KEEP ON TOP OF YOUR AGENCY'S STANDARD OPERATING PROCEDURES

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Over the next decade, many of the nation's public works departments will experience the retirement of a substantial part of the generation of employees who started their careers in the 1970s and '80s. These employees represent a disproportionate share of the knowledge and expertise that currently exists in the workforce. They are often the mentors, coaches, and models for the remaining employees.

In most government agencies there is often an absence of any recognizable effort to document time-tested policies and procedures developed and used over the years by these retiring employees. The knowledge base essentially will be lost resulting in enormous labor and financial costs to the agency in delivering services to the general public.

How can a public works department plan strategically to minimize this knowledge or information drain? Typically, as we have found, most public works departments in the United States continue to provide cost-effective services using skilled teams of managers, engineers, and technicians, who through many years of experience have developed a set of "best practices." Oftentimes, however, these "best practices," made up of unwritten policies, procedures, and certain ways of accomplishing things remain in the staff member's head and are, for the most part, lost upon retirement.

Developing SOPs

Over the past two years, our team has worked with the Traffic Division staff from Florida's Hillsborough County public works department in an effort to identify and document current operating policies, procedures, work processes, and reporting methods. The overall objective of this effort was to develop a manual--the "Standard Operating Procedures" or "SOP"--containing the information to not only serve as a communications tool for all division staff, but also to share the staff's existing work knowledge with current and future employees. Further, the development of the SOP would greatly assist the division's efforts to transition to a centralized workspace for all employees over the next several years.

The division's SOP, was prepared using a variety of data and information sources including site visits to individual work units, interviews of key traffic division professional staff, and review of pertinent reports and organizational data. An outgrowth of this extensive effort resulted in the following key aspects:

- identification of the mission-essential function of each work group
- development of checklists of procedures
- details on existing division/department policies
- description of staffing and training needs
- determination of specialized software used by individual work groups
- reporting methods in terms of forms and templates
- development of process maps of everyday work activities
- identification of overall work plans

Once data and information were gathered and analyzed for each respective work area, a draft section of the SOP was prepared and shared with the work group for review and comment. This often required one or more follow up visits with key staff members to resolve questions and potential misinterpretations. In those cases, a revised draft was issued to both the individual work group and the division's management team to identify any inconsistencies or data/information gaps between the respective sections in the SOP. After final review and comment, the traffic division's SOP was issued in both paper and electronic form on the county intranet to enable easy access by all division staff members.

Phase II–Standardization

Typically, in most public works agencies forms and report templates have been developed by staff members to record field observations, issue findings, or make formal recommendations to their superiors on needed public improvements. These forms and report templates are often individually developed by a respective staff member, borrowing from his or her prior work experiences. These templates may work well for a

specific staff member, but with a lack of standardization at the agency level, it may be possible for staff members sitting side by side to be using entirely different formats and assumptions for data recording and reporting.

An outgrowth of the initial SOP study with the Hillsborough County Traffic Division was to develop standardized reporting forms and final report templates for mission-essential functions of the division. A study team interviewed key project managers within the division to determine the types of forms currently used. An Internet literature search was then conducted to identify best practices of similar county and city traffic agencies. Queries were then made of traffic professionals using a Web site maintained by the DOT . Using these data and information, new or revised forms and report templates were then developed. As of this writing, workshops are being conducted with the division's key staff members to issue final traffic reporting forms and reports for use by county staff.

Lessons Learned

The county's public works department currently is implementing a self-assessment accreditation program, as outlined by the American Public Works Association (APWA) Management Practice Manual. This work effort is part of the department's commitment to become an accredited agency under the highly regarded APWA program. The development of formal, written polices, procedures, and practices by the division, through the development of its SOP, ensures that the division and, ultimately, the department itself, has addressed and complies with the manual's recommended practice statements.

However, notwithstanding the ultimate goal of department-wide certification, the division's steady progress toward completing a written SOP already has enabled staff members to develop standardized reports using common templates, thereby reducing the learning curve and county training costs for new staff members entering the division. Current plans are to make continuous enhancements to the SOP so that it can truly become a working tool for the division's professional staff.

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Why Traffic SOP Project?

- Ongoing Effort by County Public Works to Complete APWA Self Assessment
- Traffic Division Had Been Focus of Efficiency Studies
- Lighting District Program SOP Partnered With Tampa Electric

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SOP Goals

- Document Existing Processes
- Organize Into Logical Sequence
- Standardization
- Communicate Information in Document Manual and on County Intranet
- Strengthen Staff Morale

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SOP Process

- Phase I – Data/Information Gathering
- Phase II – Group Interviews
- Phase III – Document Findings
- Phase IV – Comments on Draft SOP Manual
- Phase V – Print and Place on COIN

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Organization of the Traffic Division's SOP

- Overview of procedures
- Division organization
- Communication
- Contracts administration
- Intelligent transportation systems
- Investigations
- Markings
- School safety
- Signals
- Storeroom
- Street lighting
- Traffic calming
- Traffic engineering
- Traffic studies
- Data management
- Miscellaneous forms
- Software model documentation
- Summaries of standard models

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Key Traffic Forms and Reports

- Signal warrants
- Left-hand signal phasing
- Dead-end street treatment
- Speed studies
- Corridor reports
- Multi-way stops
- No parking sign process
- Dangerous curve reports
- School safety
- Mid-block crosswalks

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Investigations Group Process Flows

Figure 6-1
Investigations Group Process Flow

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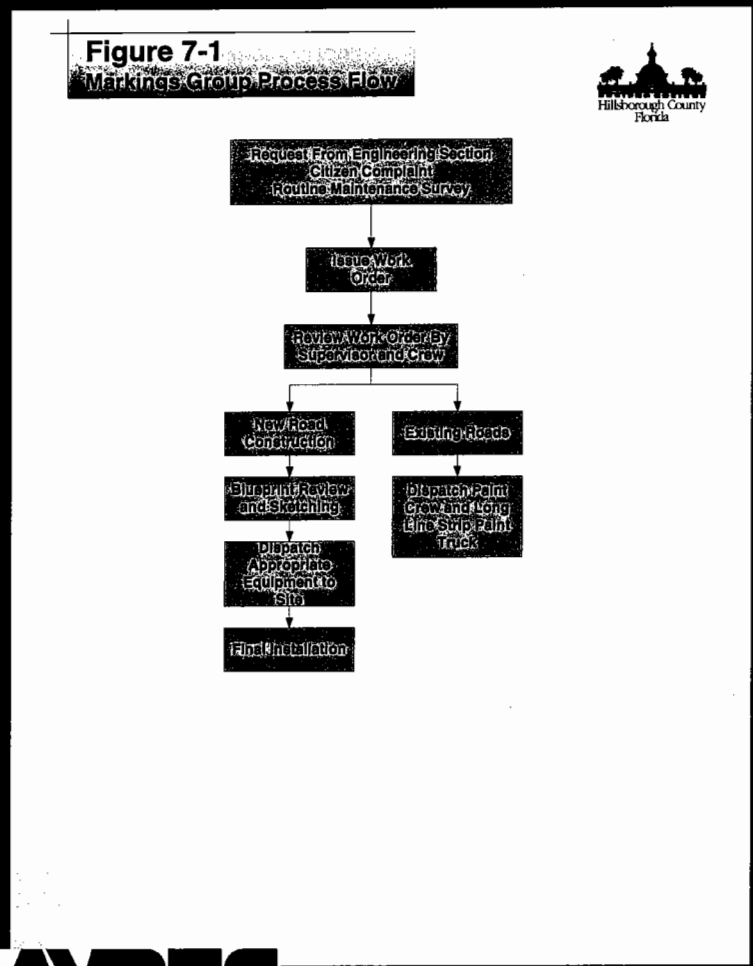
Markings Group Process Flows



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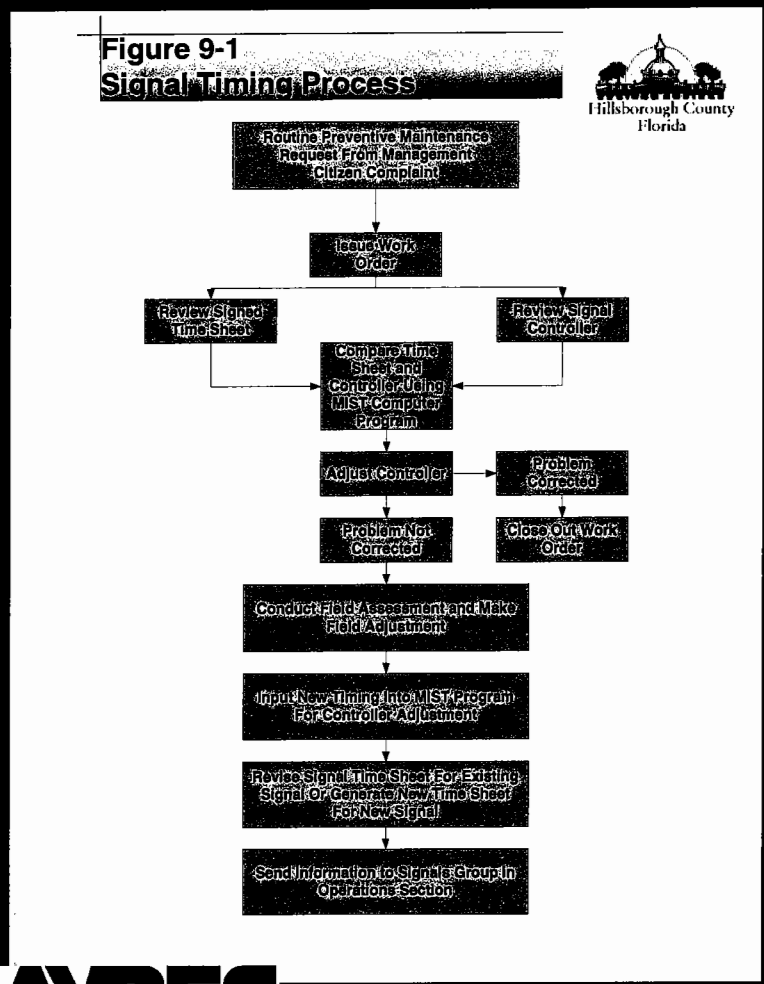
Signal Timing Group Work Process



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SOP Report

Mission

Process

Staffing

Training

SECTION 9.0
SIGNALS

9.1 Mission Essential Function

The Signals Group is divided into two subgroups located within the Engineering and Operations Sections of the Traffic Division. The subgroup within the Engineering Section is responsible for developing and maintaining signal timings in unincorporated Hillsborough County, signal engineering, and maintenance and operation of the Traffic Management Center. The subgroup within the Operations Section is responsible for the installation and maintenance of traffic signals and streetlights in unincorporated Hillsborough County.

9.2 General Procedures and Policies

As illustrated in Figure 9-1, the work for this Group is generated through the following sources:

1 Requests from management;
2 Administrative referrals of citizen complaints; and
3 Routine preventive maintenance.

9.2.1 Signal Timings

As noted above, the Group is responsible for fielding complaints relating to signal timing issues. These average two to three complaints per day. When a complaint is received, the signal time sheet (Form 9-1) is reviewed for the signal in question. The information from the signal time sheet and signal controller is then compared using the MIST computer program (see Appendix A). If there is any discrepancy (signal controller information does not match the signal time sheet), the correct timing is made to the controller using MIST and the complaint is closed out. If this does not correct the problem, a field assessment is conducted and a field adjustment is made. Typically, several field trips are required.

The field time adjustment is then entered into MIST to revise the signal controller setting (see Form 9-2). The signal time sheet is corrected and the information is sent to the Operations Signal Group. New signals follow the same procedure with the exception of a new signal time sheet being generated.

The Group also performs yearly site visits to each signalized intersection within the County (408 in 2001), and evaluates signal-timing operation and look for deficiencies at intersection (poor pavement markings, malfunctioning detectors, inappropriate signage, etc.). This information is then used to biannually evaluate the signal coordinate systems for arterial intersections. The group also assists with Signal Engineering and the operation of the Traffic Management Center.

9.2.2 Signal Engineering

The Group is also responsible for conceptual design and improvements at signalized intersections to improve traffic level of service. It performs traffic modeling and animation using collected field data, review and approves consultant's signal design, review flash operation warrants, left turn signal warrants and travel time delay studies. This Group is also responsible for computer software review and updates to accommodate FHWA policy changes. The Group provides technical support to the Intersection Improvements Program and ITS Program. Lastly, this group assists with signal timings and operation of the TMC, which is described in the paragraphs below.

9.2.3 Traffic Management Center

This Group is responsible for the operation and maintenance of the TMC. This includes daily review of the fiber optic management system, the monitoring, maintenance and repair (when necessary), of the closed circuit (IS) camera system, monitoring the MIST computer system for failures, and maintaining the LAN system for MIST. Twice weekly, the group takes requests from consultants and contractors for signal timing data and answers any technical questions as well as consults and interfaces on ITS projects.

1.1.1 Signals (Operations Group)

The installation and maintenance of traffic signals and streetlights are divided regionally into three field crews: southeast county, northwest county, and utilities (Opticon preemption device for emergency vehicles, communications maintenance). There is also an in-house bench technician. All staff work four 10-hour days, however, there is rotating 24-hour on-call maintenance coverage. The field crew's routine preventive maintenance program includes signal relamping and maintenance (including school flashers and flasher time clocks), signal upgrades, streetlight installations and maintenance (operating survey performed in evening). The bench technician and/or supervisor maintains the stores list and ordering of equipment, develops maintenance vehicle specifications (tower and bucket trucks), and maintains a signal spreadsheet on County and State roads, and streetlight knockdowns. The supervisor is also responsible for administration and monitoring of term contract work order projects for signals and streetlights and developing a work program for signal maintenance using the County inventory (HANSEN System) results.

9.3 Staffing and Training

The Signals Group located within the Engineering Section at present consists of the following staff complement: two Engineering Technician II and one Electronics Technician III. There is currently a vacant Signals Supervisor's position. The Signals Supervisor's position would report directly to the Supervisor of the Engineering Section. All positions within the group are taught by OJT. The Electronics Technician III is a graduate of an electronics technical school, worked eight years as a signals technician and is certified by the International Municipal Signals Association (IMSA) as a Signals Technician, Level III. One of the Signal Technician II is also certified by IMSA as a Signal Technician, Level II.

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SOP Studies and Software

The Signals Group located within the Operations Section consists of twelve (12) Signal Technicians I, II and III and one supervisor who reports directly to the Supervisor of the Operations Section. The majority of the Signal Technicians have technical school or military backgrounds in either electronics or electrical systems. 80 percent of the roadway applications for the Signal Technician is on-the-job (OJT) training. 20 percent is training and certification by IMSA. The Signal Technician I assists the Signal Technician II and III in the field. After six months the Technician I is given a skills test, which must be passed before a promotion (when open), to Technician II. The Signal Technician II performs hands-on trouble-shooting, maintenance and installations. He is also given a skills test at the end of six months, which must be passed before promotion (when open), to Technician III. The Signal Technician III functions as a crew leader.

Standards

9.4 Standards Utilized

General standards utilized are those presented by the Association of State Highway and Transportation Officials (ASHTO), Federal Highway Administration (FHWA), U.S. Department of Transportation (U.S. DOT), Florida Department of Transportation (FDOT), National Electric Codes (NEC), Tampa Electric Company specifications, and standards developed by the Division.

Equipment

9.5 Inventory of Tool and Equipment

The following sections provide an inventory of tools and equipment used by the Group.

9.5.1 Signals Group (Engineering Section):

1 Global Positioning System (GPS) Instruments;
2 Distance Measuring Instruments (DMI);
3 High Profile Vehicles (4-Wheel Drive);
4 Conflict Monitor and Loop Detectors;
5 Volt-Ohm Multimeters;
6 Oscilloscopes;
7 Signal Generators;
8 Fiber Optic Light Metering and Testing Equipment;
9 Optical Time Demand Meters; and
10 Personal Computer

Studies

9.5.2 Signals Group (Operations Section):

- Volt-Ohm Multimeters;
- Decibel Meters;
- Time Domain Reflectometers (TDR);
- Optical Time Domain Reflectometers (OTDR);
- Meg Ohm Meters;
- [illegible]pes;
- [illegible]d Tower Trucks;

Software

9.6 Specialized Software

The following paragraphs list the current software used by the Group. Appendix A contains more detailed descriptions of these programs.

9.6.1 Signals Group (Engineering Section)

1 HCS 2000 (2000 Highway Capacity Manual, Signalized Intersection;
2 TS/PP Draft (Time-Space and platoon progression diagrams for arterial roads);
3 MIST (Management Information System for Traffic);
4 Novell LAN (Local Area Network);
5 SQL (Database Software);
6 OS2 WARP;
7 TPAK;
8 ART-TAB (Arterial Tabulation to determine function class based on level of service);
9 CORSIM/TRAFVU (Microscopic simulation of traffic flow on urban streets with simulation and output graphic processor);
10 LMD Series (Software/Interface LMD8000/9200 Traffic Controller);
11 NOSTOP (Illustrates two-way maximum bandwidth optimization (coordination of intersections));
12 PASSER II-90 (Analysis of individual signalized intersections and progression operations along an arterial road;
13 PASSER III-98 (Analysis of traffic responsive, fixed sequence signalized diamond interchanges);
14 PC-TRAVEL (Process travel time and delay data);
15 SIGNAL2K (Implements capacity analysis techniques of the updated 2000 Highway Capacity Manual);
16 SYNCHRO/SIMTRAFFIC (Modeling and optimizing of signalized intersection timings;
17 TRANSYT-7F (Traffic signal timing optimization);
18 WARRANTS (8 hour signal warrant analysis);
19 SIGNAL CINEMA (Animated graphics for intersections): and
20 Microsoft Office Suite

9.6.2 Signals Group (Operations Section)

- CONFLICT MONITOR DIAGNOSTIC (Certifying Program – all signalization must pass this program for certification);
- MIST (Management Information System for Traffic);
- OPTICON MAINTENANCE (Preemption Device for Emergency Vehicles);
- Pager Programmable Time Switch System (Group and location time switching); and
- Windows 98

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SOP Work Plans

Forms

.7 Forms and Templates

The group uses the following forms and computer spreadsheets listed in the paragraphs below.

9.7.1 Signals Group (Engineering Section)

1 Coordination Time Sheet (Form 9-1); and
2 Phase Timing Sheet (Form 9-2).

9.7.2 Signals Group (Operations Section):

- Streetlights Knockdown Form (Form 9-3); and
- Streetlight/Illuminated Signs Run (Southeast and Northwest) (Form 9-4)

Work Plans

9.8 Work Plans

The Group develops the Traffic Signals Location, Type and Cost Report for the Division (Table 9-1). This report details the costs of traffic signals countywide and indicates the County's reimbursements costs from FDOT for these traffic improvements

In September of 2000, an Administrative Directive (Policy 9-1) was unofficially issued by the County Administrator to adopt and begin implementation of the Signalization Intersection Timing Update Policy (SITUP) Program. The SITUP Program was initiated to develop proactive, preventive maintenance for the safe and efficient operation of traffic control devices (TCDs). This is accomplished through regularly scheduled observation of traffic signals in order to evaluate proper operation, timing, and phasing. It also includes making any required coordination adjustments due to changing traffic volumes and increased traffic demands. The Administrative Directive specifically details the procedures and guidelines to be used in the SITUP Program. Implementation of the SITUP Program is ongoing with full official adoption scheduled for the year 2006.

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Lessons Learned

Establish Overall Time Schedule

Identify Need for Staff Time

Develop Reporting Format Upfront

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Questions ?

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