



Using an Environmental Management System to Meet Transportation Challenges and Opportunities

An Implementation Guide

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ATTACHMENTS

- Attachment 1 – Applying the EMS Process Roadmap to DOT Activities/Locations
- Attachment 2 – DOT EMS Case Studies

1.0 INTRODUCTION

This Guide addresses the goals listed below in Sections 2.0 through 5.0. Following are the goals and brief descriptions of the information provided in each section to address each goal.

Challenges and Opportunities – Improve transportation program delivery and foster environmental stewardship through environmental management.

Section 2.0, An EMS – The Right Thing to do

- Describes the environmental and program delivery challenges that DOTs face,
- Discusses environmental opportunities that DOTs can use to meet their challenges,
- Highlights benefits that DOTs have realized as a result of implementing an EMS,
- Introduces the concept of an EMS, and
- Shows how an EMS can be used to meet the challenges and realize environmental opportunities.

EMS Overview – Introduce State DOTs to environmental management systems (EMSs) and provide EMS information and tools.

Section 3.0, Developing and Implementing a DOT EMS

- Introduces the concepts behind an EMS, and
- Presents a step-by-step EMS Process Roadmap along with instructions that a DOT can use to develop and implement an EMS.

An EMS – DOT “How to’s” – Build on existing environmental management initiatives within a DOT, learn to conduct a gap analysis, and recognize that a DOT need only to implement the system in part of their organization to achieve some success..

Section 4.0, EMS Specifics for a DOT

- Provides a series of templates, based on the EMS Process Roadmap, that DOTs can use to develop and implement EMSs in planning, design, construction, and operations and maintenance activities or facilities. These templates contain suggested detailed step-by-step instructions.

DOT EMS Information – Provide information on the current status of State DOT EMS efforts and form a State DOT EMS network for ongoing sharing of information.

Section 5.0, DOT EMS Information

- Presents the results of a DOT EMS benchmarking survey conducted by AASHTO in conjunction with preparing this Guide.
- The results include the current status of EMS implementation efforts in state DOTs and, in particular, contact information that transportation professionals in DOTs across the US can use to develop their own information network.

2.0 AN EMS – THE RIGHT THING TO DO

“Our customers demand that our projects and activities fit, look good, have balance, and are sensitive to the human and natural environment. Therefore, we must continue to change our culture to one that has an environmental ethic and assumes an environmental stewardship role. It is the correct approach...the right thing to do...the common sense thing to do, and our customers deserve this type of treatment.”

Secretary James C. Codell, III

2.1 DOT Challenges

Federal, State, and local transportation professionals face a variety of challenges that both affect and are affected by a multitude of environmental concerns. Without minimizing the importance of specific issues, these challenges can be summarized as:

- **Program Delivery** – Meeting public transportation demands as fast as possible while coping with diminishing resources and conforming to complex and extensive regulation. There are more than 70 laws and regulations which affect DOT activities and operations.
- **Environmental Stewardship** – While fulfilling program delivery, demonstrate to the public, elected officials, and regulators that DOT employees maintain and improve the environment.

2.2 DOT Opportunities

During the implementation of a DOT's programs, DOT personnel are presented with opportunities to enhance environmental protection as well as improve operations while meeting the challenges described above in Section 2.1. These opportunities go beyond environmental protection to include:

- **Using resources efficiently**, both capital and human;
- **Improving project schedules**; and
- **Capturing and disseminating institutional knowledge and initiatives** that may reside within one individual or group.

An EMS offers the means for a DOT to meet its challenges and opportunities and optimize the relationship between environmental actions and decisions and its operational and management decisions.

2.3 Benefits of an EMS

State DOTs that have implemented EMSs in various parts of their organizations have realized a variety of benefits, including:

- Cost savings/cost avoidance and improved use of available resources,
- Regulatory oversight eased as regulatory agencies gain confidence in a DOT's environmental management processes, and
- More timely regulatory reviews.

The following sections of this guide explain an EMS and provide details on how to implement an EMS.

Exhibit 2-1 presents examples of DOT EMS benefits; additional details are provided in Attachment 2 – DOT EMS Case Studies. These Case Studies also describe other EMS benefits and provide information on the resources needed to implement EMSs by these DOTs.

Exhibit 2-1 EMS Benefits from DOTs

Protect our environmental legacy.



During the PENNDOT ISO 14001 registration, a PENNDOT employee summarized his role in environmental stewardship in the following comment to the ISO Registrar:

“I’ve worked here for more than 20 years. We never did this before but that doesn’t mean we were right. This is what I want to do for my children and grandchildren.”

Save money, avoid costs, and reduce resource consumption.



New Hampshire’s Traffic Bureau EMS provided the consistent, structured process to identify previously unrecognized requirements and opportunities for operational improvements. One such improvement (waste separation) has provided savings of \$25,000 per year.

The Massachusetts EMS provides the means to identify and correct compliance issues and maintain a focus on compliance. This EMS has helped to significantly reduce the potential for and cost of fines.

Pennsylvania’s procedures and practices for erosion and sedimentation control provide an estimated 2 weeks of work crew and equipment productivity across an Engineering District at no increase in cost. This translates to cost avoidance of \$25,000/year for District labor and equipment.

Pennsylvania’s environmental management program provided the basis for reducing monitoring and oversight burdens and, in turn, the associated costs.

Texas’ Pollution Prevention and Abatement (PPA) compliance audits identify issues that can be corrected before additional costs are incurred and opportunities that provide resource consumption and waste materials savings.

Ease the burden of regulatory oversight



Maryland's Stormwater Management Program procedures and processes helped it to obtain one of the first NPDES Municipal Separate Storm Sewer System Permits issued to a DOT. This permit incorporates features that ease compliance and oversight burdens.

Pennsylvania's environmental management program was recognized as best management practices by Department of Environmental Protection (DEP) regional staff. This recognition led to eased oversight, monitoring, and permitting requirements.

Texas' relationships with regulators have been improved through the implementation of its design, construction, and operational environmental management processes. The improved relationships with regulators has helped to ease oversight burdens (in terms of both time and resources).

Improve review cycles.



Florida's Efficient Transportation Decision Making (ETDM) Process has significantly shortened the time required for transportation project reviews by the public and regulators and approvals provided by regulators. Project alternatives are identified and screened much earlier in the project cycle.

Pennsylvania's EMS efforts (beginning in one Engineering District) to enhance consistency and planning in habitat assessments have improved relationships with and eased oversight of US Fish and Wildlife Services staff.

2.4 An EMS – What is it?

The definition of each word within the term “EMS” provides insight into what an EMS is and gives a foundation for subsequent discussion. Each word is defined as follows:

- **ENVIRONMENTAL** – One definition states, “pertaining to the complex of physical, chemical, and biotic factors that act upon an organism or an ecological community.” In the context of this manual, environmental considerations include pollution prevention and compliance with environmental regulatory requirements.
- **MANAGEMENT** – One definition states the “judicious use of means to accomplish an end.”
- **SYSTEM** – Definitions include “an organized or established procedure” and “an organized set of doctrines, ideas, or principles.”

A **MANAGEMENT SYSTEM** may, therefore, include an organizational structure with defined responsibilities and procedures. **Please Note:** there is a difference between management system tools and management system components (e.g., an information system is a tool to support management system responsibilities, procedures, and responsibilities).

Consolidating these definitions and the concepts behind each leads us to the EMS definition that will be used throughout and forms the basis for the information and suggestions presented in the Guide.

ENVIRONMENTAL MANAGEMENT SYSTEM

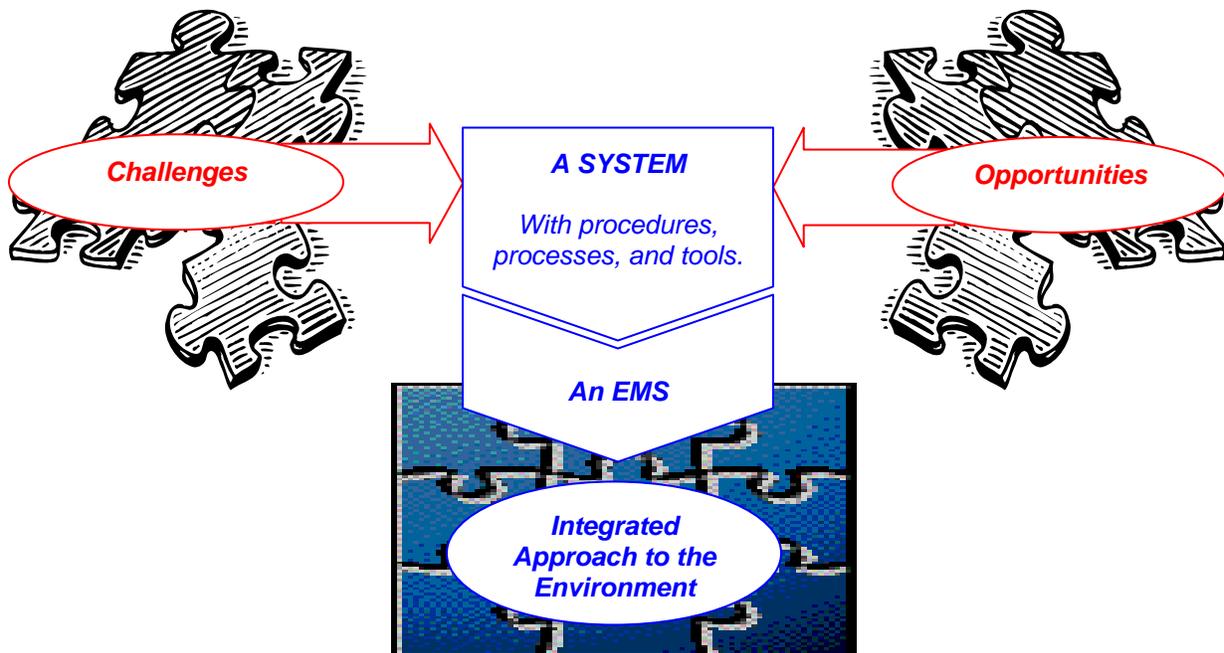
An EMS may be considered as the organizational structure and associated responsibilities and procedures to integrate environmental considerations and objectives into the ongoing management decision-making processes and operations of an organization.

2.5 Using an EMS to Meet DOT Challenges and Opportunities

As shown in Exhibit 2-2, an EMS provides the structure (i.e., *the system*) to help a DOT:

- Understand and make best use of the environmental/operational relationships,
- To meet its challenges and opportunities.

Exhibit 2-2
The EMS Interface



This **system** (the EMS) consists of planning, operational, and review procedures, processes and tools that incorporate various features and benefits as described below:

Exhibit 2-3
EMS Features, Benefits, and Relevance

| EMS Features | Associated Benefits and Relevance to a DOT |
|--|--|
| Needs Identification Framework | An EMS offers the step-by-step process (i.e., framework) to identify, characterize (e.g., resource needs, time required, and expected results), and prioritize DOT environmental as well as operational and management challenges and opportunities. |
| Solution Identification Framework | Provides a DOT with the framework to identify specific best practices, both within the DOT and in other DOTs, which can help meet identified needs. |
| Consistency | EMS procedures, processes, and tools establish the instructions and expectations to be followed by all personnel involved in an identified activity or function, from simple day-to-day efforts to senior management reviews and decision-making. |
| Repeatability | The consistency of EMS procedures, processes, and tools helps to ensure that successes are reproduced (wherever an activity or function is located throughout a state) and that problems are not replicated (i.e., lessons learned are captured). |
| Adaptability and Flexibility | The EMS process described in this Guide is designed to: support the goals and typical operations of a DOT, address the needs and constraints of a DOT, and be useable by DOT organizational units – from a handful of employees to hundreds of employees. |
| Integration with Existing Initiatives | The EMS process outlined in this Guide recognizes that the success of any new undertaking depends on avoiding change for the sake of change. Therefore, the EMS includes steps to identify existing initiatives, programs, and successes on which EMS procedures, processes, and tools can build. |
| Involvement of All Affected Employees | The EMS process also incorporates steps calling for the identification of all employees, regardless of position, who could be involved in or affected by EMS procedures, processes, and tools. Involvement of all affected by an EMS promotes environmental ownership and stewardship. |
| Easily Understood | The EMS process outlined herein also includes steps to develop EMS-related instructions and training that are relevant and limited to the information which an employee needs to know. Simplicity facilitates employee ownership. |
| Provide Measurable Performance | The EMS process described in this Guide also includes actions to identify and examples of performance measures that can be used to track progress and determine success. These measures of success can then be used to promote further management “buy-in” and, quite importantly, demonstrate to regulators and the public that the DOT is environmentally responsible. |

EMS STEP-BY-STEP PROCESS/Framework

The above summary refers to step-by-step processes – Section 3.0 of this Guide describes a process for DOT development and implementation of an EMS.

2.6 EMS Key Points

There are several key points that should be noted before moving forward into the details of developing and implementing a DOT EMS. Exhibit 2-4 (on the following page) presents these EMS implementation keys.

The next section of this Guide presents information on the process that a DOT can use to develop and implement an EMS.

Exhibit 2-4 – EMS Implementation Keys

MANAGEMENT COMMITMENT

- ✓ The continued support of a DOT's top management is critical to the successful development and implementation of an EMS. Not only does senior management commitment ensure that resources are provided, this commitment also tells managers and employees throughout the DOT that this "change in culture" is here to stay.
- ✓ Management commitment may begin in two ways:
 - DOT senior management may direct staff or a unit to investigate and develop an EMS, or
 - DOT staff may develop an EMS implementation "proposal" to submit to senior management.In either case, senior management will want answers to the questions: (1) What is our near-term and long-term focus (environmental issues and opportunities); (2) What will it take to get there (time, people, and money)?; (3) What will it do for me (expected results and benefits)?; and, (4) How can I measure progress and performance and how will I know when I get there (objectives, targets, milestones, and performance measures)?

EMS MODELS

- ✓ Development and implementation of an EMS does NOT mean that a DOT is committed to obtaining ISO 14001 certification. A DOT can use/adapt the ISO 14001 Standard whether or not the EMS is submitted for certification.
- ✓ Other models (e.g., Baldrige and other continual improvement tools) can also be used as EMS models.
- ✓ Make the model fit the DOT. You do not need to make your DOT fit the model or its criteria.

EMS FOCUS

- ✓ Focus EMS development and implementation efforts on actions and facilities that the DOT directly controls. While EMS efforts may be expected to have a benefit that influences individuals or organizations outside of the DOT, the DOT cannot control the response or perceptions of others but it can control what it does to achieve the desired perception or response.
- ✓ An EMS can be as specific (addressing certain activities or small groups of employees) or as all-encompassing (addressing entire units or deputates with hundreds of employees) as deemed necessary and appropriate by a DOT. The key is to do what works for you and meets your needs and opportunities.

BUILD ON EXISTING INITIATIVES AND SUCCESSES

- ✓ Identify, build upon, and incorporate existing successes. When conducting a gap analysis it is at least as important to recognize what is in place and applicable as it is to identify what needs to be developed.

MEASURE EMS PERFORMANCE AND SUCCESS

- ✓ Identifying achievable and relevant expectations and measures helps in several ways. First, the measures keep employees involved in EMS efforts focused on the value of their efforts and on the actions needed to achieve the expected results. The measures also help to maintain senior management commitment, even if there is a change of administration.
- ✓ Use "low hanging fruit" opportunities to the advantage of the EMS. EMS benefits achieved in the near-term build interest, participation, and commitment of all involved – from senior management throughout the work force.

NOT JUST FOR ENVIRONMENTAL STAFF

- ✓ EMS development and implementation requires the participation of a wide-range of DOT skills. EMS decisions, procedures, processes, and tools cannot be made without considering implementability or impact on the EMS focus activities or facilities.

EMPLOYEE INVOLVEMENT

- ✓ Successful EMS implementation requires addressing the day-to-day training and operational procedure needs of all employees involved in the EMS focus activities or facilities.

3.0 DEVELOPING AND IMPLEMENTING A DOT EMS

3.1 EMS Overview

When considering EMS development it is useful to establish both:

- The basic framework (or overall approach) for an EMS and
- A step-by-step process (i.e., roadmap) for EMS development and implementation.

A useful example of this methodology is the transportation project procurement process. The basic framework entails: 1) establish the procurement need, 2) solicit bids or proposals, 3) review responses, 4) award a contract, and 5) complete the effort. As we all know, the step-by-step process to accomplish this basic approach is detailed and involves a number of elements including setting expectations, defining requirements, assigning a review panel, managing the procurement process, monitoring contract performance, and ensuring that all obligations are fulfilled prior to contract closeout.

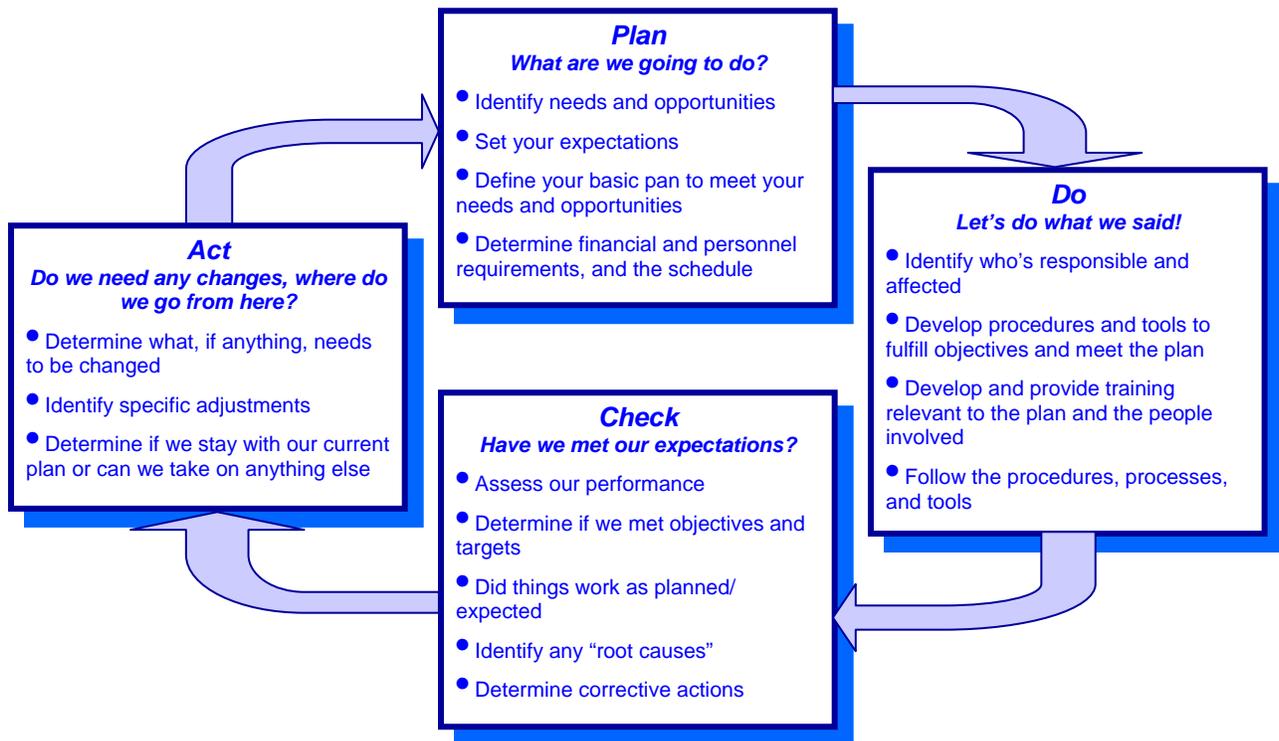
The next section describes how the basic framework approach and step-by-step process discussed above can be used to develop and implement a DOT EMS.

3.2 The Basic Framework

A common, well accepted framework for any management system that strives for continual improvement is the Plan – Do – Check – Act (PDCA) structure. This framework has been proven over a number of years in a wide variety of applications in both government and industry. The concepts behind this framework can be easily understood. In addition, this structure can be easily adapted for a management system, be it environmental or otherwise.

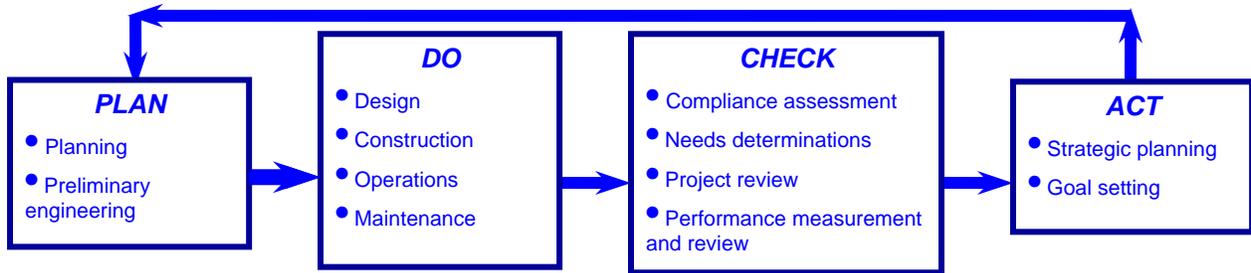
Exhibit 3-1 illustrates the basic PDCA framework.

Exhibit 3-1
The Plan-Do-Check-Act Framework



3.3 Applying the PDCA Framework to DOTs

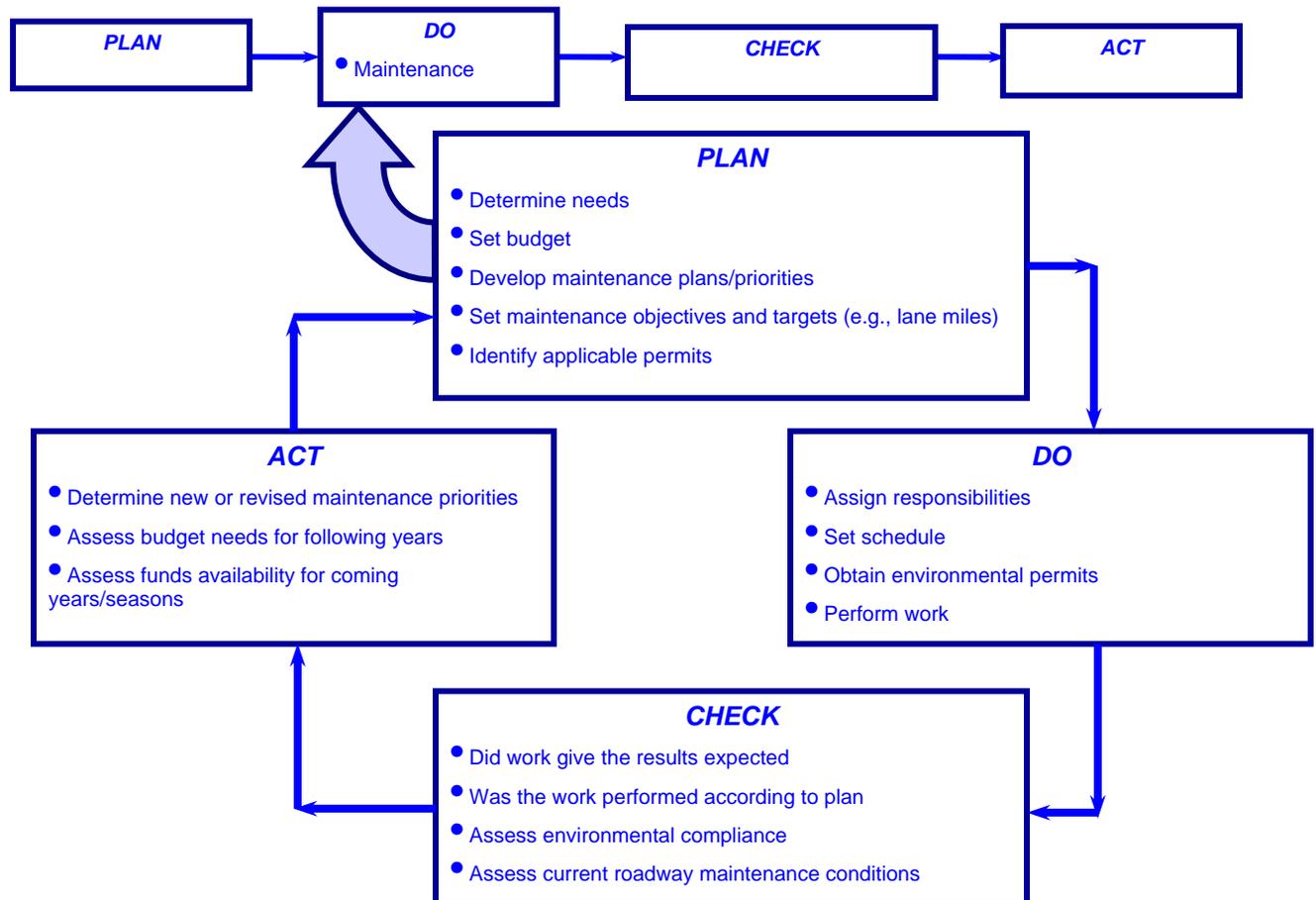
A DOT is generally organized along the lines of the PDCA framework as shown below.



As the next step in understanding how this framework is applied to transportation activities, consider how the PDCA framework is then applied down the DOT organization (as opposed to across the organization as shown above).

As an example, apply the PDCA framework to the planning and performance of maintenance activities.

Please Note: the activities listed are presented as examples; the list is not intended to be all-inclusive.



This understanding of the PDCA framework and its application across a DOT and within separate DOT activities and operations provides the basis for determining the step-by-step process to develop an EMS that addresses DOT environmental challenges and opportunities.

3.4 The EMS Process Roadmap

The suggested EMS process roadmap presented as Exhibit 3-2 can be used by transportation professionals at various levels and in various units (environmental as well as non-environmental) to help develop and implement an EMS in their organization. This Process Roadmap identifies a basic EMS development and implementation process that can then be adapted for use to meet the wide variety of challenges and opportunities that face a DOT.

Referring to the EMS features noted in section 2.3 of this Guide, the EMS Process Roadmap has been developed to:

- Ensure consistent and repeatable environmental performance,
- Capture existing successes and initiatives that may be dependent on the efforts of a single individual or unit and establish the means to implement these initiatives in the future and throughout the DOT,
- Involve and communicate with all employees who can affect environmental performance,
- Identify environmental management performance measurements and routinely assess performance, and
- Pursue environmental performance improvement on an ongoing basis.

Please Note: The EMS Process Roadmap (Exhibit 3-2) steps assume that management direction to pursue EMS development is to be obtained. However, in some cases the initial direction for development of an EMS may originate with senior management. In these instances the information developed in EMS Process Roadmap Steps 1 through 3 would be used to refine further efforts, maintain management commitment, and assess performance.

3.5 Using the EMS Process Roadmap

Your organization already has a number of management systems. It may even have some or most of the elements that comprise an EMS. Exhibit 3-3 lays out how to approach creating a fully-functional EMS. It provides step-by-step instructions, examples, and details for application of the EMS Process Roadmap for DOT use. When using the instructions provided in Exhibit 3-3 consider the systems, processes, and tools which may already be in place.

Please Note: Exhibit 3-3, Using the EMS Process Roadmap in a DOT, immediately follows Exhibit 3-2, Environmental Management System Process Roadmap.

Referring to Step 4 in Exhibits 3-2 and 3-3, management commitment may begin in two ways:

- DOT senior management may direct staff or a unit to investigate and develop an EMS, or
- DOT staff may develop an EMS implementation “proposal” to submit to senior management.

In either case, senior management will want answers to the questions:

- What is our near-term and long-term focus (environmental issues and opportunities)?
- What will it take to get there (time, people, and money)?
- What will it do for me (expected results and benefits)?; and,

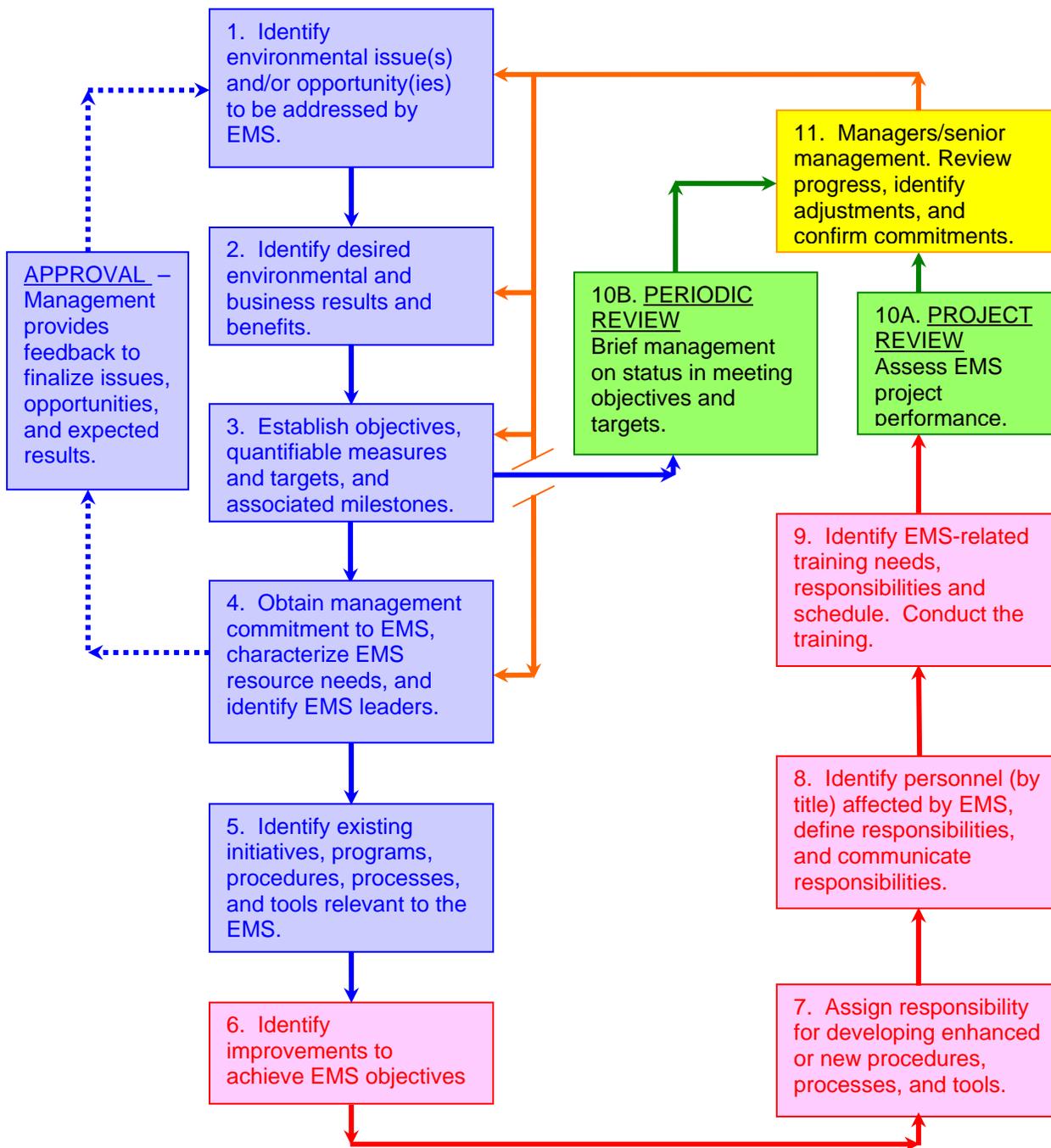
- How can I measure progress and performance and how will I know when I get there (objectives, targets, milestones, and performance measures)?

Steps 1 through 3 of the EMS Process Roadmap are designed to answer these questions.

As a further aid to help DOTs implement an EMS, Section 4, EMS Specifics for a DOT, presents templates that apply the step-by-step instructions in Exhibit 3-3, Using the EMS Process Roadmap in DOT, to several DOT planning, design, construction, and operations and maintenance activities and facilities.

**Exhibit 3-2
ENVIRONMENTAL MANAGEMENT SYSTEM PROCESS ROADMAP**

(Please Note: this is a continual improvement process – you can use the results of one step to enhance the actions and results of a prior step.)



Legend: PLAN DO CHECK ACT

Exhibit 3-3
USING THE EMS PROCESS ROADMAP IN A DOT

1. Identify environmental issue(s) and/or opportunity(ies) to be addressed by EMS.

Gather and prioritize environmental information and select focus:

- + List problems, prior Notices of Violation, prior formal notifications from regulatory authorities, citizen complaints associated environmental issues – these may include: recent compliance, increased potential for violations or complaints, lack of employee familiarity with relevant requirements, changing conditions.
- + **List relevant environmental opportunities** – consider: cost savings, cost avoidance, increased productivity (e.g., do more work with existing resources),
- + **Rank/prioritize the issues and opportunities (IOs)** – considerations may include: resources needed to fulfill the IOs, time required, relative magnitude of environmental effect from fulfilling the IOs (may be viewed as “low hanging fruit”), relative acceptance/acknowledgement by public and regulators, ability to get and affect on employee “buy-in”, and management interest or view that an issue is a problem.
- + **Identify the specific aspect(s)** of the activity, operation, or location associated with the IOs (e.g., materials handling and storage at stockpiles, storm water control during roadway maintenance, or storm water management permit process for construction projects).
- + **Identify the specific aspects and IOs** (using the ranking information from above) to be addressed by the EMS and BRIEFLY document your rationale (for presentation to the group).

Please Note: Keep your EMS effort manageable, you don't need to fix everything at once.

2. Identify desired environmental and business results and benefits.

Identify results. Referring to: the selected activity, operation, or facility; selected aspects; and chosen issues and opportunities –

- + List associated environmental benefits that can be measured (to the extent practical) – these may include: quantities or volumes, customer satisfaction score re: the environment, improved regulatory relationships, and # of violations or incidents prevented or avoided (based on recent history).
- + Identify associated business benefits (including benefits related to the noted environmental benefits) that can also be measured – including: dollars saved, cost avoided, manhours saved or available for other use as a result of avoiding incidents or violations, dollars and hours associated with reduced monitoring or regulatory oversight, time saved (and associated hours, dollars, and schedule advancement) as a result of improved regulatory relationships/enhanced review process.

Please Note: EMS implementation and acceptance can be facilitated through the use of existing tracking and measurement systems/processes, and existing data and measures. Identify systems, measures, and data in your organizations that would be applicable.

Exhibit 3-3 (cont'd)
USING THE EMS PROCESS ROADMAP IN A DOT

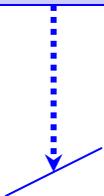
3. Establish objectives, quantifiable measures and targets, and associated milestones.



4. Obtain management commitment to EMS, characterize EMS resource needs, and identify EMS leaders.

To management review/approval.

To Step 5.



Set measures for performance and success.

- + **Identify actions** to address the selected issues, opportunities, and activity, operation, or facility and to realize the benefit(s) identified in step 2. *PLEASE NOTE:* There may be near-term and future actions – consider a step-by-step approach.
- + **Keep the list of actions short** – too many actions can lead to confusion, loss of focus, and an effort that is difficult to manage.
- + **Identify objectives that provide a goal/focus for each action.** For example, an action could be to train employees in a certain requirement, the objective could be to reduce incidents of notices of violation. Keep the list as short as practical.
- + **Establish a performance measure(s) for each objective.** The measures could be near-term as well as long-term. In the example noted in the preceding bullet a near-term measure could be % of work force trained, while the long-term measure would be # of incidents. In this example, the measure(s) should address the real reason/benefit for an action.
- + **Establish a target(s) for each measure.** The target(s) should be realistic and achievable, but should challenge an organization to improve. Realistic targets help to ensure success and, thus, build buy-in for future EMS efforts that may present a greater challenge. Referring to the example, the targets could be 95% of work force trained leading to zero incidents without a follow up to prevent recurrence.
- + **Establish a milestone(s) for meeting each target.**
- + **Identify the position(s) who would be responsible for taking the action and meeting the target(s)**

Prepare the EMS Business Case.

- + **Estimate the resources (personnel, financial, contractors, etc.) needed** to implement the actions and meet the targets.
- + If the resource needs span 2 or more planning/business cycles estimate the relative splits (% of total or estimate for each cycle).
- + Using the information developed in Steps 2 and 3, summarize the expected benefits, when they would be realized, and for how long.
- + **Identify the position who will manage the EMS effort and the positions who will play key roles** (e.g., those responsible for an objective and target).
- + **Identify the senior management position who will serve as the leader (i.e., management “champion”).** This leader would ensure that: resources are available when needed, units outside of the EMS managers area coordinate with and support the EMS effort, and employees throughout the organization recognize the commitment of senior management.

Exhibit 3-3 (cont'd)
USING THE EMS PROCESS ROADMAP IN A DOT

APPROVAL –
 Management provides feedback to finalize issues, opportunities, and expected results.

Feedback/review to Steps 1, 2, 3, and/or 4.

From Step 5.

5. Identify existing initiatives, programs, procedures, processes, and tools relevant to the EMS.

Obtain management approval and commitment for EMS.

- + **Present the Business Case** (see Step 4) to senior management.
- + **Solicit management input** on EMS:
 - Issues,
 - Opportunities,
 - Objectives,
 - Targets,
 - Goals,
 - Focus,
 - Resource requirements,
 - Schedule,
 - Expected results, and
 - Designated management “champion.”
- + **Incorporate/address management comments** in EMS plans.
- + **Obtain specific, public commitment of management commitment to EMS** and planned efforts.
- + **Publicize management commitment** to EMS to all potentially involved employees. Consider possibility of and schedule for announcing initial commitment to the public.

Please Note: Management direction and commitment is critical to the success of EMS development and implementation efforts. If DOT management provided the initial directive to pursue EMS development, this Approval step may not be as structured and detailed as shown or described. However, Steps 1 through 4 should still be followed to provide the focus and structure for an EMS and to help ensure EMS effectiveness and success.

Using the information developed in Step 4 and the issues, opportunities, aspects, actions, objectives, and targets developed in Steps 2 and 3:

- + **List the initiatives, etc.** that could be used or adapted for use in the EMS to fulfill the selected actions and meet the targets.
- + Initiatives would be strategic in nature (e.g., plans to improve environmental performance).
- + Programs could be department- or unit-wide directives (e.g., activities to fulfill an initiative).
- + Procedures would be step-by-step instructions.
- + Processes would be activities to fulfill programs or procedures (e.g., training courses).
- + Tools would be used to support programs, procedures, and processes (e.g., checklists, computer databases, or performance “scorecards.”)

Please Note: This effort is intended to focus on **WHAT IS ALREADY IN PLACE** that can be used or adapted for use in an EMS effort. Experience shows that use of existing procedures, processes, and tools helps to break through the inherent resistance to change.

Exhibit 3-3 (cont'd)
USING THE EMS PROCESS ROADMAP IN A DOT

6. Identify improvements to achieve EMS objectives

Continue the analysis begun in Step 5, identify gaps/needs for procedures, processes, and tools.

- + **Identify the desired procedures, processes, and tools** that will:
 - Address the issues and opportunities of the specific aspects selected in Step 1,
 - Achieve the environmental and business benefits identified in Step 2,
 - Fulfill the actions, objectives, and targets established in Step 3, and
 - Meet the commitments and expectations of management determined in Step 4.
- + Keep in mind the EMS attributes:
 - Consistency,
 - Repeatability,
 - Adaptability and flexibility (to accommodate various situations),
 - Integrated with existing actions (see Step 5), and
 - Easily understood by the user.

Please Note: This Step, in conjunction with Step 5, provides the means to move the DOT from “what is in place” to “what should be used.”

7. Assign responsibility for developing enhanced or new procedures, processes, and tools.

Identify personnel for an EMS Development Team who will help in the development AND implementation of the EMS procedures, processes, and tools.

- + Identify a Team leader (this may be the EMS Manager) who will coordinate Team activities and maintain the Team’s focus on “results.”
- + The Team should be small enough to be manageable and meet routinely.
- + Set a clear, agreed upon time table for Team efforts.
- + The Team should represent all levels and units affected by the EMS.

Please Note: The EMS Development Team can support identification of the desired EMS procedures, processes, and tools (see Step 6). In this case, Steps 6 and 7 would progress concurrently.

8. Identify personnel (by title) affected by EMS, define responsibilities, and communicate responsibilities.

The EMS Development Team identifies ALL personnel who would play a role in implementing, or following, the EMS procedures, processes, and tools.

- + **Develop BRIEF responsibility statements** for the identified personnel.
- + The **responsibility statements should be related to the actions required** by the procedures, processes, and tools.
- + Identify the means by which these responsibilities will be communicated.
- + **Establish a schedule** for communicating the environmental responsibilities.
- + **Determine who will communicate the responsibilities**_(Note: may be based on existing personnel practices).

Please Note: Incorporate these statements of environmental responsibility into existing performance review/job description practices.

Please Note: These activities may proceed concurrently with Steps 6 and 7.

Exhibit 3-3 (cont'd)
USING THE EMS PROCESS ROADMAP IN A DOT

9. Identify EMS-related training needs, responsibilities and schedule. Conduct the training.

The EMS Development Team develops a training program.

- + **Determine the training type and content** that would best achieve implementation of the EMS procedures, processes, and tools.
 - Consider the intended audience (different types and content may be needed).
- + Determine the training schedule/frequency.
- + **Identify existing training materials, schedules, and/or programs** (refer to Step 5) that could be adapted for EMS use or to which EMS content could be added.
- + **Identify the presenter(s)** for the training.
- + **Develop the training materials.** This could be performed by:
 - The EMS Development Team,
 - A subgroup of the Team, or
 - Others identified by the EMS Manager and Team.
- **Present the training** to the intended recipients and in accordance with the established schedule.

10A. PROJECT REVIEW
 Assess EMS project performance.

Monitor EMS progress and performance.

- + The EMS Manager and EMS Development Team identify criteria and schedule that can be used to assess EMS progress and performance on an ongoing basis. Refer to:
 - The actions, objectives, and targets from Step 3;
 - The benefits identified in Step 2; and,
 - The management commitments and expectations identified in Step 4.
- + **Develop a progress summary report** for senior management and present the report.
- + **Identify problems that may occur** during EMS development and implementation and the means by which they could be overcome (either as they occur or before they occur).
 - Include these solutions in the management report.
 - Identify actions that may require management comment or action.
- + **The EMS Manager and Development Team identify criteria and develop a report format that will be used to assess overall success of the EMS project.** Refer to Steps 2, 3, and 4.
- + **Submit the project review report** to senior management.
 - Characterize lessons learned and successes.
 - Identify opportunities for improving upon and/or expanding EMS efforts within or beyond the current organizational unit (refer to Steps 1 through 3).

10B. PERIODIC REVIEW
 Brief management on status in meeting objectives and targets.

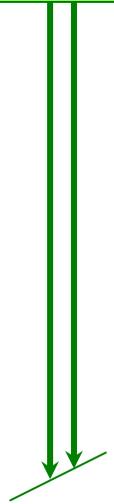
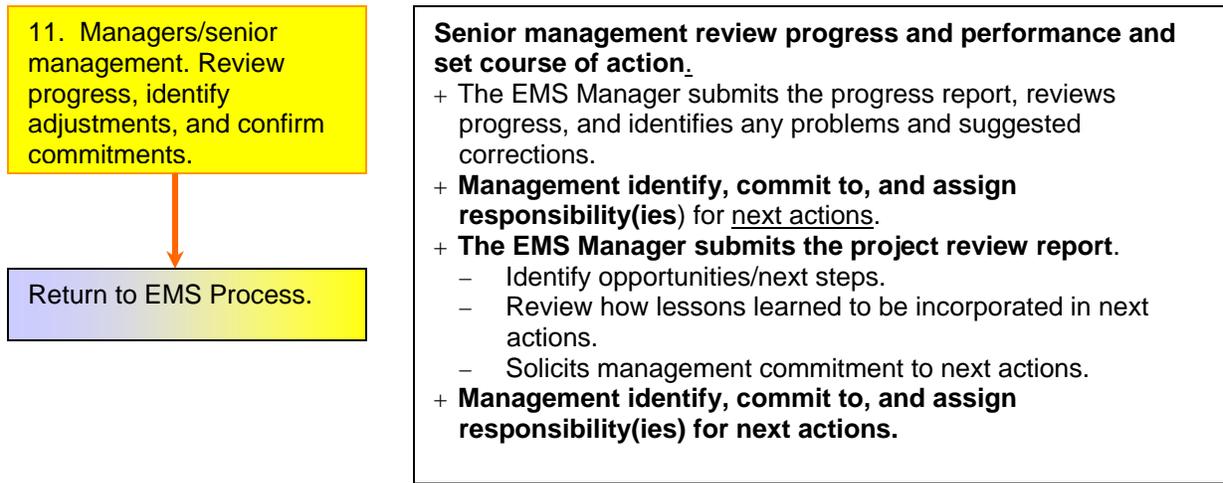


Exhibit 3-3 (cont'd)
USING THE EMS PROCESS ROADMAP IN A DOT



4.0 EMS SPECIFICS FOR A DOT

Attachment 1 provides a series of templates (based on Exhibit 3-3, Using the EMS Process Roadmap in a DOT) that DOTs can use to develop and implement EMSs.

Exhibit 4-1 identifies the functions and activities/locations for which EMS Templates have been prepared.

**Exhibit 4-1
EMS Templates**

| Template No. | DOT Function | DOT Activity/Location |
|--------------|--|---|
| 1 | Planning and Design | NEPA and Permitting Processes (including Context Sensitive Design, Commitments and Requirements Identification and Implementation, and Project Development) |
| 2 | Construction | Construction Inspection |
| 3 | Construction, and Operations and Maintenance | Instructions and Procedures (including Standard Specifications and Maintenance Manual Development) |
| 4 | Operations and Maintenance | Stockpile and Garage Operations |
| 5 | Operations and Maintenance | Roadway Maintenance |
| 6 | Operations and Maintenance | Rest Areas |

These templates contain suggested detailed step-by-step instructions that DOT personnel can follow “as is” or adapt for use in their specific applications. As noted previously in this Guide, a DOT can be as all encompassing or as focused as the organization deems appropriate, based on available resources, level of management commitment, needs, opportunities, etc. Please use the information provided in the templates to develop and implement an EMS that:

- Provides the greatest benefit to your DOT, and
- Forms the foundation for subsequent EMS initiatives.

Please Note: The templates are provided as examples to help DOT personnel apply the EMS Process Roadmap to their own organizations and activities. Some information, such as the assigned responsibilities and details on expected benefits and targets, is therefore presented as an example only – DOT personnel would be responsible for developing specific details that reflect their own situations.

5.0 DOT EMS INFORMATION

To help DOT personnel evaluate EMS opportunities in their own organizations and learn from the EMS experiences of other DOTs, this section provides information from other DOTs including:

- Information on the status of EMS efforts;
- EMS accomplishments and lessons learned;
- Sample EMS procedures, processes, and tools developed by DOTs that could be adapted for use in other DOTs; and,
- DOT contacts who can exchange information on their own EMS efforts.

5.1 EMS Benchmarking Survey

In the spring of 2003 AASHTO support staff surveyed state DOTs nationwide to characterize the status of their EMS development and implementation activities and plans. The survey also was used to develop an EMS knowledge base regarding:

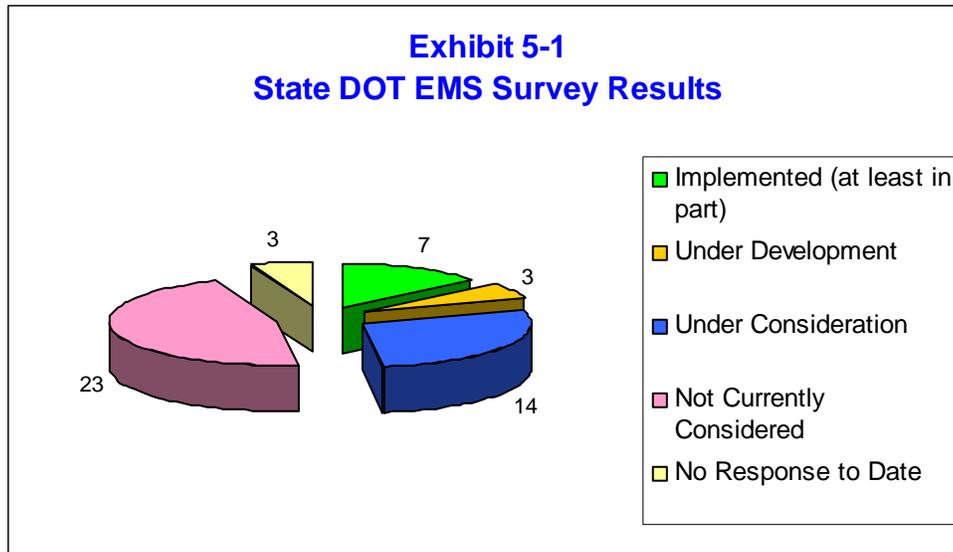
- Considerations that affect DOT EMS decisions and implementation efforts,
- Benefits realized or expected from EMS implementation,
- Lessons learned, and
- EMS development and information that would benefit state transportation professionals (presented in an EMS Guide and/or at an EMS implementation conference).

For the purposes of this survey the following EMS definition was used, and communicated as necessary to the survey participants:

An EMS may be considered as the organizational structure and associated responsibilities and procedures to integrate environmental considerations and objectives into the ongoing management decision-making processes and operations of an organization.

5.2 EMS Implementation Status

Exhibit 5-1 shows the status of DOT EMS development and implementation efforts.



5.3 DOT EMS Experiences

In conducting the EMS Benchmarking Survey DOTs with an EMS in-place (at least in part) or under development were asked several questions and to provide information that could be of value to other DOTs interested in developing and implementing an EMS. EMS Case Study information was developed for DOTs with an EMS in-place or under development – these Case Studies are presented in Attachment 2, DOT EMS Case Studies. The information presented in these Case Studies includes:

- Status of EMS efforts,
- Focus (e.g., Planning or Maintenance) of the EMS,
- Basis for selection of the focus,
- Relevance to the EMS Process Roadmap presented in this EMS Guide,
- EMS accomplishments and benefits,
- Keys to EMS development and implementation success,
- Implementation needs for the EMS,
- EMS background information,
- Points of contact for EMS information, and
- Sample EMS tools and procedures.

Exhibit 5-2 lists the Case Studies presented in Attachment 2.

Exhibit 5-2
DOT EMS Case Studies

| Case Study No. | Description |
|-----------------------|--|
| 1 | Florida Department of Transportation (FDOT) Efficient Transportation Decision Making (ETDM) Process |
| 2 | Texas Department of Transportation (TxDOT) Internal Environmental Management Systems Supporting Project Development, Construction Operations and Facility Operations |
| 3 | Maryland State Highway Administration (MDSHA) Environmental Strategic Plan and Management Systems |
| 4 | Washington Department of Transportation (WSDOT) Environmental Management System |
| 5 | Maine Department of Transportation (MDOT) Environmental Management System |
| 6 | Massachusetts Department of Transportation (Mass Highway) Environmental Management System |
| 7 | New Hampshire Department of Transportation (NHDOT) Environmental Management System for Traffic Bureau |
| 8 | New York State Department of Transportation (NYSDOT) New York State DOT's Environmental Initiative |
| 9 | Pennsylvania Department of Transportation (PENNDOT) Strategic Environmental Management Program (SEMP) |

5.4 EMS Information Network

To help DOT personnel develop a network to exchange EMS information, Exhibit 5-3 (on the following pages) presents state DOT EMS contacts identified through the benchmarking survey. This exhibit also provides the background information for Exhibit 5-1.

Please use the information provided in Exhibit 5-3 to develop, tailor, and implement your own EMS information network.

Exhibit 5-3 – EMS Survey Details

| State | Status | | | | | Contact Information | | | | |
|-------------|--------------------------------------|----------------------|------------------------|-----------------------------|------------------------|------------------------------------|--|---|-------------------------------|--|
| | Implemented (at least in part) | Under Development | Under Consideration | Not Currently Considered | No Response to Date | Name | Title | Unit | Phone | e-mail |
| Alabama | | | | X | | Alfedo Acoff | Environmental Coordinator | Environmental Section | 334.242.6143 | |
| Alaska | | | | X | | Bill Ballard | Statewide Env. Coordinator | HQ Environmental | 907.465.6954 | bill_ballard@dot.state.ak.us |
| Arizona | | | X | | | Richard Duarte | Environmental Group Manager | Environmental Planning Group | 602.712.7760 | rduarte@dot.state.az.us |
| Arkansas | | | | | X | Mike Webb, Marion Butler | | Environmental Division | 501.569.2521 | |
| California | | | X | | | Gary Winters | Division Chief | Div. of Env. Analysis | 916.653.7136 | gary_winters@dot.ca.gov |
| Colorado | | | X | | | George Gerstle | Manager | Transportation Planning | 303.757.9795 | george.gerstle@dot.state.co.us |
| Connecticut | | | | X | | Gregory Dorosh | Transportation Supervisory Engineer | Environmental Compliance Unit | 860.594.3343 | gregory.dorosh@po.state.ct.us |
| Delaware | | | | X | | Terry Fulmer | Manager | Environmental Studies | 302.760.2095 | tfulmer@mail.dot.state.de.us |
| Florida | X | | | | | Josh Boan | Environmental Research | Ecological Resources Management Section | 850.410.5893 | josh.boan@dot.state.fl.us |
| Georgia | | | | X | | (1) Jerry Hobbs, (2) Buddy Gratton | (1) Operations Manager, (2) State Maintenance Engineer | (1) Environmental Management Group, (2) Office of Maintenance | 404.699.4457 and 404.656.5314 | (2) buddy.gratton@dot.state.ga.us |
| Hawaii | | | | X | | Ronald Tsuzuki | Head Planning Engineer | Planning Branch, Highways Division | 808.587.1830 | ronald.tsuzuki@hawaii.gov |
| Idaho | | | X | | | Dennis Clark | Manager | Environmental Section | 208.334.8203 | dclark@itd.state.id.us |
| Illinois | | | | X | | (1) Larry Piche, (2) David Johnson | Section Chiefs | (1) Bur. Of Design and Env., (2) Maintenance Operations | 217.782.4770 and 217.782.2985 | (1) pichell@nt.dot.state.il.us (2) johnsondb@nt.state.il.us |
| Indiana | | | | X | | Tom Duncan | Section Manager | Env., Planning and Engineering Div. | 317.232.5512 | tduncan@indot.state.in.us |
| Iowa | | | | X | | Jim Rost | Director, Office of Location and Env. | Highway Division | 515.239.1040 | james.rost@dot.state.ia.us |
| Kansas | | | | X | | Mike Fletcher | Environmental Scientist | Env. Services Section | 785.296.0853 | fletcher@ksdot.org |

Exhibit 5-3 – EMS Survey Details (cont'd)

| State | Status | | | | | Contact Information | | | | |
|----------------|--------------------------------------|----------------------|------------------------|-----------------------------|------------------------|-----------------------|--|--|--------------|--|
| | Implemented (at least in part) | Under Development | Under Consideration | Not Currently Considered | No Response to Date | Name | Title | Unit | Phone | e-mail |
| Kentucky | | | X | | | David Waldner | Director | Environmental Analysis | 502.564.7250 | david.wldner@mail.state.ky.us |
| Louisiana | | | X | | | Vincent Russo | Environmental Engineer Administrator | Environmental Section | 225.248.4190 | vrusso@dotd.state.la.us |
| Maine | X | | | | | Christine Olson | Manager | Water Resources and Haz. Waste | 207.624.3082 | christine.olson@maine.gov |
| Maryland | | X | | | | Charlie Adams | Director | Office of Env. Design | 410.545.8641 | cadams@sha.state.md.us |
| Massachusetts | X | | | | | Steve Miller | Supervisor | Haz. Materials Section | 617.973.8248 | smiller@mhd.state.ma.us |
| Michigan | | | | X | | Scott Wheeler | Roadside Operations Specialist | Pavement and Roadside Section | 517.322.3314 | wheelers@michigan.gov |
| Minnesota | | | | X | | Bruce Johnson | Supervisor | Materials Analysis Unit, Env. Services | 651.284.3768 | bruce1.johnson@dot.state.mn.us |
| Mississippi | | | | X | | Claiborne Barnwell | Environmental Division Engineer | Environmental Division | 601.359.7920 | cbarnwell@mdot.state.ms.us |
| Missouri | | | X | | | Mark Kross | Assistant to Director of Project Development | Design Unit | 573.751.4606 | krossm@mail.modot.state.mo.us |
| Montana | | | X | | | Dave Hill | Bureau Chief | Environmental Services | 406.444.7632 | dhill@state.mt.us |
| Nebraska | | | | | X | Cynthia Vais | Manager | Environmental Section | 402.479.4410 | |
| Nevada | | | | X | | Daryl James | Chief | Environmental Services Division | 775.888.7686 | djames@dot.state.nv.us |
| New Hampshire | X | | | | | Paul Sanderson | Hearings Examiner | Commissioner's Office | 603.271.1698 | psanderson@dot.state.nh.us |
| New Jersey | | | | X | | Jack McQuillan | Section Chief | Bureau of Environmental Services, Technical Section | 609.530.2833 | johnmcquillan@dot.state.nj.us |
| New Mexico | | | | | X | Steve Reed | | | 505.827.5254 | |
| New York | X | | | | | Debbi DeLisle | Administrative Assistant | Environmental Analysis Bureau | 518.485.5672 | |
| North Carolina | | | X | | | Julie Hunkins | Director | Office for Env. Quality | 919.715.1175 | jhunkins@dot.state.nc.us |

Exhibit 5-3 – EMS Survey Details (cont'd)

| State | Status | | | | | Contact Information | | | | |
|----------------|--------------------------------------|----------------------|------------------------|-----------------------------|------------------------|----------------------|-------------------------------------|--|-------------------------|--|
| | Implemented (at least in part) | Under Development | Under Consideration | Not Currently Considered | No Response to Date | Name | Title | Unit | Phone | e-mail |
| North Dakota | | | | X | | Francis Ziegler | Director | Project Development | 701.328.2598 | fziegler@state.nd.us |
| Ohio | | | X | | | Tom Linkous | Environmental Liaison | Office of Environmental Services | 614.466.5075 | thomas.linkous@dot.state.oh.us |
| Oklahoma | | | | X | | John Hartley | Branch Manager | Env. Studies Branch | 405.521.3050 | jhartley@odot.org |
| Oregon | | | X | | | Donna Kilber | Policy and Program Coordinator | Environmental Services Section | 503.986.3493 | donna.l.kilber@odot.state.or.us |
| Pennsylvania | X | | | | | Kenneth Thornton | Director | SEM Program Office | 717.787.0459 | kethornton@state.pa.us |
| Rhode Island | | | | X | | Edward Szymanski | Associate Chief Engineer | Environmental Programs Office | 401.222.2023, Ext. 4253 | eszymanski@dot.state.ri.us |
| South Carolina | | | | X | | Blanche Sproul | Environmental Manager | Environmental Office | 803.737.1395 | sproulbs@dot.state.sc.us |
| South Dakota | | | X | | | Dave Graves | Environmental Engineer | Env. Program | 605.773.5727 | dave.graves@state.sd.us |
| Tennessee | | | | X | | Jim Bryson | Director | Env. Planning and Permits Div. | 615.741.2612 | james.bryson@state.tn.us |
| Texas | X | | | | | Duncan Stewart, P.E. | Section Director | Env. Affairs Division | 512.416.3014 | dstewart@dot.state.tx.us |
| Utah | | | X | | | Brent Jensen | Director of Env. Services | Environmental Services | 801.965.4237 | brentjensen@utah.gov |
| Vermont | | | | X | | Dennis Benjamin | Environmental Specialist Supervisor | Program Development Division, Env. Section | 802.828.3978 | dennis.benjamin@state.vt.us |
| Virginia | | X | | | | Ed Wallingford | Haz. Materials Program Manager | Environmental Division | 804.786.4559 | e.wallingford@virginiadot.org |
| Washington | | X | | | | Tony Warfield | EMS Lead | Environmental Affairs Office | 360.705.7492 | warfiea@wsdot.wa.gov |
| West Virginia | | | | X | | Norse Angus | Transportation Analyst Manager | Environmental | 304.558.2885 | |
| Wisconsin | | | | X | | Kevin Gehrman | Manager | Risk Management & Admin. Services | 608.266.0705 | kevin.gehrmann@dot.state.wi.us |
| Wyoming | | | X | | | Tim Stark | Env. Services Engineer | Env. Services Program | 307.777.4379 | timothy.stark@dot.state.wy.us |

5.5 DOT EMS Lessons Learned

To help focus the EMS consideration and implementation efforts of DOT personnel and provide a foundation for an EMS lessons learned “library” Exhibit 5-4 summarizes the key considerations and comments presented in the DOT EMS Case Studies (refer to Attachment 2). **Please note:** the order of the key considerations in Exhibit 5-4 does not indicate a priority – when implementing a DOT EMS consider, prioritize, and then address the key considerations relevant to the particular DOT and activity or operation being addressed by the EMS.

**Exhibit 5-4
Lessons Learned**

| Key Consideration | Comments |
|---|---|
| <i>Management Commitment</i> | Most important, get initial buy-in from top management. Senior management commitment shows to all levels, in particular middle management, that the organization is committed to environmental improvement. Management commitment ensures that resources will be made available. |
| <i>Employee Ownership</i> | Provide procedures and training that encourage environmental “ownership” by employees. |
| <i>Employee Involvement</i> | Bring all employees, regardless of level, who may be involved in the EMS into the process through training, briefings, etc. Involve the whole organization, top to bottom, on any issue involving environmental documentation, processes, or compliance. |
| <i>Communication</i> | Use brief, frequent communications (e.g., newsletters or posters) to inform employees of EMS objectives, goals, plans, and activities. Keep the EMS message fresh and relevant. Maintain communications – don’t assume one or two briefings are all that’s needed. You cannot communicate enough what initiatives are underway. |
| <i>Integration with Existing Efforts</i> | Build on existing efforts. Don’t force feed environmental stewardship or EMS. Fit EMS into what is already there; don’t make what is there fit into EMS. Use existing methods and procedures to accomplish what you want to do. |
| <i>Check on Yourself</i> | Use internal audits to find and fix issues that arise within the system. |

5.6 Closing Remarks

Use the information presented in this EMS survey, and in the Guide as a whole, when developing and implementing an EMS. Key points to take from this section include the following:

- Use the information and contacts presented in Exhibit 5-2 to develop an individual EMS development and implementation network.
- Refer to the lessons learned when planning and briefing senior management on EMS possibilities and opportunities in your own DOT.
- Use the survey information when reviewing and using the AASHTO EMS Development and Implementation Guide (this survey is a component of and was conducted to support the development of this Guide).
- Case studies presented in the EMS Guide provide more details on EMS accomplishments, benefits, implementation needs, and keys to success for DOTs that have implemented (at least in part) EMSs of their own.