

PB2001-106529



PENNDOT Research Annual Report 1999-2000

REPRODUCED BY: **NTIS**
U.S. Department of Commerce
National Technical Information Service
Springfield, Virginia 22161

Message from **PENNDOT'S Research Manager**

Thank you for taking a few moments to look through this Annual Report to learn more about PENNDOT's Research Program. In this report the Research Staff has attempted to create a permanent record highlighting the broad accomplishments and significant investments that comprise the PENNDOT Research Program. Our research initiatives are aligned with the strategic objectives of both the Federal Highway Administration and PENNDOT and are distilled into a three-pronged—"Safer, Swifter, Smarter"—theme. When reading this report, you will find that these strategies permeate the PENNDOT Research Program.

As I review the highlights of the past research program year, I realize that this greeting could easily become a multiple page document, but for brevity's sake I will limit these highlights to three significant programs. The first is the training partnership developed between PENNDOT and the Governor's Center for Local Government Services. This partnership, using PENNDOT and FHWA funds, delivered over 40 training courses for municipal officials to nearly 600 participants. These included Second Class Township Roadmaster, Winter Maintenance, Spring Maintenance, and a Peer-to-Peer consulting effort. The true innovation in this partnership is that the statewide associations that represent the municipal officials conduct the training classes. For example, instructors from the Pennsylvania Association of Township Supervisors, the Pennsylvania State Association of Boroughs, and the Pennsylvania League of Cities and Municipalities conduct classes. Because better than half of Pennsylvania's roads and highways are owned, operated and maintained by municipalities, this training is a direct investment in the "Safer" element of PENNDOT's strategic direction.

Research is also making an impact on the "Swifter" objective. In particular, the research and technology transfer effort that has been conducted to develop Superpave into a viable option for long-lasting, durable roads is expediting Pennsylvania's road construction methods. Driven by its research investments in several programs, Pennsylvania is now recognized as a national Superpave leader. Superpave is giving Pennsylvania's highway designers and builders the tools necessary to improve pavement surfaces quickly without the need for frequent maintenance. The "get in, get out, stay out" mantra is being realized through the Superpave research that is being conducted.

The third program is the Summer Transportation Institutes for high school scholars being held at Lincoln University and Cheyney University. During the past two summers, nearly 100 bright, energetic, and motivated high school students spent a month on the Lincoln or Cheyney campuses to learn about careers in transportation. These intense one-month college experiences exposed the students to all aspects of transportation-related careers. University faculty ran the summer Transportation Institutes using funds from the FHWA and PENNDOT to give the students many hands-on and laboratory experiences. These Institutes are clearly an investment in our future and support the "Smarter" theme of our strategic mission.

Thanks again for taking time out of your busy schedules to learn more about PENNDOT's Research Program.

Sincerely,



Bob Garrett,
PENNDOT's Research Manager



Introduction

The Pennsylvania Department of Transportation's (PENNDOT) Executive Committee has entrusted the Bureau of Planning and Research and the Division of Research staff with the responsibility for managing a Research Program that is a department-wide asset. This Research Program is directly linked to PENNDOT's Strategic Plan, "Moving Pennsylvania Forward", and supports all eight enterprise-wide goals.

Managing PENNDOT's Research Program is both an art and a science. The scientific process is used for developing the recommendations and findings that lead to improved techniques, tools, and applications throughout Pennsylvania's transportation system. Working with diverse groups of stakeholders, customers, and partners requires the art of providing clear leadership resulting in a shared vision that becomes PENNDOT's Research Program.

The Innovations Deserving Exploration and Analysis (IDEA) process has become a standard operating procedure. Throughout PENNDOT 162 IDEAs or project submissions have been made. Nearly 50% of these projects have been initiated through research contracts and agreements. Another 40% of the proposed projects have been referred to other areas of PENNDOT for consideration, and a few have been returned to the submitter for reconsideration.

New research initiatives have been undertaken in the areas of aviation and rail freight modes and in environmental quality. Technology transfer efforts have been solidified with our municipal partners in road maintenance, traffic safety, and transit. Exciting new possibilities in professional capacity building are currently being discussed with several new agreements expected in the near future.

The PENNDOT Research Annual Report contains three major sections:

- Research Program Highlights.....pages 1-2
- Review of Projects.....pages 2-56
- Financial Summary.....pages 57-63

To learn more about PENNDOT's research program, please visit the website at www.dot.state.pa.us or call the Division of Research at (717) 783-5593. PENNDOT's Division of Research appreciates your interest in how its research initiatives are Moving Pennsylvania Forward.

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Research Program Highlights

Research IDEAs Have Consequences

The Innovations Deserving Exploration and Analysis (IDEA) program is a Research Division invitation to all PENNDOT employees to suggest potential research projects. The IDEA submission form is an easily understood document for employees to use in outlining their suggested projects. The IDEA program incorporates the best practices attributed of the National Cooperative Highway Research Program, the Transportation Research Board, and the Federal Highway Administration (FHWA) Office of Technology Applications.

Several committees are utilized to ensure that PENNDOT's research funds are invested in high priority projects that will be implemented upon completion. The first committee to review the proposed projects is the Research Program Management Committee (RPMC). This is a research staff function receiving guidance from the FHWA and PENNDOT's Research Cooperative Agreement Administrator.

The RPMC provides recommendations on the proposed projects to the PENNDOT Research Advisory Committee (RAC). The PENNDOT RAC is an intermodal/interdisciplinary organization including the RPMC members, PENNDOT bureau directors and special assistants. This committee is co-chaired by PENNDOT's Chief Engineer and the Director of the Bureau of Planning and Research.

PENNDOT RAC recommends research projects for submission to the Strategic Management Committee (SMC) for final approval. The SMC, PENNDOT's executive arm, ensures that the proposed Research Program supports the goals and objectives of Moving Pennsylvania Forward, PENNDOT's overall transportation strategy.

University-Based Cooperative Agreement

The University-Based Cooperative Agreement is a five-year research contract to expedite projects to be performed by college/university faculty serving as principal investigators, staff, and students. The agreement provides \$15 million in contracting capacity over the life of the contract. Projects are initiated through individual work orders, and funding is secured as these work orders are executed.

The Research Advisory Committee sets priorities for projects under this agreement. Project development begins with the submission of an IDEA. Research panels are formed to identify principal investigators and develop work statements. Accompanying budgets are prepared based on projections made by the project research panel and/or project manager.

Research Program Introduction at the University of Pittsburgh

On April 9, 1999, the FY 1999-2000 PENNDOT's Research Program was introduced to interested staff and faculty at the Benedum Engineering Hall located at the University of Pittsburgh. Over 50 people attended including representatives from PENNDOT Engineering Districts 10-0, 11-0, and 12-0.

After welcoming remarks from the Vice Provost for Research and the Dean of the School of Engineering, the research staff discussed the Research Cooperative Agreement, the research IDEA solicitation process, the PENNDOT Materials Program and current, on-going research. The proposed FY 1999-2000 Research Program was discussed with the university participants and fellow PENNDOT employees.

University faculty gave presentations on their areas of expertise and interest. These ranged from application of high performance steel to new highway bridge construction to the influence of pore structure on the degradation of shales. A tour of university facilities concluded a very productive session with a future partner in the PENNDOT Research Program.

Partnership with the Governor's Center for Local Government Services

On July 6, 1998, PENNDOT's research staff initiated the first of a series of training-related Memoranda of Understanding with the Governor's Center for Local Government Services. The philosophy of these early agreements was to continue the long-standing partnership between PENNDOT and the re-engineered training function of the former Department of Community Affairs. The model that was selected used PENNDOT/FHWA funds contracted through the Center. This model used the Governor's Center for Local Government Services to contract with statewide associations of municipal officials. The Pennsylvania State Association of Township Supervisors was the first municipal association sub-contractor that was selected. Since the first agreement, the Pennsylvania State Association of Boroughs and the Pennsylvania League of Cities and Municipalities have been added as sub-contractors.

The original training agreement permitted the continuation of former Department of Community Affairs training classes including Time and Stress Management, Dealing with the Angry Public, and Effective Supervision. Both general education and road maintenance-specific class topics have been added including Maintaining Vehicles, Bidding and Purchasing Techniques, Innovative Winter Maintenance, the Spring Maintenance series, Computers in Your Road Department, Safety Training Manual, and Superpave for Local Officials.

The partnership with the Governor's Center for Local Government Services has resulted in stronger ties between state and local government officials. High quality, cost-effective courses have been conducted across the Commonwealth. The "Pennsylvania Local Government Program" now includes both the Local Transportation Assistance Program (LTAP) Center and a partnership with local government associations that is unparalleled anywhere in the United States.

Roadside Vegetation Management

(100% State Funded—714)

Program Objective:

This project's objective is to maximize the utility, aesthetics and safety of the roadside through the application of sound plant and environmental science which complements the engineering of the roadway system.

Accomplishments:

- Co-sponsored the 1999 Roadside Vegetation Management Conference in Allentown, PA, along with the Department, the Federal Highway Administration, and the Eastern Resource Center.
- Co-sponsored the 2000 Roadside Vegetation Management Seminar in State College, PA, along with the Department.
- Produced Research Reports summarizing 17 research trials and demonstrations conducted during the 1998 calendar year and 23 research trials and demonstrations conducted during the 1999 calendar year.
- Established and/or maintained 32 research trials and demonstrations.
- Gave presentations at regional, state, and local vegetation management meetings and responded to inquiries on vegetation management from PENNDOT and its contractors, as well as other Pennsylvania agencies, other state departments of transportation, and private industry.

Program Manager
Project Manager
Total Project Cost
FY 99-00 Expenditures
Contractor
W.O. #
Project #
Contract Completion

Tom Horne
Joseph S. Demko
\$764,711
\$153,188.33
Penn State University
2
97-04
March 18, 2003



Statewide Transportation Planning—PennPlan

Program Objective:

This project is designed to create a program for public involvement in the update of the Statewide Long-Range Transportation Plan.

Accomplishments:

- Developed a planning process employing an innovative and comprehensive public involvement component.
- Produced a 25-year plan based on ten statewide goals and thirty statewide objectives.
- Established a standard for transportation planning linking the expenditure of public funds to public policy.

Program Manager	Tom Horne
Project Manager	James A. Smedley
Total Project Cost	\$649,604
FY 99-00 Expenditures	\$229,543.31
Contractor	Penn State University
W.O. #	5
Project #	97-04
Contract Completion	February 3, 2000

I-95 Corridor Coalition Field Operational Test

Program Objective:

This objective of this project is to develop a prototype comprehensive, performance-based motor carrier safety compliance and management program to support the I-95 Corridor's commercial vehicle operations (CVO) activities.

Accomplishments:

- Produced a "Best Practices in Motor Carrier Safety Management" technical memorandum containing recommendations for educational and outreach programs and materials to improve motor carrier safety and compliance with regulations.
- Surveyed state motor carrier safety agencies throughout the United States to obtain information about their motor carrier safety enforcement and educational activities, the results to be used to develop the prototype program.

Program Manager	Michael Bonini
Project Manager	Dennis Lebo
Total Project Cost	\$300,000
FY 99-00 Expenditures	\$90,016.49
Contractor	Penn State University
W.O. #	8
Project #	97-04
Contract Completion	August 31, 2001

PENNDOT/FHWA Priority Technologies Program for Smart Paint

Program Objective:

The purpose of this project is to provide a method for detecting cracks in a structure, incorporate a corrosion protection system within the paint, provide a self-activating crack indication system visible to observers with minimal training, and provide a nondestructive crack indication technique. This is PENNDOT's first project with the Priority Technologies Program.

Accomplishments:

- Tested the first generation of the formulation in a laboratory setting on large steel beam specimens undergoing fatigue testing and on smaller tensile coupon specimens.
- Modified materials for field tests and applied material to I-476 bridge site in Conshohocken, PA.
- Monitored application for one year and demonstrated crack detection method.

Program Manager	Tom Horne
Project Manager	Harold C. Rodgers
Total Project Cost	\$66,250
FY 99-00 Expenditures	\$31,867.53
Contractor	Lehigh University
W.O. #	9
Project #	97-04
Contract Completion	April 22, 2000

Fiber Reinforced Polymer Bridge Deck

Program Objective:

The Laurel Hill Creek Bridge is constructed with a fiber reinforced polymer deck, an innovative material with the potential to withstand weather extremes more successfully than standard bridge decks. Bridge decks constructed of this material also can be fabricated off site, thus reducing construction time and costs. This project monitors the in-service behavior of this bridge to provide data needed to produce accurate design specifications and revisions, evaluate construction techniques, prepare load rating methods and prepare inspection methods.

Accomplishments:

- Draft design specifications are being written for AASHTO utilizing data obtained from this and additional sites.
- Reduced the cost of installing composite decking from a high of \$72.00/sq. ft. to approximately \$53.00/sq. ft. using information from this project.

Program Manager	Tom Horne
Project Manager	Rebecca Burns
Total Project Cost	\$63,829
FY 99-00 Expenditures	\$2,137.53
Contractor	West Virginia University
W.O. #	11
Project #	97-04
Contract Completion	September 22, 2001

Probing Motorist Perceptions of Highway Quality

Program Objective:

The goal of this project is to improve customer satisfaction. This project attempts to improve PENNDOT's understanding of the ratings of highway quality generated from current annual motorist surveys and the interpretation of ratings for use by PENNDOT maintenance managers in improving customer satisfaction. Data from this project is being used to verify the validity and reliability of customer feedback from PENNDOT's annual county-level survey of motorist satisfaction.

Accomplishments:

- Conducted a mail survey of Pennsylvania motorists to test the feasibility and usefulness of a new survey instrument for PENNDOT.
- Produced a final report presenting the results of this survey and utilized the survey data to strengthen the validity and reliability of PENNDOT's annual county-level survey, expanding the dimensions of highway quality incorporated in the survey.

Program Manager
Project Manager
Total Project Cost
FY 99-00 Expenditures
Contractor
W.O. #
Project #
Contract Completion

Michael Bonini
Joe Robinson
\$202,780
\$26,264.53
Georgia State University
12
97-04
December 5, 2000

Municipal New Products Evaluations

Program Objective:

The purpose of this project is to investigate various construction materials with the goal of allowing their use by municipalities in road construction and maintenance. It defines product properties and characteristics and investigates their performance. Specifications and guidelines are also being developed for the use of these materials/products so that PENNDOT may approve their use in low volume roads or by local municipalities.

Accomplishments:

- Produced a study and report on the evaluation of the performance and sustainability of FB-3 Modified Wearing Course evaluating its mixing and placement requirements and comparing its performance to wearing course materials currently approved by PENNDOT for low volume roads.
- Developed a "Recommended Specification for Small Diameter Drainage Pipe for Use by Local Municipalities" recommending that that local municipalities use a minimum of 12" of cover thickness for all small diameter pipe culverts.

Program Manager
Project Manager
Total Project Cost
FY 99-00 Expenditures
Contractor
W.O. #
Project #
Contract Completion

Michael Bonini
Gene Smeltzer
\$56,500
\$28,407.48
Penn State University
16
97-04
September 19, 2000

Increasing the Pool of Highway Construction Subcontractors and Construction Personnel

Program Objective:

The project's goal is the development of a highway/bridge construction subcontractors' manual and a highway construction vocational and technical manual that encourages high school students to consider heavy construction as a viable career choice.

Accomplishments:

- Created an Advisory Committee with members drawn from PENNDOT, Pennsylvania's Department of Education, Cheyney University, The Pennsylvania Association of Vocational Administrators, The Association of Pennsylvania Constructors, and private contractors to guide the development of the vocational-technology curriculum in highway construction.
- Produced the highway/bridge construction subcontractor's manual.
- Developed the vocational education program in highway construction technology.

Program Manager	Tom Horne
Project Manager	William S. Kerney
Total Project Cost	\$124,891
FY 99-00 Expenditures	\$60,870.55
Contractor	Penn State University
W.O. #	17
Project #	97-04
Contract Completion	September 30, 2000

Evaluation of Triaxial Strength as a Simple Test for Asphalt Concrete Rut Resistance

Program Objective:

This project's goal is to examine the feasibility of using the triaxial strength test for Superpave volumetric mix designs, particularly for evaluating rut resistance. The current Superpave method for hot-mix asphalt concrete consists of three phases: (1) materials selection, (2) aggregate blending, and (3) volumetric analysis on specimens compacted using the Superpave gyratory compactor. There is no strength or stability test as has been used in the traditional Marshall and Hveem methods of mix design. The triaxial strength test is a fairly simple, performance-related test, and its applicability to Superpave has never been fully evaluated.

Accomplishments:

- Tested ten dense-graded asphalt concrete mixtures using standard triaxial strength tests, six mixtures being based on Marshall mix designs and four based on Superpave mix designs.
- The IDT strength was found to be an excellent predictor of rut resistance.

Program Manager	Fran Treisbach
Project Manager	Dean Maurer
Total Project Cost	\$80,000
FY 99-00 Expenditures	\$56,305.94
Contractor	Penn State University
W.O. #	19
Project #	97-04
Contract Completion	August 31, 2000

NECEPT Binder Testing and Training

Program Objective:

This project evaluates the laboratory fatigue performance of hot mix asphalt using an innovative testing technique developed in conjunction with École Nationale des Travaux Publics de l'État (ENTPE) in Lyon, France. Its goal is to provide continued development and validation of the binder specification. This research tests the hypothesis that separate and opposing specification criteria are not needed for thick and thin pavements. The new testing protocols developed under the ENTPE study unify controlled stress and controlled strain fatigue test results, as well as account for self-heating and thixotropy, thus giving a unique approach for developing more rational binder fatigue criteria.

Accomplishments:

- Completed literature review.
- Arranged to obtain special testing equipment at no cost to the project.
- Developed testing protocol.

Program Manager
Project Manager
Total Project Cost
FY 99-00 Expenditures
Contractor
W.O. #
Project #
Contract Completion

Fran Treisbach
Dean Maurer
\$77,715
\$0
Penn State University
20
97-04
July 15, 2001

Pilot Project for Concrete Maturity Meter for QA/QC and Acceptance

(100% State Funded—614)

Program Objective:

This project investigates the implementation and use of concrete maturity meters. It consists of an extensive literature search on concrete maturity meters' current use and the associated specifications used to implement the meters' use in quality control and quality assurance programs. The program is to make recommendations for the use of concrete maturity meters on two PENNDOT projects and to develop revised protocols for the use of the meters on future construction projects. The project includes the development of a workshop for PENNDOT and its contractors.

Accomplishments:

- Completed literature review
- Developed trial protocols.
- Completed all field trials.

Program Manager
Project Manager
Total Project Cost
FY 99-00 Expenditures
Contractor
W.O. #
Project #
Contract Completion

Fran Treisbach
Gerald Malasheskie
\$126,000
\$35,874.66
Penn State University
22
97-04
January 31, 2001

Construction and Materials Community Training and Education Plan

Program Objective:

This project's goal is the development of a training plan addressing the necessary technical knowledge and skills needed by Pennsylvania's agencies, commissions, constructors, and engineering consultants in defining future education and training activities for all training partners.

Accomplishments:

- Generated a compact disk (CD) containing the interactive plan.
- Produced a document highlighting training needs and recommendations.

Program Manager	Tom Horne
Project Manager	Chris A. Drda
Total Project Cost	\$120,000
FY 99-00 Expenditures	\$62,690.19
Contractor	Penn State University
W.O. #	23
Project #	97-04
Contract Completion	April 11, 2000

Materials Product Evaluation Reports

Program Objective:

This project's purpose is to review products that have been installed on Pennsylvania roads, but not yet evaluated. Information that has been previously collected and existing draft reports are being reviewed and summarized into a final report. Products/processes being evaluated are:

1. Cathodic Deck Protection on P/S Beams with Latex Modified Concrete and Elgard Anode Mesh Cathodic Protection System for Piers,
2. Isotropic Bridge Deck Evaluation,
3. Experimental Bridge Paint Primer Rust Penetrating Sealer,
4. Lightweight Aggregates as Structural Backfill,
5. Evaluation of Polymer Modified Asphalts for Sealcoat Construction and Evaluation of Surface Treatments,
6. Blastox: Lead Reducing Abrasive.

Accomplishments:

- Completed data collection, field evaluations, etc. for all projects except #5, which is being completed in FY 2000-01.
- Completed draft evaluation reports for PENNDOT review.

Program Manager	Michael Bonini
Project Manager	Bob Klotz
Total Project Cost	\$120,000
FY 99-00 Expenditures	\$20,829.55
Contractor	Howard University
W.O. #	24
Project #	97-04
Contract Completion	June 27, 2001

Heavy Axle Study—Impact of Higher Rail Car Weight Limits on Short Line Railroads

Program Objective:

This project examines a sample population of short line railroad bridges currently in service to determine whether these bridges have the capacity to carry higher railcar weight limits safely, particularly on those railroads that connect directly with truck transfer facilities, thus maximizing available transportation resources.

Accomplishments:

- Developed sampling methodologies, options, and considerations.
- Collected bridge data and applied sampling methodologies.
- Conducted survey of structural problems in sample bridge population.

Program Manager
Project Manager
Total Project Cost
FY 99-00 Expenditures
Contractor
W.O. #
Project #
Contract Completion

Tom Horne
Randy R. Haldeman
\$120,000
\$14,602.33
Penn State University
27
97-04
May 31, 2001

Pennsylvania Highway Drainage Manual

(100% State Funded—614)

Program Objective:

The objective of this project is to develop a portion of the Pennsylvania Highway Drainage Design Manual.

Accomplishments:

- Completed drafts incorporating PENNDOT's comments of the "Hydrology", "Hydraulics of Bridges", "Hydraulics of Culverts", and "Hydraulics of Open Channel Flow" chapters of the manual.

Program Manager
Project Manager
Total Project Cost
FY 99-00 Expenditures
Contractor
W.O. #
Project #
Contract Completion

Tom Horne
Barry A. Newman
\$53,951
\$27,142.63
Penn State University
28
97-04
June 30, 2001



Understanding Litter in Pennsylvania

(100% Federal—100% Reimbursable—612)

Program Objective:

This project's objective is to provide information on the current rate, composition, and sources of street and roadside litter in Pennsylvania. This information is to be used to establish a baseline against which future progress in litter reduction targeted in anti-litter media campaigns can be measured.

Accomplishments:

- Conducted a visible litter count survey at 102 randomly selected locations (urban and rural freeways, other rural state highways and rural local roads) throughout Pennsylvania which found that 31 percent of all freshly generated litter was deposited in 36 of the 102 random sites with the remainder being generated along urban streets.

Program Manager
Project Manager
Total Project Cost
FY 99-00 Expenditures
Contractor
W.O. #
Project #
Contract Completion

Michael Bonini
Bob Morash
\$100,000
\$38,725.16
Penn State University
29
97-04
January 18, 2001

Comprehensive Customer Outreach and Recruitment Program

(100% State Funded—616)

Program Objective:

This project will produce print material to raise public awareness about PENNDOT's many programs and services and to encourage qualified candidates to consider a professional career with PENNDOT. This is a public education program to make PENNDOT more accessible, improving customer service to the public. It also provides an extra recruitment tool to encourage top-quality professional and technical personnel to seek employment with PENNDOT.

Accomplishments:

- Developed the concepts for both the general information and recruitment tri-fold brochures.
- Completed both the design and layout of the brochures.

Program Manager
Project Manager
Total Project Cost
FY 99-00 Expenditures
Contractor
W.O. #
Project #
Contract Completion

Tom Horne
Rebecca Rosser-Yearick
\$60,643
\$0
Penn State University
36
97-04
May 31, 2001



Route 30 Documentary

Program Objective:

The project will produce a one-hour educational television program on the historic Lincoln Highway (U.S. Route 30) in Pennsylvania. It will concentrate on the historical impact of this highway on the economic development and settlement of the United States.

Accomplishments:

- Completed one-hour program after touring U.S. Route 30 and selecting 15 venues to be included.
- Scheduled program to be aired the week of March 12, 2001 on Pennsylvania Public Television stations.

Program Manager	Tom Horne
Project Manager	Rebecca Rosser-Yearick
Total Project Cost	\$132,316
FY 99-00 Expenditures	\$1,494.73
Contractor	Penn State University
W.O. #	37
Project #	97-04
Contract Completion	March 31, 2001

Implementation and Administration of a Pilot Program for PENNDOT Maintenance Bituminous Technician Certification

(100% State Funded—611)

Program Objective:

The Maintenance Bituminous Technical Certification program's purpose was to develop a pilot program to certify maintenance personnel in hot-mix asphalt paving operations. Penn State University's Northeast Center of Excellence for Pavement Technology (NECEPT) modified PENNDOT's Bituminous Field Technician Review and Certification course to correspond to the specific limited roles of maintenance personnel in hot-mix asphalt paving operations with the goal of providing a uniform, consistent technical background for all personnel involved in hot-mix asphalt paving activities, thus improving and promoting quality.

Accomplishments:

- Presented three 2-day sessions of the PENNDOT Maintenance Bituminous Technician Certification pilot program in April and May, 2000, to a total of 119 maintenance personnel from Districts 3-0, 5-0, 8-0, 9-0 and 12-0.
- Certified a total of 107 new Maintenance Bituminous Technicians after testing for competence.

Program Manager	Fran Treisbach
Project Manager	Don Wise
Total Project Cost	\$36,876
FY 99-00 Expenditures	\$5,427.55
Contractor	Penn State University
W.O. #	38
Project #	97-04
Contract Completion	November 18, 2000

LTAP—Local Technical Assistance Program Maintenance First

Program Objective:

The purpose of this program is to transfer quality transportation technology to local governments in Pennsylvania. This is accomplished in a number of ways including the Road Scholar Program, workshops, and technical assistance with issues and questions posed by specific local governments.

Accomplishments:

- Conducted 239 Technical Assists.
- Conducted 207 Roadshows attended by 7,726 people.
- Distributed 23,984 publications.
- Distributed 16,227 newsletters and technical reference sheets.
- Hosted 5 demonstrations attended by 300 people.

Program Manager
Project Manager
Total Project Cost
FY 99-00 Expenditures
Contractor
W.O. #
Project #
Contract Completion

Bill Pogash
Bill Pogash
\$1,830,544
\$294,825.78
Penn State University
41
97-04
February 24, 2003

LTAP—Local Technical Assistance Program Municipal Traffic Safety Liaison Program

Program Objective:

This program is specifically directed to address issues related to traffic safety. It provides technical assistance to local governments in achieving their safety goals. This is accomplished primarily by providing technical assistance with issues and questions posed by specific local governments.

Accomplishments:

- Conducted 152 Technical Assists.
- Conducted 112 Roadshows attended by 1,640 people.
- Hired a second safety engineer to assist in traffic safety training and technical assistance activities.

Program Manager
Project Manager
Total Project Cost
FY 99-00 Expenditures
Contractor
W.O. #
Project #
Contract Completion

Bill Pogash
Gary Modi
\$753,939
\$0
Penn State University
42
97-04
February 24, 2003

NECEPT-Superpave Validation Studies

(100% State Funded—241)

Program Objective:

This project funds research applicable to Pennsylvania-specific Superpave projects. It includes validation of Superpave binder and mixture test methods and specifications by providing sampling services for validation sites and characterizing mixtures and binders from these sites. Tests include full characterization using the dynamic shear rheometer, bending beam rheometer, and the direct tension test. Mixture testing includes volumetric validation, shear testing for rutting (SST testing), and IDT testing (strength and creep for low-temperature thermal cracking). Funding is also provided for developing a database for use in all Superpave studies and for instrumenting new Superpave installations to obtain baseline readings for a planned long-term Superpave study scheduled to begin in 2001.

Accomplishments:

- Determined sampling and testing protocols.
- Designed the basic structure and flow chart of the database.
- Developed MS Access formats for data input.
- Began sampling and instrumentation.

Program Manager
Project Manager
Total Project Cost
FY 99-00 Expenditures
Contractor
W.O. #
Project #
Contract Completion

Fran Treisbach
Tim Ramirez
\$200,000
\$60,346.30
Penn State University
43
97-04
April 30, 2001

Communicating Driver Safety to Teenagers through the Internet

(100% State Funded—603)

Program Objective:

This project funds the creation of an Internet-based website to inform teenagers about driver safety in an entertaining and engaging way. It is designed to attract teenagers to explore the website while helping them learn to operate a motor vehicle safely.

Accomplishments:

- Designed and implemented a website based on focus group studies and direct contact.
- Tested the website with over fifty teenagers in western Pennsylvania, primarily sixteen-year-olds, receiving an overall positive response.

Program Manager
Project Manager
Total Project Cost
FY 99-00 Expenditures
Contractor
W.O. #
Project #
Contract Completion

Tom Horne
Michael P. Kistler
\$126,532
\$1,250.10
Carnegie Mellon University
45
97-04
June 30, 2001

Developing a Learning Organization

(100% State Funded—611)

Program Objective:

This project funds an educational effort directed specifically to PENNDOT employees in District 10-0. It provides funding for the development of interactive seminars for employee participation to enhance knowledge and skills.

Accomplishments:

- Developed interactive seminars to familiarize managers with the principles of Organizational Learning & Systems Thinking using the concepts espoused in "The Fifth Discipline" by Peter M. Senge and familiarize them with a number of other managerial tools and techniques including After Action reviews, Force Field Analysis, Storyboarding, etc.
- Evaluated the program with pre-tests, post-tests, and participant evaluations which showed improved knowledge, skills, and attitudes toward organizational learning.

Program Manager	Tom Horne
Project Manager	James J. Gaul
Total Project Cost	\$43,274
FY 99-00 Expenditures	\$1,458.43
Contractor	Indiana University of Pennsylvania
I.W.O. #	46
Project #	97-04
Contract Completion	December 12, 2000

Weak-Post Guiderail Phase II

Program Objective:

The project funded the performance of full scale tests on a modified PENNDOT Type 2 guiderail in accordance with the National Cooperative Highway Research Program. PENNDOT staff, Penn State University, Bucknell University, and Worcester Polytechnical Institute researchers assisted Texas Transportation Institute in conducting the research.

Accomplishments:

- Conducted four tests on PENNDOT Type 2 Guiderail following NCRHP Report 350 testing criteria with the fourth test being successful.
- Modified design of the Guiderail for each test in order to redirect the test vehicle.

Program Manager	Bill Pogash
Project Manager	James Tenaglia
Total Project Cost	\$231,047
FY 99-00 Expenditures	\$29,499.17
Contractor	Texas Transportation Institute
W.O. #	50
Project #	97-04
Contract Completion	October 31, 2000

Median Safety Study (Interstates and Expressways)

Program Objective:

The project evaluates overall median safety in Pennsylvania. This includes the relationship between median crossover crashes and median widths on interstates and expressways.

Accomplishments:

- Completed Report of Preliminary Numerical Analysis of Cross-Median Collisions.
- Completed survey of panel of experts.
- Gathered field data for accident and non-accident Pennsylvania Interstate sites.
- Completed refinement of Numerical Analysis.

Program Manager
Project Manager
Total Project Cost
FY 99-00 Expenditures
Contractor
W.O. #
Project #
Contract Completion

Tom Horne
James P. Tenaglia
\$154,207
\$5,190.96
Penn State University
53
97-04
April 3, 2001

Foremen and Assistants' Academy

Program Objective:

This project funds the development and presentation of training academies for PENNDOT's Assistant County Maintenance Managers (ACMM) and Maintenance Foremen. The academies are consistent with the findings and recommendations set forth in the Highway Maintenance Training and Education Initiative carried out through a previous PENNDOT Research contract (Work Order #8, November 1998).

Accomplishments:

- Conducted two 2-week long ACMM training academies for 47 participants and four 3-week long Maintenance Foreman training academies for 77 participants.
- Evaluated the ACMM training academy using self-report surveys at the end of each academy and discussions between instructors and PENNDOT training academy observers.

Program Manager
Project Manager
Total Project Cost
FY 99-00 Expenditures
Contractor
W.O. #
Project #
Contract Completion

Michael Bonini
Don Wise
\$220,126
\$20,113.45
Penn State University
54
97-04
February 26, 2001

Aviation Outreach Manual

(100% State Funded—418)

Program Objective:

This project's objective is to determine the factors that contribute to successful public outreach in support of aviation facilities and projects.

Accomplishments:

- Produced and distributed the promotional videotape, "Wings of Dreams".

Program Manager	Tom Horne
Project Manager	Kathy Reitz
Total Project Cost	\$47,684
FY 99-00 Expenditures	\$0
Contractor	Penn State University
W.O. #	55
Project #	97-04
Contract Completion	February 21, 2001

Unionid Workshop

Program Objective:

The project's objective was to conduct a one-day workshop to identify research areas needed to implement management plans to protect the unionid fauna effectively. The unionid, a freshwater mussel and an endangered species, inhabits the Allegheny River basin and has caused conflict with a number of PENNDOT bridge replacement projects in the area.

Accomplishments:

- Held one-day workshop on March 6, 2000 at Penn State University's main campus to address research needs and appropriate additional research funding sources. This workshop:
- Identified areas where research is needed to expedite design and approval of bridge replacement projects in the Allegheny River basin.
- Identified potential funding sources including the Wild Resources Conservation Fund, United States Geological Survey, the Transportation Research Board, and the National Forest Foundation.

Program Manager	Tom Horne
Project Manager	Antonia C. Zawisa
Total Project Cost	\$11,390
FY 99-00 Expenditures	\$4,893.15
Contractor	Penn State University
W.O. #	58
Project #	97-04
Contract Completion	July 18, 2000

PA Driver Education Program Evaluation

Program Objective:

This project funded a comprehensive evaluation of Pennsylvania's driver education programs with the goal of improved traffic safety throughout the Commonwealth. Project components included:

- a) Reviewing prior research in driver education
- b) Conducting focus groups of young drivers
- c) Analyzing survey data and crash and driving conviction records
- d) Interviewing driver education instructors
- e) Analyzing driver education activities in other states
- f) Performing a cost-benefit analysis of driver education in Pennsylvania

Accomplishments:

- Analyzed Pennsylvania data and determined that driver education resulted in:
 - No lower crash rate,
 - No lower conviction rate,
 - No demonstrated change in seat belt use,
 - No lower rate of risk-taking behaviors, and
 - No lower rate of crash severity or injuries.

Program Manager
Project Manager
Total Project Cost
FY 99-00 Expenditures
Contractor
W.O. #
Project #
Contract Completion

Michael Bonini
Michael Kistler
\$195,795
\$34,839.18
Penn State Capitol College
59
97-04
December 12, 2000

Lottery Transportation Database Management and Statistical Report

(100% State Funded—155)

Program Objective:

The project funded the conversion of WordPerfect/Lotus 1-2-3 and Word/Excel applications to Y2K compliant software programs. The programs converted under this project are used to manage and track the Free Transit and Shared Ride programs for the Bureau of Public Transit.

Accomplishments:

- Converted Shared Ride database from nonY2K-compliant Access Version 2 to Y2K-compliant Access 97.
- Developed an Access database application to manage the Free Ride Program.
- Modified Grantee table structure to allow the creation of a Grantee Profile report.
- Provided fix for Free Transit Excel/Word data tracking system.

Program Manager
Project Manager
Total Project Cost
FY 99-00 Expenditures
Contractor
W.O. #
Project #
Contract Completion

Tom Horne
LaVerne E. Collins
\$26,620
\$8,858.84
Penn State University
61
97-04
July 20, 2000

Partnership Outreach

Program Objective:

The purpose of this project is to provide a mechanism whereby PENNDOT will have the ability to access information and individuals connected with Penn State's State Program on a timely basis and improve the customer service provided to PENNDOT by the State Program. This is the administrative work order to the Cooperative Agreement.

Accomplishments:

- Held a Bridge Structures forum at Penn State University for the development of future research ideas.
- Developed a cost decrease amendment to reflect the PENNDOT Research Division's handling many of the work products originally planned for funding under this work order.

Program Manager	Michael Bonini
Project Manager	Bill Pogash
Total Project Cost	\$144,149
FY 99-00 Expenditures	\$20,416.22
Contractor	Penn State University
W.O. #	62
Project #	97-04
Contract Completion	June 29, 2001

Roadway Management Conference

Program Objective:

This project's objective was to organize and deliver the 8th Annual Roadway Management Conference. Presentations and vendor displays at this conference covered various transportation issues and concerns. These included up-to-date technology and products, solutions to important road and street maintenance problems, methods, practices and processes used by other agencies, and current transportation legal requirements.

Accomplishments:

- Hosted the annual Roadway Management Conference in March, 2000, for 440 participants from Delaware, Maryland, New Jersey, New York, Virginia, West Virginia, and Pennsylvania with over 40 vendor displays--the largest number of participants and displays in conference history..

Program Manager	Michael Bonini
Project Manager	Michael Bonini
Total Project Cost	\$20,000
FY 99-00 Expenditures	\$12,160.71
Contractor	Penn State University
W.O. #	63
Project #	97-04
Contract Completion	July 13, 2000



PLAS and PLAM

Program Objective:

The purpose of this project is to deliver the PENNDOT Leadership Academy for Supervisors (PLAS) and the PENNDOT Leadership Academy for Managers (PLAM). These programs provide practical training solutions that can be implemented into the day-to-day work challenges faced by managers and supervisors at PENNDOT.

Accomplishments:

- Conducted regularly-scheduled sessions of the Pennsylvania Leadership Academy for Supervisors (PLAS), a three-day training program giving participants the opportunity to learn, practice and use fundamental tools and techniques to create better communication channels, analyze performance gaps, maximize performance, give feedback, and counsel through employee performance problems.
- Conducted regularly-scheduled sessions of the Pennsylvania Leadership Academy for Managers (PLAM), a five-day training program giving participants the opportunity to learn, practice and use tools and techniques in results-oriented communication, team and relationship building, leadership, quality initiatives, and performance management.

Program Manager
 Project Manager
 Total Project Cost
 FY 99-00 Expenditures
 Contractor
 W.O. #
 Project #
 Contract Completion

Michael Bonini
 Pam Meloy
 \$197,767
 \$36,685.66
 Penn State University
 64
 97-04
 January 27, 2001

PENNDOT Morale Index and Morale Assessment

(100% State Funded—616)

Program Objective:

The objective of this project was to create an agency-wide morale index for PENNDOT that can be used to assess changes in workplace morale over time and to compare morale across units of the organization. It was to account for changes due to various gap closure and other local or department-wide initiatives, measure organizational improvements, and diagnose problem areas.

Accomplishments:

- Developed a website for the morale survey document which supported data entry or upload for paper surveys and allowed administrators to make results available online to survey participants and create custom feedback reports.
- Developed a Morale Survey User's Manual providing detailed instructions on using the morale survey, website, and survey results.

Program Manager
 Project Manager
 Total Project Cost
 FY 99-00 Expenditures
 Contractor
 W.O. #
 Project #
 Contract Completion

Michael Bonini
 Aimee Gross and Dick Fox
 \$25,989
 \$0
 Penn State University
 65
 97-04
 November 3, 2000

Penn TRAIN Transit Training and Technical Assistance Program

Program Objective:

The objective of this program is to provide training and technical assistance to personnel of rural public and community transit systems. This project is the fourth phase of Penn TRAIN's operation. Its goal is a closer working relationship with the Pennsylvania Public Transportation Association (PPTA). This closer relationship includes specific cooperative activities and guidance from PPTA's Penn TRAIN Committee on the scope and direction of the program. This program is funded jointly by this work order and RTAP funds provided by a grant from PENNDOT's Bureau of Public Transit.

Accomplishments:

- Completed a second series of 100 hours of PennSCORE training with the graduation of 20 individuals who completed all courses and are not qualified to conduct all training sessions.
- Sponsored three Mid-Atlantic RTAP group training programs in Pennsylvania, New York, and Virginia on managerial and supervisory training, each program having 20 participants.
- Developed the PennTRAIN website (www.patransit.psu.edu) to include discussion forums, in particular a maintenance forum to be used in developing a maintenance training program similar to the PennSCORE program for drivers.

Program Manager
Project Manager
Total Project Cost
FY 99-00 Expenditures
Contractor
W.O. #
Project #97-04
Contract Completion

Michael Bonini
William Parkin
\$75,398
\$0
Penn State University
68
September 19, 2000



DBE Goal Setting

Program Objective:

The purpose of this project is to assist PENNDOT in benchmarking and establishing/evaluating its Disadvantaged Business Enterprise (DBE) goals for the Federal Highway Administration, Federal Aviation Administration, and Federal Transit Administration. This is in response to Federal legislation (49 C.F.R. Part 26) requiring states to set goals for the inclusion of DBE's in their contracts/subcontracts and measuring their accomplishment of these goals. The goals are based upon the "relative availability of DBE's;" i.e., the number of "ready, willing and able DBE's relative to all businesses ready, willing and able to participate on PENNDOT-assisted contracts."

Accomplishments:

- Established initial testing protocols
- Collected data to determine recommended goals.
- Held meetings in the Pittsburgh and Philadelphia areas to solicit public comment.

Program Manager	Fran Treisbach
Project Manager	Frank Petruskevich
Total Project Cost	\$315,000
FY 99-00 Expenditures	\$0
Contractor	Penn State University
W.O. #	70
Project #	97-04
Contract Completion	November 30, 2002

Enhanced Graduated Driver License (GDL) Program

Program Objective:

The project evaluates the overall effect of legislation enacting a graduated driver license (GDL) program on the driving performance of young drivers. The anticipated outcome is a reduction in young driver crashes and injuries and a better understanding among young drivers of the cause-and-effect relationship between unsafe driving behaviors and the resulting crashes/injuries.

Accomplishments:

- Began data collection to perform a comprehensive analysis of crashes and violations involving drivers between the ages of 16 and 21.
- Began plans for an assessment of the knowledge and attitudes of parents and adolescents on the various provisions of Pennsylvania's Graduated Licensing System.

Program Manager	Michael Bonini
Project Manager	Michael Kistler
Total Project Cost	\$231,329
FY 99-00 Expenditures	\$0
Contractor	Penn State University
W.O. #	71
Project #	97-04
Contract Completion	March 18, 2003

National Conference on Transportation and the Environment

Program Objective:

The project provides assistance to the Pennsylvania Department of Transportation, the National Academy of Science, and the Transportation Research Board in the implementation of the conference.

Accomplishments:

- Completed all plans for the conference to be held July 22-26, 2000 in Pittsburgh, Pennsylvania, with approximately 650 participants scheduled to attend.

Program Manager	Tom Horne
Project Manager	Wayne W. Kober
Total Project Cost	\$39,088
FY 99-00 Expenditures	\$0
Contractor	University of Pittsburgh
W.O. #	72
Project #	97-04
Contract Completion	June 30, 2001

2000 Summer Transportation Institutes

Program Objective:

The purpose of this project is to encourage high school students, particularly minorities, to consider careers in transportation. Each summer institute is a four-week program. It exposes students to many aspects of transportation, increasing their levels of awareness, understanding, and knowledge of the industry. All aspects of transportation are included in the program. Course content consists of presentations by transportation professionals, field trips to transportation facilities and construction sites, and hands-on classroom and laboratory work in transportation-related sciences. An additional part of the program is concentrated on improving students' College Board scores.

Accomplishments:

- Recruited students and planned curricula for two summer transportation institutes.
- Began the summer transportation institute at Cheyney University on June 26, 2000.
- Scheduled a second institute at Lincoln University to begin July 2.

Program Manager	Fran Treisbach
Project Manager	Bill Kerney
Total Project Cost	\$54,927
FY 99-00 Expenditures	\$0
Contractor	Penn State University
W.O. #	76
Project #	97-04
Contract Completion	May 22, 2001



Evaluation of Approved Erosion and Sediment Controls to Determine Best Management Practices

Program Objective:

This project is to develop evaluation and measurement procedures identifying erosion and sediment control measures appropriate and effective for use in a public highway environment. PENNDOT and other state highway departments are now required to select erosion and sediment control devices from a list of approved best management practices (BMP's.) The intent of this research is to develop evaluation and measurement procedures to assess BMP's that are planned in conjunction with Interstate 99 (I-99) construction and to identify effective erosion and sediment control measures.

Accomplishments:

- Held an initial meeting with the researcher to discuss project start-up and to develop a detailed work plan after the Notice-to-Proceed was issued on October 30, 2000.

Note: Project deliverables may be impacted by delays in the construction schedule for I-99.

Program Manager	Bill Pogash
Project Manager	James Ritzman
Total Project Cost	\$175,022
FY 99-00 Expenditures	\$0
Contractor	Penn State University
W.O. #	77
Project #	97-04
Contract Completion	March 18, 2003

Reduction of Movement and Stresses in Curved and Skewed Bridges, I-99 Advanced Technology Test Bed, Phase I

Program Objective:

The purpose of this project is to investigate curved and skewed structures to understand their behavior better during construction and while in service. Although the use of curved and skewed bridges continues to increase steadily throughout the country, certain aspects of their behavior during construction and while in service are not well understood. Constructing single or multi-span curved or skewed bridges instead of straight structures may require fewer substructure units and reduced excavation at the abutments; this should result in overall cost savings. Additionally, curved and skewed bridges provide a better fit in the roadway alignment than straight bridges and allow traffic design speeds to be maintained.

Accomplishments:

- Held an initial meeting with the researcher to discuss project start-up and to develop a detailed work plan after the Notice-to-Proceed was issued on October 30, 2000.

Note: Project deliverables may be impacted by delays in the construction schedule for I-99.

Program Manager	Bill Pogash
Project Manager	James Ritzman
Total Project Cost	\$349,892
FY 99-00 Expenditures	\$0
Contractor	Penn State University
W.O. #	79
Project #	97-04
Contract Completion	March 18, 2003

Methodology to Predict Movement and Stresses in Integral Abutments

Program Objective:

This project's objective is to examine the performance of a number of integral abutment bridges to establish credible, verified design procedures for integral abutment bridge construction. This is a significant change in bridge design philosophy and construction; its goal is to eliminate the high cost of maintenance at the joints by eliminating the joints. Many engineering uncertainties exist in the prediction of long-term and short-term behavior of all spans of jointless bridges, and a majority of the design principles continue to be empirically based and anecdotal. This project provides a two-phased, comprehensive field testing and monitoring program on the I-99 corridor to address several of these uncertainties.

Accomplishments:

- Held an initial meeting with the researcher to discuss project start-up and to develop a detailed work plan after the Notice-to-Proceed was issued on October 30, 2000.

Note: Project deliverables may be impacted by delays in the construction schedule for I-99.

Program Manager	Bill Pogash
Project Manager	James Ritzman
Total Project Cost	\$375,574
FY 99-00 Expenditures	\$0
Contractor	Penn State University
W.O. #	80
Project #	97-04
Contract Completion	March 18, 2003

Interstate 99 - High Performance Concrete (HPC) Initiative; Long Term Durability of Bridge Decks - Phase I

Program Objective:

This project seeks to develop long-term data on design and construction of 50- to 100-year design life bridge decks. The project encompasses approximately 15 bridges; ten bridges will have HPC Decks with the remaining five bridges serving as controls. The project will result in design recommendations and a best practices document on the construction of long-life bridge HPC bridge decks. The project will also evaluate life cycle cost projections and document the initial cost of HPC construction.

Accomplishments:

- Held an initial meeting with the researcher to discuss project start-up and to develop a detailed work plan after the Notice-to-Proceed was issued on October 30, 2000.

Note: Project deliverables may be impacted by delays in the construction schedule for I-99.

Program Manager	Bill Pogash
Project Manager	James Ritzman
Total Project Cost	\$527,603
FY 99-00 Expenditures	\$0
Contractor	Penn State University
W.O. #	81
Project #	97-04
Contract Completion	March 18, 2003

Geotechnical Site Investigation for Bridge Foundations

Program Objective:

This project's objective is to conduct a comprehensive study of subsurface conditions at bridge sites prior to, during, and after construction to develop more comprehensive practices of subsurface characterization. Bridges in Pennsylvania are largely founded on piles or other deep foundations. Highly variable subsurface conditions result in great uncertainty in deep foundation design and construction.

Accomplishments:

- Held an initial meeting with the researcher to discuss project start-up and to develop a detailed work plan after the Notice-to-Proceed was issued on October 30, 2000.

Note: Project deliverables may be impacted by delays in the construction schedule for I-99.

Program Manager	Bill Pogash
Project Manager	James Ritzman
Total Project Cost	\$519,688
FY 99-00 Expenditures	\$0
Contractor	Penn State University
W.O. #	82
Project #	97-04
Contract Completion	March 18, 2003

Cooperative Research and Development Agreement 95- CRADA-2530 (Timber Bridge Monitoring Agreement)

Program Objective:

The purpose of this agreement is to obtain objective engineering data regarding the design and field performance of eight stress-laminated timber bridges constructed in Pennsylvania. This is a cooperative effort with the USDA Forest Service to evaluate and document the long-term field performance of these bridges. The data generated from this project will contribute to efforts to develop future design recommendations for stress-laminated timber bridges.

Accomplishments:

- Monitored the eight stress-laminated bridges throughout the year using a data capture device attached to each bridge. USDA researchers visit each bridge site twice per year to download the data and replace batteries.

Program Manager	Bill Pogash
Project Manager	Bill Pogash
Total Project Cost	\$176,000
FY 99-00 Expenditures	\$24,433.36
Contractor	USDA, Forest Service, Forest Products Laboratory
W.O. #	N/A
Project #	95-36
Contract Completion	July 9, 2001

University Expertise Matrix

Program Objective:

The purpose of this project is to develop university partnership strategies for the Transportation Operations and Systems Research and Development Partnership.

Accomplishments:

- This is the administrative work order for the Transportation Operations Partnership.

Program Manager	Michael Bonini
Project Manager	Bill Pogash
Total Project Cost	\$20,000
FY 99-00 Expenditures	\$1,690.40
Contractor	Penn State University
W.O. #	1
Project #	95-28
Contract Completion	April 20, 2001

Traffic Engineering Education Program

Program Objective:

The objective of the Traffic Engineering Education Program developed under Transportation Operations Work Order No. 6 is to outline a deployment plan to implement the first six knowledge modules of the Traffic Engineering Education Program. In addition, this project is developing additional knowledge modules for the Department.

Accomplishments:

- Completed Phase I of development and deployment focusing on developing 6 knowledge modules: Transportation Engineering, Transportation Planning, Design Concepts Traffic Engineering Characteristics, Work Areas, and Traffic Signal Systems and Optimization.
- Began development of additional knowledge modules including: Traffic Engineering Studies, Crash Analysis and Mitigation, Traffic Signal Software, Intelligent Transportation Systems, and Work Zone Flagger Training.
- Developed a vision statement to guide the concept of TEEP; i.e., to make Pennsylvania a world leader in transportation engineering by assuring state of the art knowledge, skills and engineering applications among transportation professionals.

Program Manager	Michael Bonini
Project Manager	Steven Koser
Total Project Cost	\$100,000
FY 99-00 Expenditures	\$58,515.13
Contractor	Penn State University
W.O. #	6
Project #	95-28
Contract Completion	April 20, 2001

ITS Steering Committee Support

Program Objective:

The objective of the ITS Steering Committee Support project is to provide resources for Pennsylvania's Statewide ITS Steering Committee during the planning and deployment of strategic plans for ITS implementation. In addition, evaluations and assessments of Pennsylvania's ITS programs are being conducted as requested by PENNDOT.

Accomplishments:

- Produced a Congestion Management Strategic Plan.
- Conducted background research and developed resource materials.
- Participated in strategic/business planning activities.
- Evaluated and assessed Pennsylvania's ITS programs as requested by PENNDOT including: Penn Lincoln Parkway Service Patrol, SmarTraveler, I-80 Advanced Traveler Information System, Truck Rollover Warning Devices, and Cost/Benefit Analyses of new ITS projects.

Program Manager	Michael Bonini
Project Manager	Steven Koser
Total Project Cost	\$75,000
FY 99-00 Expenditures	\$3,759.18
Contractor	Penn State University
W.O. #	7
Project #	95-28
Contract Completion	April 20, 2001

TRAC - Phase 4

Program Objective:

The objective of TRAC (Transportation Careers) is to increase the number and diversity of students pursuing education careers in engineering and other transportation-related fields through the Pennsylvania Transportation and Civil Engineering (TRAC) Center. The goal is to integrate TRAC into each secondary school expressing interest in the program; however, program quality is a higher priority than the number of schools hosting the program.

Accomplishments:

- Integrated the program into 32 schools to date.
- Forged a new partnership with the Pennsylvania Department of Education's School to Work program by working with school coordinators to establish an immediate relationship with the new schools selected.

Program Manager	Michael Bonini
Project Manager	Mike Snyder
Total Project Cost	\$62,500
FY 99-00 Expenditures	\$21,476.72
Contractor	Penn State University
W.O. #	25
Project #	95-28
Contract Completion	January 31, 2001

Transportation Research and Education Consortium (TREC)

Program Objective:

The objective of this project is to evaluate the concept of developing a Transportation Research and Education Consortium (TREC) that includes the private sector and PENNDOT. This is a broad-based initiative to study the feasibility of cooperative efforts by government, academia, and industry in four areas: safety, professional capacity building, the environment and civil infrastructure. The application of information systems and technology is implied across all four areas.

Accomplishments:

- Formed a TREC Steering Committee with government, university, and private industry representatives which met to discuss issues associated with tri-party agreements.
- Began review of legal issues including governance, fees, and intellectual property rights.

Program Manager	Michael Bonini
Project Manager	Tom TenEyck
Total Project Cost	\$50,000
FY 99-00 Expenditures	\$0
Contractor	Penn State University
W.O. #	27
Project #	95-28
Contract Completion	April 20, 2001

Seismic Column Reinforcement Study

Program Objective:

The Seismic Column Reinforcement Study evaluates the seismic performance of a sample of Pennsylvania's bridge inventory under consideration for seismic retrofit. Retrofit is potentially necessary due to the current AASHTO design specifications requiring additional transverse reinforcement in the plastic hinge zones of columns in Seismic Performance Category (SPC) B, C, and D seismic zones. Additionally, the specifications require that "Essential Bridges" be considered in the next higher category when designing retrofits. Information is needed about the expected seismic performance (strength, ductility, and failure mode) of bridge columns under the action of realistic seismic inputs. If the performance is inadequate, more research may be necessary to develop an economical means of retrofit. If performance is adequate, though, the need for expensive retrofits may be avoided.

Accomplishments:

- Selected seven bridges for analysis based on type of construction and location.
- Completed SEISAB analysis on all bridges.

Program Manager	Fran Treisbach
Project Manager	Scott Christie
Total Project Cost	\$98,458
FY 99-00 Expenditures	\$13,413.64
Contractor	Penn State University/ Drexel University
W.O. #	4
Project #	96-29
Contract Completion	May 31, 2001

Development of Product and Materials Use Approval for Scrap Tires for State and Local Projects

Program Objective:

The objective of this project is to develop a product and material use approval process for state and local projects to utilize scrap tires as an alternative to conventional aggregate materials in embankments. Shredded or chipped tires have been used as a lightweight fill material for construction of embankments; however, combustion problems make a re-evaluation of design techniques necessary. Successfully utilizing scrap tires would provide an environmentally-friendly method of recycling some of the estimated 280 million tires disposed of each year.

Accomplishments:

- Began information and data-gathering in late June, 2000.

Program Manager	Fran Treisbach
Project Manager	Ken Thornton
Total Project Cost	\$135,509
FY 99-00 Expenditures	\$0
Contractor	Penn State University
W.O. #	4
Project #	96-30
Contract Completion	September 14, 2001

Feasibility of the Use of Cathodic Protection and Electro-Chloride Extraction Technology for Structures in Pennsylvania

Program Objective:

The objective of this project is to study the feasibility of the two electrochemical restoration techniques, cathodic protection and electro-chloride extraction, for Pennsylvania's bridge structures. Severe corrosion and pitting of reinforcing steel from chloride contamination is a major maintenance problem. In Pennsylvania this corrosion is caused by ingress of chloride ion from de-icing salts. This creates a build up of stresses in the concrete manifesting itself in spalling of concrete on the deck surfaces, columns, or overhead supports. This project examines the feasibility of these two electrochemical restoration techniques for Pennsylvania bridge structures.

Accomplishments:

- Completed documentation using a web-based selection process, "Automated Feasibility Analysis of Cathodic Protection or Electrochloride Extration for Reinforced Concrete Bridge Structures (AFACE)."
- Drafted a user manual for the web-based application.

Program Manager	Fran Treisbach
Project Manager	Bob Klotz
Total Project Cost	\$62,599
FY 99-00 Expenditures	\$17,203.50
Contractor	Penn State University/ Lehigh University
W.O. #	5
Project #	96-31
Contract Completion	February 28, 2001

Investigation of Slag Sources

Program Objective:

The project's objective was the investigation of slag chemistry and production history at steel production facilities in Pennsylvania. Steel slag contains a number of components, including magnesium oxide and iron. Since these components can double in volume over time, they are very detrimental when used in highway construction. Pennsylvania had been experiencing a severe cracking problem, and the problem seemed to be occurring only with materials from one supplier. The source of this problem needed to be determined.

Accomplishments:

- Performed x-ray diffraction analysis of slag samples to determine manganese oxide, iron oxide, and sulfur contents.
- Analyzed data and determined that the slag sources did not meet Pennsylvania's specifications banning steel slag in highway construction.
- Developed a PowerPoint presentation outlining the results of this study.
- Held a series of meetings using the PowerPoint presentation until the response to the cracking problem was fully implemented.

Program Manager	Fran Treisbach
Project Manager	Paul Ingram
Total Project Cost	\$11,432
FY 99-00 Expenditures	\$0
Contractor	Valley Forge Laboratories, Inc.
W.O. #	3
Project #	96-09
Contract Completion	August 7, 2000

Shrinkage Evaluation of Bridge Decks

Program Objective:

The project monitors trial batches of concrete for potential drying shrinkage and its subsequent transverse cracking tendency over a twelve-month period. The purpose of this program is to assist in the forensic analysis of chronic bridge deck cracking problems by comparing bridge structural systems with various classifications of concrete.

Accomplishments:

- Completed data collection for 18 bridges scheduled for evaluation, and began laboratory analysis of specific mixtures.

Program Manager	Fran Treisbach
Project Manager	Paul Ingram
Total Project Cost	\$142,666
FY 99-00 Expenditures	\$20,428.27
Contractor	Valley Forge Laboratories, Inc.
W.O. #	4
Project #	6-09
Contract Completion	January 7, 2001

Implementation of Findings from the PHASE II - Investigation of Pavement Slab Failures in Districts 1-0 and 3-0, Mercer, Union, Montour, Northumberland, and Columbia Counties

Program Objective:

The objective of this project was to manage and conduct meetings of the I-80 Task Force, assist PENNDOT in developing summary reports issued by the Task Force, and develop a PowerPoint presentation for technology transfer.

Accomplishments:

- Completed the PowerPoint presentation.
- Held a series of meetings using this presentation until the response to the cracking problem was fully implemented.

Program Manager	Fran Treisbach
Project Manager	Paul Ingram
Total Project Cost	\$36,578.02
FY 99-00 Expenditures	\$6,143.28
Contractor	Valley Forge Laboratories, Inc.
W.O. #	13
Project #	96-09
Contract Completion	August 7, 2000

Fire Damage Assessment Concrete Pier of I-99, State College, PA

Program Objective:

The purpose of this project was to conduct a forensic investigation of fire damage resulting from a form-work fire in April, 2000, at a bridge being constructed on the Interstate 99 (I-99) Corridor. The fire was limited to the plastic sheets and outer form surfaces of a concrete curtain wall. The estimated combustion period was 15 minutes, and water was used to extinguish the fire. The investigation required field services. These included visual inspection and exploratory chipping to identify and locate spalling, cracks and other evidence of the severity of the fire.

Accomplishments:

- Completed required inspections and explorations to determine the severity of the fire, revealing that fire damage was slight and limited to thermal/mechanical stresses at the extreme fibers of the concrete.
- Prepared a formal recommendation that the only treatment warranted was surface scarification to create a uniform appearance and permit uniform weathering over the service life of the structure.

Program Manager	Fran Treisbach
Project Manager	Paul Ingram
Total Project Cost	\$4,922.19
FY 99-00 Expenditures	\$0
Contractor	Valley Forge Laboratories, Inc.
W.O. #	14
Project #	96-09
Contract Completion	July 14, 2000



Safety and Congestion Management/ITS

Program Objective:

The purpose of this project is to provide PENNDOT with the means of conducting research in essential areas of safety, congestion management, and advanced and emerging technologies. The three primary goals of the project are: (1) to find, develop and customize the most appropriate safety, congestion management, travel demand, and advanced technology applications; (2) to identify the institutional barriers to implementing each application, developing strategies to overcome these barriers; and (3) to develop plans to enhance the expertise of PENNDOT professionals and to educate the public to understand and confidently accept project findings. Separate work orders are executed for specific project goals.

Accomplishments:

- Executed work orders for the development of a Congestion Management System and Optimization of Traffic Signal Timings.
- Developed traffic calming guidelines which are now being adapted to PENNDOT's website.
- Developed an updated evaluation of the Enhanced Driver Education Plan which involves the statistical assessment of crash characteristics comparing Pennsylvania drivers trained under the Enhanced Driver Education Plan with a control group trained using the traditional training material.

Program Manager	Michael Bonini
Project Manager	Thomas E. Bryer
Total Project Cost	\$1,000,000
FY 99-00 Expenditures	\$241,401.31
Contractor	Orth-Rodgers & Associates, Inc.
W.O. #	95186
Project #	95-18
Contract Completion	September 4, 2001

NECEPT Regional Pooled Fund Study

Program Objective:

The purpose of this project was to develop and implement the Superpave binder and mixture specifications by evaluating and improving Superpave technology, provide material design and analysis equipment on a regional basis, and providing technical assistance and training to members of the Northeast User/Producer Group. The activities funded through this work order provided training, technology transfer, research implementation, and technical support to the Northeast region for the first year of operation. The Northeast Center of Excellence for Pavement Technology (NECEPT) at Penn State University worked with the CAP Lab at the University of Connecticut to develop and deliver work funded under the project.

Accomplishments:

- Published three regional newsletters.
- Developed the Manual of Practice for Binder Testing.
- Developed and delivered the Northeast Binder Technician Certification Program (NETTCP) which has been endorsed by AASHTO for implementation.
- Completed a binder test method round robin.
- Presented two binder technician workshops in support of the binder test method round robin.
- Developed a guide document for the acceptance of asphalt binders after extensive analysis of asphalt binder test data.
- Held two meetings of the Regional Superpave Pooled Fund Advisory Committee.

Recommendations:

- Develop a regional database for Superpave binders.
- Develop a Quality Management Program for Asphalt Binders.
- Continue round robin testing and technician workshops.
- Develop a testing program for uniformity of tank materials.
- Develop a low-temperature specification.

Program Manager
Project Manager
Total Project Cost
FY 99-00 Expenditures
Contractor
W.O. #
Project #
Contract Completion

Fran Treisbach
Roger Apple
\$236,000
\$196,628.62
Penn State University
18
97-04
June 10, 2000



Evaluation of Recycled Glass in Bituminous Concrete Base Course

Program Objective:

The purpose of this project was to evaluate a selected bituminous concrete base course (BCBC) mixture to determine if small amounts of crushed glass could be added to it without creating a mixture susceptible to moisture damage. The glass cullet used was crushed, cleaned and graded to resemble a PENNDOT type B-1 sand. The BCBC mixture was typical of those used in Pennsylvania and used high quality, dolomitic limestone aggregates.

Accomplishments:

- Evaluated six mixtures (0, 5, and 10 percent glass by aggregate weight, each with and without hydrated lime) using the most widely accepted test for evaluating moisture resistance of asphalt concrete mixtures, AASHTO T283.

- Analyzed test data and determined that:

The general mixture properties such as voids and Marshall flow and stability were all similar and within allowable limits for BCBC mixtures.

No mixture containing hydrated lime exhibited stripping.

Of mixtures made without hydrated lime, only the one containing 10 percent glass exhibited stripping.

Recommendations:

- Apply study results only to the specific material used.

Program Manager
Project Manager
Total Project Cost
FY 99-00 Expenditures
Contractor
W.O. #
Project #
Contract Completion

Fran Treisbach
Ron Blauch
\$8,500
\$6,818.19
Penn State University
21
97-04
September 30, 1999



Bicycle-Friendly Shoulder Rumble Strips

Program Objective:

This research was initiated to develop new rumble strip configurations that could alert inattentive or drowsy motorists yet still be safely and comfortably traversed by bicyclists. These new rumble strips would decrease the level of vibration experienced by bicyclists while providing an adequate stimulus to alert inattentive/drowsy motorists.

Accomplishments:

- Performed field tests of various configurations using several bicycles and a motor vehicle and using different speeds and angles.
- Collected objective data such as vertical and pitch angular accelerations to evaluate comfort and control levels of bicyclists traversing the various configurations.
- Collected subjective data of bicyclists' perceptions using a written questionnaire.

Recommendations:

- Implement test pattern 3 along non-freeway facilities with higher operating speeds (near 55 mph).

Program Manager
Project Manager
Total Project Cost
FY 99-00 Expenditures
Contractor
W.O. #
Project #
Contract Completion

Michael Bonini
David Bachman
\$135,400
\$103,112.04
Penn State University
25
97-04
March 14, 2000

Assistant Academy Curriculum and Structure

(100% State Funded—611)

Program Objective:

The purpose of this project was to develop and produce a one-week training academy for assistant county maintenance managers (ACMMs). The work involved determining areas to be covered in the curriculum, development of initial training materials, and pilot testing the program with ACMMs from various parts of the Commonwealth.

Accomplishments:

- Developed a two-week academy curriculum with input from members of the Maintenance Management Training Committee and selected ACMMs with week one addressing specific technical topics; e.g., Internet use, work zone traffic control, and week two addressing PENNDOT-specific topics such as survey basics, GIS, and risk management.
- Presented a pilot test of the program to nineteen ACMMs, conducting pre-session and post-session tests and determining that participants' knowledge of the subject areas increase 12.6% as a result of the training.

Recommendations:

- Continue training program for all ACMMs.

Program Manager	Michael Bonini
Project Manager	Don Wise
Total Project Cost	\$90,000
FY 99-00 Expenditures	\$79,293.79
Contractor	Penn State University
W.O. #	30
Project #	97-04
Contract Completion	May 11, 2000



Fish Species Reference Book

Program Objective:

The purpose of this project was to develop a fish species reference book which would be the definitive resource and reference work for the state on this subject. It would provide technical information required by professionals and academics while being useful to teachers, students, and the general public. It would provide detail on individual species' biology, habitat, meristics, morphometrics, variation, coloration, etc. This project was the first phase of a long-term effort.

Accomplishments:

- Developed an electronic version of the species in the genus Percina that included species accounts, keys, and videos.
- Developed a database incorporating GIS data for Region I with the threatened and endangered species data for Pennsylvania fishes and data on proposed bridge construction and its impact on these species.
- Prepared species accounts of the entire candidate, threatened, and endangered fish species.

Recommendations:

- Continue incorporating GIS and bridge construction data for additional regions.
- Complete the keys for the other fishes inhabiting Pennsylvania with the keys and species accounts for the genus Etheostoma to be the next species documented.

Program Manager
Project Manager
Total Project Cost
FY 99-00 Expenditures
Contractor
W.O. #
Project #
Contract Completion

Tom Horne
Antonia Zawisa
\$50,000
\$36,449.56
Penn State University
31
97-04
June 20, 2000

NCHRP 350 Crash Tests for Type III Barricades and Portable Concrete Barriers

Program Objective:

The purpose of this project was to evaluate the crashworthiness of Type III barricades and portable concrete barriers in order to meet Federal Highway Administration (FHWA) requirements. Full-scale crash tests were to be conducted according to NCHRP 350 requirements.

Accomplishments:

- Conducted two crash tests on Type III barricades using a 1993 Geo Metro passenger car to impact the test articles at 62 mph, the first test being conducted head on and the second test with the barricade at a 90-degree angle, both tests being completed with satisfactory results.
- Conducted one test on a length of portable concrete barrier (20 sections/12 ft. length per section connected with a slotted plate connection) using a Ford F-250 pickup truck to impact the barrier at a 25-degree angle at 62 mph, the test yielding unsatisfactory results due to joint damage.

Recommendations:

- Submit the test results for the Type III barricades to FHWA requesting approval for use on Pennsylvania highways.
- Review the design of the portable concrete barrier to develop a new joint detail prior to re-testing.

Program Manager
Project Manager
Total Project Cost
FY 99-00 Expenditures
Contractor
W.O. #
Project #
Contract Completion

William Pogash
James Tenaglia
\$116,258
\$75,504.61
Penn State University
32
97-04
March 27, 2000



Development of a Research and Development Plan for I-99

Program Objective:

The purpose of this project was to develop a research and development plan for a proposed advanced transportation technology test bed on the I-99 highway with input from PENNDOT, the Federal Highway Administration, local and regional interests, and the private sector. Included in this plan were traffic and ITS, geotechnical engineering, structural engineering including materials, construction, and pavement performance, and hydrology and hydraulics. This highway corridor would provide an excellent opportunity to perform extensive long-term research projects.

Accomplishments:

- Conducted a conference in State College, Pennsylvania, to develop and prioritize a list of potential research projects including:

- Movement and stresses in skewed and curve girder bridges,
- Inability to prevent deck cracking,
- Design of integral abutment bridges,
- Construction of bridges using new seismic designs,
- Geotechnical problems associated with bridges,
- Design and performance of pavements,
- Use of recycled materials,
- Documentation of construction practices,
- Improved modeling of surface and subsurface water quantity and quality,
- Evaluation of erosion and sediment controls,
- Evaluation of stream restoration,
- Evaluation of man-made wetlands,
- Improved winter maintenance and hazardous materials response,
- Smart highway illumination and signing, and
- Establishment of a traffic management center.

Recommendations:

- Implement the project listed above in an extensive and cohesive research program.

Program Manager	Tom Horne
Project Manager	Bert Kisner
Total Project Cost	\$50,000
FY 99-00 Expenditures	\$49,999.99
Contractor	Penn State University
W.O. #	33
Project #	97-04
Contract Completion	September 30, 1999



Lincoln University Summer Transportation Institute

Program Objective:

The objective of the Summer Transportation Institute (STI) was to offer secondary school students early exposure to career opportunities in transportation and to engage them during the summer in transportation-related activities that are both educational and recreational. The STI curriculum covered all the major modes of transportation: land-based transportation, air transportation and space exploration, and water transportation. The curriculum also included issues relating to transportation safety, the environment, and potential career choices. The STI was an educational initiative involving a partnership among the Federal Highway Administration, PENNDOT, Lincoln University, and the private sector.

Accomplishments:

- Presented a four-week STI to fifteen participants who resided at the Lincoln University campus during the program.
- Evaluated the program from the participants' perspective and solicited recommendations for future program activities.

Recommendations:

- Present an STI during the following summer to a larger number of students.
- Monitor the progress of STI participants for several years following the program.

Program Manager	Fran Treisbach
Project Manager	William Kerney
Total Project Cost	\$20,000
FY 99-00 Expenditures	\$0
Contractor	Penn State University/ Lincoln University
W.O. #	40
Project #	97-04
Contract Completion	October 2, 1999

Revised Disadvantaged Business Enterprise Goals

Program Objective:

The objective of this project was to comply with the new regulation set forth in 49 C.F.R. Part 26 requiring PENNDOT to measure its local marketplace to ascertain the amount of participation it would expect Disadvantaged Business Enterprises (DBE) to achieve absent discrimination and the effects of past discrimination. The regulation required PENNDOT to establish a numerical, measurable goal and forward it to the Federal Highway Administration for approval. The goal was to be based on the "relative availability of DBEs," that is, the number of "ready, willing and able DBEs relative to all businesses ready, willing and able to participate on DOT-assisted contracts." The methodology and the overall goal had to be legally defensible.

Accomplishments:

- Developed a database for future goal tracking.
- Established a final overall DBE goal at 11.2 percent.
- Filed the revised goal and methodology with the Federal Highway Administration as required..

Recommendations:

- Develop data collection and management procedures for currently available data within PENNDOT's Bureau of Equal Opportunity, rather than relying on an outside source.
- Involve key stakeholders in the goal setting process.
- Actively pursue race-neutral measures to reduce race-conscious requirements.
- Use an evaluation and benchmarking framework to address race-neutral interventions.
- Review contracting and agreement mechanisms from a race-neutral perspective.

Program Manager
Project Manager
Total Project Cost
FY 99-00 Expenditures
Contractor
W.O. #
Project #
Contract Completion

Fran Treisbach
Frank Petruskevich
\$115,000
\$97,873.01
Penn State University
47
97-04
June 16, 2000



Cheyney University Summer Transportation Institute

Program Objective:

The objective of the Summer Transportation Institute (STI) was to offer secondary school students early exposure to career opportunities in transportation and to engage them during the summer in transportation-related activities that are both educational and recreational. The STI curriculum covered all the major modes of transportation: land-based transportation, air transportation and space exploration, and water transportation. The curriculum also included issues relating to transportation safety, the environment, and potential career choices. The STI was an educational initiative involving a partnership among the Federal Highway Administration, PENNDOT, Cheyney University, and the private sector.

Accomplishments:

- Presented a four-week STI to twenty participants who resided at the Cheyney University campus during the program.
- Evaluated the program from the participants' perspective and solicited recommendations for future program activities.

Recommendations:

- Present an STI during the following summer to a larger number of students.
- Monitor the progress of STI participants for several years following the program.

Program Manager	Fran Treisbach
Project Manager	William Kerney
Total Project Cost	\$20,000
FY 99-00 Expenditures	\$17,770.31
Contractor	Penn State University/ Cheyney University
W.O. #	51
Project #	97-04
Contract Completion	April 26, 2000

The Population Biology of the Spotted Salamander, *Ambystoma Maculatum*, Inhabiting Penn State Erie Wetlands

Program Objective:

The objective of this project was to quantify the population biology of *Ambystoma maculatum* inhabiting Penn State Erie, The Behrend College, and the impact of the construction of the East Side Access Highway on this population. This population inhabited approximately 4 hectares (about 10 acres) of mitigating wetlands on an undeveloped part of campus. Very little was known about the species and how changes in landscapes resulting from development, road construction, and wetland mitigation affect it. The study began in 1995.

Accomplishments:

- Completed a four-year period of data collection which included:
 - Genetic variation and reproductive isolation of the populations,
 - Temporal and spatial patterns of the reproductive migration,
 - Abundance and distribution of the reproductive adults, and
 - Importance of the upland habitat to the number and quality of migrating adults.

Recommendations:

- Undertake pro-active, specific mitigation efforts to reduce the impact of construction/development on this population.
- Locate mitigation wetlands as far as possible from new roads.
- Evaluate the long-term impact of construction on the population for many years following completion of any construction.

Program Manager
Project Manager
Total Project Cost
FY 99-00 Expenditures
Contractor
W.O. #
Project #
Contract Completion

Michael Bonini
William Petit
\$37,000
\$11,494.33
Penn State University
9
95-28
January 5, 2000



Design Community Training and Education Plan

Program Objective:

This project established a strategic plan to define, validate, and deploy education and training activities that should put PENNDOT's design community at the forefront of state departments of transportation. PENNDOT recognized the need to update the technical knowledge base within its design community substantially. Developing the plan to do so required addressing several design disciplines: highway design, structure inspection and design, environmental design, waterway and drainage permits, right-of-way, utilities, grade crossings, electrical engineering and highway lighting, consultant procurement and project management, contract management, geotechnical and foundation engineering, photogrammetry, surveying and mapping, pavement design, general computing and related technology, planning, engineering computing, administrative services, sanitary engineering, and roadside development.

Accomplishments:

- Completed an internal assessment of training needs and current resources available to PENNDOT's design community.
- Developed a plan defining knowledge levels needed over the next five years and needed at each staff level, training and education media, and an implementation strategy.

Recommendations:

- Implement the training program among PENNDOT's design community.

Program Manager	Michael Bonini
Project Manager	Mary Sharp
Total Project Cost	\$91,615
FY 99-00 Expenditures	\$10,059.45
Contractor	Penn State University
W.O. #	21
Project #	95-28
Contract Completion	August 14, 2000



Pennsylvania Quality Initiative: Synthesis of Customer Satisfaction and Information Requirements

Program Objective:

This project consisted of three tasks: a review of existing highway customer satisfaction surveys in Pennsylvania, interviews with key stakeholders in the Pennsylvania Quality Initiative (PQI) process, and a report that synthesizes the results of the surveys and interviews and presents an agenda for further market research addressing additional information needs regarding customer satisfaction with Pennsylvania highways. The purpose of the project was to provide a customer focus for this and other PQI initiatives.

Accomplishments:

- Analyzed collected data and determined that stakeholders' perspective of Pennsylvania highways is that they are improving, but more improvement is needed.
- Analyzed collected data and determined that stakeholders view road maintenance and repair as more important than new road construction.

Recommendations:

- Pursue a formalized, recommended research agenda addressing a number of issues regarding customer satisfaction with, and preferences concerning, Pennsylvania roadways.

Program Manager
Project Manager
Total Project Cost
FY 99-00 Expenditures
Contractor
W.O. #
Project #
Contract Completion

Michael Bonini
Richard Harris
\$31,167
\$30,334.27
Theodore Poister Associates
24
95-28
May 23, 2000

Pennsylvania's Transportation Research Board Research Showcase

Program Objective:

This project provided funds for the Pennsylvania Transportation Institute (PTI) to organize a research showcase at the January 11, 2000 Transportation Research Board (TRB) Annual Meeting in Washington, D.C. This was one of a number of conferences and showcases relevant to PENNDOT's mission. The showcase exhibited research, education, and technology transfer projects sponsored by PENNDOT through the university-based research programs that it supports.

Accomplishments:

- Presented the Research Showcase on January 11, 2000, with 46 exhibitors representing 16 universities and organizations participating and over 400 individuals attending.

Recommendations:

- Continue hosting a research showcase at subsequent TRB Annual Meetings.

Program Manager	Michael Bonini
Project Manager	Michael Bonini
Total Project Cost	\$10,731
FY 99-00 Expenditures	\$5,580.75
Contractor	Penn State University
W.O. #	28
Project #	95-28
Contract Completion	August 14, 2000

High Performance Concrete

Program Objective:

This project addressed the issue of total performance vis-à-vis concrete mixtures. In an effort to develop more cost-effective strategies for using high performance concrete in bridges and structures, a substantial testing program was undertaken. Considerations included economics and multiple combinations of strength, permeability, modulus, cracking tendency, abrasion resistance, freeze-thaw resistance, alkali-aggregate reaction, internal and external sulfate attack, workability, construction scheduling, traffic openings, and other criteria.

Accomplishments:

- Developed a matrix of current performance characteristics with specific performance criteria generated from high performance concrete characteristics, finding that the Commonwealth could save substantially by utilizing high performance concrete in extended-life structures.

Recommendations:

- Recommended PENNDOT focus efforts on eliminating often redundant and counterproductive prescriptive specifications to reduce the long term costs of repair, rehabilitation, and replacement.

Program Manager	Fran Treisbach
Project Manager	R. Scott Christie
Total Project Cost	\$35,000
FY 99-00 Expenditures	\$23,355.24
Contractor	Penn State University
W.O. #	3
Project #	96-29
Contract Completion	March 29, 2000



Integration of Recycled and Co-Product Material in Controlled Low-Strength Material

Program Objective:

The objective of this project was to identify opportunities to use recycled or co-product materials in PENNDOT's current Controlled Low-Strength Material (CLSM) specification. Prospective materials had to meet the flow consistency, strength, and density requirements already established by the current specifications. The goal of this research was to alter the current specification to allow or facilitate the use of acceptable recycled or co-product materials.

Accomplishments:

- Completed all studies and determined that:
 Foundry sand, ground glass cullet, and recycled Portland cement concrete as aggregate should be included explicitly, and The use of fly ash and ground granulated blast furnace slag should be encouraged.

Recommendations:

- Revise the state specifications to define the use of foundry sand, cullet glass and recycled Portland cement concrete (Document 408, Section 703).
- Add Type D fine aggregate to the specification.
- Require the use of CLSM in utility cut applications (Document 408, Section 601).

Program Manager	Fran Treisbach
Project Manager	Kenneth Thornton
Total Project Cost	\$22,500
FY 99-00 Expenditures	\$8,631.92
Contractor	Penn State University
W.O. #	3
Project #	96-30
Contract Completion	August 14, 2000

Develop Design, Application Criteria and Specifications for Subgrade Stabilization Using Geosynthetics

Program Objective:

The objective of this research was to develop application guidelines and specifications for geosynthetics used for subgrade stabilization. Geosynthetics had been used successfully for subgrade stabilization as an experimental feature on several projects in Pennsylvania as reinforcement, separation, and filtration. As a result of these experiments, it was decided to create design criteria for high-strength geotextiles, geogrids, and geocells.

Accomplishments:

- Developed criteria and specifications for using geosynthetics for separation, stabilization, or reinforcement as an alternative to undercutting.
- Completed a final report setting forth the recommended criteria and specifications.

Recommendations:

- No specific recommendations were made using geosynthetics.

Program Manager
Project Manager
Total Project Cost
FY 99-00 Expenditures
Contractor

Fran Treisbach
Bob Klotz
\$24,991
\$907.22
Penn State University/
Drexel University
2
96-31
December 7, 1999

W.O. #
Project #
Contract Completion



Prefabricated Wall Drain Systems for Structures

Program Objective:

The objective of this project was to investigate the cost/benefit, material properties, and design criteria of a geocomposite drainage system behind retained structures and present a draft specification on material properties and design guidelines. The geocomposite drainage system would replace conventional soil drainage layers behind retaining walls and abutments.

Accomplishments:

- Completed a review of current available literature on prefabricated geocomposite drains (PGD).
- Completed an assessment of currently available PGD's and a cost comparison.
- Assessed the current usage of PGD's.
- Developed specifications and guidelines for using PGD's.

Recommendations:

- No specific recommendations were made regarding the use of PGD's.

Program Manager
Project Manager
Total Project Cost
FY 99-00 Expenditures
Contractor

Fran Treisbach
Bob Klotz
\$18,564
\$10,630.79
Penn State University/
Drexel University
3
96-31
June 16, 2000

W.O. #
Project #
Contract Completion

Potential for Use of Stainless and Stainless-clad Steel in Highway Construction

Program Objective:

The purpose of this project was to assess the factors that affect the selection of either solid stainless steel or stainless-clad steel reinforcement for rebars and dowel bars. The intent of the assessment was to recommend whether or not, and in what applications, PENNDOT should use stainless bars and to identify barriers to the bars' use. While epoxy-coated carbon-steel reinforcing bars have a major share of the reinforcement market, stainless steel reinforcement, with its higher corrosion resistance, was seen as potentially being effective in reducing life-cycle cost.

Accomplishments:

- Completed field and laboratory studies as planned which provided positive evidence that using solid stainless and stainless-clad reinforcement would substantially benefit PENNDOT, since:
 - The high degree of corrosion resistance extended pavement and bridge deck life, Stainless and stainless-clad reinforcement is readily available, and Life-cycle cost was significantly reduced without sacrificing mechanical or other properties.

Recommendations:

- Develop a specification permitting the use of stainless and stainless-clad reinforcement, preferably using stainless alloys 316L or 316 LN for best chloride resistance.

Program Manager
Project Manager
Total Project Cost
FY 99-00 Expenditures
Contractor
W.O. #
Project #
Contract Completion

Fran Treisbach
Ronald Blauch
\$25,000
\$10,970.41
Penn State University
4
96-31
June 30, 2000



Historic Local Bridges 94-04

Program Objective:

The objective of this project was to research and compile information to support and justify recommendations regarding which of Pennsylvania's locally-owned bridges meet the criteria for inclusion in the National Register of Historic Places. The project also provided criteria and methodology for future bridge evaluations.

Accomplishments:

- Completed all field evaluations and documentation specified in the contract.
- Presented the findings from the field evaluations to PENNDOT and the PA Historical and Museum Commission for examination.

Recommendations:

- Close the project with the completion of the field evaluations, so that PENNDOT and the PA Historical and Museum Commission can examine the findings, a process expected to take 1-2 years.
- Use a new contracting mechanism to continue project activities if the examination of the field evaluations indicate the value of doing so.

Program Manager
Project Manager
Total Project Cost
FY 99-00 Expenditures
Contractor

Fran Treisbach
Mark Lombard
\$1,131,179
\$77,035.24
A. G. Lichtenstein &
Associates, Inc.
94046
94-04
May 25, 2000

W.O. #
Project #
Contract Completion

Innovative HPS-70W Ford City Demonstration Project: Improved Weldability Using Undermatched Welds 97-15

Program Objective:

The purpose of this project was to utilize wide plate tension tests to characterize the strength and ductility of closely or undermatched HPS-70W steel weldments and full scale girder tests to characterize their fatigue resistance. The use of newly developed high strength and tough steels designated HPS-70W, providing a minimum yield strength of 70 ksi, represented potential savings if their higher yield strengths could be utilized in design and if their fabrication costs could be demonstrated to be economically feasible. Some applications of HPS-70W have not utilized their higher yield strengths over ASTM A588 (50 ksi) in design. The hypothesis was that undermatched welds could be used successfully to provide bridge members of acceptable strength and fatigue resistance.

Accomplishments:

- Completed the study and determined that:
ASTM A709 grade HPS485W steel offers higher strength, toughness, and weldability, an advantage in bridge construction; The use of weld consumables normally employed for ASTM A709 grade 345W for wide plate splices results in weldments that match strength requirements for ASTM A709 grade HPS485W; and
The effectiveness of ASTM A709 grade HPS485W is increased when its improved strength is utilized in innovative bridge design resulting in girders that are lighter in weight, require fewer welds, are stiffer, have improved shear buckling resistance, and have improved fatigue life.

Recommendations:

- No recommendations regarding further study or process implementation were made.

Program Manager	Tom Horne
Project Manager	Scott Christie
Total Project Cost	\$200,000
FY 99-00 Expenditures	\$11,029.44
Contractor	Lehigh University
W.O. #	97156
Project #	97-15
Contract Completion	August 6, 1999



Organizational Agility Partnership Project 97-17

Program Objective:

The purpose of this project was to create a "Proof of Concept" (POC) by applying the principles of Agility to the operations of PENNDOT. The POC was designed to result in redirected savings, faster service delivery by the Agile Maintenance Enterprises (AMEs), higher quality, improved efficiency, and increased customer satisfaction.

Accomplishments:

- Concluded the pilot and began the state-wide implementation of Agility by enabling PENNDOT to continue its successful implementation of Agility through the:
Development of Agile Metrics, Adoption and implementation of a Customer Involvement Model, and Development of a comprehensive training program for the Externally Focused Managers where relevant materials (customer involvement) may be applied to other areas of PENNDOT.
- Enhanced communications operations among the AME partners by recommending technological tools to increase the efficiency and effectiveness of internal procedures within PENNDOT and supporting organizations.

Recommendations:

- Implement a system of Agile Metrics to evaluate the impact of AME pilots.
- Adopt and implement the Customer Involvement Model across Pennsylvania.
- Support Agility and customer involvement within the Pennsylvania Council of Government.

Program Manager	Michael Bonini
Project Manager	Bonnie Fields
Total Project Cost	\$150,000
FY 99-00 Expenditures	\$150,000.00
Contractor	Lehigh University
W.O. #	97176
Project #	97-17
Contract Completion	August 31, 2000

Governor's Center for Local Government Services Municipal Training 97-88

Program Objective:

The purpose of this project was to transfer funds from PENNDOT to the Governor's Center for Local Government Services of the Department of Community and Economic Development. These funds were to be used to contract with State-Contracted Municipal Training Organization(s) for the administration and delivery of training programs for municipal road and street officials and the administration of a Municipal Public Works Peer-to-Peer Program.

Accomplishments:

- Presented training courses including:
 - Time Management
 - Dealing with the Angry Public
 - Supervision and Employee Relations
 - PC Applications
- Developed five Municipal Public Works Peer-to-Peer Program reports were developed

Recommendations:

- Continue the partnership created with the Governor's Center for Local Government Services and the Pennsylvania municipal associations to develop a new training program and continue the peer-to-peer program.

Program Manager	Michael Bonini
Project Manager	Ruby Doub
Total Project Cost	\$120,000
FY 99-00 Expenditures	\$85,000.00
Contractor	Various
W.O. #	97886
Project #	97-88
Contract Completion	June 30, 2000

Governor's Center for Local Government Services Municipal Training 99-06

Program Objective:

The purpose of this project was to transfer funds from PENNDOT to the Center for Local Government Services of the Department of Community and Economic Development (DCED). These funds were to be used to contract with State-Contracted Municipal Training Organization(s) for the administration and delivery of training programs for municipal road and street officials and the administration of a Municipal Public Works Peer-to-Peer Program.

Accomplishments:

- Presented 75 training classes to over 1,275 participants from local government including the following courses:
 - Winter Road Maintenance
 - Spring Road Maintenance
 - Superpave for Local Government Officials
 - Maintaining Your Vehicles
 - Equipment Bidding
 - Purchasing
 - Contracting
 - Leasing
 - Quickbooks
 - The Changing, Challenging Role of Roadmasters
- Developed an APWA training manual and an associated training course.
- Managed the Municipal Peer-to-Peer Program which enables municipalities to review and recommend plans for improving volunteering municipalities public works' activities.

Recommendations:

- Initiate a new Memorandum of Understanding with DCED beginning FY2001-2002 to continue and expand program activities.

Program Manager	Michael Bonini
Project Manager	Michael Bonini
Total Project Cost	\$250,00
FY 99-00 Expenditures	\$90,000.00
Contractor	Various
W.O. #	99066
Project #	99-06
Contract Completion	June 30, 2001

Research and Development of Short Span, Pre-Fabricated Bridge Standards and Specifications SS-05

Program Objective:

The purpose of this project was to develop bridge design and construction standards and specifications for a pre-fabricated bridge system. This system was expected to create significant improvements in bridge construction projects by reducing construction time by as much as 50%, improving quality control, and reducing costs.

Accomplishments:

- Designed and successfully constructed two demonstration bridges in Districts 9-0 and 11-0 respectively.
- Ended the project with the construction of the demonstration bridges due to time constraints, omitting the development of specifications for future implementation.

Recommendations:

- Monitor bridge performance locally with the assistance of PENNDOT personnel.

Program Manager	Fran Treisbach
Project Manager	Scott Christie
Total Project Cost	\$753,643
FY 99-00 Expenditures	\$82,121.65
Contractor	Penn State University
W.O. #	90576
Project #	S-057
Contract Completion	January 2, 2000

Pier Analysis, Design & Drafting System 90-19

Program Objective:

The goal of this project was to develop a computer-based analysis, design, and drafting system for bridge piers that is both flexible and user-friendly.

Accomplishments:

- Completed the final report in November, 1999.

Recommendations:

- Implement the system developed under this project.

Program Manager	Fran Treisbach
Project Manager	Rebecca Burns
Total Project Cost	\$1,049,000
FY 99-00 Expenditures	\$112,328.94
Contractor	Imbsen & Associates, Inc.
W.O. #	90196
Project #	99-19
Contract Completion	November 2, 1999

Expenditure Summary

FISCAL YEAR 1999-2000

Safety and Congestion Management/ITS: 95-18

<i>Work Order</i>	<i>Project Description</i>	<i>Total Project Cost</i>	<i>Expenditures</i>
4	Customer Service Survey	95,368.00	4,577.52
5	Stop Sign Controlled Intersections – Human Factors Research	72,943.00	14,432.58
9	Optimization of Traffic Signal Timings	78,525.00	5,164.71
10	Reducing Congestion in Work Zones in PA	68,865.00	23,550.12
11	Evaluation of Enhanced Driver Education Program	38,140.00	30,334.27
13	Customer Service Survey, Safety and Traffic Flow Issues – Recommended Product Changes	129,330.00	76,407.88
14	Development of Traffic Calming Guidelines	53,951.00	46,107.95
15	Congestion Management System	112,732.00	23,473.24
16	Optimization of Traffic Signal Timings (cont'd)	46,217.00	17,353.04
	Subtotal:	\$696,071.00	\$241,401.31

Transportation Operations Partnership: 95-28

<i>Work Order</i>	<i>Project Description</i>	<i>Total Project Cost</i>	<i>Expenditures</i>
1	University Expertise Matrix	20,000.00	1,690.40
6	Traffic Engineering Education Program	100,000.00	58,515.13
7	ITS Steering Committee Support	75,000.00	3,759.18
9	The Population Biology of the Spotted Salamander, Ambystoma Maculatum, Inhabiting Penn State Erie Wetlands	37,000.00	11,494.33
21	Design Community Training and Education Plan	91,615.00	10,159.45
24	Pennsylvania Quality Initiative: Synthesis of Customer Satisfaction and Information Requirements	31,167.00	30,334.27
25	TRAC – Phase 4	62,500.00	21,476.72
27	Transportation Research and Education Consortium (TREC)	50,000.00	0.00
28	Pennsylvania's Transportation Research Board Research Showcase	10,731.00	5,580.75
	Subtotal:	\$478,013.00	\$143,010.23

Forensic Testing: 96-09

<i>Work Order</i>	<i>Project Description</i>	<i>Total Project Cost</i>	<i>Expenditures</i>
3	Investigation of Slag Sources	11,432.00	0.00
4	Shrinkage Evaluation of Bridge Decks	142,666.00	20,428.27
5	Investigation of Substandard Performance of Concrete Pavements and Shoulders, SR 0080, Luzerne County	28,824.00	2,210.33
7	Long Term Pavement Performance of Asphalt and Bituminous Concrete Samples	15,496.00	1,549.59
8	Evaluation of Pavement Base Drain Geotextile Suitability, I-80, Mercer County	29,747.00	2,680.45
9	Investigation of Pavement Slab Failures on Renewed Sections of I-80 in Districts 1-0 and 3-0 in Mercer, Union, Montour, Northumberland and Columbia Counties	28,528.00	2,852.81
10	Investigation of Pavement Slab Failures	252,194.00	142,213.82
11	Ford City Bridge – Weld Crack Investigation	10,174.00	10,073.08
12	Free Lime Content/Iron and Steel Slag	7,163.00	4,562.43
13	Implementation of Findings from the PHASE II – Investigation of Pavement Slab Failures in Districts 1-0 and 3-0, Mercer, Union, Montour, Northumberland, and Columbia Counties	36,578.02	6,143.28
14	Fire Damage Assessment Concrete Pier of I-99 – State College, PA	4,922.19	0.00
	Subtotal:	\$567,724.21	\$192,714.06

Materials Partnership, Construction Material Analysis and Design Specification Development: 96-29

<i>Work Order</i>	<i>Project Description</i>	<i>Total Project Cost</i>	<i>Expenditures</i>
3	High Performance Concrete	35,000.00	23,355.24
4	Seismic Column Reinforcement Study	98,458.00	13,413.64
	Subtotal:	\$133,458.00	\$36,768.88

Materials Durability Testing and Analysis: 96-30

Work Order	Project Description	Total Project Cost	Expenditures
3	Integration of Recycled and Co-Product Materials in Controlled Low-Strength Material	22,500.00	8,631.92
4	Development of Product and Materials Use Approval for Scrap Tires for State and Local Projects	135,509.00	0.00
	Subtotal:	\$158,009.00	\$8,631.92

New Product Evaluation: 96-31

Work Order	Project Description	Total Project Cost	Expenditures
2	Subgrade Stabilization Using Geosynthetics	49,982.00	907.22
3	Prefabricated Wall Drain Systems	37,128.00	10,630.79
4	Potential for Use of Stainless and Stainless-clad Steel in Highway Construction	25,000.00	10,970.41
5	Feasibility of the Use of Cathodic Protection and Electro-Chloride Extraction Technology for Structures in Pennsylvania	62,599.00	17,203.50
	Subtotal:	\$174,709.00	\$28,173.91

Cooperative Agreement: 97-04

Work Order	Project Description	Total Project Cost	Expenditures
1	University Expertise Matrix	150,371.00	39,388.13
2	Roadside Vegetation Management	764,711.00	153,188.33
4	Guiderail Testing Phase II	117,295.00	60,821.69
5	Statewide Transportation Planning – Penn Plan	649,604.00	229,543.31
6	Education and Seminars	320,667.00	20,459.45
8	I-95 Corridor Coalition Field Operational Test	300,000.00	90,016.49
9	PENNDOT/FHWA Priority Technologies Program for Smart Paint	66,250.00	31,867.53
10	High Speed Rail	27,464.00	9,397.73



<i>Work Order</i>	<i>Project Description</i>	<i>Total Project Cost</i>	<i>Expenditures</i>
11	Fiber Reinforced Polymer Bridge Deck	63,829.00	2,137.53
12	Probing Motorist Perceptions of Highway Quality	202,780.00	26,264.53
16	Municipal New Products Evaluations	56,500.00	28,407.48
17	Increasing the Pool of Highway Construction Subcontractors and Construction Personnel	124,891.00	60,870.55
18	NECEPT Regional Pooled Fund Study	236,000.00	196,628.62
19	Evaluation of Triaxial Strength as a Simple Test for Asphalt Concrete Rut Resistance	80,000.00	56,305.94
20	NECEPT Binder Testing and Training	77,715.00	0.00
21	Evaluation of Recycled Glass in Bituminous Concrete Base Course	8,500.00	6,818.19
22	Pilot Project for Concrete Maturity Meter for QA/QC and Acceptance	126,000.00	35,874.66
23	Construction and Materials Community Training and Education Plan	120,000.00	62,690.19
24	Materials Product Evaluation Reports	120,000.00	20,829.55
25	Bicycle-Friendly Shoulder Rumble Strips	135,400.00	103,112.04
26	Statewide ITS Strategic Plan Update	50,000.00	37,479.38
27	Heavy Axle Study—Impact of Higher Rail Car Weight Limits on Short Line Railroads	120,000.00	14,602.33
28	Pennsylvania Highway Drainage Manual	53,951.00	27,142.63
29	Understanding Litter in Pennsylvania	100,000.00	38,725.16
30	Assistant Academy Curriculum and Structure	90,000.00	79,293.79
31	Fish Species Reference Book	50,000.00	36,449.56
32	NCHRP 350 Crash Tests for Type III Barricades and Portable Concrete Barriers	116,258.00	75,504.61
33	Development of a Research and Development Plan for I-99	50,000.00	49,999.99
36	Comprehensive Customer Outreach and Recruitment Program	60,643.00	0.00
37	Route 30 Documentary	132,316.00	1,494.73
38	Implementation and Administration of a Pilot Program for PENNDOT Maintenance Bituminous Technician Certification	36,876.00	5,427.55
39	1999 QUIK Survey	75,000.00	65,484.75
40	Lincoln University Summer Transportation Institute	20,000.00	0.00
41	LTAP—Local Technical Assistance Program Maintenance First	1,830,544.00	294,825.78
42	LTAP—Local Technical Assistance Program Municipal Traffic Safety Liaison Program	753,939.00	0.00

43	NECEPT—Superpave Validation Studies	200,000.00	60,346.30
45	Communicating Driver Safety to Teenagers through the Internet	126,532.00	1,250.10
46	Developing a Learning Organization	43,274.00	1,458.43
47	Revised Disadvantaged Business Enterprise Goals	115,000.00	97,873.01
50	Weak-Post Guiderail Phase II	231,047.00	29,499.17
51	Cheyney University Summer Transportation Institute	20,000.00	17,770.31
53	Median Safety Study (Interstates and Expressways)	154,207.00	5,190.96
54	Foremen and Assistants' Academy	220,126.00	20,113.45
55	Aviation Outreach Manual	47,684.00	0.00
58	Unionid Workshop	11,390.00	4,893.15
59	PA Driver Education Program Evaluation	195,795.00	34,839.18
61	Lottery Transportation Database Management and Statistical Report	26,620.00	8,858.84
62	Partnership Outreach	144,149.00	20,416.22
63	Roadway Management Conference	20,000.00	12,160.71
64	PLAS and PLAM	197,767.00	36,685.66
65	PENNDOT Morale Index and Morale Assessment	25,989.00	0.00
68	Penn TRAIN Transit Training and Technical Assistance Program	75,398.00	0.00
70	DBE Goal Setting	315,000.00	0.00
71	Enhanced Graduated Driver License (GDL) Program	231,329.00	0.00
72	National Conference on Transportation and the Environment	39,088.00	0.00
76	2000 Summer Transportation Institutes	54,927.00	0.00
77	Evaluation of Approved Erosion and Sediment Controls to Determine Best Management Practices	175,022.00	0.00
79	Reduction of Movement and Stresses in Curved and Skewed Bridges, I-99 Advanced Technology Test Bed, Phase I	349,892.00	0.00
80	Methodology to Predict Movement and Stresses in Integral Abutments	375,574.00	0.00
81	Interstate 99 – High Performance Concrete (HPC) Initiative; Long Term Durability of Bridge Decks – Phase I	527,603.00	0.00
82	Geotechnical Site Investigation for Bridge Foundations	519,688.00	0.00
	Subtotal:	\$11,730,605.00	\$2,312,407.69

Individual Contracts

<i>Work Order</i>	<i>Project Description</i>	<i>Total Project Cost</i>	<i>Expenditures</i>
90-19	Pier Analysis, Design and Drafting System	1,074,000.00	112,328.94
92-16	Advanced Driver Interface Design/Assessment	2,000,000.00	204,025.73
94-04	Historic Local Bridges	1,285,293.00	77,035.24
95-26	Measures for Increasing the Mobility of Aging Commonwealth Citizens	450,000.00	51,964.33
95-36	Cooperative Research and Development Agreement 95-CRADA-2530 (Timber Bridge Monitoring Agreement)	176,000.00	24,433.36
97-15	Innovative HPS-70W Ford City Bridge Demonstration Project	200,000.00	11,029.44
97-17	Organizational Agility Partnership Program	150,000.00	150,000.00
97-88	CLGS Municipal Training	120,000.00	85,000.00
98-10	Pennsylvania Innovative High-Performance Steel Bridge Project	565,000.00	53,197.12
99-06	Memorandum of Understanding with Governor's Center for Local Government Services	250,000.00	90,000.00
SS-057	Pre-Fabricated Bridge Standards and Specifications	753,643.00	82,121.65
SS-058	Local Technical Assistance Program	5,177,984.00	410,847.36
SS-060	NECEPT	1,300,000.00	57,034.46
	Subtotal:	\$13,501,920.00	\$1,409,017.63

Total Expenditures
FISCAL YEAR 1999-2000

<i>Contract</i>	<i>Title</i>	<i>Expenditures</i>
90-19	Pier Analysis, Design and Drafting System	112,328.94
92-16	Advanced Driver Interface Design/Assessment	204,025.73
94-04	Historic Local Bridges	77,035.24
95-18	Safety and Congestion Management/ITS	241,401.31
95-26	Measures for Increasing the Mobility of Aging Commonwealth Citizens	51,964.33
95-28	Transportation Operations Partnership	143,010.23
95-36	Timber Bridges	24,433.36

96-09	Materials and Forensic Analysis	192,714.06	—
96-29	Materials Partnership: Construction Material Analysis and Design Specification Development	36,768.88	
96-30	Materials Partnership: Materials Durability Testing and Analysis	8,631.92	
96-31	Materials Partnership: New Product Evaluation	28,173.91	
97-04	Cooperative Agreement	2,312,407.69	
97-15	Innovative HPS-70W Ford City Bridge Demonstration Project	11,029.44	
97-17	Organizational Agility Partnership Program	150,000.00	
97-88	CLGS Municipal Training	85,000.00	
98-10	Pennsylvania Innovative High-Performance Steel Bridge Project	53,197.12	
99-06	Memorandum of Understanding with Governor's Center for Local Government Services	90,000.00	
SS-057	Pre-Fabricated Bridge Standards and Specifications	82,121.65	
SS-058	Local Technical Assistance Program	410,847.36	
SS-060	NECEPT	57,034.46	
	Total:	\$4,372,125.63	

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