



Transportation Engineering Professional Development Programs at State Departments of Transportation

Prepared for
Bureau of Traffic Operations

Prepared by
CTC & Associates LLC
WisDOT Research & Library Unit
October 18, 2011

Transportation Synthesis Reports are brief summaries of currently available information on topics of interest to WisDOT staff throughout the department. Online and print sources for TSRs include NCHRP and other TRB programs, AASHTO, the research and practices of other transportation agencies, and related academic and industry research. Internet hyperlinks in TSRs are active at the time of publication, but changes on the host server can make them obsolete. To request a TSR, e-mail research@dot.wi.gov or call (608) 267-6977.

Request for Report

WisDOT is developing a transportation engineering professional development program in partnership with the University of Wisconsin–Milwaukee and is interested in similar efforts under way in other state departments of transportation. Of particular importance are guidelines for what training is needed and how often staff members have to take or retake classes to fulfill credential requirements for engineering positions. WisDOT is also interested in program content and format; the use of outside coursework from professional development organizations and collaboration with state universities; methods for tracking credit hours; and generally in examples of course content, training timelines, agreements with universities and any other materials that might be helpful in starting a program.

Summary

We distributed a survey to members of the AASHTO Research Advisory Committee for completion by appropriate staff at their agencies. The questions focused on the types and formats of coursework offered, tracking and assessment of participation in their professional development programs and responsibilities for administering the programs. Staff at 17 state DOTs responded to this survey. Seven respondents (41 percent) say they have a TEPD program. Of these:

- All use classroom teaching as a learning format, four use peer-to-peer training/mentoring, two use Webinars and none use white papers.
- Three states include coursework and professional development participation from professional organizations, including the National Highway Institute.
- Five states report that universities support the agency's current standards and training.
- Six state TEPD programs include training for new employees.
- Six states offer the training to DOT staff, four to consultants and two to municipality staff; one DOT noted that the training is offered only to newly hired civil engineers.
- Five states use an internal database to track participation and credit hours; one uses a Web-based learning management system; and one has a dedicated human resources staff member for this purpose.
- All states use DOT staff to teach courses; four also use consultants while four use universities and one uses the National Highway Institute.

- Five agencies use training plans developed by supervisors to assess the need for a TEPD program; two DOTs use training plans that were self-developed by employees; one state draws on formal testing; and three DOTs employ other methods.
- Two agencies always test employees upon course completion, three sometimes and two never.

See **Survey Results** below for the full text of the survey questions and responses.

Most of the respondents initially did not provide course or other materials through the survey. (Texas DOT provided a link to an online catalog, and Mississippi DOT provided a link to NHI courses). After follow-up calls, Florida DOT provided a description of its Professional Engineer Training Program (Appendix A), Georgia DOT provided some training materials (see Appendices B.1 and B.2), and Illinois DOT agreed to provide materials within the next week.

An online search showed that several other states that did not respond to the survey have professional development programs of interest, including California, Iowa, Minnesota and New Mexico. (See **Professional Development Programs in Other States** on page 8 of this report.) We were able to engage in follow-up discussions with California and Iowa, and California provided a number of materials related to its professional development programs. (See Appendices C.1, C.2, C.3, C.4 and C.5.)

Finally, we found a number of materials that may be relevant to WisDOT’s development of a TEPD program, which are included in **Related Research and Resources** beginning on page 10.

Survey Results

The survey consisted of the following questions:

1. Does your agency have a transportation engineering professional development program?
 - a. No. Please skip to the end and select “Finish.” All questions relate to TEPD programs.
 - b. Yes. Please specify what content is offered (for example, traffic operations, roadway design and career development).
2. What types of learning formats are used by your agency’s TEPD program? Check all that apply.
 - a. Classroom teaching
 - b. Webinars
 - c. White papers
 - d. Peer-to-peer training/mentoring
 - e. Other (Please specify)
3. Does your agency’s TEPD program include coursework and professional development participation from professional organizations (such as the Institute of Transportation Engineers and the American Society of Civil Engineers)?
 - a. No
 - b. Yes. Please explain.
4. Do state universities support your agency’s current standards and training so that undergraduates are prepared for the workforce?
 - a. No
 - b. Yes. Please explain.
5. Does your TEPD program include training for new employees?
 - a. Yes
 - b. No
6. To whom is your TEPD program offered? Check all that apply.
 - a. DOT staff
 - b. Consultants
 - c. Municipality staff
 - d. Other (Please specify)

7. How does your agency track participation and credit hours for the TEPD program?
 - a. Internal database
 - b. University or private entity assists in record keeping
 - c. We don't track this
 - d. Other (Please specify)
8. Who teaches the courses offered through your TEPD program? Check all that apply.
 - a. DOT staff
 - b. Consultants
 - c. Universities
 - d. Other (Please specify)
9. How does your agency assess the need for the TEPD program? Check all that apply.
 - a. Formal testing
 - b. Training plans developed by supervisors
 - c. Training plans self-developed by employees
 - d. Other (Please specify)
10. How often does your agency (or those managing your TEPD program) test employees upon completion of a course to assess their understanding and retention of the course material?
 - a. Always
 - b. Sometimes
 - c. Never
11. Please provide the name and contact information for the person in your agency who WisDOT can contact for more information.
12. Please provide links to course descriptions, course materials and program pages, if available.

The full text of each survey response is provided below. For reference, we have included an abbreviated version of each question before the response.

Colorado

Contact: John Eddy, Branch Manager, Contracts & Market Analysis, Colorado Department of Transportation, (303) 757-9592, john.eddy@dot.state.co.us.

1. **Content offered:** We have a CDOT University to provide training.
2. **Learning formats:** Classroom teaching.
3. **Participation by other organizations?** No.
4. **State university training?** No.
5. **New employee training?** Yes.
6. **Target audience:** DOT staff, consultants.
7. **Participation tracking:** Internal database.
8. **Teachers:** DOT staff, consultants.
9. **Testing:** Training plans developed by supervisors. Training plans self-developed by employees.
10. **Testing frequency:** Never.
11. **Contact:** John Eddy, (303) 757-9592.
12. **Materials:** None provided.

Florida

Contact: Larry Ferguson, Manager, Performance Management Office, Florida Department of Transportation, (850) 414-4382, lawrence.ferguson@dot.state.fl.us.

1. **Content offered:** FDOT has a 4 year Professional Engineer Training Program for civil engineering graduates.
2. **Learning formats:** Classroom teaching, peer-to-peer training/mentoring.
3. **Participation by other organizations?** No.
4. **State university training?** Yes. We bring in those with CIT certification.
5. **New employee training?** Yes.
6. **Target audience:** DOT staff.
7. **Participation tracking:** Internal database.
8. **Teachers:** DOT staff.
9. **Testing:** Recruited for the program. Then Supervisor/Employee training plans in the second 2 years (Senior Phase).
10. **Testing frequency:** Always.
11. **Contact:** Larry Ferguson, Manager, Performance Management Office, lawrence.ferguson@dot.state.fl.us, (850) 414-4382.
12. **Materials:** Upon follow-up, Florida provided a description (Appendix A) of its Professional Engineer Training Program. Materials available on the Web:
 - Training page: <http://www.dot.state.fl.us/planning/training/>
 - Professional Engineer Training Program: <http://www.dot.state.fl.us/projectmanagementoffice/PETraining/default.shtm>

From Follow-up

FDOT's program is in-house and not associated with taking classes or tied to any of the state universities. It uses a rotation schedule through the first two years to expose the PE Trainee to the various offices and disciplines of the agency.

Georgia

Contact: Doug Cogburn, PEDP Administrator, Georgia Department of Transportation, (404) 651-7451, dcogburn@dot.ga.gov.

1. **Content offered:** GDOT has the Professional Engineer Development Program (PEDP) designed to help newly hired engineers (graduates from ABET-accredited academic programs) learn the agency, how transportation engineering is practiced in Georgia, and how each office's work products fits with the output of the other offices. The program about six months in duration and consists of on-the-job rotations to Offices such as Planning, Roadway Design, Bridge Design, Right of Way, Environmental Services, Utilities, Maintenance, Traffic Operations, and field construction.
2. **Learning formats:** Classroom teaching; Peer-to-peer training/mentoring; Hands-on projects (real or simulated) in most offices, those having longer duration assignments. Lectures and presentations for the offices with short training durations.
3. **Participation by other organizations?** No.

4. **State university training?** Yes. We only hire engineers who have completed ABET-accredited civil engineering college programs.
5. **New employee training?** Yes.
6. **Target audience:** Only newly hired civil engineers.
7. **Participation tracking:** There is an HR staff member dedicated to formulating the PEDP program schedules, communicating with participants and instructing office, tracking participation, and collecting evaluation paperwork at each participant's program conclusion.
8. **Teachers:** DOT staff.
9. **Testing:** Training plans developed by supervisors. Program's learning objectives are developed and updated under the auspices of the Division Directors of GDOT's engineering divisions.
10. **Testing frequency:** Never.
11. **Contact:** Doug Cogburn, PEDP Administrator, (404) 651-7451, dcogburn@dot.ga.gov.
12. **Materials:**
 - Appendix B.1: GDOT Professional Engineer Development Program manual. Both participants and instructors possess this manual during training.
 - Appendix B.2: GDOT Professional Engineer Development Program handout.

From Follow-up

Our Professional Engineer Development Program (PEDP) is all on-the-job training (OJT). Our newly hired civil engineers stay in their regular jobs four-to-six months in order to acquire a context for the training; then they start the rotational program. The PEDP engineers visit 15-to-18 offices (depending upon their office of origination) on a rotating basis and generally finish the program in six months. There is no involvement with local universities; the program is all in-house and OJT.

Illinois

Contact: John Baranzelli, ISO Quality Assurance Officer, Illinois Department of Transportation, (217) 557-1654, john.baranzelli@illinois.gov.

1. **Content offered:** Roadway design, construction/materials inspection activities, traffic operations, safety engineering and career development.
2. **Learning formats:** Classroom teaching, Webinars.
3. **Participation by other organizations?** Yes—National Highway Institute.
4. **State university training?** Yes—somewhat. Most state universities incorporate IDOT materials into their coursework.
5. **New employee training?** No.
6. **Target audience:** DOT staff, consultants, municipality staff.
7. **Participation tracking:** We use a Web-Based Learning Management System developed by KMSI, Inc. to maintain records of training.
8. **Teachers:** DOT staff, consultants, universities.
9. **Testing:** Each program has a steering committee which helps identify training needs.

10. **Testing frequency:** Sometimes.
11. **Contact:** John Baranzelli, (217) 557-1654, john.baranzelli@illinois.gov.
12. **Materials:** Will provide materials by 10/21/11. Materials available on the Web:
 - Illinois Technology Transfer Center 2011-2012 Training Program (booklet): <http://www.dot.state.il.us/blr/FY12%20Training%20Booklet.pdf>
 - Context Sensitive Solutions Training: <http://www.dot.state.il.us/css/training.html>
 - QC/QA Training Program: <http://www.lakeland.cc.il.us/idotqcqa/>

Mississippi

Contact: Terry Winstead, Training Manager, Human Resources Division, Mississippi Department of Transportation, (601) 359-7350, twinstead@mdot.state.ms.us.

1. **Content offered:** Flagger Training, Work Zone Traffic Control, Bridge Design and Inspection, ADA Compliance, National Highway Institute classes, Storm Water Management, Driving Skills, Asphalt Pavement Maintenance, Equipment Maintenance, Construction (Earthwork, Sub-Base/Base Inspection, Erosion Control, etc.), Planning, various technical issues addressed through conference attendance, LPA Compliance.
2. **Learning formats:** Classroom teaching, Webinars, Peer-to-peer training/mentoring.
3. **Participation by other organizations?** Yes—Use of outside consultants from professional engineering organizations, and FHWA/NHI is common at MDOT.
4. **State university training?** Yes—as far as I know, the EIT’s we hire are prepared when they enter our workforce. However, as with any employer, new hires have to learn the organizational culture.
5. **New employee training?** Yes.
6. **Target audience:** DOT Staff, Consultants, Municipality Staff.
7. **Participation tracking:** Internal Database.
8. **Teachers:** DOT Staff, Consultants, Universities.
9. **Testing:** Training plans developed by supervisors, Training plans self-developed by employees.
10. **Testing frequency:** Sometimes.
11. **Contact:** Terry Winstead, Training Manager, Human Resources Division, (601) 359-7350, twinstead@mdot.state.ms.us.
12. **Materials:** www.nhi.fhwa.dot.gov

North Carolina

Contact: Mrinmay “Moy” Biswas, Manager, Office of Research, North Carolina Department of Transportation, (919) 508-1865, biswas@ncdot.gov.

1. **Content offered:** Maintenance, Construction Safety, General Highway Engineering for non-engineers, review courses for EIT & PE, Equipment Management, Superpave, Implementation of research products, etc.
2. **Learning formats:** Classroom teaching, some university resources.
3. **Participation by other organizations?** No.
4. **State university training?** No.

5. **New employee training?** Yes.
6. **Target audience:** DOT Staff, Consultants.
7. **Participation tracking:** Internal database.
8. **Teachers:** DOT Staff, Universities.
9. **Testing:** Training plans developed by supervisors.
10. **Testing frequency:** Sometimes.
11. **Contact:** Mrinmay “Moy” Biswas, Manager, Office of Research, (919) 508-1865, biswas@ncdot.gov.
12. **Materials:** Not available.

Texas

Contact: Nancy Ellen Soteriou, Lead, Professional Development and Contracts Workforce Development Section, Texas Department of Transportation, (512) 486-5447, nancyellen.soteriou@txdot.gov.

1. **Content offered:** Our program is a comprehensive career development program that includes job rotation, training, mentoring, and exam preparation. The training and job rotation activities include all areas of transportation: design, construction, maintenance, traffic, environmental, planning, right of way, safety, and administration.
2. **Learning formats:** Classroom teaching, peer-to-peer training/mentoring, eLearning.
3. **Participation by other organizations?** Yes. Our courses are developed both in-house and through contracted development contracts. The materials are owned by TxDOT. We also have a large component of NHI courses from FHWA.
4. **State university training?** Several universities and colleges assist us by developing and delivering our training.
5. **New employee training?** Yes.
6. **Target audience:** DOT staff.
7. **Participation tracking:** Internal database.
8. **Teachers:** DOT staff, Consultants, Universities, National Highway Institute (FHWA).
9. **Testing:** Formal testing, training plans developed by supervisors.
10. **Testing frequency:** Always.
11. **Contact:** Nancy Ellen Soteriou, Professional Development and Contracts Workforce Development Section, (512) 486-5447, nancyellen.soteriou@txdot.gov.
12. **Materials:** Our links for the program are internal—here is the link to our course catalog: <http://www.dot.state.tx.us/hrd/tdp/tdp.htm>.

Professional Development Programs in Other States

California

Professional Development Training Courses, California Department of Transportation, 2007.

<http://www.dot.ca.gov/hq/tpp/offices/owd/training.html>

Mary Frederick of the Office of Capital Project Skill Development provided the following information about professional development at Caltrans from the Division of Design intranet website. (Note: Continuing education is not currently required to maintain professional registration in California.)

Design Training Curriculum

Welcome to the Division of Design Training Curriculum Program

The Division of Design and the Design Management Board have developed a Design Curriculum Program for engineers and technicians working within a design or functional support unit. This program consists of courses designed to give employees the tools they need to perform their assignments in the dynamic world of Transportation Engineering for the Department of Transportation. The curriculum program complements a degree in Civil Engineering by providing the participants in the program an understanding of their role in project development, training on the engineering tools and techniques specific to Caltrans and provides them an opportunity to focus their training on key specialties. It also affords technicians without a degree these same opportunities for training and development. It is intended to be used as a guide to focus training and development towards competencies relevant to the Design Program. With the necessary adjustments for individual, squad and departments need it can form the basis for a training or career development plan.

The program is divided into 4 Parts—Entry, PE and Senior-level, and the fourth part, consisting of various specialties. The first three Parts are further divided into 4 components—Foundation, Engineering and Management courses, which are required for completion. The fourth component is a specialty component that allows participants to choose elective course work to complete. Continued courses work in the specialization component will lead to completing the curriculum for that specialization. A detailed description of each Part along with a Curriculum Transcript is shown below, and is available on the Curriculum website.

Program Goals

Upon successful completion of this program, students will have the following knowledge, skills and abilities.

- Have a working knowledge of the Highway Design Manual (HDM) and be well versed in the topics included in Chapters 10 through 400 of the HDM, along with any relevant Design Information Bulletins (DIBs). Depending on the specialty completed, they will also be well versed in the remaining chapters of the HDM as well as any relevant design memos and DIBs.
- Have basic technical skills of Plane Surveying and Transportation Engineering.
- Be able to use Caltrans' drafting tool, Microstation, to develop plans and other technical drawings.
- Have basic competency in preparing plans to the standards in the Caltrans Drafting and Plans Preparation Manual.
- Be competent with Microsoft Excel and Word, the standard tools for report writing and data management.
- Be able to calculate quantities in accordance with the standard specifications or relevant special provisions.
- Be able to work in a team environment and assist other employees with their development.

Specializations

Computer Aided Drafting (CAD), Computer Aided Drafting and Design (CADD), Contract Development, Highway Drainage, Storm Water Treatment, Design, Planning and Pavement

Program Catalog

See Appendix C.1.

Curriculum Tracker

See Appendix C.2.

Program Policy

Equivalent courses may be substituted or waived as recommended by the employee supervisor, subject to approval by the Academy Manager. Courses may be offered through LMS or another source subject to funding. Successful completion of this program does not guarantee advancement nor is it a prerequisite for employment. This training is considered Category 3 training and should be part of the employee's Career Development Plan.

Certificates of completion will be issued to those who have successfully completed any Part of this program. The appropriate Curriculum Transcript should be forwarded to the above address for processing.

For more information on course content, contact Mark Robinson, Academy Manager, (916) 654-6682, mark_robinson@dot.ca.gov.

Caltrans also provided examples of design modules for entry level engineers, mostly civil engineers. (See Appendices C.3, C.4 and C.5.) According to Ms. Frederick, many of its new hires do not have a solid background in transportation engineering, so Caltrans provides them with the basics via such modules before they begin to train for and use computer-aided design software.

Contact: Mary Frederick, Office of Capital Project Skill Development, (916) 657-1409, mary_frederick@dot.ca.gov.

Iowa

DOT Employee Training Academy, Iowa Department of Transportation, undated.

<http://www.iowadot.gov/training/academy.html>

This program is focused on materials rather than traffic engineering. According to training specialist Brian Squier, formats include classroom presentations and Webinars. Iowa has a partnership with the Des Moines Area Community College to teach courses using current or former Iowa DOT staff as instructors, with coursework developed by Iowa DOT. Thirty percent of certifications for this program go to DOT staff, and 70 percent to contractors and consultants, or city and county staff. Iowa DOT tracks credit hours using an internal database. All training manuals and other materials are available via the link above.

Contact: Brian Squier, Training Specialist, Iowa Department of Transportation, (515) 233-7915, brian.squier@dot.iowa.gov.

Minnesota

Mn/DOT Training and Conference Center, Minnesota Department of Transportation, undated.

<http://www.dot.state.mn.us/hr/trngctr/>

Traffic-related Courses, Minnesota Department of Transportation, undated.

<http://www.dot.state.mn.us/trafficeng/education/>

From the website: Traffic classes provide technical leadership to state, city, and county traffic professionals. The Traffic Education Section works closely with the Mn/DOT Traffic Engineering Organization, as well as county, city, and private traffic professionals, to identify professional continuing education needs.

Traffic engineering specialty areas include courses in corridor simulation modeling—advanced training, lighting design, safety, signal and lighting certification, signing design, traffic signal, work zone and other traffic-related courses.

New Mexico

NMDOT Training Academy, Field Operations Division, New Mexico Department of Transportation, 2011.

<http://dot.state.nm.us/main.asp?secid=10932>

The New Mexico Department of Transportation's Training Academy provides opportunities for employees to develop knowledge, skills and abilities through a variety of training programs in safety, preventive maintenance and heavy equipment operation. This website offers access to a quarterly training schedule and course descriptions:

- Training schedule:
<http://dot.state.nm.us/upload/images/Training%20Academy/4th%20Quarter%202011%20Schedule.pdf>
- Course descriptions:
<http://dot.state.nm.us/upload/images/Training%20Academy/Course%20Description.pdf>

Related Research and Resources

Development of Knowledge Tables and Learning Outcomes for an Introductory Course in Transportation Engineering, *Transportation Research Record*, Vol. 2211, 2011: 27-35.

<http://trid.trb.org/view/2011/C/1091816>

This paper develops core concepts and associated knowledge tables for an introductory transportation course in the following core concept areas: traffic operations, transportation planning, geometric design, transportation finance, transportation economics, traffic safety, and transit and nonmotorized transport.

Catalog of Transportation Education, Training, and Workforce Development Programs and Resources, Federal Highway Administration, August 2010.

<http://www.fhwa.dot.gov/transprocat/>

This catalog brings together transportation-related education, training and professional development programs offered by the U.S. Department of Transportation and professional associations and organizations.

The Louisiana Model for Transportation Workforce Development: Integrating Technical Assistance, Structured Training, Continuing Education, and Technology Transfer, *TR News*, Vol. 257, July-August 2008: 7-13.

<http://onlinepubs.trb.org/onlinepubs/trnews/trnews257Louisiana.pdf>

This article includes a description of Louisiana Department of Transportation and Development's structured training program:

[The program] consists of a department-sanctioned, progressive training curriculum that requires the completion of specific work-related training at each level of an employee's career path. For DOTD, training is necessary and integral to career advancement. The department supports and promotes an environment of continual learning, so that employees can pursue professional development to the fullest extent and can contribute to the goals of the department.

Training Programs, Processes, Policies, and Practices, *NCHRP Synthesis 362*, 2006.

http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_syn_362.pdf

This report examines program components required to have a sound set of policies, processes and procedures for planning, developing, implementing, funding and evaluating state DOT training, development and education programs.

Iowa Department of Transportation Technical Training Activities, *Proceedings of the 2003 Mid-Continent Transportation Research Symposium*, Iowa State University, 2003.

<http://www.ctre.iastate.edu/pubs/midcon2003/AndersonTraining.pdf>

The Iowa DOT Technical Training and Certification Program is responsible for ensuring that all technicians who perform material testing and/or construction inspection on construction projects in Iowa are qualified. This paper describes some of these training activities. More than 200 classes are held annually with approximately 3,000 individuals participating. The program is involved in a multiregional training and certification effort working toward reciprocity of technician certification between states, regional material development, uniform test procedures and coordinating exchange of state information. Iowa DOT also is using a new approach to dealing with a downsized workforce by using maintenance equipment operators to perform testing/inspection duties and construction, and materials inspectors to perform maintenance duties in their respective off-seasons, although this approach has the additional challenge of cross-training.

The Traffic Engineering and Operations Skills Training Program in Maryland, D.C. Nelson, *Proceedings of the First Road Transportation Technology Transfer Conference in Africa*, 2001: 120-127.
<http://trid.trb.org/view/2001/C/688231>

From the abstract: Development of the Traffic Engineering and Operations Skills Training Program was initiated in 1999 by the Maryland State Highway Administration and the Maryland Transportation Technology Transfer Center. 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. This paper describes the training, organizational, and structural needs of the program, the initial curriculum, and partnership arrangements.