

**Initial thoughts and Concepts
For an Traffic Operations Academy**

**Prepared by the
Center for Advanced Transportation Technology
and Technology Transfer Centers
At the
University of Maryland**

September 1, 2005

Background

As the emphasis on transportation operations increases, the demand for skilled professionals with operations knowledge and experience is also growing. Unless adequate personnel can be identified to support this area, it is unlikely that the desired results will be achieved.

While universities provide some of the required knowledge through existing transportation graduate programs, many essential subjects (project management, systems engineering, emergency management, maintenance management, etc.) are rarely covered in adequate detail, if at all. In addition, these programs do not provide the hands-on experience required for the positions that public agencies are attempting to fill.

This concept paper defines a training program that will address these needs. It is based on the concept of total immersion in the subject of transportation operations, with emphasis on roadway operations. It makes use of takes advantage of existing course material and resources to the greatest extent possible, and maximizes hands-on experience to ensure internalization and retention of the material being presented.

The program is designed in a manner to ensure that it will have been considered an honor to have attended. This is reflected in the requirements for admission, the quality of the program, and the recognition received by those who have satisfied its requirements.

Program Objectives

- Provide knowledge and skills spanning the entire range of operations activities including (in no particular order):
 - Operations planning (regional cooperation, funding sources)
 - Freeway operations
 - Surface street operations (including signal operations)
 - Corridor management
 - Traffic engineering
 - Traffic control devices
 - Social, environmental and institutional issues (including public/private partnerships)
 - ITS
 - Systems engineering (including standards)

- Project management (including return on investment, performance measures, contracting)
- Provide a mix of hands-on training, exercises, workshops, and exams to ensure a high level of retention.

Student Profile

Admission to the program will be selective. Students must meet the following requirements:

- Individuals with BS degree or higher
- Existing public agency employees with an interest in an operations career path
- Preferably at least 2 years experience working with a public sector transportation organization. Equivalent experience in another sector (i.e. consulting) can be substituted upon the approval of the admissions staff.
- Responsibilities (current or anticipated within the next 6 months) in an operations-related position

Recognition

To successfully complete the program, students will have to:

- Be willing to attend the entire two week program
- Have successfully completed all self-study material including passing grades on tests
- Complete an exam at the conclusion of each course
- Complete a final exam
- Provide acceptable solutions to the workshop problems

Upon successful completion, students will receive:

- Continuing education units from either NHI or the University of Maryland (tbd)
- A certificate of completion (tbd but could be provided by FHWA, CITE, ITE, AASHTO, etc.)
- Published recognition in articles provided to Public Roads, ITE Journal and other trade publications and newsletters

The Program

A two week program has been designed. (10 working days). The program would be preceded by the equivalent of 40 hours of self study. The self study will ensure that all students are at the same level of knowledge prior to beginning the Academy training, to minimize the cost and other problems associated with more than two weeks away from home.

All students will be housed at the training facilities. Working days will include evening homework and on-line assignments. Students may return home on the one weekend, or optionally, remain at the training facility. Local site-seeing type outings will be available to those who remain at the facility.

The program design is based on a review of similar “total immersion” training offered in other fields. In all cases, training includes a mix of presentations, workshops and hands on experience.

The program design includes the following mix of activities:

- Preliminary self-study (40 hours) Exams must be completed to verify successful completion
- Formal training including exams 48 hours
 - Classroom – 40 hours
 - E-learning (evenings – 8 hours or approximately 1 hours per weekday evening)
- Workshops 20 hours
- Hands-on 20 hours

Formal Training: This training would include the following modules:

- Self-Study – Includes the following course with outlines provided in Appendix A:
 - Selected sections of the ITE PTOE training Power Point self study course
 - ITS Awareness on-line course
 - ITS Devices on-line course
 - Introduction to telecommunications on-line course
 - ITS Architecture on-line course
- Operations training (both freeway and arterial) – This would include incident management, TMC operation, ATIS, signal operations, and integrated freeway/arterial operation. Note that some of this material would already have been covered with the self study. (1 day)
- Project management – Includes project management for ITS, financial aspects of project management, procurement, performance measures and asset management (2 days)
- Systems engineering – Includes the PCB courses of systems engineering, advanced systems engineering, and configuration management. Note that some of this material will already have been covered during the self study. (1 day classroom plus 8 hours on-line)
- Advanced Social, environmental and Institutional Issues – including planning for operations, regionalism, public/private partnerships, outsourcing, funding sources (1 day)

Workshop: Groups of 4-5 students would be formed for the workshop problem. Groups would be made up of students specializing in traffic engineering, planning and systems engineering. They would be presented with the following problem which may look difficult, but 4 students x 20 hours per student is equivalent to 80 person-hours of available labor.

- Network: An idealized, congested corridor approximately 15 miles long consisting of parallel freeway and arterial roadways with three interconnecting links. The freeway has three interchanges (one for each interconnecting link). The arterial has 6 cross streets including the three interconnecting links
- Resources

- Data including:
 - Benefit data from similar projects
 - Cost data from similar projects
 - Traffic characteristics for the project
- Problem details:
 - Agencies involved
 - Legacy systems
 - Incident characteristics
 - Anticipated traffic growth
 - Funding sources and availability
 - Potential opportunities and obstacles including industry's interest in participation, agency's outsourcing policies, contracting policies
- The problem:
 - Management-level analysis
 - Identify alternative technical approaches, and determine the costs and benefits of each
 - Examine the feasibility of alternative approaches for project implementation including outsourcing, public-private partnerships, contracting (include consideration of legal, financial, and policy issues)
 - Prepare presentation material for senior level management with project justification
 - Systems engineering/project management determine systems requirements for satisfying the traffic engineering needs
 - Prepare a regional architecture
 - Prepare a concept of operations including both transportation and first responders
 - Develop requirements
 - Prepare contracting plan, project management plan and systems engineering plan
 - Output – Reports and presentations along with competition for the best/most effective solutions.
- Grades would be given based on a pre-defined grading system that is shared with the students in advance of the workshop

Hands-On Training: This training would be provided with the cooperation of the Maryland State Highway Administration (SHA). It would include one day each of the following:

- Riding with a freeway service patrol unit
- Ride-along with ITS maintenance personnel (signals, detectors, DMS, CCTV, etc.)
- Working in a traffic management center (note there are at least three TMC's within easy travel of the training facility)
- One day to critique these operations, make suggestions for improvements and document the experience.

Costs and Facilities

This training would be performed at the Maritime Institute, a facility located within one mile of BWI airport, and within five miles (10 minutes) of the SHA facilities. The Maritime Institute is frequently used by the Technology Transfer Center for training and large scale workshops. It has extensive conference facilities, training/breakout rooms, an auditorium and a cafeteria (with good food). Perhaps most important, they also have living quarters. Their quote is attached as Appendix B.

Based on the Maritime Institute's estimate, training can be delivered for the costs summarized below and prepared in detail in Appendix C. As indicated in Appendix C, costs have been estimated for two cases; 20 students and 40 students. Obviously, the cost per student for 40 students is less than that for 20 students, since the instructor and other labor costs are spread over an increased number of participants.

Travel (airline) costs are not included in the estimate. It is assumed that out of town students would remain on site for a continuous 12 day period (10 weekdays and one weekend). Costs for out of town students include transportation to local sites such as Baltimore's Inner Harbor. Local students would be housed on site during the weekdays and return home on weekends. In all cases, costs include room and board (three meals per day). The training schedule is intensive and would not leave time for site seeing or for students to return home during the week.

The costs summarized in the table below were developed using these assumptions. Note that funding for the course development has not been included in the cost per student.

Summary of Estimated Training Costs

Cost Item	40 Students	20 Students
Training cost per student	\$ 1,289	\$ 2,078
Per diem for students	\$ 1,200	\$ 1,200
Extra weekend costs per student	\$ 400	\$ 400
Total out of town student cost	\$ 2,889	\$ 3,678
Total local student cost	\$ 2,489	\$ 3,278
Course Development cost	\$ 75,000	\$ 75,000

Appendix A

Home Study Training

1. Traffic Operations Analysis

- Traffic flow concepts- volume, density, speed, queue
- Road user characteristics
- Freeway Operations
- Intersections
- Transportation System Management Techniques, Access Management Tools
- Travel Demand Management

2. Traffic Safety

- Integration of various transportation modes
- Elements of Safety Improvement Program
- Crash Records System
- Road Safety Audits
- Non-Crash Indicators, i.e. crash rate, crash frequency, equivalent property damage only rate
- Understanding Crash Patterns
- Potential Countermeasures & Evaluation
- Liability, Negligence
- Effective Traffic Safety Program

3. Social, Environmental and Institutional Issues

- Types Federal, State and Local Regulations that affect transportation decisions; growth management policies, funding, environmental, vehicle weight and size limitations, etc
- Planning issues: State, Regional and Local Transportation Plans, Transportation Improvement Programs
- Strategies for implementation and evaluation (performance measures)
- Public Interaction and Involvement
- Transportation Planning Models, i.e. 4-Step Process
- Environmental Impact Analysis Process

4. ITS Awareness

- Describing ITS
- Integrating Systems
- Stakeholders and Partnerships

5. ITS Devices

- Surveillance Technologies
- Dynamic Message Signs
- DMS Applications
- Highway Advisory Radio
- Information Displays
- Traffic Signal Controllers

6. Introduction to Telecommunications

- Telecommunications fundamentals (signals, frequencies, voice and data, wireline and wireless)
- Networks

- Local Area Networks
- Wide Area Networks
- Data Communications Protocols
- Standards
- Applications
- Architecture and Communications

7. ITS National Architecture

- Introduction to the National Architecture
- Basic Concepts of Systems Engineering
- Systems Engineering Processes
- What is Architecture?
- Regional Applications
- Planning a Regional System
- Standards
- User Service Requirements
- Logical Architecture

Appendix B

Proposal Issued to Janette Prince University of Maryland by the Maritime Institute

*Approximately 90 Day classes
Not to start until After August 8th 2005*

1 Classroom to seat 40 persons classroom style

1 Classroom to seat 30 persons classroom style

Day Meeting Package includes:

*AM Break, PM Break, All you can eat lunch buffet in main dining room
General Session Meeting Room, LCD Projector, Screen, Podium with microphone
TV & VCR, Overhead, Service Charges*

\$44.00 per person per day or

\$28.00 per person per day without LUNCH

Overnight Guest Room

*Single Room to include Dinner each evening & a full hot breakfast buffet
120.00 per night*

*Single room w/ NO MEALS
\$95.00 per night*

Appendix C
Operations Academy Cost Estimate
Prepared 9/1/05

Item	Unit Cost	Quantity	Extension	Unit Cost	Quantity	Extension
Number of Students			40			20
Maritime Institute	44	10	17,600	44	10	8,800
Direct Labor						
Instructors	3,000	5	15,000	3,000	5	15,000
Instructor for Workshop days	1,000	5	5,000	1,000	5	5,000
Registration and Admin Support	200	45	9,000	200	45	9,000
UMD Student for support	100	15	1,500	100	15	1,500
Total Direct Labor			30,500			30,500
Other Direct Costs						
Copying	0.04	40,000	1,600	0.04	20,000	800
Long Distance Telephone	10		400	10		200
Local transportation	15	45	675	15	45	675
Parking			200			200
Total Other Direct Costs			2,875			1,875
20% Contingency on ODCs			575			375
Total Training Costs			\$ 51,550			\$ 41,550
Training cost per student			\$ 1,289			\$ 2,078
Per diem for students	\$ 120	10	\$ 1,200	\$ 120	10	\$ 1,200
Extra weekend costs per student	\$ 200	2	\$ 400	\$ 200	2	\$ 400
Total out of town student cost			\$ 2,889			\$ 3,678
Total local student cost			\$ 2,489			\$ 3,278
Course Development cost			\$ 75,000			\$ 75,000