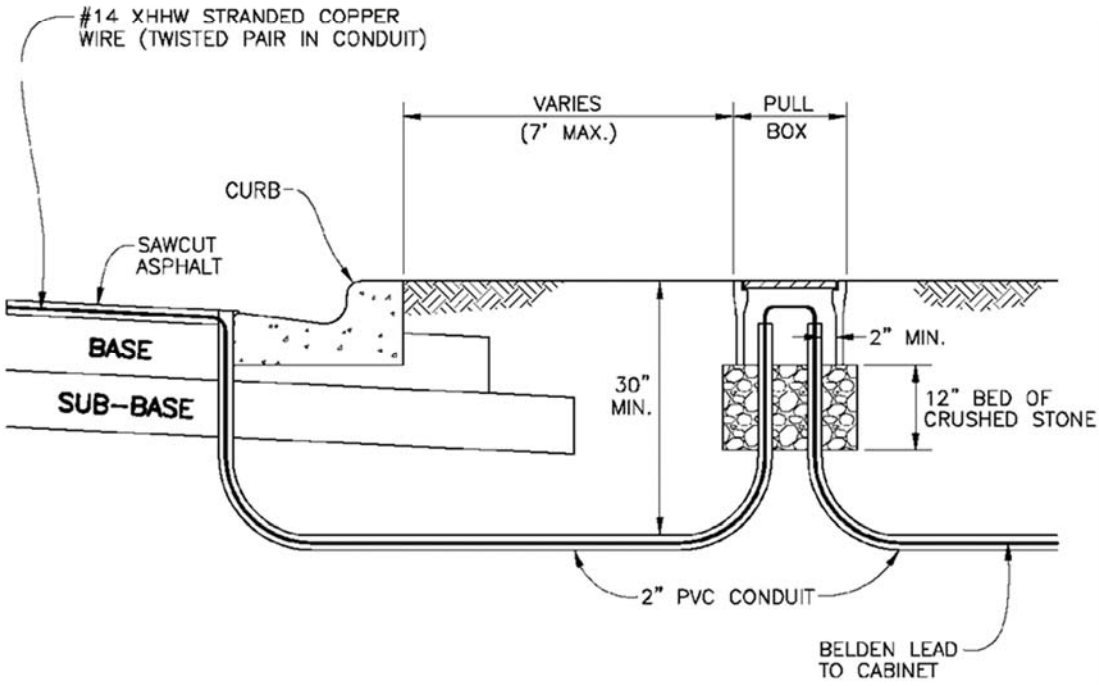
TYPE "F" 6'x40' DETECTOR LOOP WIRING DIAGRAM

1) TYPE "F" LOOP WITH LEAD–IN FROM CENTER.
2) TWO WIRES IN CENTER SLOT MUST GO IN SAME DIRECTION.
3) ONE WIRE IN OUTSIDE SLOTS MUST GO IN SAME DIRECTION.



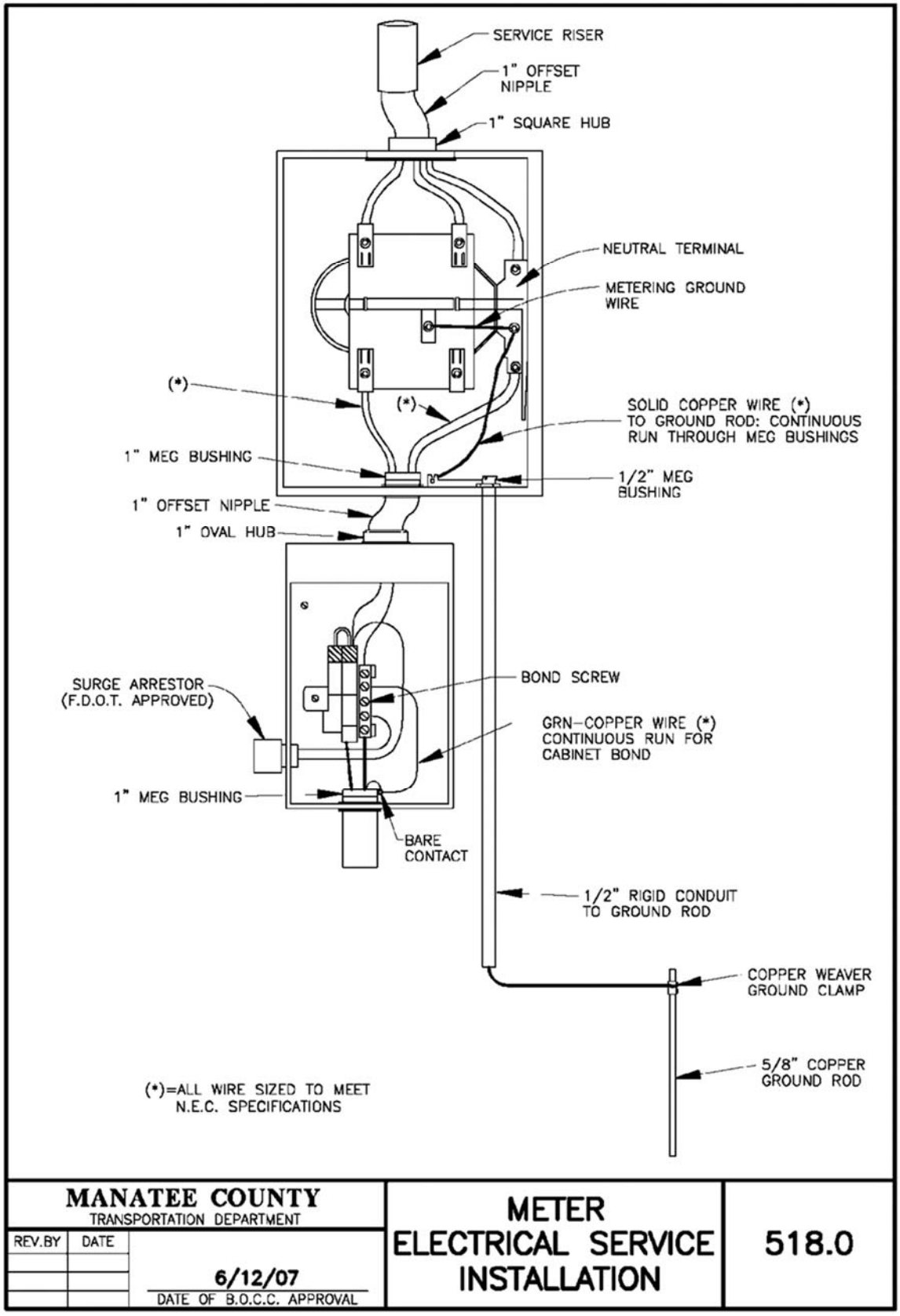
MANATEE COUNTY TRANSPORTATION DEPARTMENT				
REV.BY	DATE	6/12/07 DATE OF B.O.C.C. APPROVAL	TYPE "F" 6'x40' DETECTOR LOOP WIRING DIAGRAM	514.0

J. **Sheet 515.0. Detector Loop Lead-In Installation**



MANATEE COUNTY TRANSPORTATION DEPARTMENT			DETECTOR LOOP LEAD–IN INSTALLATION	515.0
REV.BY	DATE	6/12/07 DATE OF B.O.C.C. APPROVAL		

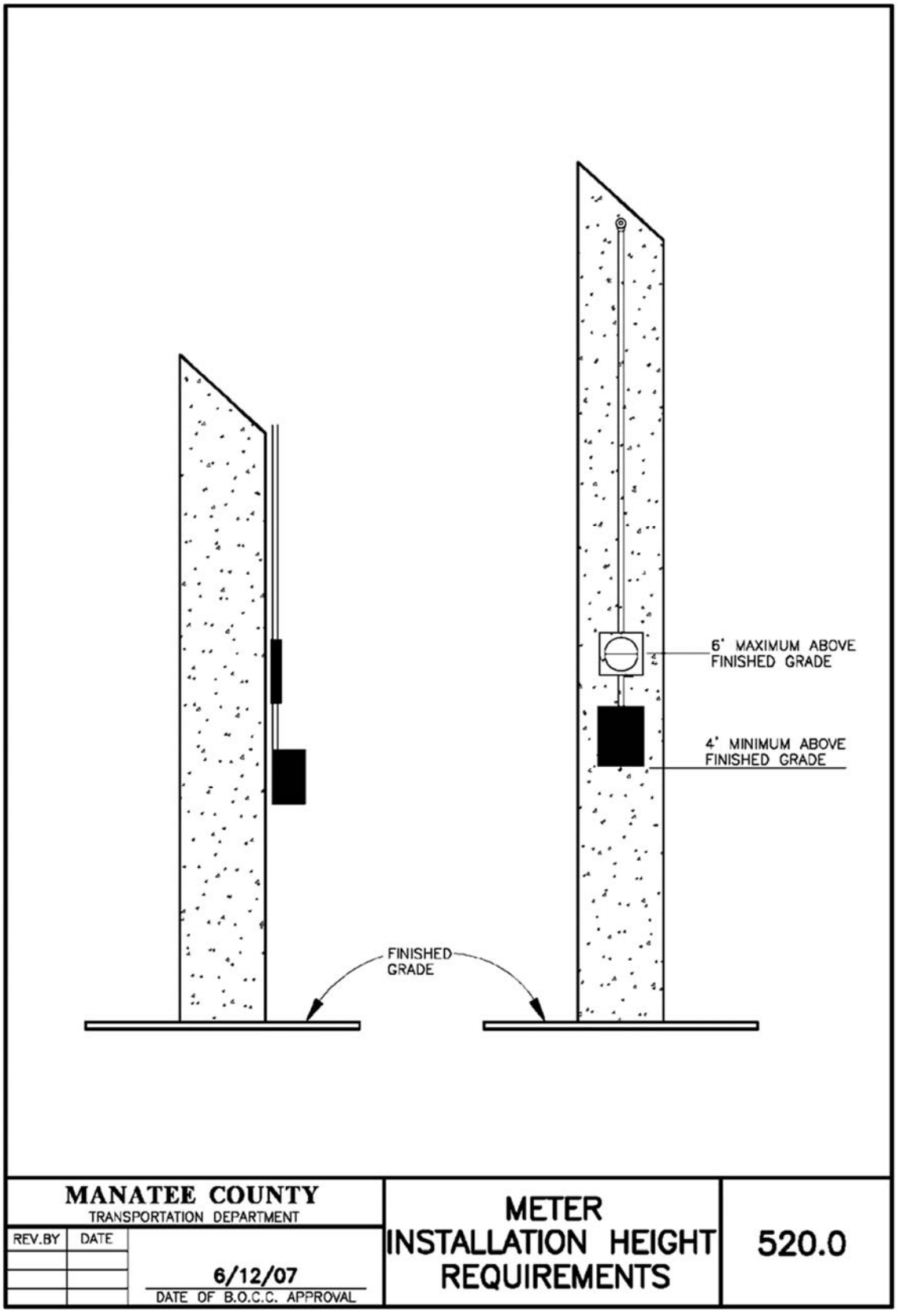
K. Sheet 518.0. Meter Electrical Service Installation



L. Sheet 519.0. Disconnect Electrical Service Installation

MISSING DIAGRAM

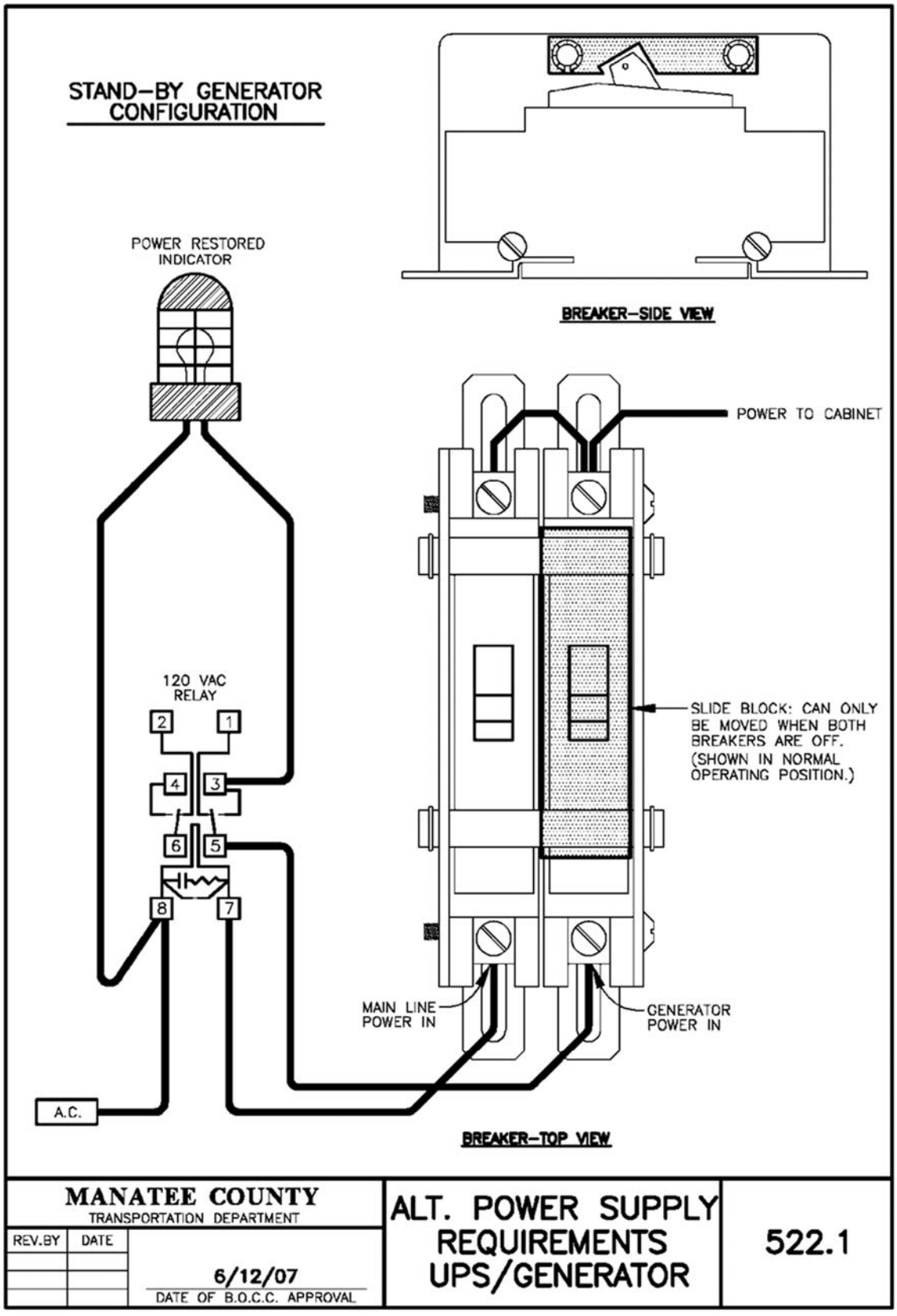
M. Sheet 520.0. Meter Installation Height Requirements



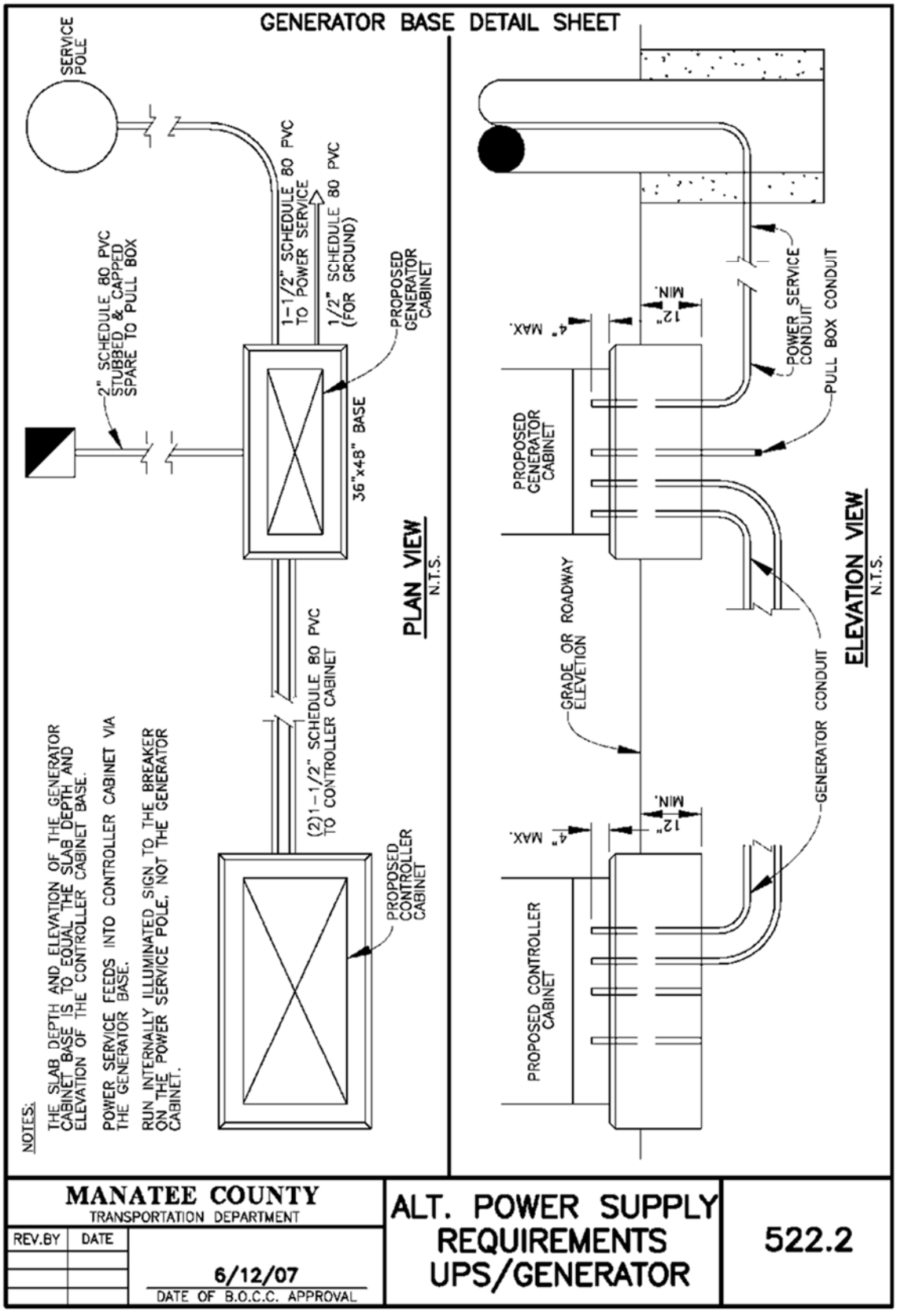
N. Sheet 521.0. Disconnect Installation Height Requirements

MISSING DIAGRAM

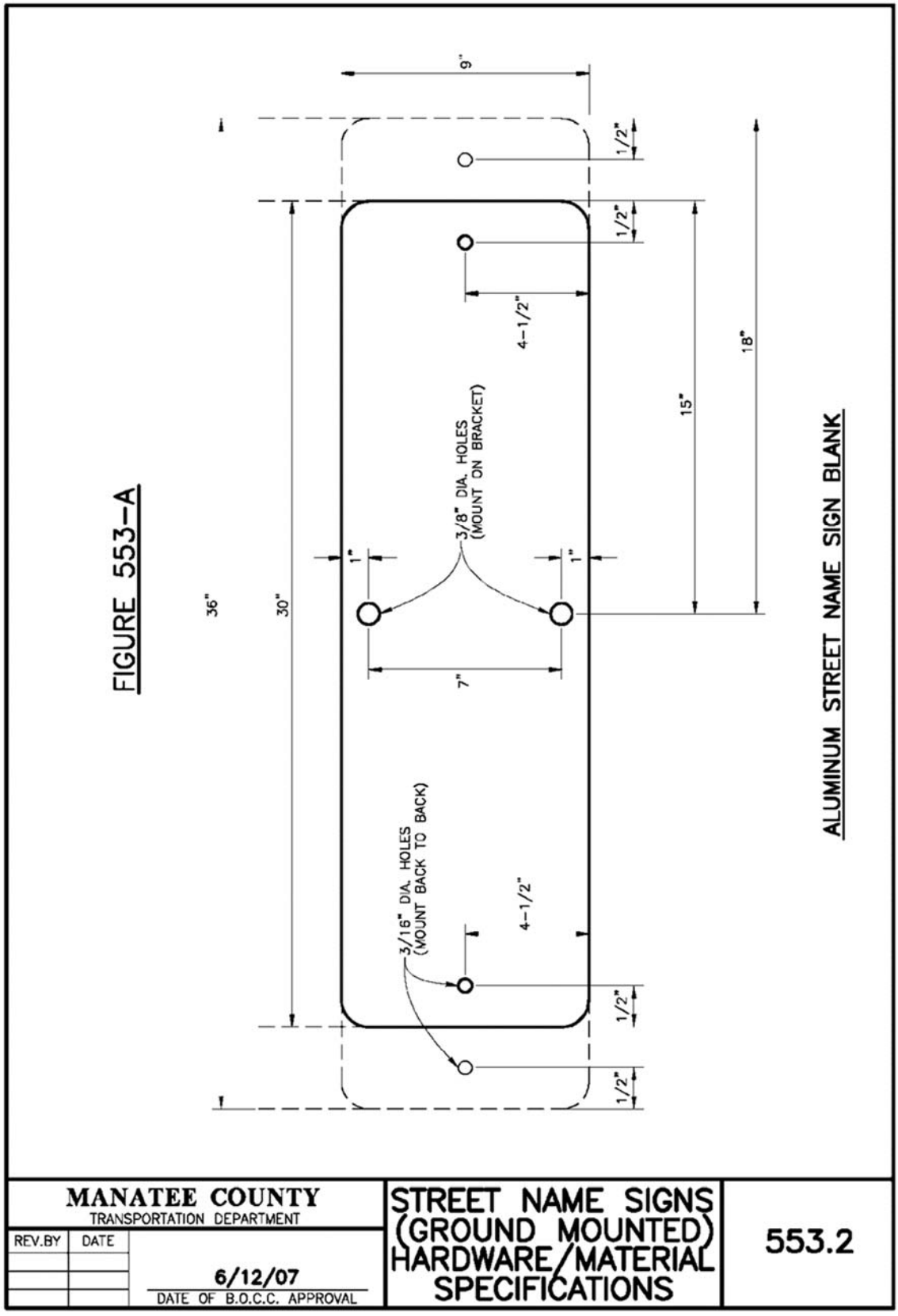
O. Sheet 522.1. Alt. Power Supply Requirements UPS/Generator



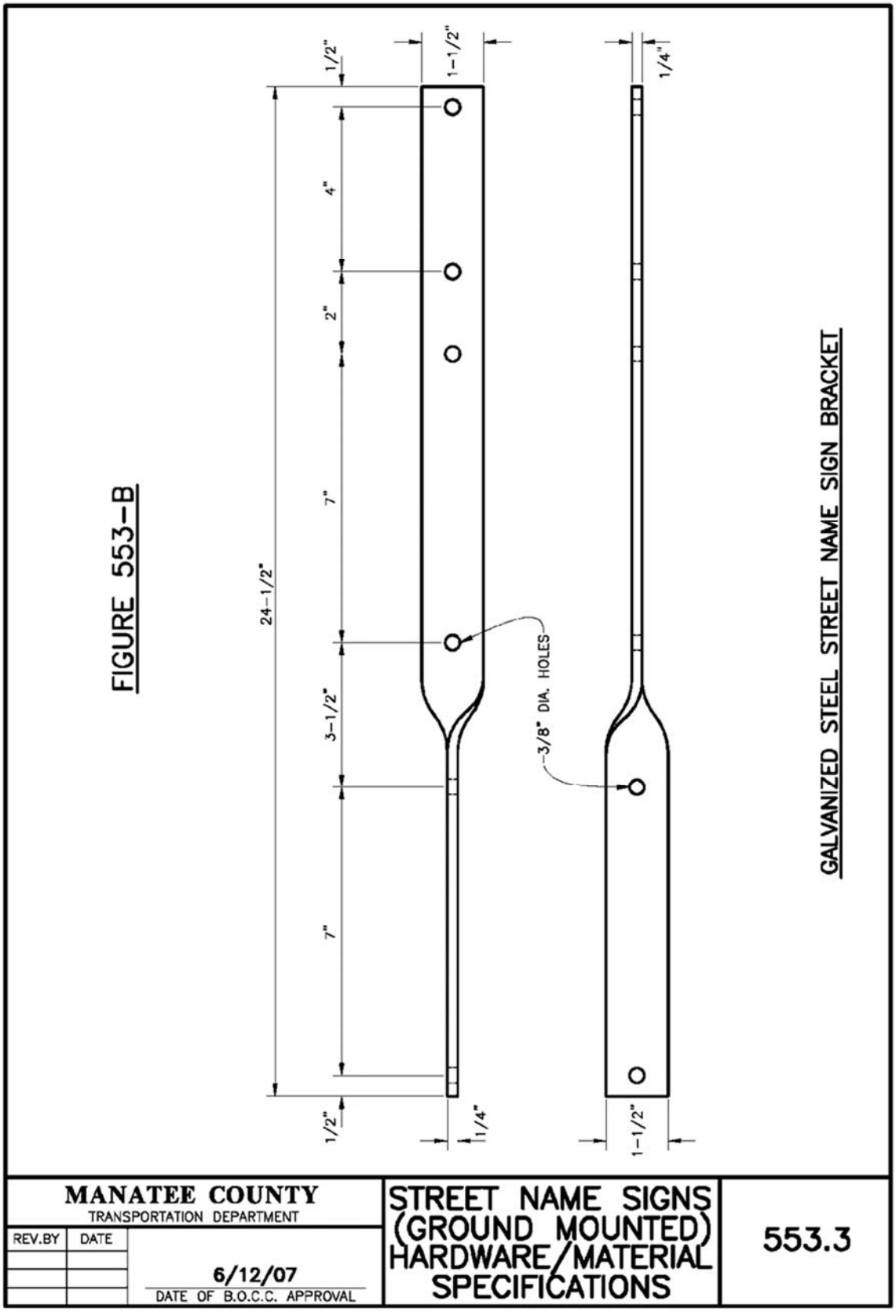
P. Sheet 522.2. Alt. Power Supply Requirements UPS/Generator



Q. Sheet 553.2. Street Name Signs (Ground Mounted) Hardware/Material Specifications (Figure A)



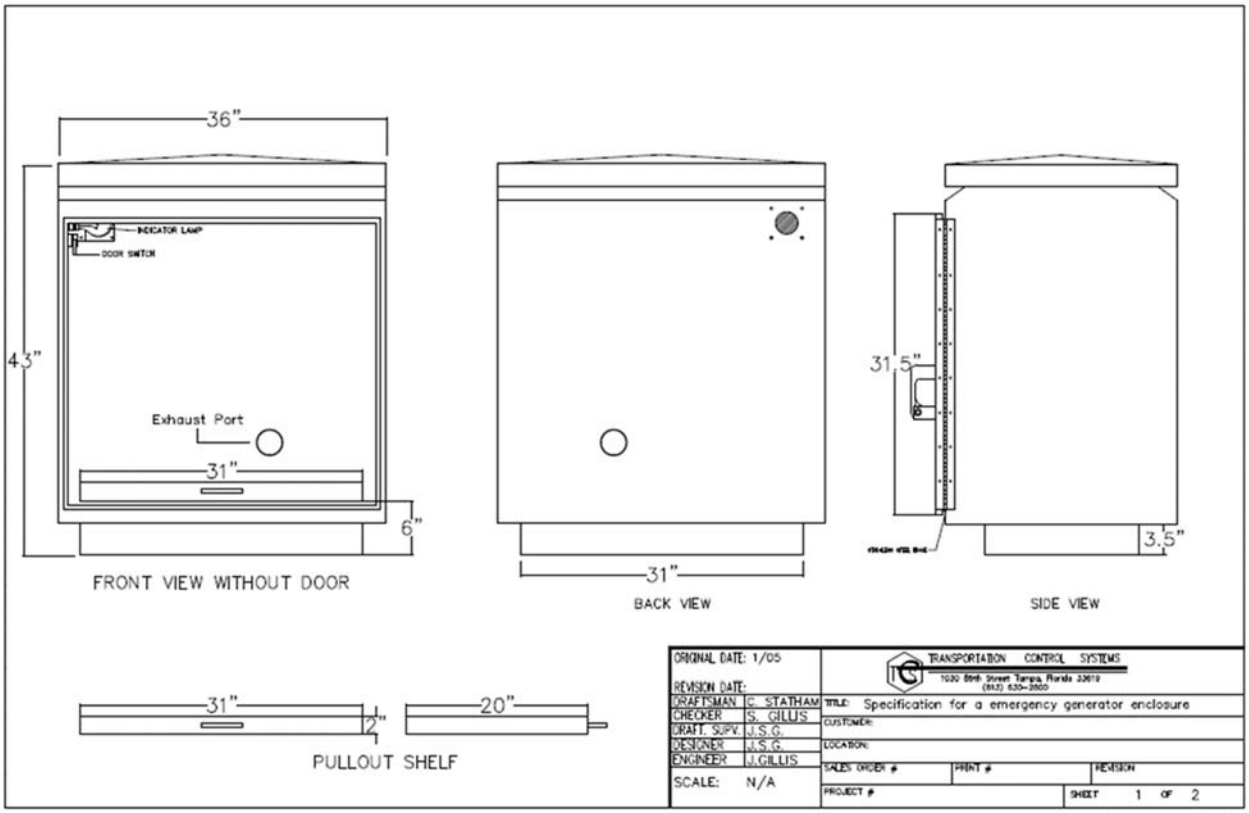
R. Sheet 553.3. Street Name Signs (Ground Mounted) Hardware/Material Specifications (Figure B)

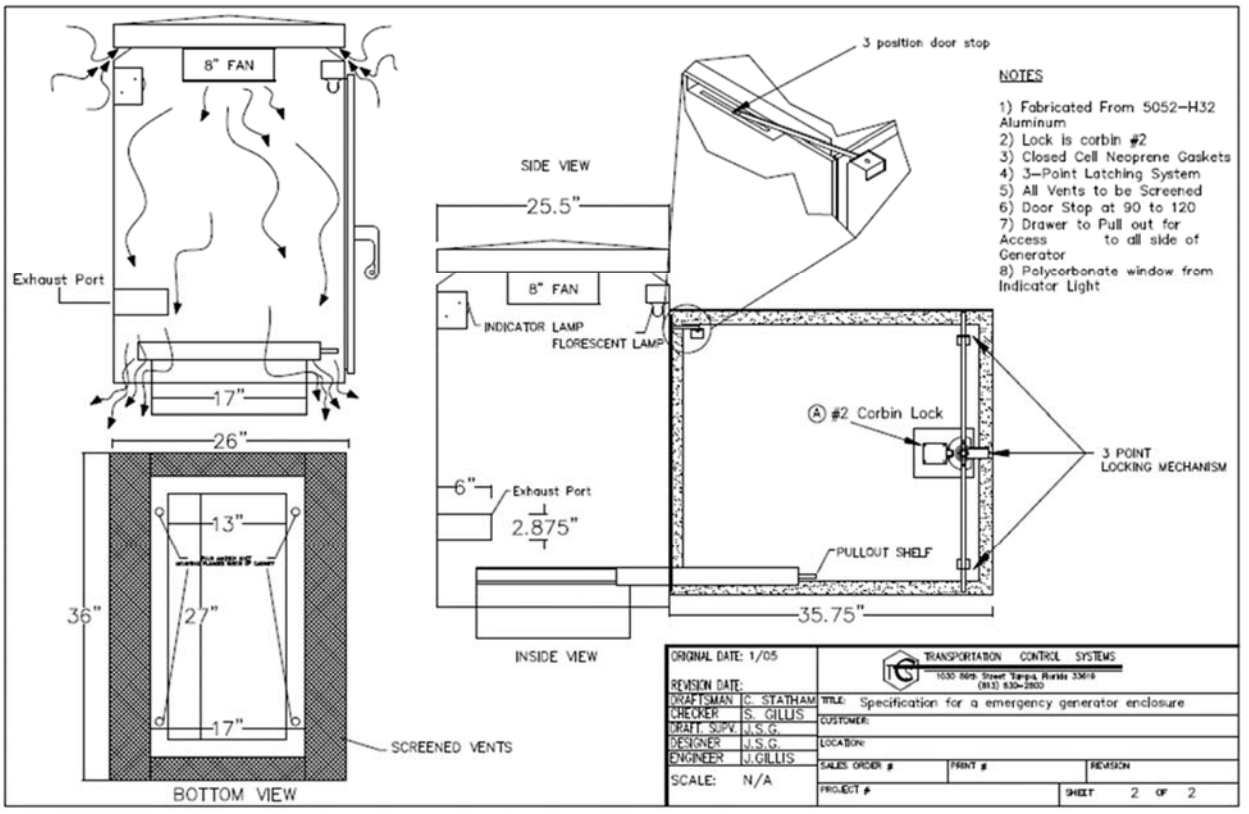


S. Controller Cabinet Specifications

Controller Cabinet	• Naztec TS2 Type 1 Cabinet • TS2 Type 1, 4 – Port Secondary Controller Assembly, Ethernet enabled • P-44 Cabinet Assembly 7006-TS2/FL - Type 5 as shown in table 7-1 of the 2003 NEMA Standard TS2 publication (W 30" x H 48" x D 16"). • Shall be fully compatible with Manatee County's Advanced Traffic Management System (ATMS), Naztec's ATMS.NOW. • Shall be wired for SOP 10 regardless of the proposed signal operation at the intersection. (Controller shall be programmed according to the proposed SOP as shown on the traffic signal plan.) **<u>Shall come equipped with:</u>** • 1 ea - MMU Model 516L-E w/ Ethernet • 1 ea - Ruggedcom Switch Model Number RS900 HI-D-C2-C2-00 w/ components and accessories necessary for integration into an Ethernet-based fiber optic network. • 3 ea - TS2 BIU Model 130 • 16 ea – NEMA Load Switches • 1 ea – NEMA Flasher • 6 ea – Flash Transfer Relays • 1 ea – Luminaire interface on power panel • 1 ea – TS2 Cabinet Power Supply • 1 ea – 16 Channel Detector Rack (If two detector racks are necessary (greater than 16 sensors), a Type 6 cabinet shall be provided.) • 1 ea – Opticom Rack for 1 754 4-channel or 752 2-channel cards • 1 ea – 16 Channel Loop Detector Panel w/ 16 SRA-6LC Surge Arrestors • 1 set – FL DOT Spec Load Resistors for Back Panel • 1 ea – Ball Bearing Roller Drawer • 1 ea – GPS Clock Synchronizer • 1 ea – Generator Plug In Module • 1 ea – Interface Panel (Fiber interface panel, 12 position mounted in cabinet with cables to switch) • 1 ea – Telemetry Transceiver (Ethernet Switch, includes connection between switch and controller) **Controller Cabinet - General Specifications Continued:** • 1 ea – Back Door (All controller cabinets shall have a front and back access door.) • 1 ea – Additional Neutral / Grounding bar w/ a minimum of 32 termination points • 2 ea – TS2 Time/ Delay 2-Channel Detector •
Controller	• All signal controller cabinets shall be NEMA TS2 type 1 as described in the 2003 NEMA Standard TS2 publication. • The controller supplied with the cabinet shall be a Naztec 980 TS2 type 1. • The Naztec 980 controller shall come equipped with 4 serial ports and one Ethernet port.

Uninterruptable Power Supply (UPS)	• Provide (1) one uninterruptable power supply (UPS) Model No. Alpha FXM 1100 equipped with an Ethernet port. • All uninterruptable power supplies shall support SNMP (protocol) for remote monitoring and management. • The UPS shall be sized to accommodate the maximum connected load. • The battery bank shall be sized to provide a minimum 4 hours run time under full load. • The UPS shall be mounted to the side of the traffic signal controller cabinet, the side of the power service pedestal or on its own pedestal.
Generator Cabinet	• When specified, Traffic Signal shall be equipped for auxiliary generator operations for use in periods of long power outages • The generator cabinet shall be compatible with Manatee County's generator/ inverter back up program. • The cabinet shall be capable of operating a Yamaha YG2800i inverter or similar model and design with the capability of providing a power to operate the traffic signal, controller cabinet and all peripheral equipment housed therein, excluding lighting circuits such as illuminated street name signs and street lighting. • The controller panel shall contain a dual 40 Amp circuit breaker assembly with a mechanical device to allow only one circuit breaker to be set at any one time. • The mechanical device shall require that both circuit breakers be placed in the off position before a transfer from one breaker to the other can occur. • The cabinet generator power connectors shall be marinco 6371E1 Male, rated for 50 Amps at 125 Volts, 3 wire • See attached design below


36"
INDICATOR LAMP
DOOR SWITCH
43"
Exhaust Port
31"
6"
FRONT VIEW WITHOUT DOOR
31"
BACK VIEW
31.5"
3.5"
SIDE VIEW
31"
2"
20"
PULLOUT SHELF
ORIGINAL DATE: 1/05
REVISION DATE:
DRAFTSMAN C. STATHAM
CHECKER S. GILLIS
DRAFT. SUPV. J.S.G.
DESIGNER J.S.G.
ENGINEER J.GILLIS
SCALE: N/A
TRANSPORTATION CONTROL SYSTEMS
1030 86th Street Tampa, Florida 33619
(813) 630-2800
TITLE: Specification for a emergency generator enclosure
CUSTOMER:
LOCATION:
SALES ORDER #
PRINT #
REVISION
PROJECT #
SHEET 1 OF 2


8" FAN
Exhaust Port
17"
26"
13"
27"
36"
17"
SCREENED VENTS
BOTTOM VIEW
SIDE VIEW
3 position door stop
25.5"
8" FAN
INDICATOR LAMP
FLORESCENT LAMP
Ⓐ #2 Corbin Lock
3 POINT
LOCKING MECHANISM
6"
Exhaust Port
2.875"
PULLOUT SHELF
35.75"
INSIDE VIEW
NOTES
1) Fabricated From 5052-H32 Aluminum
2) Lock is corbin #2
3) Closed Cell Neoprene Gaskets
4) 3-Point Latching System
5) All Vents to be Screened
6) Door Stop at 90 to 120
7) Drawer to Pull out for Access to all side of Generator
8) Polycorbonate window from Indicator Light
ORIGINAL DATE: 1/05
REVISION DATE:
DRAFTSMAN C. STATHAM
CHECKER S. GILLIS
DRAFT. SUPV. J.S.G.
DESIGNER J.S.G.
ENGINEER J.GILLIS
SCALE: N/A
TRANSPORTATION CONTROL SYSTEMS
1030 86th Street Tampa, Florida 33619
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CUSTOMER:
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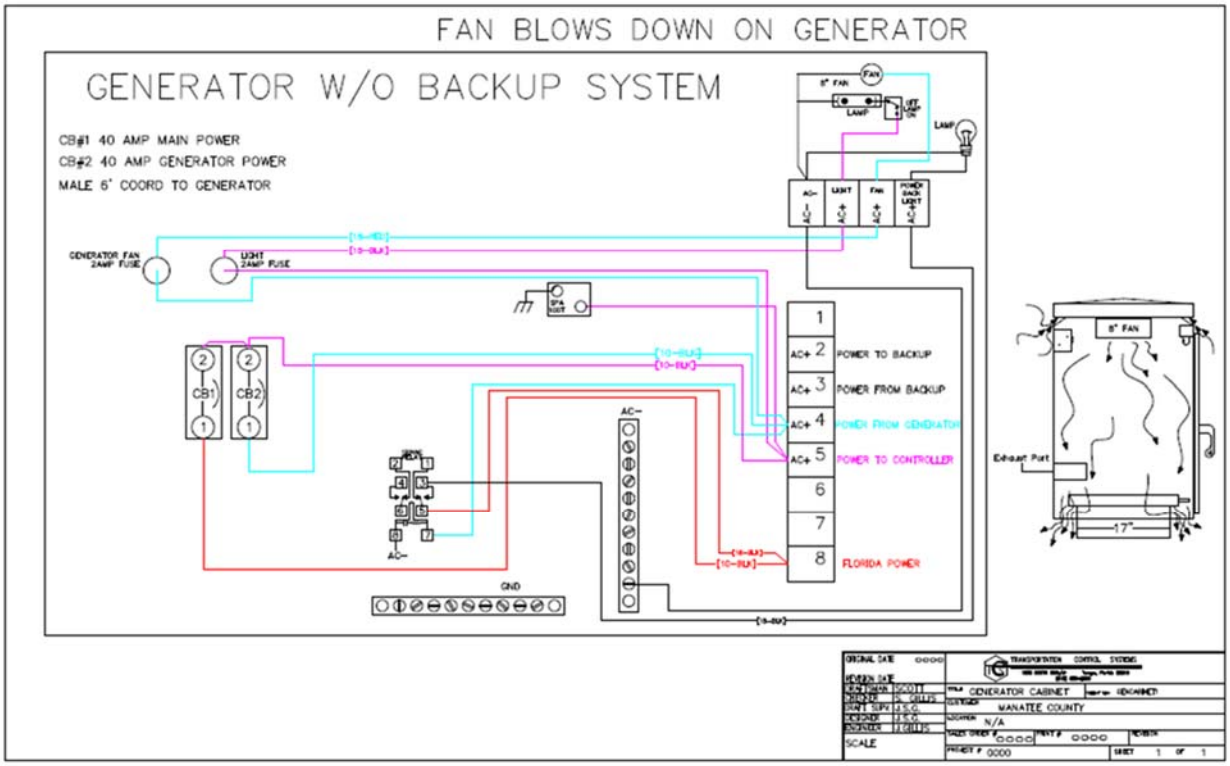
SHEET 2 OF 2


FAN BLOWS DOWN ON GENERATOR
GENERATOR W/O BACKUP SYSTEM
CB#1 40 AMP MAIN POWER
CB#2 40 AMP GENERATOR POWER
MALE 6' COORD TO GENERATOR
GENERATOR FAN 2AMP FUSE
LIGHT 2AMP FUSE
CB1
CB2
AC+ 2 POWER TO BACKUP
AC+ 3 POWER FROM BACKUP
AC+ 4 POWER FROM GENERATOR
AC+ 5 POWER TO CONTROLLER
6
7
8 FLORIDA POWER
AC-
GND
8" FAN
LAMP
Exhaust Port
17"
GENERATOR CABINET
MANATEE COUNTY
N/A