

# THE TRAFFIC ENGINEERING AND OPERATIONS SKILLS TRAINING PROGRAM IN MARYLAND

by

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## ABSTRACT

*In 1999, the Office of Traffic and Safety in the Maryland State Highway Administration and the Maryland Transportation Technology Transfer Center initiated development of the Traffic Engineering and Operations Skills Training Program. The goal of this program is to raise the level of traffic engineering skills among State Highway Administration staff, as well as staff of local agencies, and consultants in the State of Maryland. The key elements of the program include curricula for highway and traffic engineers, planners, traffic technicians, and others who must understand transportation systems operations, fostering the development and delivery of instruction that provides the knowledge and skills described in these curricula to the Maryland State Highway Administration (SHA), local agencies, and consultants; providing an organized source of information on traffic education and training available in the State of Maryland, and promoting continuing education within the transportation community to improve the safety and efficiency of Maryland's surface transportation system.*

*This paper describes the needs for training, organization and structure of the program, the initial curriculum, and partnership arrangements.*

## 1. INTRODUCTION

The Office of Traffic and Safety within the Maryland State Highway Administration (SHA) identified key areas in which their staff and consultants performing for OOTS and other SHA offices require additional training and education. As their efforts progressed, the SHA discovered that while traffic engineering related training is offered by a number of organizations in the region, a review of the training available revealed several problems;

- Many of the subjects needed are not being offered or do not exist.
- There are no comprehensive sources of information on training available or planned within the region.
- Few engineers and technicians, and the organizations they are employed by adequately understand current and emerging training needs.
- The cost to any individual organization to independently develop and offer all the needed training is prohibitive.

The Traffic Engineering and Operations Skills Training Program (TEST) was initiated to address these problems, and was charged with the long-term goal of raising the level of traffic engineering skills for State Highway Administration staff, local agencies, and consultants in the State of Maryland.

The Traffic Engineering Skills Training Program (TEST) is to achieve this by:

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- (i) Developing and maintaining curricula for highway and traffic engineers, planners, traffic technicians, and others who must understand transportation systems operations.
- (ii) Fostering the development and delivery of instruction that provides the knowledge and skills described in these curricula to the Maryland SHA, local agencies, and consultants.
- (iii) Providing an organized source of information on traffic education and training available in the State of Maryland, and
- (iv) Promoting continuing education within the transportation community to improve the safety and efficiency of Maryland's surface transportation system.

Most (if not all), State Departments of Transportation have active training programs for their staff. This program differs from traditional in-house training in several important ways.

## 2. THE APPROACH

The objectives of the SHA and the Maryland T<sup>2</sup> Center in defining TEST are 1) to rapidly implement traffic engineering skills training in Maryland and 2) to develop and provide a framework that supports the development and delivery of traffic engineering training in Maryland over the longer term. This framework will include:

- (i) **A strategy to rapidly implement and coordinate existing training** that supports development of traffic engineering skills in Maryland.
- (ii) **A Multiple-track Curriculum** that defines the training needs of three audiences; engineers engaged in traffic operations and related subjects; engineers, planners, and others who need an understanding of traffic engineering principles and practice; and traffic engineering technicians.
- (iii) **A strategy for leveraging training** resources that allows SHA to leverage existing training resources and efforts and to reduce their training costs associated with developing and updating courses, course delivery, and course attendance.
- (iv) **A coordinated source of information** that serves a clearinghouse useful for those who wish to enroll in develop or deliver traffic engineering training.

This framework represents a coordinated, cooperative approach to training that involves the University, the State Highway Administration, local agencies, and the private sector.

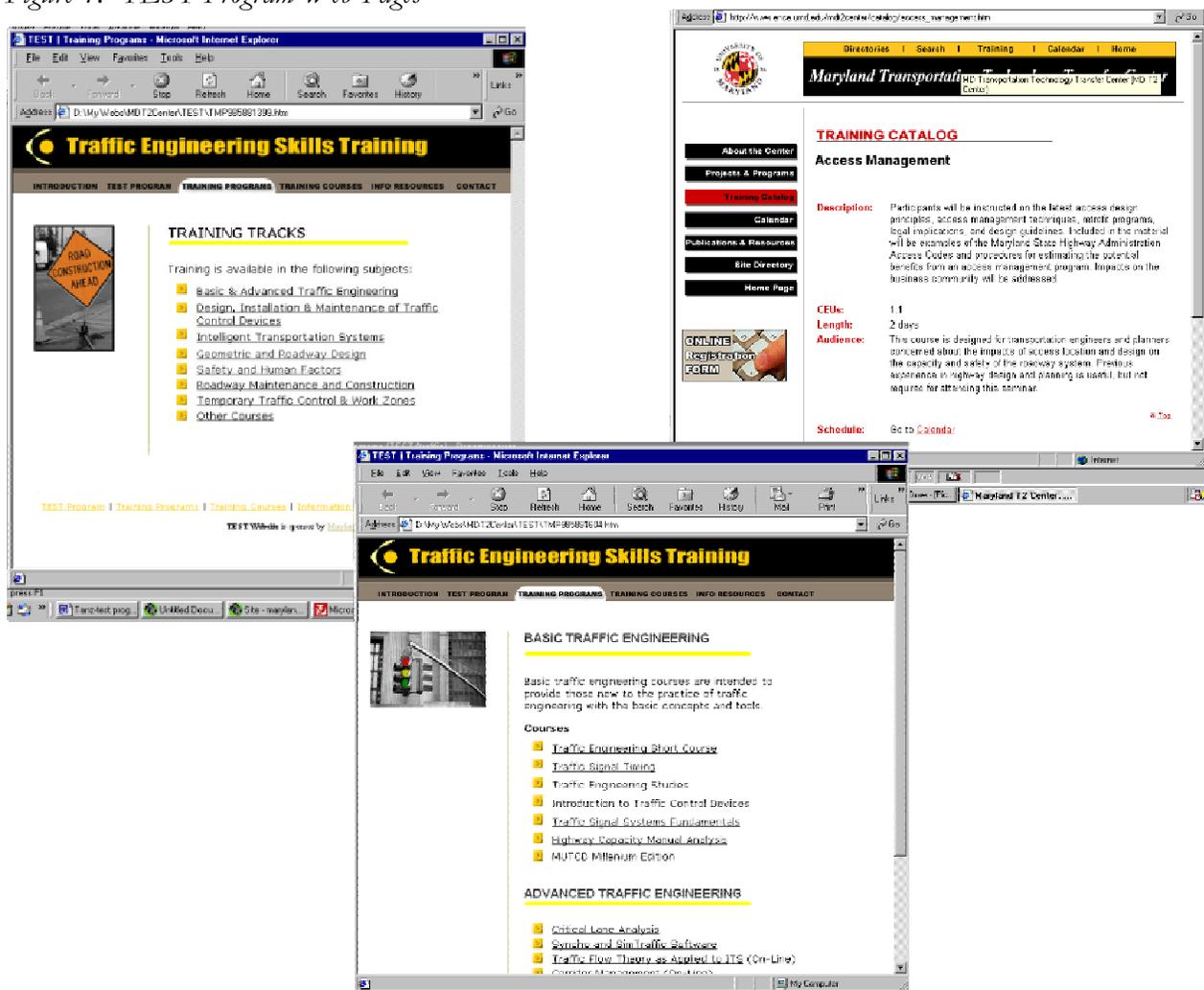
The curricula describe the knowledge and skills needed for each audience, and match them to specific course topics, and provide a means for course developers to identify unmet education and training needs. Curricula in each of eight areas are developed in collaboration with a team of experts, supplemented by the results of a training needs survey described later in this paper. Over time, these curricula will evolve to meet the changing needs of organizations in Maryland. The program is not intended to replace existing training programs or to supplant licensing and certification programs. The intention is to coordinate with and build upon existing SHA training programs, as well as training programs offered by organizations such a (but not limited to) the Institute of Transportation Engineers, the Maryland Municipal League, and the Consortium for ITS Training and Education (CITE). For example, the traffic engineering curricula provides the knowledge that traffic engineers will need to successfully obtain the Professional Operations Traffic Engineering license now offered in the United States.

Cooperative development and delivery of courses allows course costs to be shared over a larger audience, thereby reducing training costs for everyone and making it economically feasible

to develop and offer a greater variety of courses. Registration fees paid by local agencies and the private sector can significantly offset course development and course delivery costs for SHA. This larger pool of participants makes the development and delivery of specialized courses and more frequent delivery of higher-demand courses cost effective. The participation of local agencies and the private sector consultants that serve them will help to raise the level of traffic-engineering knowledge and expertise in the region. Courses will include participants from a wide variety of state and local agencies and the private sector. These “mixed” audiences provide a more complete learning experience in that all course participants will benefit from exposure to a variety of perspectives. It also provides an opportunity for Maryland State Highway Administration staff to interact with representatives from local agencies and the private sector. One of the most important aspects of this approach is that SHA; as well as local agencies are involved in the development of the curricula and review individual courses. This helps to ensure that the courses offered are relevant for staff of a variety of organizations, and results in strong support for training course. Employers are more confident that course material provides the needed skills, and that it conforms to practice and policy within the state.

A website is used as the primary means of disseminating information on the program and on available training. The website provides information on the curriculum, as well as training resources available through multiple sources. It will also provide a means for the transportation community to communicate their training needs to the T<sup>2</sup> Center, and to others. The sample pages in Figure 1 present a series of training tracks, and the curricula for basic traffic engineering. TEST web pages are linked to those of the Maryland State Highway Administration, the Maryland T<sup>2</sup> Center as well as to other training provider such as CITE, which provides internet-based training on selected topics. The T<sup>2</sup> Center and CITE pages include detailed descriptions of courses and course schedules.

Figure 1: TEST Program Web Pages



### 3. PROGRAM ORGANIZATION

The roles and responsibilities for the Maryland T<sup>2</sup> Center, the Maryland SHA and others are described in Table 1.

- **Program guidance** – program advice will be provided by an Advisory or Steering Committee. Members of this committee will include representatives from SHA, as well as individuals who understand the training needs of local agencies and private sector consultants.
- **Technical guidance** – advice and guidance on specific courses or in specific subject areas will be provided by designated resource people within SHA, as well as by other local experts. These individuals will be asked to evaluate the technical content of the courses, and the program, and to help insure that courses are consistent with practice in Maryland. They may also identify other potential reviewers and help identify and/or

evaluate instructors in specific subject areas.

- **Program Planning and Coordination** – The University of Maryland T<sup>2</sup> Center coordinates the development and delivery of courses, and tasks needed to implement and maintain a coordinated program. When appropriate, the T<sup>2</sup> Center may also provide support services to those who are developing courses.

**Table 1: Roles and Responsibilities**

|  |  |   |
|--|--|---|
| <b>Program Planning &amp; Coordination</b> | <i>Univ. of MD T<sup>2</sup> Center</i>              | <ul style="list-style-type: none"> <li>• Coordinate the development &amp; implementation of the training plan.</li> <li>• Facilitate development &amp; delivery of courses</li> <li>• Promote active resource-sharing</li> <li>• Establish and maintain peer-review and quality control processes,</li> <li>• Promote &amp; market program outside of SHA</li> <li>• Coordinate Advisory Committee</li> <li>• Conducts needs surveys and assessments</li> </ul> |
| <b>Program Guidance</b>                    | <i>Steering Committee</i>                            | <ul style="list-style-type: none"> <li>• Review curricula and recommended tracks</li> <li>• Recommend training priorities</li> <li>• Participate in program and course evaluation</li> </ul>  |
| <b>Technical Guidance</b>                  | <i>Maryland SHA</i><br><i>Subject-matter experts</i> | <ul style="list-style-type: none"> <li>• Appoint resource people for specific subject areas.</li> <li>• Work closely with the T<sup>2</sup> Center to identify instructors, course reviewers, and other aspects of the course.</li> </ul>   |

#### 4. THE TRAINING NEEDS SURVEY

The Center conducted a survey of local agencies and private sector companies in Maryland to determine the training needs and interests of local agencies, to identify barriers to training, and to assess interest in Internet-based distance learning.

##### 4.1 The Survey

This survey was conducted during June – September, 2000. The objectives were to get an indication of the demand for traffic-related courses among local agencies, private-sector companies that work with Maryland State Highway Administration, and various offices within SHA.

Surveys were mailed to fifty local agencies and twenty-five private-sector companies in

the State of Maryland, and were distributed in appropriate technical departments within SHA. Private sector companies included in the survey were primarily those who currently provide traffic-related services to the Maryland State Highway Administration. Mailings to local agencies were sent to Directors of Public Works and Transportation Departments. Transit and law enforcement agencies (both of which may have interest in these courses) were not included in the survey (with the exception of the Maryland State Police).

Part 1 of the survey focused on general training needs and barriers to training, and included questions regarding interest in certificates, as well as the use of distance learning. The objective of Part 2 was to get an indication of what specific topics are of interest, and when possible, get an estimate of the number of individuals who might be interested in courses in these topic areas. The list of topics included in the survey was drawn from the draft curriculum developed by the Traffic Training Committee at SHA that has been guiding this project over the previous year. The survey form includes topics at three levels; overview, basic, and advanced.

- **Overview courses** These courses provide an overview or summary of a topic, and are usually suitable for a broad audience
- **Basic Courses.** Basic or “Introductory” courses introduce a topic and provide a more in-depth overview of selected topics.
- **Advanced Courses.** Advanced course builds on basic courses and provide advanced instruction in specific areas. For example, traffic flow theory builds upon Introduction to Traffic Engineering

Respondents were asked to indicate interest in specific topic areas, and if possible, to provide a rough estimate of the number of individuals who may be involved. While this survey focused on traffic-related topics, respondents were encouraged to list additional topics in other areas.

#### 4.2 Survey Results

Responses were received from 10 private sector companies, 12 local agencies, five areas within SHA, and the Maryland State Police. The absolute numbers of participants in individual courses presented in the survey are not intended to be an accurate indication of the number of individuals who will enroll in a specific course. Rather, they provide a good indication of the level of interest in specific subject areas.

- **Certificates.** Eighty two percent of the respondents felt that the TEST Program should consider developing certificates, or some other means of recognizing individuals who complete selected series of courses, and the remaining 18% thought it was somewhat important. No respondents were opposed to the development of these certificates.
- **Continuing Education Units (CEUs).** Only 8% of the respondents felt that CEUs were not important. All of the private-sector respondents thought CEUs were important (70%) or somewhat important (30%).
- **Training Allocations.** Approximately ½ of the organizations studied had no formal allocation of training time for staff. The remaining respondents allocated from 1 to 5 training days per year.
- **Access to Training.** Twenty one percent of the respondents felt access to training was a problem for their organizations. All of the survey responses from Maryland SHA indicated that access to training was not a problem. Times out of the office and schedule

conflicts were a primary issue for approximately 58 % of the respondents. A number of local agencies were also constrained concerned by the cost of registration fees and travel.

- **Distance Learning.** Only 21% of respondents were unfamiliar with distance learning. 73% expressed interest in trying an internet-based distance-learning course to see what it is like, and over 50% would try distance learning based on what they currently know. Only 4% stated they were not interested in using distance learning courses as an alternative to traditional training for selected courses.

The highest levels of interest were, as expected, in courses related to basic traffic engineering, traffic control devices, geometric design, and temporary traffic control. Courses receiving the lowest levels of interest were related to Intelligent Transportation Systems (with the exception of ITS for Snow Removal and Global Positioning System). This is not surprising because these systems are just beginning to impact traffic operations at the local level.

- **Local Agencies.** Local agencies expressed strongest interest in traffic engineering courses at all levels, and roadway design courses. Their responses largely reflect their transportation-related responsibilities.
- **Maryland State Highway Administration.** General traffic engineering, courses related to traffic control at work zones, and safety-related courses seem to be of interest to the widest range of offices responding to the survey.
- **Maryland State Police.** The survey was sent to only one law enforcement agency, however their response shows a strong interest in traffic safety, as well as traffic-related courses that address issues relevant to incidence response. This, combined with the increasing involvement of local law enforcement staff in T<sup>2</sup> Center courses suggests a growing interest in these areas. Traffic-related training needs of law enforcement and other incident responders will be studied in the future.
- **Course Series.** Survey results indicated that series of courses at more than one level are needed for a number of topics, particularly in traffic engineering, traffic control devices, and geometric design.
- **Advanced Technical Courses.** There appears to be high interest in more advanced technically oriented traffic engineering courses.
- **Certificates.** A series of mini-certificates should be developed through the TEST program. These certificates can serve two purposes. First, they can provide individuals and their employers with some guidance on series of courses that will contribute to an individuals competency in specific areas, and
- **Internet-based Distance Learning.** Respondents expressed strong interest in Internet-based distance learning as a way to provide access to training. More than 50% of the respondents cited time out of the office as a primary barrier to training. Local agencies were also concerned about the cost of training (tuition) fees.
- **Training Objectives.** Most respondents indicated that traffic-related training was of interest to those would benefit from a better understanding of traffic-related topics, as well as those working directly in traffic-related jobs.

The results of this survey will be used to develop a training and course development plan for this program, and will be used by the Maryland T<sup>2</sup> Center to guide development of the 2001 training.

## **5. TRAINING TRACKS & CURRICULUM DEVELOPMENT**

Seven preliminary training tracks were selected based on the recommendations of the project advisory committee and the results of the survey. These tracks, will be modified and adjusted in the coming year, and re-organized into curricula that include series of courses for specific audiences. The list includes:

- Basic Traffic Engineering
- Advanced Traffic Engineering
- Geometrics & Roadway Design
- Intelligent Transportation Systems
- Safety and Human Factors
- Roadway Maintenance & Construction
- Temporary Traffic Control and Work Zones
- Maintenance & Installation of Traffic Control Devices

Basic courses have been identified for each of the categories. Existing courses are being reviewed to determine their suitability for the program, and to identify any changes needed to correspond to Maryland Practice.

## **6. CONCLUSIONS**

Phase 1 of this program is nearing completion. Courses have been defined for all but two of the eight training tracks, and training has commenced where existing courses are available. The Website for the project has been developed as a proto-type, and will be officially launched by April 2001.