



State Planning and Research



**2006
SPR**

Work Program and Estimate of Cost



MINNESOTA DEPARTMENT OF TRANSPORTATION

In cooperation with the
U.S. DEPARTMENT OF TRANSPORTATION
Federal Highway Administration

STATE PLANNING AND RESEARCH

Calendar Year 2006

STATE OF MINNESOTA

DEPARTMENT OF TRANSPORTATION

In cooperation with

US DEPARTMENT OF TRANSPORTATION

FEDERAL HIGHWAY ADMINISTRATION

PART I: PLANNING

PART II: RESEARCH, DEVELOPMENT & TECHNOLOGY TRANSFER

PART III: FINANCIAL SUMMARY

This program is prepared and submitted according to provisions of Title 23, United States Code, regulated under 23 CFR Part 420. On August 10, 2005, the new surface transportation reauthorization legislation, the Safe, Accountable, Flexible, Efficient, Transportation Equity Act: A Legacy for Users (SAFETEA-LU) was signed into law. SAFETEA-LU is a 5-year bill covering FFY 2005 – 2009. The funding levels for FFY 2006 are \$7.2 million for Statewide planning, 5 million for Metropolitan Planning Organization planning, and \$2.4 million for research activities.

The contents of this program describe the continued efforts of the Minnesota Department of Transportation in State Planning and research activities. This document is organized into several parts. Part I of this program is a summary of the Statewide and MPO Planning program. Part II is a summary of the State Research and Development program. Part III is the financial summary of the total participation costs of the program. Appendix A details the task objectives and methodologies, and products by office in the Minnesota Department of Transportation. Appendix C summarizes pooled fund projects with balances but not contributed to in the 2006 SP&R program.

Status reports on products will be prepared and submitted to document the progress of Part I of the program. Part II research activities are updated on a quarterly basis.

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PART I: PLANNING: STATEWIDE**ITEMIZED COST ESTIMATED****JANUARY 1, 2006 – DECEMBER 31, 2006****FUNDING SUMMARY: STATEWIDE PLANNING PORTION OF PART I**

Office of Investment Management	\$3,568,908
Office of Transportation Data Analysis	\$2,853,550
Office of Transit	\$720,000
Office of Finance	\$28,000
Office of Traffic, Security and Operations	\$157,334
Office of State Aid	\$795,873
Office of Technical Support	\$1,600,000
Office of Freight & Commercial Vehicle Operations	\$449,846
Total Needs	\$10,173,511
Total Federal Statewide Planning funds available	\$7,233,962
State funded difference	\$2,939,549

OFFICE OF INVESTMENT MANAGEMENT

State Transportation Improvement Program.....	\$113,850
Salaries...../13.8 Person Months	
State Transportation Plan and Statewide Planning Services.....	\$451,814
Salaries...../43 Person Months	
Federal & State Transportation Programs.....	\$777,150
Salaries...../94.2 Person Months	
Transportation & Economic Analysis.....	\$613,207
Salaries...../24 Person Months	
Land Use Access Management.....	\$342,856
Salaries...../48 Person Months	
Research Program Development and Financial Mgmt	\$817,669
Salaries...../154 Person Months	
Library and Information Mgmt	\$452,362
Salaries...../96 Person Months	
 TOTAL ESTIMATED COST.....	 \$3,568,908

OFFICE OF TRANSPORTATION DATA & ANALYSIS

Transportation Information System (TIS) & GIS BaseMap Data Maintenance.....	\$598,104
Salaries	597,604/101 Person Months
Travel	500
Vehicle Classification and Truck Weight Studies	\$379,252
Salaries	375,752/61.9 Person Months
Travel	3,000
Overtime	500
Traffic Counting.....	\$337,935
Salaries	335,435/62.9 Person Months
Travel	2,000
Overtime	500
Traffic Forecasting for Highway Design.....	\$287,912
Salaries	287,412/43 Person Months
Travel	500
Transportation Information System (TIS) Development & Maintenance	\$375,439
Salaries	375,439/50 Person Months
Transportation Information System (TIS) Support.....	\$236,791
Salaries	236,791/34 Person Months
Municipal Maps.....	\$208,947
Salaries	208,647/51 Person Months
Travel	300
St. Paul – Minneapolis Area Map.....	\$101,497
Salaries	101,397/14 Person Months
Travel	100
County Maps.....	\$92,690
Salaries	92,390/13 Person Months
Travel	300
State Maps.....	\$30,831
Salaries	30,631/4 Person Months
Travel	200
Roadway History & Project Log.....	\$204,152
Salaries	204,152/36 Person Months
TOTAL ESTIMATED COST	\$2,853,550

OFFICE OF TRANSIT

Transit Program Planning.....	\$204,000
Salaries...../35 Person Months	
Travel.....	3,000
Newsletter.....	4,000
Misc	4,000
Transit Research & Program Evaluation.....	\$119,000
Salaries...../23 Person Months	
Travel.....	2,000
Misc.	2,000
Bikeway Planning.....	\$397,000
Salaries...../60 Person Months	
Travel.....	5,000
Professional/Technical.....	45,000
(SBAC) State Bicycle Adv. Comm. .	10,000
Misc	9,000
TOTAL ESTIMATED COST	\$720,000

OFFICE OF FINANCE

Highway Statistics\$28,000

Salaries.....4.7 Person Months

TOTAL ESTIMATED COST.....\$28,000

OFFICE OF TRAFFIC, SECURITY AND OPERATIONS

Speed Data Summaries\$21,626

Salaries...../3 Person Months

Accident Surveillance\$135,708

Salaries...../23 Person Months

TOTAL ESTIMATED COST.....\$157,334

OFFICE OF STATE AID

County State Aid Highway	\$410,823
Salaries.....	402,023/48 Person Months
Travel.....	4,800
Supplies.....	3,000
Municipal State Highway Need Study.....	\$385,050
Salaries.....	380,550/42/46 Person Months
Supplies.....	2,400
Travel.....	2,100
TOTAL ESTIMATED COST.....	\$795,873

October 25, 2005

OFFICE OF ENVIRONMENTAL SERVICES (CULTURAL RESOURCES UNIT)

Trunk Highway and County/Municipal Cultural Resource Investigations

Contracts\$1,600,000

Cultural Resources Firms

TOTAL ESTIMATED COST.....\$1,600,000

OFFICE OF FREIGHT AND COMMERCIAL VEHICLE OPERATIONS

Freight Planning, Studies and Data Management.....\$449,846

Salaries 72 Person Months

TOTAL ESTIMATED COST.....\$449,846

PART I: PLANNING:

METROPOLITAN PLANNING ORGANIZATION (MPO)

FUNDING DISTRIBUTION

CALENDAR YEAR 2006

MPO	FHWA (PL)	FTA (Sec. 5303)	TOTAL (Planning funds avail.)
Twin Cities Metropolitan Council	\$2,602,053	\$731,855	\$3,333,908
Duluth-Superior MIC	370,423	136,063	506,486
St. Cloud APO	369,453	106,721	476,174
Rochester – Olmsted COG	369,341	85,158	454,499
Fargo – Moorhead COG	135,347	27,961	163,308
Grand Forks/E. Grand Forks MPO	33,184	6,392	39,576
La Crosse Area Planning Committee	23,279	3,633	26,912
TOTAL	\$3,903,080	\$1,097,783	\$5,000,863

Notes

The MPOs and Mn/DOT developed a formula for the distribution of the Consolidated Planning Grant (CPG) funds, which was approved by both FHWA and FTA.

PART II: RESEARCH AND DEVELOPMENT

ITEMIZED COST ESTIMATED

CALENDAR YEAR 2006

State Study No. *(Asterisk denotes lead state project)	Study Title	Commitment in Dollars (\$)	New (N), Modification (M) or Ongoing Projects (O)	MnDOT Contact
STATE RESEARCH & DEVELOPMENT				
SPR-TPF-5(406)	National Cooperative Highway Research Program (NCHRP)	\$530,490	N	Kahle
Solicitation #1070	TRB Core Program Services for FY'07	\$127,705	N	Lodahl
0002(207)	Traffic Management Center (TMC) Study	\$50,000	M	Thompson
0003(017)	Midwest State Crash Test (additional dollars added for annual meeting costs)	\$56,700	M	Dehdashti
0003(020)	Enterprise	\$30,000	M	Nookala
0003(042)	Aurora	\$25,000	M	Curt Pape
0003(049)	Urban Mobility Study	\$25,000	M	Henkel
0003(074) (Addition to the above study)	Tack Coat Study (SPTC) (Pavement Research & Technology)	\$20,000	O	Olson
0003(098)	Pavement Reconstruction Scheduling Software	\$52,000	O	Johnson
TPF-5(004)	Long Term Pavement Performance (LTPP) Specific Pavements Study (SPS) Traffic Data Collection	\$35,000	M	Kreideweis
TPF-5(021)	North Central Superpave Center (NCSC)	\$20,000	M	Olson
TPF-5(029)	High Occupancy Vehicle	\$25,000	M	Thompson
TPF-5(036)	Maintenance Quality Assurance Peer exchange	\$5,000	O	Gobeli
TPF-5(037)	Southeast Superpave Center (NCAT Tire/Pavement Noise Study)	\$21,000	O	Oman
TPF-5(046)	Transportation Curriculum Coordination Council (TCCC)	\$15,000	M	Betts
TPF-5(054)	Development of Maintenance Support System	\$50,000	M	Pape
TPF-5(066)	Material & Construction Optimization	\$15,000	M	Schwartz

State Study No. *(Asterisk denotes lead state project)	Study Title	Commitment in Dollars (\$)	New (N), Modification (M) or Ongoing Projects (O)	MnDOT Contact
*TPF-5(080)	Investigation of Low Temperature Cracking in Asphalt Pavements	\$50,000	M	Worel
*TPF-5(086)	Reducing Crashes at Rural Intersections (IDS)	\$22,000	M	Starr
TPF-5(090)	Pavement Tools Consortium	\$20,000	M	Olson
TPF-5(092)	<i>Test & Evaluation of Materials, Equipment & Methods for Winter Maintenance</i>	\$25,000	M	Taylor
*TPF-5(093)	North/West Passage (phase II)	\$50,000	M	Nelson
TPF-5(099)	Evaluation Of Low Cost Safety Improvements	\$65,000	M	Hill
TPF-5(105)	Transportation Library Connectivity	\$20,000	M	Baldwin
TPF-5(111)	Development of Standards for Geotechnical Management Systems	\$25,000	O	Person
TPF-5(112)	Midwest States Pooled Fund Pavement Preservation Partnership	\$5,000	M	Geib
TPF-5(114)	Roadside Safety Research Program	\$50,000	M	Dehdasht
TPF-5(116)	Investigation of the Fatigue Life of Steel Base Plate to Pole Connections for Traffic Structures	\$12,000	M	Merritt
TPF-5(118)	Upper Midwest Freight Corridor Study Phase II	\$20,000	O	Gardner
TPF-5(119)	North Central Pavement Research Partnership (Frozen Four)	\$5,000	M	Johnson
TPF-5(120)	Deer Vehicle Crash Information and Research (DVCIR) Center	\$25,000	M	Weinholzer
*TPF-5(126)	Geocomposite Capillary Barrier Drain for Limiting Moisture Changes	\$70,000	M	Roberson
PENDING			\$45,000	
MODIFICATIONS & NEW STUDIES			\$1,378,895	
STATE RESEARCH & DEVELOPMENT - TOTAL				\$1,423,895

	AMOUNT	TOTALS
SPR-0001(046) Research Projects, Technology Transfer, Implementation, Special Projects & Administration (FFY 2006) available but not obligated	\$2,411,320	\$2,441,320
Previous Years – (FFY 2005) - 0001(045) Unexpected	\$1,984,635	\$4,395,955
Previous Years – (FFY 2004) - 0001(044) Unexpected	\$1,529,074.15	\$5,925,029.15
RESEARCH TOTAL		\$5,925,029.15
Less 2006 Research & Development (<i>Pending & Modifications</i>)	\$1,423,895	\$4,501,134.15

KEY

New	N	OIM does the paperwork and forwards to FHWA
Modification	M	federal aid section of Finance does the paperwork on modifications and forwards to OIM
Ongoing Projects	O	“Commitment” column is shaded and shows the last obligation amount. These amounts don’t carry forward to the Research & Development total - \$143,000
Lead State Project	*	Mn/DOT has responsibility for administration of the project
<i>Pending projects will show in italics - \$45,000</i>		

PART III
FINANCIAL SUMMARY
STATE PLANNING AND RESEARCH PROGRAM
Calendar Year 2006

TOTAL ESTIMATED PARTICIPATION

	Federal Participation	Fed. Project Number	Appropriation code
Statewide Planning	\$7,233,962	SPR-0001(046)	L55
MPO Planning	\$3,903,078	--	L45
Research	\$2,411,320	SPR-0001(046)	L56
Total	\$13,548,360	NA	NA

Notes:

- State funds added \$2,939,549 for a State-wide planning total of \$10,173,511
- MPO Planning funds are supplemented by FTA funds, State funds and Local funds.
- Research program is supplemented by State funds.

APPENDIX A

OFFICE OF

INVESTMENT

MANAGEMENT

TASK TITLES: State Transportation Improvement Program (STIP)

ESTIMATED COST: \$113,850.00

WORK AUTHORITY NUMBER: TH 101

WORK PERFORMED BY: Program Development Section

OBJECTIVES:

- Provide guidance in the planning and development of the federally required, fiscally constrained, three year STIP document that includes all anticipated expenditures for all modes of transportation under the authority of Mn/DOT. Publish and distribute the final Web Page availability. Provide analysis as requested. Process STIP amendments and publish web site.

ACTIVITIES:

- Prepare State Transportation Improvement Program & Amendments
- Prepare State Transportation Improvement Program Guidance
- State Transportation Improvement Program Analysis

METHODOLOGY:

- STIP Guidance and Development: Guidance for the development of the State Transportation Improvement Program (STIP) is provided through continuous communication with the District/ATPs and other partners. A Guidance document provides transportation goals objectives and direction for use in making statewide transportation investment.
- The Area Transportation Partnerships (ATPs) submit prioritized lists of candidate projects based upon the integration of transportation priorities from modal interest, RDC's and MPO's and Mn/DOT consistency. A draft STIP is developed and reviewed by the District/ATP and with their comments considered. A final STIP is prepared.

PRODUCTS:

- STIP Guidance and STIP: Guidance is updated periodically and sent to the districts. The three-year State Transportation Improvement Program is produced annually.

TASK TITLES: Statewide Transportation Plan and Statewide Planning Service

ESTIMATED COST: \$451,814.00

WORK AUTHORITY NUMBER: TH 102

WORK PERFORMED BY: Statewide Planning & Analysis Section

OBJECTIVES:

- Assist the Metropolitan Planning Organization (MPO's) in developing and maintaining a transportation planning process that fulfills the requirements of the appropriate federal regulations.
- Develop and manage the process of developing a statewide multi-modal transportation plan including scope of services development and management of a consultant contract for statewide multi-modal transportation plan. Provide statewide planning services to districts and other partners/customers; and provide guidance and planning services to districts, offices and other partners. This would include planning studies statewide in scope, public participation processed and other required or necessary activities.
- Perform the necessary activities for evaluating the physical characteristics, performance on all networks in Minnesota.

ACTIVITIES:

- MPO Planning Office
- MPO Planning Field
- Statewide Transportation Plan
- Statewide Transportation Planning Services
- RDC Area Planning
- Highway performance Monitoring System
- Functional Class & National Highway System

METHODOLOGY:

- Coordinate with Mn/DOT district planning staff in the development, review and /or approval of MPO planning documents to ensure the MPOs maintain certifiable transportation planning. Facilitate MPO planning committees to ensure awareness and use of state of the art planning procedures, through training and technical assistance that respond to mutual transportation concerns.
- Prepare a statewide transportation planning and policy studies – such as the Statewide Transportation Planning – to serve as a consultant in developing frame works for district, division and model plan. Assist districts in developing district long-range transportation plans. Coordinate, review and respond to national and state initiatives, policies, and proposed regulations which impact on transportation. Administer and coordination Mn/DOT transportation planning committees and units of local government.
- Maintain the capability to periodically assess by measuring the performance and quality through annual reports upon the condition o f the highways, roads and streets in Minnesota using the Highway Performance Monitoring System. Create, maintain and provide maps and records in an up-to-date status/revision as necessitated for the Functional Classification system and the National Highway system.
- Obtain traffic data needs from Office of Transportation Data & Analysis.

PRODUCTS:

- Annual MPO Planning Work Programs and Funding Distribution Agreements.
- Annual MPO Transportation Improvement Program (TIP) and Certification.
- Provide reports and/or maps for highway studies as requested by FHWA, State and Local Road Authorities, including yearly FHWA – 534 reports.
- Development of the Statewide Transportation Plan revisions and updates, including district transportation plans and highway operations plans.
- Development of guideline and performance measures to support statewide transportation policies.
- HPMS yearly data submitted including signed public & mileage certification.

TASK TITLES: Federal & State Transportation Programs

ESTIMATED COST: \$777,150

WORK AUTHORITY NUMBER: TH 103

WORK PERFORMED BY: Programming and Project Authorization Unit, Program Analysis unit and Regulatory & Policy Analysis Section

OBJECTIVES:

- Provide administration of the Federal Aid Highway Program to maximize federal funds and utilize those funds efficiently. Provide budgetary control and fiscal management of the State Road Construction Programs in accordance with legislative constraints and Mn/DOT policy.
- Provide the direction, supervision and general office work necessary for the administration of the State Planning and Research Work Program.
- Maintain computerized Mn/DOT program delivery schedules and to further develop the financial tracking of projects in PPMS.

ACTIVITIES:

- Transportation Program Administration
- Federal Aid Coordination
- Emergency Relief Program
- State Planning and Research Program
- Federal Aid System Interface
- Transportation Revolving Loan Fund Program
- PPMS

METHODOLOGY:

- Conduct the Federal Aid Programming process, the FHWA project status and the submittal of projects to FHWA for authorization. Coordinate compliance with all federal aid requirements, engineering and fiscal by other division of Mn/DOT offices. Provide directions to the flow of federal funds between Mn/DOT and FHWA for their most efficient innovative use. Ensure the program context is compatible with program funding distribution. Maintain program budget status by listing expenditures, anticipated expenditures and balances. Make the necessary adjustments that conform to legislative budget limits.

- Special federal aid programs: Program all viable projects in compliance with the published FHWA guidelines. These include:
 - Forest Highways
 - Public Lands Highways
 - Emergency Relief
 - State Planning and Research
- Using the project management system to update data such as letting dates, program funding estimates, amounts of contract awards, type of funding, funding agreements, post award changes and program status.

PRODUCTS:

- Efficiently use federal and other transportation funds in Federal Program.
- State Planning and Research Program annual report.
- Use a current on-line state program as a tool in managing State Aid, Transit and Mn/DOT Construction program as a statewide program management and project scheduling system.

TASK TITLES: Transportation and Economic Analysis

ESTIMATED COST: \$613,207

WORK AUTHORITY NUMBER: TH 104

WORK PERFORMED BY: Economic Analysis & Special Studies Section

OBJECTIVES:

- Determine the most cost effective investments for transportation system improvements. Develop investment criteria to evaluate economic feasibility and priority for proposed projects. Analyze economic, demographic transportation and the related trends for their impact on transportation demand. Analyze transportation financing trends and transportation issues like Interregional Corridors. Conduct economic analysis for specific transportation investments especially on benefit/cost analysis, financial analysis and business development impact analysis.

ACTIVITIES:

- Transportation & Economic Analysis (Non-project specific)
- Transportation & Economic Analysis (Project specific)

METHODOLOGY:

- Investigate the relationship between transportation along with highways and the economies of the state and nation on topics such as:
 - Effects of major demographic business and economic trend on transportation system demands and revenues.
 - Economic efficiency or financial returns of major transportation system segments and corridors.
 - Extend of benefit accrued to local, regional, statewide and/or nation economies from transportation projects.
 - Economic impact of alternative solutions to urban transportation problems.
 - Focus on economic activities and transportation relationship among Twin Cities, regions and inter-regions of other states.
 - Distributional effects of transportation investments.

- Develop criteria for evaluating the economic impact and feasibility of transportation projects through activities such as:
 - Conduct benefit/cost analysis of proposed transportation projects.
 - Calculate the economic rate of return to transportation investments.
 - Evaluate benefit-cost on transportation investments across identified groups in society.
 - Develop standard techniques and practices to implement investment analysis.
 - Incorporate accepted criteria on investment analysis to prioritize and project selection process.
 - Provide personnel involved in transportation process technical training and implement investment analysis.
 - Communicate outcome of investigations by means of reports, presentations or others technique to appropriate audience the status of projects identified.

PRODUCTS:

- Components in scoping, environment and other documents for pending projects. (ongoing)
- Training on use of investment analysis tools in transportation investment. (ongoing)
- Reports in different formats, for examples memos, working papers and research reports, on issues investigated and appropriate status noted above and intended audiences. (ongoing)
- Investment guidelines or criteria. (ongoing)
- Economic analysis training materials such as methodologies and standard values. (ongoing)

TASK TITLES: Land Use Access Management

ESTIMATED COST: \$342,856

WORK AUTHORITY NUMBER: TH 105

WORK PERFORMED BY: Land Use and Access Management Section

OBJECTIVES:

Provide policy guidance and technical assistance to Mn/DOT Districts/Metro Division and local government partners on approaches to manage access on all types of roads throughout the state. Produce and maintain the Access Management Manual that defines a Roadway Access Category System. Recommend access spacing. Outline methodologies for application of the System to corridor planning, project development and local land use transportation planning. Establish a uniform access permitting procedure. Provide training to planners and engineers on the Manual content at Mn/DOT Districts, Divisions, offices and local government. Provide technical assistance to Mn/DOT and local partners in planning efforts to coordinate long range land use and transportation plan with a special emphasis on IRC Corridor related issues.

ACTIVITIES:

- Develop and administer land use and access management policies
- Design and implement research and demonstration projects
- Access management/land use technical assistance

METHODOLOGY:

- Research, develop and implement a comprehensive set of strategies that integrate engineering, land use planning and legal approaches to improve land use and access management practice throughout Minnesota.
- Promote stronger intergovernmental partnerships by providing common access guidelines for use by all partners. Education training and technical assistance in access management and land use integration.
- Promote the safety and mobility of the traveling public.
- Protect and extend the useful life of the public's investment in the State's highway system.
- Support the economical vitality, character and livability of the local community.

- Achieve stronger integration of local government land use decision with state transportation goals and policies including Smart Growth, Interregional Corridors and Multi-modalism.

PRODUCTS:

- Permitting Procedures
- District Training and Technical Assistance
- Local Government Workshops and Technical Assistance
- Model Access Management and Overlay Ordinance.
- Access Management Guidelines/Manual.

TASK TITLES: Research program Development and Financial Mgmt

ESTIMATED COST: \$817,669

WORK AUTHORITY NUMBER: TH 901

WORK PERFORMED BY: Research Services Section

OBJECTIVES:

- Supports measurable improvements in Minnesota's transportation system by meeting the knowledge needs and finding solutions for transportation practitioners and the transportation community.
- Obtain research results that are of practical value in the most cost effective manner possible. Research must be theoretically rigorous and accurate, but ultimately has the potential to improve the way Mn/DOT does business by providing cost effective solutions to transportation problems.
- Convey research results through effective technology transfer and outreach.

ACTIVITIES:

- Understanding Mn/DOT issues
- Managing and leveraging various research funds and resources
- Develop/Select Research Proposals
- Develop and administer research contracts
- Outsourcing expertise
- Plan and ensure that Implementation occurs
- Evaluate the impact of Mn/DOT's research investment
- Perform Technology Transfer and Outreach or Research Results

METHODOLOGY:

- Educate clients about the value of knowledge and research and inspire them to learn through customer focus groups and development of different methods to show customers the value of knowledge and research
- Continuously evaluate client needs, expectations and awareness of our services by measuring the frequency of customer contacts and the development and sharing of research specific performance measures.

METHODOLOGY (CONTD.):

- Encourage partners to share new knowledge techniques and technologies they acquire by enhancing current partnerships, and identifying and capitalizing on opportunities for new partnerships.

PRODUCTS:

- Annual research report
- Research newsletter
- Published research reports
- Research exhibits and conferences and events
- Market research results from research coordinators and technical liaisons survey
- Research Coordinator meeting
- Project Orientation meetings
- Research web site
- Trading Cards
- Technical Research Summaries
- Implementation plans and close out memos

TASK TITLES: Library and Information Mgmt

ESTIMATED COST: \$452,362

WORK AUTHORITY NUMBER: TH 901

WORK PERFORMED BY: Research Services Section – Library Unit

OBJECTIVES:

- Provide information for its customers faster, better, and/or cheaper than they can do so for themselves.
- Meet the transportation-related information needs of the employees of the Minnesota Department of Transportation, other transportation practitioners throughout the state, especially city and county engineers, consultants under contract to Mn/DOT, other librarians, both locally and globally, and the general public.

ACTIVITIES:

- Staff Reference Desk
- Catalog Mn/DOT Information Resources
- Share Information Resources with Other Libraries
- Loan Information Resources to Library Customers

METHODOLOGY:

- Educate clients about the available resources and encourage them to take advantage of those resources to meet their own knowledge needs by delivering information to customers, simplify and improve customer access to information, and utilizing improving technology to support Mn/DOT's processes and needs.
- Inform clients how we can help with the research and knowledge needs through promotion of the library resources and services and library tours.

PRODUCTS:

- Document delivery
- Periodical Routing
- Internet and Intranet Development
- Circulation Services

PRODUCTS (CONTD.):

- Collection Development
- Reference Assistance
- Recent Acquisitions List
- Alerting Services

**OFFICE OF
TRANSPORTATION
DATA & ANALYSIS**

TASK TITLES: Transportation Information System (TIS) & GIS BaseMap Data Maintenance

ESTIMATED COST: \$598,104

WORK AUTHORITY NO: TH 202

WORK PERFORMED BY: Geographic Mapping & Information Section

OBJECTIVE:

- To maintain TIS and GIS BaseMap data within Mn/DOT's Location Data Manager (LDM) software environment by providing data collection, data updating and data enhancements.
- To provide analyses of TIS and GIS BaseMap data by providing data quality controls and assurances.
- To provide liaison and user support for both internal and external users/contributors of the LDM's Transportation Data System (TIS) and GIS BaseMap data components.

METHODOLOGY:

The Office of Transportation Data and Analysis is the steward for Mn/DOT's Location Data Manager (LDM) - a major Information Resource System comprised of a number of databases and systems used for transportation planning and analysis. This system incorporates graphical representations (GIS BaseMap) and associated data (TIS) about roads, railways, navigable waters, and airports. This data includes physical characteristics (both vertical and horizontal), geometric features, various attributes such as bridges, railroad crossings, traffic volumes and classification, crashes, and designation information such as route system and number, federal classification, street names etc.

This task consists of data collection, data analysis, data maintenance, LDM training and user support. Data is collected from a variety of sources such as construction plans, roadway status reports, imagery, and requests to various governmental offices and agencies for resolutions, mapping etc., and various other sources as listed under item number TH 606, County Maps. This information is used to update current information and create new records and is made part of the LDM through several methods such as manual data entry, file transfers, etc.

The information contained in the LDM's core of TIS and BaseMap data is used by transportation decision makers, planners and analysts and is provided in multiple forms such as text reports, graphs, and attribute maps for transportation planning, asset management, investment tradeoff analysis and project development. It allows for the use of "windowing in" on a statewide map down to regional, district, county, city or even corridor specific maps. Users are able to display and analyze data from many sources and in any of the several location reference systems. These additional capabilities and resulting flexibility produce a better picture of transportation networks

and interrelationships within the State of Minnesota. The LDM is under continuous development and it will be enhanced and maintained by Mn/DOT.

PRODUCTS:

- Current and accurate GIS BaseMap and corresponding TIS file updates using data collection and maintenance methods which meet the needs of the end users.
- Current data on the physical characteristics of roads, trunk highway construction histories, mileage, traffic and crashes to be used for various studies and for reporting to the FHWA's Highway Performance Monitoring System (HPMS) and HSIS.
- TIS data is used to support reporting requirements for other departmental needs and activities such as bridge management, pavement management, and bikeway management.
- Local road attributes maps for use by DPS and law enforcement agencies and Road Life records, Construction Project Logs, and Control Section Listings to be used as references by districts and other offices and agencies.
- From 1996 through 2000, the State of Minnesota BaseMap was produced annually and distributed via CD-ROM. Beginning in 2001, the BaseMap was made available via the Internet on Mn/DOT's Web site at: <http://www.dot.state.mn.us/tda/basemap/index.html>.
- Maps, reports, user manuals, memos and articles relating to GIS BaseMap and TIS data input into the LDM.
- Mn/DOT's GIS BaseMap is also available on TDA's Web site at:
<http://www.dot.state.mn.us/tda/basemap/index.html>
- Mn/DOT's TIS roadway data is also available on TDA's Web site at:
<http://www.dot.state.mn.us/tda/basemap/index.html>

TASK TITLES: Vehicle Classification / Truck Weight Studies

ESTIMATED COST: \$379,252

WORK AUTHORITY NO: TH 213

WORK PERFORMED BY: Traffic Forecasting and Analysis Section & Weight Data & Enforcement Policy Coordination Section

OBJECTIVE:

To determine the types and weights of vehicles using the States roadways and continually improve the methods used to accomplish this. Analyze and report on the data in the format needed by Mn/DOT traffic forecasters, FHWA, and various other public and private parties.

- Process vehicle classification data collected both manually and automatically throughout the state. About 100 locations are counted on a two year cycle with approximately 900 other site counted on a six year cycle.
- Process the truck weight data collected by Weight-In-Motion scales at permanent locations.
- Evaluate and update traffic data collection and analysis methods through the use of statistics, new technology and computer software while making available additional traffic data in the Transportation Information System (TIS).
- Provide expertise and coordination in the development and dissemination of weight enforcement policies and regulations.
- Install permanent vehicle classifiers to collect, edit and report on the data. Since 2003, twenty-five such classifiers have been installed and are reporting data.

METHODOLOGY

Through the use of PC based programs, the raw data is processed to represent average day of the year values. Review of current methods and the use of innovative techniques will facilitate meeting users' needs.

- Develop plans and enforcement policy proposals and make recommendations; attend various meetings and hearings and provide technical advice. Carry out strategy changes and equipment purchases to improve weight enforcement productivity.

PRODUCTS:

- Annual Vehicle Classification and Truck Weight reports.
- Truck volumes produced biennially on the state traffic flow map.
- Heavy Commercial volumes input into TIS.
- Analysis of data and special studies.
- Weight enforcement policies
- Improved interagency coordination and communication processes.
- Improved weight data expert system development.

TASK TITLES: Traffic Counting

ESTIMATED COST: \$337,935

WORK AUTHORITY NO: TH 214

WORK PERFORMED BY: Traffic Forecasting and Analysis Section

OBJECTIVE:

- To conduct and continually improve our traffic counting program which provides data for determining annual average daily traffic (AADT), vehicle miles of travel (VMT) and growth trends for Mn/DOT traffic forecasters, FHWA, and various other public and private agencies.

METHODOLOGY:

- Determine short duration and continuous (Automatic Traffic Recorder – ATR) traffic data requirements and sampling plan for the State’s traffic Monitoring Program.
- Coordinate and oversee the collection of traffic data from central office, District and local government agencies, and maintain the data processing infrastructure to process and manage traffic data.
- Develop and apply proper axle correction and seasonal/day-of-week adjustment factors to trunk highway (TH) and local road short duration counts and develop official AADT for all segments according to the count cycle schedule (either 2 or 4 years).
- Help to ensure that all traffic monitoring equipment is tested and repaired when necessary.
- Continuously improve methods for screening, interfacing and reporting raw and final traffic estimates using statistics, new technology, and computer software.

PRODUCTS:

- Statewide, seven county metropolitan area and 52-sheet series, county and city maps depicting TH, County Road and Municipal State Aid street AADT's on paper and CD and via the office web page.
- An ATR summary report containing annual AADT and monthly comparisons, rank order hourly volume data, and maps illustrating ATR locations.
- Count location maps and supporting materials for fieldwork activities.
- Analysis of data to determine adjustment factors, trends and VMT estimates in addition to other special studies and technical assistance.

TASK TITLES: Traffic Forecasting and Highway Design

ESTIMATED COST: \$287,912

WORK AUTHORITY NO: TH 216

WORK PERFORMED BY: Traffic Forecasting and Analysis Section

OBJECTIVE:

- To provide training, traffic monitoring data, auditing and reports for traffic forecasting to the districts and Metro Division.
- Maintain database of traffic forecasts.
- Provide Metro Division and Districts with technical support in traffic forecasting, especially in the use of Travel Demand Modeling.
- Monitor and report short-term traffic trends.
- Assist Metropolitan Planning Organizations and communities with traffic forecasting training and technical studies.

METHODOLOGY:

- Through the use of various computer traffic models, forecasting techniques and analysis of traffic data, provide Metro Division and the districts with instructions on calculating projections of future truck and auto volumes.

PRODUCTS:

- Systems Planning and Analysis reports.
- Individual highway traffic volume and load estimates.
- Estimates of truck volumes and movements.
- Special studies and reports.
- Statewide trunk highway traffic and heavy commercial volume projections for long-range planning efforts.

TASK TITLES: Transportation Information System (TIS) Development & Maintenance

ESTIMATED COST: \$375,439

WORK AUTHORITY NO: TH 224

WORK PERFORMED BY: Data Systems & Coordination Section

OBJECTIVE:

- To design, build, test, deploy, and maintain new applications and technology in order that TIS maintenance and data retrieval efforts are constantly improved.
- To design, build, and test database enhancements (including changes to existing tables, creation of new tables, and maintenance of stored procedures and scripts) to improve performance or enhance data retrieval.
- To provide technical support for the applications and databases required by the TIS users to ensure that the applications and databases remain in an operational state and are accessible to users.
- To work with partners to develop new tools and methods for exchanging and sharing data, including use of the office web site.
- To provide up-to-date and accessible reports, data, and maps via an efficient, effective office web page.

METHODOLOGY:

- The Office of Transportation Data and Analysis is responsible for the department's Transportation Information System (TIS) and the spatial data in Mn/DOT's Location Data Management (LDM). These systems incorporate data about roads (trunk highways and all other roads), railways, and bridges. These data include spatial roadway network features, physical characteristics (both vertical and horizontal), geometric features, various attributes such as crashes traffic volumes and classification, accidents, and designation information such as route system and number, federal classification, street names, etc.
- The information contained in the TIS is used by transportation decision makers, planners and analysts and is provided in multiple forms such as text reports, graphs, and attribute maps for transportation planning, investment tradeoff analysis and project development.
- This task consists of developing and maintaining TIS reporting applications and databases, enhancing connectivity between the TIS system and other data systems. It includes developing extraction tools and scripts to easily share data with other users, as

well as the creation of tools to receive data updates from external partners such as the Department of Public Safety.

Additional work under this task includes:

- Maintaining and enhancing the office web site which is receiving an average of 4,000 hits per day, and working with county, city, MPR and RDC partners to exchange data and move closer to the goal of entering data once and using it often.
- Ensuring that this system is available whenever it is needed and the data maintenance and report generating functions operate properly and efficiently support is provided for software and hardware maintenance and troubleshooting.
- Providing programming and system analysis services, hardware installations, system enhancements and modifications, and overall system support.

PRODUCTS:

- Location Data Manager (LDM) application for updating and managing line work on the Mn/DOT GIS BaseMap and roadway attributes in the Transportation Information System (TIS).
- TIS Report applications and files able to be accessed by users with remote terminals.
- ArcGIS extensions for managing traffic data on TIS.
- Hardware configuration, system data files, computer programs, and systems documentation to meet the needs of various internal and external users.
- Office web page with links to TIS report, GIS BaseMap and traffic volume maps.
- User manuals, metadata dictionaries, memos and articles detailing TIS capabilities.
- Tools for providing crash data for the Office of Traffic, Security and Operations and the Department of Public Safety.
- Tools for providing pavement data for the Office of Materials and Road Research.
- Tools for providing bridge locations for the Bridge Office.
- Tools for providing data for Mn/DOT's Route Builder System.

TASK TITLES: Municipal Maps**ESTIMATED COST:** \$220,665**WORK AUTHORITY NUMBER:** TH 601**WORK PERFORMED BY:** Geographic Information and Mapping Section**OBJECTIVES:**

- To prepare and maintain a complete set of planimetric street maps at suitable scales for all incorporated municipalities in Minnesota. These maps are used by the department for general-purpose planning and operational functions and for municipal corporate boundary reference. In addition, many federal, state and local agencies and the general public use these maps for business and recreational purposes.

METHODOLOGY:

- The original base maps of all incorporated municipalities are prepared in accordance with standards outlined in the *FHWA Guide for a Highway Planning Map Manual (Volume 20, Appendix 25)*. Municipalities are categorized as being over or under 5,000 population. The procedures followed in producing these maps are the same in both cases.
- Municipalities having a population of 5,000 or greater are represented individually on one or more 24" x 36" map sheet. Municipalities with less than 5,000 populations are grouped by county on one or more 24" x 36" sheets with as many municipalities on a sheet as space will allow.
- At present there are 136 incorporated municipalities having a population of 5,000 or more on 150 map sheets; and 708 incorporated municipalities of less than 5,000 population on 255 sheets. This makes a total of 854 municipalities represented on 405 24" x 36" map sheets.
- In the development and maintenance of municipal maps, all possible current information is collected and compiled from the same various map information sources as listed under county maps. (See TASK TITLES on County Maps.)
- With the implementation for Computer-Assisted Design and Drafting (CADD), we are in the process of converting all our map products computer-generated maps. This process is called "digitizing" where the locations of geographic features (those elements to be mapped) are recorded as digital x, y coordinates in a computer file.
- Update and revision are achieved by either manually drafting any changes to be made on those municipal maps that have not been converted to a digital format or by entering any revisions to be made in the appropriate digital file and obtaining a new plot. At present 100% of the municipalities having a population of 5,000 or more and

78% of the under 5,000 population municipalities have been converted to a digital format.

- Graphic records for all of Minnesota's municipal corporate boundaries are maintained by the Geographic Information and Mapping Unit. For the past three years, an average of over 350 boundary revisions per year have been processed. Due to age, many of these paper graphic files are in poor condition. We are in the process of converting those plats that are in the most serious condition and those that generate the most revision activity to a digital format.
- For those deteriorating graphic records that only need preservation, a technique called "scanning" is used to generate a digital raster file. For those graphic records that have constant or extensive revisions to be mapped, digital vector CADD files are created from the existing analog map and supplemented with additional information from appropriate Mn/DOT Right-of-Way maps, plat maps, legal land descriptions, local government GIS files and city engineer maps.
- Municipal State Aid Street (MSAS) maps are produced for all municipalities having a population of 5,000 or more. MSAS maps delineate state trunk highways, County State-Aid Highways (CSAH), County Road (CR) and MSAS routes on the appropriate municipal map. These various route systems are shown by computer generated line patterning on the corresponding route. Additionally, MSAS streets are labeled with the number assigned in the Commissioner's Order that establishes the designation.

PRODUCTS:

- A complete set of planimetric street maps of all 854 incorporated municipalities in Minnesota.
- Municipal State Aid Street (MSAS) maps for all incorporated Minnesota municipalities having population of 5,000 or more.
- Graphic boundary record maps for all 854 incorporated municipalities in Minnesota.

TASK TITLES: St. Paul–Minneapolis Metropolitan Area Maps

ESTIMATED COST: \$99,425

WORK AUTHORITY NUMBER: TH 604

WORK PERFORMED BY: Geographic Information and Mapping Section

OBJECTIVES:

- To prepare and maintain maps of the St. Paul–Minneapolis Metropolitan Area showing existing streets and roads, route system designations, railroads, political boundaries and other miscellaneous features. These maps provide the department and various other governmental agencies with basic mapping for general-purpose planning and operation functions.

METHODOLOGY:

- The Geographic Information and Mapping Unit maintains a digital base map for the entire Seven County Metropolitan Area. This set of 55 map sheets is referred to as the Metro Area Street Series. While prepared, maintained and usually plotted as 55 individual digital map files these sheets are structured to be seamless and can be mosaiced into any desired metro area coverage.
- These maps show all roads and streets in single line format. Route systems such as state trunk highways or county roads are portrayed by different weights as well as their respective route designation symbol and number. These maps also show all political boundaries, hydrography and railroads as well as selected references to the Public Land Survey System (section, township and range) and geodetic location (lat/long and state plan coordinates).
- The Computer-Assisted Design and Drafting (CADD) method was used to produce the Metro Street Series. Using high-resolution computer graphic workstation and Bentley MicroStation® software, a mapping technician “digitizes” all the various graphic elements contained within the computer map file. (See Task Title on Municipal Maps for explanation of digitizing.)
- USGS 1:24000 scale 7½ minutes quadrangle (quad) maps are used as the source for positioning control and the initial line-work to be digitized. Using the same digitizing techniques this “skeletal” line-work is then supplemented with other more up-to-date map information sources such as aerial photographs, road plans, satellite imagery, GIS files and other maps.
- Individual Metro Area Street Series map street coverage is formed by merging and “clipping” appropriate Mn/DOT “skeletal” quad files within the computer. The symbolical and text annotation needed to complete the map are also entered into the digital file. The finished map file is used to produce computer file plots. From this same digitizing, the Geographic Information and Mapping Unit has formatted a single

map sheet file entitled the St. Paul–Minneapolis Area map. Features depicted on this map include all state trunk highways and county state-aid highways, selected county roads and other local arterial roads, hydrography and political/civil boundaries. The graphic format and level assignment of this file resembles that of the county mapping activity. (See Task Title for County Maps.)

- Additionally this same Metro Area Street Series digitizing serves as the base for formatting individual municipal maps for those cities within the seven county metropolitan areas.

PRODUCTS:

- A 55-map sheet set (Metro Area Street Series) covering the entire Seven County St. Paul–Minneapolis Area at a scale of 1:24000 (one inch equal 2000 feet).
- A single sheet St. Paul–Minneapolis Metropolitan Area Map.

TASK TITLES: County Maps

ESTIMATED COST: \$89,982

WORK AUTHORITY NUMBER: TH 606

WORK PERFORMED BY: Geographic Information and Mapping Section

OBJECTIVES:

- To maintain a complete set of current, accurate, legible county maps at a scale of one inch equals to one mile. Prints and/or duplicate reproductions of these maps are used in the planning, location and design of projects by the Minnesota Department of Transportation. Additionally these maps are used as base maps by most state agencies, local and county government units, many federal agencies, private sector business application, such as transit and transportation industry, utilities, manufacturing etc., and by the general public for business or recreational purposes.

METHODOLOGY:

- The original, full-scale county maps are prepared and maintained in accordance with standards outlines in the FHWA Guide for the Highway Planning Map Manual (Volume 20, Appendix 25).
- Currently 126 map sheets are required to map Minnesota's 87 counties. These are produced on a uniform sheet size of 36" x 56" requiring from one to seven sheets for a single county.
- In the development of a new county map base, all possible current information is obtained from the following reliable sources:
 1. County Maps
 2. U.S Geographical Survey 1:24000 Quadrangle Maps
 3. Mn/DOT Project Construction Plans
 4. Aerial photography obtained from Mn/DOT Photogrammetric Unit, U.S, NAPP, Department of Natural Resources and Metropolitan Council
 5. Road Status Reports from County and Municipal Council
 6. Municipal and County Project Construction Plans
 7. Mn/DOT Intermodal Programs Division, Transportation Data Section Road Note Data
 8. Railroad and Public Utilities
 9. Minnesota Department of Natural Resources

10. Various United States agencies such as Bureau of Land Management, Bureau of India Affairs, U.S. Forest Service, Federal Aviation Administration and Federal Highway Administration
11. Decisions from the U.S. Board of Geographic Names
12. Others
 - After all data is collected the information is plotted using colors to denote various items. Colors are used to facilitate the later map preparation. Maps are prepared at a scale of one-inch equals to one mile, with the exception of six of the seven metropolitan area counties that are mapped at a scale of two inches equals to one mile using a polyconic projection. These are classified as full-scale maps.
 - County map sheets are prepared utilizing Computer-Assisted Design And Drafting (CADD). The procedures for this process are described in the section on “Municipal Maps”. This method is labor intensive in the initial stages but saves considerable time when making annual updates. The positional accuracy of the map product and the ability to seamlessly combine adjoining counties to create area maps are important benefits of this method. After completion and checking, copies are submitted to FHWA for approval.
 - Minor revisions are received almost daily. These revisions are filed for reference and every county map is updated at least once each year to reflect these changes.

PRODUCTS:

- A complete set of digital county general highway maps covering the entire state.

TASK TITLES: State Maps

ESTIMATED COST: \$23,215

WORK AUTHORITY NUMBER: TH 608

WORK PERFORMED BY: Geographic Information and Mapping Section

OBJECTIVES:

- To prepare and maintain current, accurate and legible Minnesota maps depicting Minnesota's transportation systems statewide. These state maps are used by Mn/DOT for administrative and planning activities as well as by other federal, state and local government agencies in relating their concerns to Minnesota's transportation systems. Public utilities, private industry and businesses, and the general public also make use of these maps for their individual needs.

METHODOLOGY:

- State map originals are prepared and maintained in accordance with the standards outlines in the FHWA "Guide for a Highway Map Manual", Volume 20, Appendix 25.
- When Mn/DOT (formerly Minnesota Highway Department) began producing its own Official Highway Map in 1965, the base map showed the state and county lines and the state trunk highway system, and served as the base for all other departmental statewide mappings. (See State Map Products.) In 1992 work was completed on digitizing a new base map for the Official Minnesota Highway Map utilizing the capabilities of Computer-Assisted Design and Drafting (CADD).
- The new Official Highway map base was created in much the same manner as described in the section on "Municipal Maps". Digitizing was done using the U.S.G.S 1:100,000 quadrangle map series for Minnesota as the basis. Prior to digitizing all pertinent map data was supplemented and updated with current information from all available sources. With the completion of this project considerable flexibility is available in generating the necessary overlays for printing and the current map.
- Revision of the digitized base map and overlays to show current status is achieved by researching maps and data produced by other governmental mapping agencies and various other sources as listed under item number TH 606, County Maps. The Official Highway Map is updated every two years while the other map derivatives are updated as needed in accordance with the current map production schedules.

PRODUCTS:

- The Official Highway Map is produced biennially under this project. All of the cartography, photography text and artwork for this publication are produced in-house. Offset four-color printing is accomplished by low bid from a commercial printer. Mn/DOT funds are used for purchasing the number of maps needed by Mn/DOT distribution outlets at a unit price that covers the cost of printing. Other state agencies may also purchase quantities of maps at per unit printing cost by coordinating their purchase request with Mn/DOT through the Department of Administration.
- The state trunk highway system map and the state county outline map were prepared by digitizing U.S. Geological Survey 1:100,000 scale maps. Appropriate map features from these 69 individual source maps were merged into one digital file of statewide coverage for computer plotting at any desired scale
- Other miscellaneous state maps that portray transportation related data statewide are either derivatives of or overlays to the state trunk highway system map. These types of maps are plotted and/or printed on as needed basis.

TASK TITLES: Roadway History & Project Log

ESTIMATED COST: \$198,168

WORK AUTHORITY NUMBER: TH 609

WORK PERFORMED BY: Geographic Information and Mapping Section

OBJECTIVES:

- Roadway History provides an historical representation of the vertical roadway structural layers on state trunk highway system. Project Log provides an index of construction and maintenance projects within a trunk highway control section. The data contained in these files are used by the Office of Materials in calculating pavement deterioration rates as part of Mn/DOT's Pavement Management System and district materials engineers to review roadway profiles as part of the project design and pavement selection process.

METHODOLOGY:

- The Office of Transportation Data and Analysis is responsible for the maintenance and update of both the Roadway History and Project Log data files. The updating tasks include the collection, research and interpretation of various source documents – construction plans being the primary source. Appropriate update information is incorporated into the Transportation Information System (TIS) so that TIS contains accurate and up-to-date data.

PRODUCTS:

- Roadway History data is available through several TIS reports including cross-section lists and project contract lists. The data from these lists is incorporated into the Office of Materials' annual Pavement Management System reporting.
- Project Log provides a line diagram file containing one line per project which includes state project number, year work performed, type of work and a diagrammatic location map. Project Log data is also available on TDA's Web site at:
<http://www.dot.state.mn.us/tda/reports/projectlog.html>.

OFFICE OF

TRANSIT

TASK TITLES: Transit Program Planning

ESTIMATED COST: \$204,000

WORK AUTHORITY NUMBER: TH 301

WORK PERFORMED BY: Office of Transit

OBJECTIVES:

- To prepare transit and para-transit program plans and reports in cooperation with participating agencies and staff.
- To analyze, document and recommend transit and para-transit program policies that encourage coordination and cost-effectiveness of transit services.
- To develop, evaluate and recommend alternative program strategies and performance criteria.

METHODOLOGY:

- Produce an annual report that concisely summarizes public transit activities.
- Prepare specialized reports and present results to internal and external customers. Legislative and regulatory development will be monitored.
- Develop a transit information network that will maintain information on all transit services in the state in order to further coordination and cost effectiveness of public transit services. Alternative strategies are developed and analyzed when issues arise.
- Establish performance measures that are applicable to the various transit services and providers. Policies and other considerations are combined and documented as part of the overall program strategy implementation.
- Review and update a variety of policy and planning documents that are used by the department and external customers.
- Maximize the transportation investment in transit projects.
- Support office-planning activities.
- Produce results as needed and to be used as a focus for testing new approaches and implementation for practical improvements in transit services.
- Sponsor transit safety and security seminars and workshops (e.g. FTA Substance Abuse, Homeland Security Preparedness).

PRODUCTS:

- Annual Report
- Policy Analysis Reports
- Transit Issue Presentations
- Public Education & Involvement Plans
- Project Oversight
- Quarterly Progress Reports
- Semi-annual DBE Reports
- In-Transit Newsletter/Transit Bulletin
- Office of Transit Website
- Drug and Alcohol Testing Policies
- Transit System Safety Plans
- Transit Coordination Study/Action Plan
- United We Ride (Coordination) Forums

TASK TITLES: Transit Research and Program Evaluation

ESTIMATED COST: \$119,000

WORK AUTHORITY NUMBER: TH 302

WORK PERFORMED BY: Office of Transit

OBJECTIVES:

- To research and prepare a variety of specialized reports, site studies and surveys to ensure that adequate information is available to identify and evaluate alternative options involving numerous transit issues.
- To provide technical assistance to transit programs and project managers on specific transit planning and research projects.
- To develop research programs using a comprehensive computerized transit program database and specialized software.

METHODOLOGY:

- Prepare specialized reports on current transit topics.
- Analyze market characteristics for changing transit service area.
- Conduct site studies for existing public transit systems.
- Develop, implement and analyze on-board transit surveys to continually update ridership profiles.
- Analyze trends (economic, social, demographic, etc.) that have current and/or potential impacts on public transit via utilization of specialized computer software.
- Support office research and program evaluation activities.

PRODUCTS:

- Program Performance Reports
- System Performance Evaluations
- Demographic Trend Analysis Reports
- Site Studies for Transit Systems
- New Starts Service Designs/System Service Redesigns
- Transit Peer Group Analyses
- Transit Needs Assessments
- DBE Program Technical Assistance
- Drug and Alcohol Program Technical Assistance

TASK TITLES: Bike and Pedestrian Ways Planning

ESTIMATED COST: \$397,000

WORK AUTHORITY NUMBER: TH 117

WORK PERFORMED BY: Office of Transit, Bicycle and Pedestrian Section

OBJECTIVES:

- To promote and facilitate the delivery of non-motorized modes into our multi-modal transportation system

METHODOLOGY:

- This objective will be achieved by devoting staff time to the following sections:
 - Policy Development and Planning
This section is responsible for the creation, review, and updating of a variety of policy and planning documents that are used by the department and external customers in the integration of non-motorized modes in Minnesota's transportation system.
 - Outreach and Awareness
This section of staff time is devoted to managing the relationship between Mn/DOT and its customers
 - Training
In a typical year the section works with a broad base of transportation professionals to provide them with tools to apply the principals of non-motorized modes to their transportation planning and projects. Training also provides the additional benefits of allowing staff to meet people in the field and gain immediate and direct customer feedback that in turn improves the categories of consulting and policy development.
 - Consulting
The staff is frequently sought out for assistance in their areas of technical expertise. This work is also an important source of customer feedback that allows us to have first hand experience with what is working and being used as well as an effective way for our staff to increase our pool of shared knowledge.
 - Research
This section manages and participates in research to promote the application and benefits of non-motorized modes. The section also serves as the Technical Liaison on Tourism/Transportation Research, the U of M (CTS) Environmental Research Council, and provides council to the Hubert Humphrey Institute's Research on Cost Benefits of Bicycling and their work on Bicycle Safety (Toward Zero Deaths).

- Staff Development and Support
This section reflects the time that is spent in managing resources and ensuring continued growth and development as a departmental resource. These activities include resource management, internal communication, work planning, training, conference participation, and other professional development

PRODUCTS:

- Non-motorized Modal Plan (Bike, Pedestrian, Transportation Action Model)
- Mn/DOT Road Design revisions for bicycle facilities
- Highway Project Development Process: Part II, Section D, Subject Guidance: Bikeways and Pedestrians
- Bicycle Design Guideline revisions
- Mn/DOT's Design Advisory Committee inputs
- Bonding Projects: Bicycle and Pedestrian Accommodation Advisories and Recommendations
- Federal Surface Transportation Program Solicitation Process for Metro Area
- State Bicycle Maps
- Metro Bicycle Mapping and System Plan
- Mississippi River Trail
- State Bicycle Advisory Committee
- National Bike and Pedestrian Coordinators (AASHTO Task Force on Non-motorized Transportation)
- Community Bike and Pedestrians events
- Bike Facility Design Technical Assistance
- Participation in State Planning Groups
- Modal representation checklist
- Transportation Plan Performance Measures
- Requested plan reviews
- Economic impact of Bicycling in Minnesota- University of Minnesota
- Cost/Benefit of Bicycle Facilities – Hubert Humphrey Institute's National Study
- Bicycle Safety Education Campaign, "Share the Road" promotion and support
- Implement new Safe Routes to School federal program
- Participate in developing the Non-Motorized Transportation Pilot Program

OFFICE OF

FINANCE

ESTIMATED COST: \$28,000

WORK AUTHORITY NUMBER: TH 401

WORK PERFORMED BY: Accounting Systems Section, Financial Reporting Unit

OBJECTIVES:

- To furnish information on motor vehicle registration, fees and taxes, driver license regulation and fees, and fuel consumption. This data is used to develop motor vehicle and motor fuel usage for forecasting future highway user imposts and determining vehicle and fuel tax use in the formulation of highway policy, and administration of highway matters, informational use by legislators, public officials and the general public.

METHODOLOGY:

- The procedures used to obtain statistical and financial data for reporting purposes are as follows:
- Motor vehicle registration and drivers' license data are received on an annual basis from the registrar of motor vehicles, Department of Public Safety. These data are researched, analyzed and compiled for use in the preparation of reports in accordance with instructions contained in Chapters 3, 4 and 5 of FHWA "A guide to Reporting Highway Statistics".
- Motor fuel statistics are received monthly from the Petroleum Tax Division, Department of Revenue. Upon receipt of this information, monthly computations are made and placed on tabular form for gasoline and special fuel gallonage. These statistics are used in the preparation of annual reports and in accordance with Chapter 2, FHWA "A guide to Reporting Highway Statistics". Periodic checking occurs prior to FHWA use for apportionment purposes.
- Financial reports are prepared from information acquired from the Department's Financial Operations Section records. These records are extensively examined and tabulated. They are prepared for assistance and used in the preparation of annual reports in accordance with the guidelines contained in Chapters 8 and 9 of FHWA "A Guide to Reporting Highway Statistics".
- Local government financial reporting is based on information furnished to the department by all cities, towns and counties on an annual basis. This information is assembled and then forwarded to the Federal Highway Administration in accordance with instructions in Chapter 10 of FHWA "A Guide to Reporting Highway Statistics".

- Travel takes place in connection with training workshops, seminars, etc. that are scheduled annually for increasing effectiveness and efficiency of financial and statistical reporting.

PRODUCTS:

FHWA-531	State Highway Income
FHWA-532	State Highway Expenditures
FHWA-534	Capital Outlay and Maintenance Expenditures
FHWA-536	Local Highway Finance Report – cities, counties and townships
FHWA-541	State Transportation obligations issued during year and allotment of Proceeds
FHWA-542	Status of State Transportation Debt
FHWA-543	State Transportation Sinking Funds and Debt Service transactions
FHWA-556	State Motor Fuel Receipts and Initial Distribution by Collection Agencies
FHWA-551M	Monthly Motor-fuel Consumption
FHWA-561	State Motor-fuel Tax Receipts and Initial Distribution by collecting agencies
FHWA-562	State Drivers' Licenses and Fees
FHWA-566	State Motor Vehicle registration fees and other receipts, initial distribution by collecting agencies
FHWA-571	Receipts from State Taxation of Motor Vehicles operated for hire and other motor carriers

These reports are used as a basis for the statistical data and the U.S. Department of Transportation's annual publication "Highway Statistics."

OFFICE OF

TRAFFIC, SECURITY AND

OPERATIONS

TASK TITLES: Speed Data Summaries

ESTIMATED COST: \$21,626

WORK AUTHORITY NUMBER: TH 501

WORK PERFORMED BY: Office of Traffic, Security and Operations (OTSO)

OBJECTIVES:

- To monitor highway speeds and develop speed characteristics at various sites located on five highway categories. Data summaries are reported quarterly and annually.

METHODOLOGY:

- Data collection procedures are developed by the Office of Traffic, Security and Operations (OTSO). Monitoring 24-hour period is desirable and therefore Mn/DOT uses a combination of automated traffic recorder stations and weigh-in-motion stations at sites with speed monitoring equipment accessible by telephone telemetry. Different software programs download the data, format it and finally analyze and print the reports. Data is still visually screened to verify accuracy and potential hardware problem. The TDA office maintains the hardware and OTSO does the data analysis. This automated methodology has helped decrease the number of person hours required compared to previous years.

PRODUCTS:

- A complete file of speed characteristics on each category of highways – These files is used to develop quarterly and annual report to evaluate motorists' compliance with speed limits.
- Data may also be used to evaluate effectiveness of enforcement and public awareness programs. Speed trends also play a role in evaluating accident trends.

TASK TITLES: Crash Surveillance

ESTIMATED COST: \$135,708

WORK AUTHORITY NUMBER: TH 502

WORK PERFORMED BY: Office of Traffic, Security and Operations

OBJECTIVES:

- To provide crash data to reveal high crash locations and over represented crash locations and over represented crash characteristics on all roads and streets in the State. This information relates to the highway facility, vehicle, environment and human factors and provides input for establishing highway safety needs and priorities for development of a long-range safety improvement program.

METHODOLOGY:

- Traffic crashes, reported per state law by investigating officers and citizens are processed by DPS and are on-line no later than ninety days afterward. A wide range of variables from the vehicle, injury, roadway, driver and environment support the federal emphasis of crash analysis and safety counter measure development. Various TIS software programs are executed by OTSO and a report is developed for a requesting agency or internal application.

PRODUCTS:

- Semi-annual crash reports will be prepared for road authorities.
- Comprehensive reports are prepared using district boundaries for comparative analysis of accidents within specified areas or highway categories.
- Customized reports can be developed for technical or non-engineering disciplines upon request.
- Crash rates can be calculated for isolated intersections, highway categories or statewide systems as designated by the scope of the requester.
- This timely crash data and summarized reporting provides road authorities an objective basis for prioritizing and developing safety countermeasures, dedicated enforcement efforts and also minimizes tort liabilities.

OFFICE OF

STATE AID

TASK TITLES: County State-Aid Highway Needs Study

ESTIMATED COST: \$317,139

WORK AUTHORITY NUMBER: TH 701

WORK PERFORMED BY: State Aid

OBJECTIVES:

- To compile a computerized record of the entire County State-Aid Highway System with specific attention given to mileage and money needs. "Money needs" is defined as the construction cost required to improve the county state-aid system to approved standard. Based on the directions from the County Engineers Screening Board, each county's mileage and annual money needs is presented to the Commissioner of Transportation. Using this information and pursuant to Minnesota Statutes, Chapter 162, the Commissioner apportions the County State-Aid part of the road user fund to the various counties.

METHODOLOGY:

- Each county engineer is required annually to update his needs study based on the construction accomplished, system revision, traffic, need reinstatement and any other necessary changes. With these updates, the computer record is revised and a new completely updated needs study is created.
- In order to keep the needs study prices current each year, a five-year average unit price study is produced. Using the results from this study, the County Engineers Screening Board develops new unit prices for inclusion into the needs study.
- Each year approximately 25% of the counties have their traffic counted. This information arrives at the Data Management Section and is transfer onto the records in the needs study.
- All the above data is presented to the County Engineers Screening Board for the use of making an annual recommendation for mileage, lane/miles and money needs to the Commissioner of Transportation.

PRODUCTS:

- Two County Engineers Screening Board Reports
- One County State-Aid Apportionment Booklet
- Miscellaneous legislative, auditor and client requests

TASK TITLES: Municipal State-Aid Street Needs Study

ESTIMATED COST: \$316,783

WORK AUTHORITY NUMBER: TH 702

WORK PERFORMED BY: State Aid

OBJECTIVES:

- To maintain the Municipal State-Aid Needs Studies which result in the annual determination of State-Aid Apportionment in municipalities over 5,000 populations according to Minnesota Statutes, Rules and Screening Board Directives.

METHODOLOGY:

- The city engineers annually report the construction accomplishments, system revisions, certification of mileage and status corrections as outlines in the State-Aid Manual. Also the Twin Cities Metropolitan area traffic data is updated every two years and the out-state cities every four years. These items are processed through a computer program together with unit prices, which are annually updated and approved by the Municipal Screening Board at their spring meeting.
- The resulting needs and tentative apportionments are reported to the Municipal Screening Board at their Fall meeting. Prior to November 1 each year, the board recommends the money needs to be used by the Commissioner of Transportation for the following year's allotment to the municipalities over 5,000 population. The actual allotment is made by the Commissioner of Transportation in January of the following year when the funds available are known.

PRODUCTS:

- Two reports to the Municipal Screening Board for use in making annual recommendations to the Commissioner of Transportation
- One annual "Municipal Apportionment" report to the municipalities over 5,000 populations showing their annual allotment and the methods of determining the amounts.

**OFFICE OF
ENVIRONMENTAL
SERVICES**

TASK TITLES: Cultural Resources Investigations

ESTIMATED COST: \$1,600,000.00

WORK AUTHORITY NUMBER: TH 46801 through TH 46899

WORK PERFORMED BY: Office of Environmental Services

REFERENCE NUMBERS: Pre-Qualification System

OBJECTIVES:

- To preserve and/or document cultural resources subject to disruption due to proposed highway improvements. This work is necessary to ensure that the effects of projects on cultural resources is being taken into account as per the requirements of 36 CFR 800 (Section 106 of the National Historic Preservation Act) so that projects can receive federal funding. This includes the archaeological survey and evaluations of prehistoric and historic sites, standing structures surveys and evaluations, geomorphological studies, and/or archaeological data recovery. The information from these investigations is included in the environmental impact study of highway corridors. Results are also forwarded to the State Archaeologist and the State Historic Preservation Office (SHPO).

Cultural resource investigations are done in conformance with:

- National Historic Preservation Act (36 CFR 800), as amended
- Department of Transportation Act of 1966 (PL 89-670)
- Executive Order 11593
- Archaeological and Historic Preservation Act of 1974 (PL 93-291)
- Title 36 of the Code of Federal Regulations (CFR) Parts 60-66 and 800
- Native American Graves Protection and Repatriation Act of 1990 (PL101-601)
- Secretary of the Interior's Standards and Guidelines for Archaeology and Historic preservation Activities. As published in the Federal Register in September 29th, 1983, Volume 248, No. 190 Part IV (48 FR 44716 through 44740)
- Association of Iowa Archaeologist's Guidelines for Geomorphological Investigation in Support of Archaeological Investigations (1992)
- State Historic Preservation Office (SHPO) Guidelines for Archaeological Projects in Minnesota, and Manual for Standing Structures
- Minnesota state historic preservation statutes

METHODOLOGY:

- Project that have the potential to affect cultural resources are determined by the professionally qualified staff of the Mn/DOT Cultural Resources Unit (CRU). These projects include District, County, and City projects. These projects are assigned to vendors in the pre-qualified program on a rotational basis based on the vendor's expertise, workload and availability. Projects are defined by type of investigation and phase as required by Mn/DOT CRU after review of the proposed project area. Types are geomorphology, historical, archaeological and architectural phases are defined as:

Phase I – Initial Reconnaissance

Phase II – Intensive Survey (Determine Significance)

PRODUCTS:

- Monthly progress reports, field notes are submitted.
- Pictures and documentation of historic sites if historic research is cited.
- If archaeology is identified, artifacts are curated.
- Final reports and conclusion of research and findings.

OFFICE OF

FREIGHT AND

COMMERCIAL VEHICLE

OPERATIONS

TASK TITLES: Freight Planning, Studies and Data Management

ESTIMATED COST: \$449,846

WORK AUTHORITY NUMBER: TH 220

WORK PERFORMED BY: Freight Planning & Program Development

OBJECTIVES:

- To improve our knowledge and integration of freight transportation into our policy, long range planning and investment processes. Make better decisions that improve or augment freight transportation service productivity and safety.
- To improve freight transportation by providing information, direction and service to internal and external customers.
- To provide for and facilitate cooperative action, private or public, to improve Intermodal freight transport specifically and freight transportation in general.

METHODOLOGY:

- Integrate the new freight policy “ Provide an integrated system of freight transportation in Minnesota – highway, rail, water, air cargo, and intermodal terminals – that offers safe, reliable, and competitive access to statewide, national, and international markets” its six policy direction and 34 strategies in Mn/DOT’s planning, programs, investments and system management.
- By increasing Mn/DOT’s basic knowledge of freight transportation and improving the comprehension of freight transport’s relation to Minnesota’s economic, social and environmental health.
- Conduct regional freight studies.
- Maintain and improve the Mn/DOT freight facilities database.
- Staff utilizes the Minnesota Freight Advisory Committee (MFAC) comprised of private industry and public sector members to provide and intermodal perspective and foster public/private cooperation.
- Enhance the efficiency of goods movement in Minnesota and support economic growth through policies and programs that optimize a multimodal transportation system.

PRODUCTS:

- Develop and update freight performance (rural and metro w/cluster approach) measures as well as supporting and recommending other statewide transportation measures.
- Provide and articulate freight related policies, issue and trend analysis that reflected a district, statewide and system level perspective.
- Provide both the frame work and information necessary for districts and regions to plan, improve and develop transportation facility information that account for interregional corridor and trade center influences, function as systems and area consistent with State goals.
- Provide information and stimulate discussion to guide statewide policy development and also local regional transportation investment decisions as well.
- Maintain a high level of freight transportation expertise available to all levels of the Department to provide advice and assistance on freight issue resolution.
- Maintain current freight information, commodity flows and database information
- Provide commodity flow data and information to improve the level of understanding of customer needs, Minnesota markets, transportation demand and freight's relationship to economic activities.
- Concentrate on the broader statewide, multi-state national/internal flows while working with MPOs, RDCs, districts and Metro division to develop regional and localized information.
- Develop techniques, report formats, mapping capabilities or other ways to turn "data" into information useful in the planning and investment decision process.
- Initiate, support and recommend freight research
- Provide development of research proposals and stay current with freight related research efforts regionally and nationally. Coordinate within Mn/DOT and provide freight information to internal and external customers
- Develop regional freight profiles summarizing geographic area, such as land mass and the percentage of land devoted to people employed in different types of industries (e.g., agriculture, manufacturing and service). It will also include a high level overview of the transportation infrastructure important to the region.
- Identify and designate NHS Intermodal connectors. Also identify other major freight generating facilities and their connector routes.

APPENDIX B:

DESCRIPTION OF

RESEARCH STUDIES

DESCRIPTION OF RESEARCH STUDIES**STATE RESEARCH AND DEVELOPMENT PROGRAM****RSS - RESEARCH PROJECTS, TECHNOLOGY TRANSFER,
IMPLEMENTATION, SPECIAL PROJECTS & ADMINISTRATION - SPR-
0001(046)**

This project provides for the preparation of proposals, detailed work outlines and cost estimates for research studies to be submitted for the SP&R Work Program. This includes incidental and miscellaneous expenses which occur during the course of the year and which are pertinent to the overall research, development and implementation efforts. Included will be the costs of support staff and researchers needed to administer and monitor the studies in the State's Research Program. These studies can be found in this section. Many of these studies are part of the Mn/ROAD and ITS research effort. This project also provides for attendance and participation in various meetings and workshops including the annual FCP conference, which contribute to a better understanding of current problems and fosters the exchange of technical information and leads to improved research management practices.

The studies in the Cooperative Research description section follow the format of the recently established Transportation Pooled Fund web site (www.pooledfund.org). The information has been edited to include only the pertinent information relevant to Mn/DOT's involvement. However, in addition to the information below the web site also has, or links to, project documents such as work plans, reports, project updates, etc. An individual can also sign up to be notified of new studies as they are posted. The site also has a browse and search feature.

Study Number: 0002(207)

Status: Contract signed

Title: **Transportation Management Center Pooled Fund Study**

Lead Agency: Federal Highway Administration

Study Partners: AZ, CA, CT, DC, DE, FHWA, FL, GA, I-95 Corridor Coalition, IL, IN, KS, MI, MODOT, NE, NM, NV, NY, PA, RI, VA

100% SP&R

Approval: Approved

Objectives: The goal of the Transportation Management Center (TMC) Pooled Fund Study is to assemble regional, state, and local transportation management agencies and the Federal Highway Administration (FHWA) to (1) identify human-centered and operational issues that are common among TMC operators and managers; (2) suggest approaches to addressing identified issues; (3) initiate and monitor projects intended to

Comments: address identified issues; (4) disseminate results; and (5) assist in solution deployment.
Desired minimum commitment is \$25,000. Level of commitment may vary, based on size and type of agency (e.g. county and city).

Study Number: 0003(017)
Status: Contract signed
Title: **Midwest States Pooled Fund Crash Test Program**
Lead Agency: Nebraska Department of Roads
Study Partners: CT, FL, IA, KS, MN, MODOT, MT, NE, OH, SD, TX, WI
100% SP&R
Approval: Approved
Objectives: To crash test highway roadside appurtenances to assure that they meet criteria established nationally.
Comments: Ongoing: Study has proved to be successful to this point, and will remain active going forward. For more information please refer to the Midwest Roadside Safety website: <http://www.mwrsf.unl.edu/>

Study Number: 0003(020)
Status: Cleared by FHWA
Title: **IVHS Study (ENTERPRISE)**
Lead Agency: Iowa Department of Transportation
Study Partners: AZ, CO, IA, KS, MI, MN, NC, VA, WA
100% SP&R
Approval: Pending Approval
Objectives: To investigate and promote IVHS approaches and technologies that are compatible with other national and international IVHS initiatives.

Study Number: 0003(042)
Status: Cleared by FHWA
Title: **Aurora Program**
Lead Agency: Iowa Department of Transportation
Study Partners: IA, IL, MN, NY, PA, SD, VA, WI
100% SP&R
Approval: Approved
Objectives: Aurora is an international program collaborative research, development and deployment in the field of road and weather information systems (RWIS), serving the interest and needs of public agencies. The Aurora vision is to deploy RWIS to integrate state-of -the-art road and weather forecasting technologies with coordinated, multi-agency weather monitoring infrastructures. It is hoped this will facilitate advanced road conditions and weather monitoring and forecasting capabilities for efficient highway

Comments:	maintenance, and provision of real-time information to travelers. (updated 7/7/01) Study is ongoing and will continue for the foreseeable future. Members contribute funds annually; propose research projects on RWIS-related projects (Road Weather Information Systems); manage contracts for the research; and prepare reports/submit results for publication. One of Aurora's goals is to provide guidelines for RWIS implementation and usage. Refer to http://www.aurora-program.org/ for project updates. (updated 2/7/02)
Study Number:	0003(049)
Status:	Contract signed
Title:	Urban Mobility Study
Lead Agency:	Texas Department of Transportation
Study Partners:	CA, CO, MD, MN, NY, OH, OR, PA, TX, WA
100% SP&R	
Approval:	Approved
Objectives:	1) Form Steering Committee, which will decide on the congestion reduction methods to include in the new methodology and which cities will be included in study. 2) Continuously Refine the Congestion Index to include multimodal operations or regional operational improvement programs (i.e., ITS service, incident detection and response, travel demand management, transportation systems management, and computerized signal control coordination. 3) Maintain Existing Congestion Measures. 4) Add Additional Urban Areas 5) Respond to Requests for Mobility Data.
Comments:	Ongoing. States are still encouraged to participate. (2/7/02)
Study Number:	0003(074)
Status:	Cleared by FHWA
Title:	Pavement Research and Technology
Lead Agency:	Washington State Department of Transportation
Study Partners:	MN, TX, WA
100% SP&R	
Approval:	Approved
Objectives:	Under this project, each state will create funding to allow technical staff and university researchers to participate in a series of project meetings focused on sharing information, identifying critical issues of mutual interest, developing plans for joint research and testing, and educating transportation professionals on the latest developments in the design, construction, reconstruction and maintenance of highway pavements. (updated 7/7/01)
Comments:	The participating states have met 11 times to discuss pavement issues and to visit various venues such as Waterways Experiment

Station, National Center for Asphalt Technology, and Western Research Institute. The project will run through the year 2005. (updated: 10/16/03)

Study Number:	0003(098)
Status:	Solicitation posted
Title:	Pavement Reconstruction Scheduling Software
Lead Agency:	Washington State Department of Transportation
Study Number:	SPR-3(098)
Partners:	MN, TX, WA
Date Posted:	09/14/2004 09:27:55 AM
Start Year:	2005
End Year:	2006
Duration:	24 months
100% SP&R	
Approval:	Approved
Background:	This pooled fund project developed the constructability scheduling software called CA4PRS. The effort also included the trained of personnel from the states of California, Minnesota, Texas and Washington on the use of this software. These four states now see the need to enhance this software to include additional construction options that could not be included in the original development.
Objectives:	The objective of this study is to enhance the existing CA4PRS software with a broader range of construction options that would include dowel bar retrofit, mill and fill HMA, continuous reinforced Portland cement concrete, and others. The effort will also include the development of a complete users manual and improvements to the program to make it more user friendly. Finally, each of the participating states will be trained in the use of the enhanced software.
Comments:	The only states eligible to join this pooled fund are those that are members of the State Pavement Technology Consortium (SPTC) that has the project designation SPR-3(074).
Study Number:	TPF-5(004)
Status:	Contract signed
Title:	Long Term Pavement Performance (LTPP) Specific Pavements Study (SPS) Traffic Data Collection
Sponsoring Agency:	Federal Highway Administration
Lead Agency:	Federal Highway Administration
Contractor:	International Road Dynamics, Inc., MACTEC
Study Partners:	AZ, CO, CT, FL, GA, ID, IL, KS, LA, MD, MI, MN, MS, NM, NY, OH, PA, TX, VA
100% SP&R	
Approval:	Approved

Objectives:	The goal of this study is to improve the quality and quantity of monitored traffic data (volumes, classifications, and weights) on the LTPP SPS -1,-2,-5,-6 and -8 projects. A core objective of the SPS studies is to understand and quantify the relationship between pavement performance, truck volumes, and axle loadings.
Comments:	<p>This is a two-phase project. Phase I involves assessing, evaluating, and calibrating Weigh-In-Motion (WIM) systems at the SPS sites. Phase II involves procuring, installing, repairing, and maintaining the WIM equipment at the test sites.</p> <p>The Phase I contract was awarded August 2003. A draft RFP for Phase II was sent out for industry comment the summer of 2003. A final RFP will be solicited the beginning of 2004.</p> <p>Although work is underway, States are still welcomed and encouraged to join this project. Visit the LTPP website at http://www.tfhrc.gov/pavement/ltp/spstraffic/index.htm or contact Ms. Walker for details. 11/18/03</p>
Study Number:	TPF-5(021)
Status:	Contract signed
Title:	Base Funding for the North Central Superpave Center
Lead Agency:	Indiana Department of Transportation
100% SP&R	
Approval:	Approved
Objectives:	This pooled fund project will provide for continued operation of the North Central Superpave Center to assist agencies and industry with Superpave implementation and hot mix asphalt issues. The NCSC will provide technical assistance, training, communication, and research and development work to meet the needs of the region.
Comments:	The North Central Superpave Center Steering Committee meeting was held at the end of January 2003 in which this study was discussed. Funds and state partners are currently being solicited for participation.
Study Number:	TPF-5(029)
Status:	Contract signed
Title:	High Occupancy Vehicle (HOV) Systems Pooled Fund Study
Sponsoring Agency:	Federal Highway Administration
Lead Agency:	Federal Highway Administration
Contractor:	Battelle
Study Partners:	CA, FHWA, GA, MA, MD, MN, NJ, NY, TN, VA, WA
100% SP&R Approval:	Approved
Background:	The High Occupancy Vehicle (HOV) Systems Pooled Fund Study (PFS) is intended to serve as a forum and provide an opportunity

	<p>for the participants to identify, address and collectively take on the key issues and challenges that are common among public agencies that are responsible for managing and operating HOV facilities. The HOV PFS focuses on the critical program, policy, technical, and other issues that arise throughout the life cycle of an HOV facility. The HOV PFS also provides an opportunity to facilitate the interaction, sharing of information, and successful practices with a broader audience to advance and improve upon the current state-of-the-practice related to the management, operation, and performance of HOV facilities.</p>
Objectives:	<p>The goal of this study is to assemble regional, State, and local agencies, service providers, and FHWA to: 1) identify issues common among HOV systems managers, operators, and service providers; 2) suggest approaches to addressing identified issues; 3) initiate and monitor projects intended to address identified issues; 4) provide guidance and recommendations and disseminate results; 5) provide leadership and coordinate with others with HOV interests; and 6) promote and facilitate technology transfer related to HOV issues nationally.</p>
Scope of Work:	<p>The following are offered as broad topics or examples of issues that might be addressed within the intended scope of the HOV PFS:</p> <ul style="list-style-type: none">· HOV System program and policy issues;· Facility, corridor, and system planning issues and techniques;· Operational policies, procedures, and plans;· Program support services and Transportation Demand Management issues;· Air quality impacts and modeling tools;· Transit facilities and intermodal transport;· Facility and system design;· Performance monitoring, evaluation, and reporting;· Contracting and procurement practices and issues;· Implementation and construction work zone issues;· Enforcement and traffic incident management; and· Marketing and public information outreach. <p>The HOV Systems PFS is now entering its third year. Five projects have been selected and are being initiated based on available funds. Details of the projects and products that have been produced to date are available at the HOV PFS web site at http://hovpfs.ops.fhwa.dot.gov/. An overview of current and future HOV PFS activities is available at http://hovpfs.ops.fhwa.dot.gov/overview.cfm.</p>
Comments:	<p>Desired level of contribution is \$50,000 per year for each agency. However, desired level of commitment may vary, based on size and type of agency (e.g. county and city). Desired minimum level</p>

of contribution is \$10,000 per year per agency. State Agencies may join online. Other agencies, such as cities, counties, regional transportation agencies, toll authorities, and port authorities, may join by submitting a commitment form available at the HOV PFS web site via the link below.

Study Number: TPF-5(036)
Status: Contract signed
Title: **Transportation Asset Management Research Program**
Sponsoring Agency: Wisconsin Department of Transportation
Lead Agency: Wisconsin Department of Transportation
Contractor: Midwest Regional University Transportation Center (MRUTC)
Study Partners: AZ, CA, GA, IN, KS, MD, MI, MN, MO, MS, MT, NY, OH, TX, WI, WY
100% SP&R Approval: Approved
Objectives: To enable participating states to leverage limited resources in an ongoing program of synthesis, research and analysis to facilitate implementation of asset management. The intent is to supplement current national asset management research efforts of the MRUTC, prevent duplicity of existing efforts, and provide a means for regional state DOTs to share resources, technology and ideas in a coordinated environment. MRUTC Contact is Jason Bittner, (608) 262-7426.
Comments: Study is in the beginning stages. State partners are still being solicited to determine study focus. Possible asset management related issues to be studied include preventative maintenance, investing strategies, and personnel utilization.

Study Number: TPF-5(037)
Status: Cleared by FHWA
Title: **Southeast Superpave Center**
Lead Agency: Alabama Department of Transportation
Study Partners: AL, AZ, CO, FL, GA, KY, LA, MI, MS, NC, NJ, NV, RI, SC, TN, TX, VA, VT, WI
100% SP&R Approval: Approved
Objectives: Support implementation of products of SHRP-Superpave research efforts.
Comments: Continuing

Study Number: TPF-5(046)
Status: Cleared by FHWA
Title: **Transportation Curriculum Coordination Council Training Management and Development**

Lead Agency:	Federal Highway Administration
Study Partners:	LA, WI, MN
100% SP&R	
Approval:	Approved
Objectives:	To facilitate management of the Transportation Curriculum Coordination Council (TCCC) at the national level and for the development of curriculum and core training materials identified by the TCCC panel.
Study Number:	TPF-5(054)
Status:	Contract signed
Title:	Development of Maintenance Decision Support System
Lead Agency:	South Dakota Department of Transportation
Study Partners:	IA, IN, MN, ND, SD
Contract Amount:	\$186,547
100% SP&R	
Approval:	Pending Approval
Objectives:	<ol style="list-style-type: none">1) To assess the need, potential benefit, and receptivity in participating state transportation departments for state and regional Maintenance Decision Support Systems.2) To define functional and user requirements for an operational Maintenance Decision Support System that can assess current road and weather conditions, forecast weather that will affect transportation routes, predict how road conditions will change in response to candidate maintenance treatments, suggest optimal maintenance strategies to maintenance personnel, and evaluate the effectiveness of maintenance treatments that are applied.3) To build and evaluate an operational Maintenance Decision Support System that will meet the defined functional requirements in the participating state transportation departments.4) To improve the ability to forecast road conditions in response to changing weather and applied maintenance treatments.
Study Number:	TPF-5(066)
Status:	Cleared by FHWA
Title:	Material and Construction Optimization for Prevention of Premature Pavement Distress in PCC Pavements
Lead Agency:	Iowa Department of Transportation
Study Partners:	GA, IA, IN, KS, LA, MI, MN, MODOT, NC, NY, OH, TX, WI
100% SP&R	
Approval:	Approved
Objectives:	To seek ways to optimize materials selection and construction methods to improve the longevity of Portland cement concrete pavements.
Comments:	Solicitation due date: December 31, 2002

Study Number:	TPF-5(080)
Status:	Cleared by FHWA
Title:	Investigation of Low Temperature Cracking in Asphalt Pavements
Lead Agency:	Minnesota Department of Transportation
Study Partners:	CT, IA, ID, IL, KS, MN, ND, NY, VT, WI
100% SP&R	
Approval:	Approved
Background:	<p>Low temperature cracking is the most prevalent distress found in asphalt pavements built in cold weather climates. As the temperature drops the restrained pavement tries to shrink. The tensile stresses build up to a critical point when a crack is formed and partial stress relief occurs. The current Superpave specification attempts to address this issue by specifying a limiting low temperature for the asphalt binder. The specification does a reasonable job predicting performance of conventional asphalt cements, but this does not hold true for polymer-modified asphalt binders that are manufactured to reach very cold temperature grades needed in cold climates. Typically the base asphalt binder controls the low temperature properties. As an example a PG 58-34 is made with an xx-34 grade asphalt and polymer is added to achieve the high end (58). Currently the low temperature specification considers only the asphalt binder. Specifications must be developed for the complete asphalt mixture. Although low temperature cracking appears to be controlled by a single-event mechanism, it is very important to understand the mechanism of crack initiation and propagation. These cracks can be initiated by traffic loading, cycles of temperature changes, and then propagated by a large drop in temperature. In addition, the significant effects of aging and moisture on crack formation and propagation is also not fully understood and needs investigation.</p>
Objectives:	<p>The development of a fracture-mechanics-based specification is one of the objectives of this study. It will allow for a better selection of asphalt binders and mixtures with respect to their resistance to crack formation and propagation. This fracture mechanics approach will also be used to investigate the detrimental role of aging and moisture to fracture resistance of asphalt materials.</p>
Scope of Work:	<p>Utilize a national Technical Advisory Panel (TAP) to assist in the selection and development of testing methods that measure fundamental material properties related to low temperature cracking.</p> <ul style="list-style-type: none">· Collect samples and mix designs from participating states and industry and run all recommended new testing methods.· Correlate the test results with documented field performance.· Develop and refine the most promising new testing methods for

	low temperature cracking. · Calibrate and validate the thermal cracking model in the 2002 AASHTO design guide. · Select mix designs for the reconstruction of MnROAD. Construction and field validation at MnROAD will be completed in the next phase of the study.
Comments:	It is anticipated that each state will contribute \$50,000 for this project. The funds can be transferred per the agencies discretion into three possible fiscal years 2004, 2005, and 2006. Committing states are asked to do so electronically.
Study Number:	TPF-5(086)
Status:	Cleared by FHWA
Title:	Reducing Crashes at Rural Intersections: Toward a Multi-State Consensus on Rural Intersection Decision Support
Lead Agency:	Minnesota Department of Transportation
Study Partners:	GA, IA, MN, NC, NH, WI
Contract Amount:	\$367,000
100% SP&R	
Approval:	Approved
Objectives:	The Minnesota objective is to develop a better understanding of the causes of crashes at rural intersections and then develop a toolbox of effective strategies to mitigate the high crash rate. Preliminary information seems to point to the driver's inability to correctly identify and select the gap needed for safe passage. Efforts proposed in this program address rural intersection crashes through the application of a suite of advanced surveillance technology, algorithms which predict vehicle and gap location, and driver interfaces designed to best provide necessary information to drivers at intersections. 'Low tech' solutions will also be considered. The main program emphasis is on the integration of these key components into an effective, affordable system. We will focus on alternatives t traditional traffic signals as a means to decrease the frequency and severity of rural intersection crashes.
Comments:	It is anticipated that each state will contribute \$70,000 for this project. The funds can be transferred per the agencies discretion over three fiscal years. Committing states are asked to do so electronically.
Study Number:	TPF-5(090)
Status:	Cleared by FHWA
Title:	Pavement Tools Consortium

Lead Agency:	Washington State Department of Transportation
Study Partners:	CA, FL, ID, IL, KS, MD, MN, TX, WA
Commitments Received:	\$700,000
100% SP&R Approval:	Approved
Background:	<p>In May 2000, the University of Washington (UW) embarked on a project for the development of a set of pavement tools that can be used by a DOT or paving contractor to improve communication, training and design/construction for the pavement topic area. A key is the use of enabling technologies, such as the Internet and digital media (DVDs and CDs). This concept allowed for the organization of these products into a broad-based format that is easy to access, straightforward to use, and upgraded quickly.</p> <p>Funding for these products has come from a variety of sources including:</p> <ul style="list-style-type: none">· Washington State DOT (WSDOT)· Maryland State Highway Agency (Maryland SHA)· National Asphalt Pavement Association (NAPA)· Transportation Northwest (TransNow)· Federal Highway Administration
Objectives:	<p>The objective of the Pavement Tools Consortium (PTC) is to develop and use HMA-oriented, computer-based pavement tools. The major focus of the Consortium is the enhancement of pavement-related training and construction. The goal of the PTC is to further develop and provide pavement tools. Examples include:</p> <ul style="list-style-type: none">· HMA View Database· Interactive Pavement Training CD/DVD (including the Virtual Superpave Laboratory)· Computer Simulations· Distance Learning Content and Delivery· Computation Software (EverFe, EverFlex, etc.) <p>Identification of specific pavement tools and the necessary development efforts will be coordinated through an annual Consortium meeting and electronic communication. The initial collaborative duration is five years. The number of products and versions developed depends on the total annual funding available.</p>
Scope of Work:	<p>The primary focus for the PTC includes five related areas. The degree of research and development accomplished for each depends on the amount of funding that is available and the agreed upon priorities. These areas currently are:</p>

- HMAView Database
- Interactive Pavement Training CD/DVD Products (includes the VSL)
- Computer Simulations
- Distance Learning Content and Delivery
- Computation Software (EverFe, EverFlex, etc.)

The Consortium members will be provided all the pavement tools shown above and others as they are produced including new versions. Software tools such as HMAView will be limited to use within the participating Consortium member's agency or company. UW will provide support in the form of documentation, troubleshooting, etc. The individual tools can be viewed as an integrated whole; the separate pieces can be made to compliment the others (analogous to Microsoft Office which has separate but complimentary tools such as Word, Excel, PowerPoint, etc.). As currently envisioned, the pavement tools are sorted by the following categories:

HMAView: HMAView would be made available to each Consortium member. The software would not be directly adopted for each agency or contractor but modified to maximize the benefit for all Consortium members. The data that is entered and viewed is currently customizable by the user. Near term, updates will include an extensive mapping capability that allows for GPS location of specific field tests. Consortium members will be given access to source code of HMAView for agency or company specific modifications. See Appendix A for the current status of HMAView.

Interactive Pavement Guide: The interactive pavement guide would continue to be expanded and improved. A straightforward process would be created that would allow local content to be added by the Consortium members. This Guide, or versions of it, can be produced in languages other than English. A need for more training in Spanish has been expressed by DOTs in Maryland and Texas.

Computer Simulations: The currently available "virtual roller" would be made available to all Consortium members. This will be improved over time. The Consortium members will suggest additional tools, like the roller, that would best serve their training needs. Another planned computer simulation is the VSL.

Distance Learning Content and Delivery: Distance Learning (DL) is a rapidly evolving education delivery approach and the other

Pavement Tools will significantly aid this process. The UW team will deliver pavement-related content for the members or aid the Consortium members in conducting their own. Such training is intended to supplement existing training venues already available. DL is an exciting and evolving training delivery approach.

Computation Software: Software such as EverFe (finite element analysis tool for plain jointed concrete pavements) and EverFlex (finite element analysis tool for flexible pavement) will be provided to Consortium members for their use. Documentation and training will be provided. If related computational tools are developed via the Consortium, those too will be distributed to members. EverFlex, for example, can accommodate non-uniform tire contact pressures.

Comments: States interested in joining the study may do so by contacting the lead agency contact for more information. Our goal is to involve a maximum of 10 states that will contribute \$20,000 per year for 5 years.

Study Number: TPF-5(092)
Status: Cleared by FHWA
Title: **Clear Roads (Test and Evaluation of Materials, Equipment and Methods for Winter Highway Maintenance)**
Lead Agency: Wisconsin Department of Transportation
Study Partners: IA, IN, MN, WI
Contract Amount: \$170,000
Commitments
Received: \$225,000
100% SP&R
Approval: Approved
Background: State departments of transportation are aggressively pursuing new technologies and practices to improve winter highway maintenance. Current research efforts address one or more aspects of the complex task of anticipating and responding to snow and ice events on highways and bridges across local and state jurisdictions. Considerable effort is directed at developing, deploying and evaluating sensing and communication technologies collected under the umbrella of anti-icing and road weather information systems (AI/RWIS). Some evaluation of anti-icing and de-icing materials and snow and ice removal equipment is also being carried out--a much needed effort. For the most part, however, these testing activities are related to the properties and characteristics of the materials and equipment in and of themselves--that is, how they meet specifications or perform on standard lab tests. What is needed, in addition, is related field-testing/follow-up.

Objectives:	Conduct structured field testing and evaluation across a range of winter conditions and different highway maintenance organizational structures to assess the practical effectiveness, ease of use, optimum application rates, barriers to use, durability, and so on, of innovative materials, equipment and methods for improved winter highway maintenance.
Scope of Work:	This proposal outlines a new transportation pooled fund research project to investigate the applicability of various winter maintenance materials, equipment and methods for use by state and local highway maintenance crews. The pooled fund will be ongoing, with new projects undertaken as previous work is completed. The Wisconsin Department of Transportation will be the lead agency, responsible for administration of the pooled fund and dissemination of results. Project partners who contribute funds to the study will appoint representatives to serve as members of the Technical Advisory Committee (TAC). The committee will be responsible for identifying needed research, selecting investigators, reviewing progress and approving deliverables.
Comments:	\$25,000 per year commitment requested from each state. More projects will be funded as additional commitments are received. To commit funds, please send an e-mail of interest to Kim Linsenmayer at kim.linsenmayer@ctcandassociates.com or call 608-628-3806.
Study Number:	TPF-5(093)
Status:	Cleared by FHWA
Title:	North/West Passage Transportation Pooled Fund Program
Contract/Other Number:	
Sponsoring Agency:	Minnesota Department of Transportation
Lead Agency:	Minnesota Department of Transportation
Study Partners:	MN, WI
Contract Amount:	\$75,000
Commitments Received:	\$175,000
100% SP&R Approval:	Approved
Background:	The North/West Passage Corridor, which includes states along I-94 and I-90 from Wisconsin to Washington, is in its second year as Transportation Pooled Fund (TPF) Study. The Corridor coalition is now soliciting participation in Phase II of the TPF Study, the focus of which is the integration on traveler information across state borders. Today in the North/West Passage Corridor states (North Dakota, Wisconsin, Minnesota, Washington, Idaho, Wyoming, Montana, and South Dakota) there are numerous systems for collecting, processing, and integrating transportation data, and for delivering the information to users. However, this information is not easily shared across state borders. Through their participation

in the Pooled Fund Study, North Dakota, Minnesota, and Wisconsin sponsored the development of the North/West Passage Phase I projects, which were selected and approved by the membership. The initial focus of Phase I projects was on the I-94 Corridor within the three funding states. It is envisioned that commitment from other states will expand the geographic focus of Phase II. Phase I projects, which started in March 2004, included development of an Interface Control Document to facilitate the exchange of traveler information data between North Dakota and Minnesota for delivery via each states 511 traveler information service. Also included is the development of plans for integrating Dynamic Message Sign (DMS) operations and bridge deck anti-icing systems across state lines in preparation for a planned system deployment. Focus was also placed on the development of a website for communication of North/West Passage information. For additional information on Phase I projects please visit: <http://www.nwpassage.info>.

Objectives:

The goals of this TPF study are to implement and evaluate integrated traveler information systems and coordinate maintenance operations across state borders. Using appropriate delivery systems, traveler information will be made available to internal staff and the traveling public via 511, dynamic message signs and other systems. The long-term vision of the North/West Passage Corridor states is to utilize effective methods for sharing, coordinating, and integrating traveler information across state borders and to influence ongoing standards development.

Scope of Work:

The North/West Passage TPF study is pursuing issues and proposed projects that were identified and selected by the membership for Phase II. This membership driven process is intended to ensure that members benefit from their investment in the North/West Passage TPF study. The objective of Phase II of the North/West Passage TPF Study Projects is to develop a North/West Passage ITS Integrated Corridor Strategic Plan. The key elements of this plan are; · Development of a corridor architecture with a focus on center-to-center data sharing across state borders, · Inventory of communication infrastructure for the entire corridor, · Development of a coordinated concept of operations for the sharing of traveler information across state borders. Suggested projects for the corridor to pursue will be identified. For your information, the Phase II Work Plan approved by the membership is included in the Study Documents section below.

Comments:

The Minnesota Department of Transportation has taken the initial lead in the development of the coalition. We strongly encourage all states along the corridor to participate in Phase II. The estimated cost of the ITS Integrated Corridor Strategic Plan is \$200,000. The recommended contribution for each state is \$25,000 per year. We

are also encouraging states to make a two-year commitment. To join the North/West Passage TPF Study, complete the online commitment form at www.pooledfund.org. State Departments of Transportation and others may become participants at any time during the year by committing funds to the North/West Passage TPF Study. Early submission of the online commitment form is encouraged to enable all states to participate in the selection of projects to be initiated in FY 2005. For additional information on joining the North/West Passage TPF Study, contact Mark Nelson, 651-284-3484 mark.nelson@dot.state.mn.us

Study Number:	TPF-5(099)
Status:	Cleared by FHWA
Title:	Evaluation of Low Cost Safety Improvements
Lead Agency:	Federal Highway Administration
Study Partners:	FL, IA, IN, KS, MD, MN, MT, NY, OK, PA, TX, VA
Commitments Received:	\$1,305,000
100% SP&R Approval:	Approved
Background:	This project will encompass safety-effectiveness evaluations of priority strategies from the NCHRP Report 500 Guidebooks, Guidance for Implementation of the AASHTO Strategic Highway Safety Plan. The safety effectiveness of many of the strategies in the guidebooks has not yet been rigorously evaluated. In order to achieve a national goal shared by the USDOT, AASHTO, and GHSA to reduce the fatality rate to 1.0 and save 9,000 lives annually by 2008, these "tried" and "experimental" strategies will need to be appropriately implemented. In this project, therefore, data will be collected and before-after safety effectiveness evaluations will be performed at sites where selected safety strategies are being implemented. A steering committee, comprised of pooled fund State DOT representatives, will provide guidance on the strategies selected for evaluation.
Objectives:	The goal of the proposed research is to develop reliable estimates of the safety effectiveness of safety improvements identified as strategies in the NCHRP Report 500 Guidebooks through scientifically rigorous before-after evaluations of sites within the U.S. where these strategies are being implemented.
Scope of Work:	The scope of the Low Cost Safety Improvements Pooled Funds Study is to conduct a research project of priority strategies from all of the NCHRP Report 500 Guidebooks. A target of 24 strategies totaling \$6M over three years is planned, but this will vary depending on the level of support. The data for the study will be gathered from those states that implement the strategies throughout the US. The methodology utilized will typically be an Empirical

	<p>Bayes evaluation, using before-after data (where the safety improvements are made, as well as untreated base locations), to help determine their effectiveness in reducing the number and severity of crashes. The data will be collected, and evaluation studies performed, as the strategies are implemented over the course of a few years. The greater the number of States implementing the strategies, the faster the rate of after data collection will be collected. This will in turn shorten the total time for each evaluation. The implementation of the strategies and the evaluations will be staggered; grouping a small number of the evaluations together, as appropriate.</p>
Comments:	<p>This project is open to any number of participating states, independent of involvement with the lead state initiative supporting implementation of the AASHTO Strategic Highway Safety Plan. The minimum target amount of funding requested by the participating states should be \$30,000-50,000 per year for three years, totaling (for all states pooled funds) \$3M over 3 years. States wishing to be involved in more than one improvement area (e.g. lane departure, aggressive driving, etc.) are asked to consider increasing their contributions accordingly. FHWA will contribute \$1.5M total, and additional funds will be solicited from other sources.</p>
Study Number:	TPF-5(105)
Status:	Cleared by FHWA
Title:	Transportation Library Connectivity
Sponsoring Agency:	Wisconsin Department of Transportation
Lead Agency:	Wisconsin Department of Transportation
Study Partners:	KS, LA, MN, MT, OH, OR, PA, TN, WA, WI
Commitments Received:	\$305,000
100% SP&R Approval:	Approved
Background:	<p>Accessible, reliable, and timely information is central to quality performance for all transportation agencies and stakeholders. Yet, a vast amount of transportation-related information is neither collected nor made available for use by others. Technology transfer activities--converting information into knowledge--are crucial for getting information in the hands of decision-makers.</p> <p>This new pooled fund project on Transportation Library Connectivity will focus on making the transfer of information an integral part of transportation library and information services. This technology transfer effort will support the systematic organization of state, federal, academic and private sector libraries to institutionalize the best practices of the Midwest Transportation Knowledge Network (MTKN), a network of transportation libraries in the Midwest.</p>

Objectives:	<p>Under the guidance of a full-time staff person contracted for the project, and with the support of a comprehensive marketing plan and materials, pooled fund participants will work to implement a national transportation technology transfer program for information and knowledge management.</p> <p>This effort will consist of two major components:</p> <p>Technical Assistance: Providing technical guidance to participating state agencies for cataloguing documents into the Online Computer Library Center (OCLC) and converting them to online format.</p> <p>Network Development: Encouraging and supporting the development and growth of DOT library information and knowledge networks.</p>
Scope of Work:	<p>Pooled fund activities will include:</p> <ul style="list-style-type: none">*Encouraging all DOT and academic transportation libraries to become members of a service network such as OCLC that would serve as a primary vehicle for interlibrary loans.*Pooling unique and specialized transportation documents produced by the states to be accessible by every state DOT.*Indexing and abstracting research and other published materials as well as soliciting and adding members to the Transportation Libraries Catalog (TLCat), a shared catalog containing all members' individual catalog listings.*Exploring coordination of Transportation Research Information Services (TRIS) Online and TLCat for quick and easy access to all transportation items whether through full-text online, inter-library loan, or purchase.*Pursuing more advanced information-sharing technology and practices for existing MTKN members.
Study Number:	TPF-5(111)
Status:	Cleared by FHWA
Title:	Development of Standards for Geotechnical Management Systems
Sponsoring Agency:	Ohio Department of Transportation
Lead Agency:	Ohio Department of Transportation
Study Partners:	CA, CT, Eastern Federal Lands Highway Division, GA, KY, MN, MO, NC, OH, TN
Commitments Received:	\$695,000
100% SP&R Approval:	Approved

Background:

A number of state and federal agencies are developing Geotechnical Databases which may be queried for information used for maintenance of existing projects as well as design, construction, etc. of nearby projects. Unfortunately, through the lack of a standard data definition for Geotechnical data, there exists significant difficulty in archiving, reusing and sharing data. This problem has been exacerbated with the dependence on computer software as the standard for design, construction, and maintenance of new and existing infrastructure projects. For instance, numerous computer programs have been developed to electronically collect and present geotechnical in-situ data by hardware manufacturers (i.e. CPT, PMT, etc.), as well as borehole/boring logs or fence diagrams. However, each software suite has developed its own data needs and formats. Some commonality exists in the definition of data through the use of standards such as ASTM, AASHTO, ANSI and others. However, some state DOTs and federal agencies, as well as software vendors may have adopted variations of the standards. In order to collect, view, and share geotechnical data there is a great need to establish a Geotechnical Data Dictionary from which a national standard XML (GML compliant) data interchange format schema may be established. The establishment of standards for the development of geotechnical management systems will provide the means for state DOTs to efficiently capture, store, retrieve, and share geotechnical data and information internally as well as with external agencies and user groups. The standards will also provide the means for IT departments and software developers to build components or modules for geotechnical management systems that would meet each state DOT's needs and be compatible with other modules developed by other software providers. These standards will reduce each State's time and cost involving software development, maintenance, and updates. In addition, the standards, if adopted by other local, state and federal agencies, would provide the means to electronically share geotechnical data obtained by other sources near DOT highway projects.

Objectives:

A first step in this process is to survey state and federal agencies and their consultants to define their geotechnical field and laboratory testing practices and the types of geotechnical data that they collect, archive and reuse through a web based survey method. Specifically of interest is the type of field and laboratory tests that are routinely performed, associated data collected, as well as metadata (data describing data: type of equipment, etc). Also of concern is the uniformity of testing practices (i.e. ASTM, AASHTO, etc.), and description of the data (e.g. soil classification, strengths, etc.). The survey will cover data at the dictionary level and will require very detailed and specific information. From the survey information, develop a consensus of data definitions to be

accepted in the standard schema. The data dictionary specifies the meaning of the terms used in the data base.

Scope of Work:

The second objective involves the development of an open and flexible XML (GML compliant) based data structure and data dictionary geotechnical management systems. The data structure will define the form and content (alpha or numeric) of the data, the precision, the units, the field size, the type of data acquired, other data attributes, and the relationships between the attributes.

The survey and schema development will be a collaborative effort by a core team consisting of technical representatives from the University of Florida, Department of Civil Engineering (UF), Association of Geotechnical and Geoenvironmental Specialists in the United Kingdom (AGS), and the Consortium of Organizations for Strong-Motion Observation Systems (COSMOS). Oversight of development by the core team will be provided by the Geotechnical Data Coalition with representation from UF, AGS, COSMOS, Construction Industry Research and Information Association (CIRIA), Federal Highway Administration (FHWA) and the Ohio Department of Transportation (ODOT). A Geotechnical Management System Group (GMS group) composed of representatives from 12 State DOTs, FHWA, US EPA, US Army Corps of Engineers, and the US Geological Survey has been formed to govern the development of the standards for all geotechnical data and to provide all final decisions for this project.

The UF group has developed a data dictionary, database and XML exchange format for the Florida DOT that allows web based sharing of geotechnical laboratory test data, classification data, in-situ test data and as-built construction data. The AGS membership is comprised of UK organizations and individuals having a common interest in the business of site investigation, geotechnics, geoenvironmental engineering, engineering geology, geochemistry, hydrogeology, and other related disciplines. AGS has a flat file exchange format that has been used for 14 years in the UK, Europe and Asia which handles geotechnical field data, lab data, and chemical and hydrological data. They also have a draft standard for an XML version that is GML compliant. COSMOS has developed a data dictionary and a virtual data center for sharing borehole data on the internet, as well as an ongoing project on geotechnical lab data.

A survey of information needs will be developed by the core team in close cooperation with the GMS group. The survey will cover basic demographic data, methods of collection, and specific data needs. The survey will be sent to a wide group of stakeholders that

use Geotechnical data including state and federal agencies, civil software developer/vendors, consulting and design firms as well as others specified with the help of the GMS group.

The Geotechnical Data Field and Laboratory Data survey is the most difficult and time consuming part of the standards development. The survey will identify the types of tests and hardware, as well as data description necessary for the development of a data dictionary. Consequently, it is envisioned that over half the effort will occur in this phase compared to the development of a final data dictionary and XML (GML compliant) schema. The results of the survey will be used as the data requirements and definitions for defining a standard schema.

The contents of the survey will be developed by a small core team. A draft version will be created by the core team by merging all the data definitions found in the UF system, AGS, COSMOS and the Army Corps of Engineers and COSMOS survey results. The draft will be a prototype data dictionary merging the existing dictionaries and any determined missing data. The draft version of the survey will be presented to the GMS group and refined based on their input.

The survey will also ask questions about metadata for equipment, location, contractor/person etc., as well as general questions about Geohazard and Geotechnical asset inventory and condition data to prepare for a further phase in defining a dictionary for that data. The final data dictionary delivered from this project may or may not include Geohazard and asset condition information. The determination will be based upon the amount of time required to develop them which will largely depend upon whether sufficiently refined data definitions exist for this data.

Study Number:	TPF-5(112)
Status:	Cleared by FHWA
Title:	Midwest States Pooled Fund Pavement Preservation Partnership
Sponsoring Agency:	Federal Highway Administration
Lead Agency:	Michigan Department of Transportation
Study Partners:	IA, IL, IN, KS, MI, MN, MO, MT, Manitoba Transportation, ND, OH, WI
Commitments Received:	\$220,000
100% SP&R Approval:	Approved
Background:	Public infrastructure, such as highways, streets, and bridges has not been traditionally regarded as assets in a formal accounting sense. The public operators of these facilities have been more concerned

with physical conditions and capabilities than with book cost and replacement value and they reported their financial information using fund and modified accrual accounting methods. But in future, these operators will be required to treat such capital infrastructure as assets, the value of which they must periodically report using full accrual accounting methods as is presently required for vehicles and equipment.

To guide and assist state and local government agencies in preparing the required reports, the Governmental Accounting Standards Board (GASB) has developed a detailed specification known as Statement 34 (GASB 34). This specification allows agencies to use either traditional depreciation accounting or a potentially more attractive modified approach which presumes that roadway assets will be preserved at predetermined acceptable condition levels.

Preserving roadways at predetermined condition levels will require the careful use of established pavement preservation techniques. Materials, methods and specifications for new construction, reconstruction, and rehabilitation of roads have been highly developed by years of peer-reviewed research and discussion by the Transportation Research Board (TRB), the American Society for the Testing of Materials (ASTM), and the American Association of State Highway and Transportation Officials (AASHTO). Unfortunately, the same is not true for pavement preservation techniques, which seriously lag behind the demand for such knowledge. The use of pavement preservation techniques varies throughout the United States. In some cases, techniques that were applied for years are no longer used because of poor performance caused by inadequate design, materials, specifications, construction, performance criteria, or quality control and quality assurance.

Developing national protocols for pavement preservation and publishing them as AASHTO standards would improve overall quality and treatment performance. But developing such standards will take time. Meanwhile many state, county and local highway agencies are building experience and developing knowledge in design, materials, specifications, and performance criteria in the area of preservation. Exchanging this information is invaluable to highway agencies.

Objectives:

The project objectives are:

- Provide funds for a multi-day annual workshop for discussion and exchange of information and knowledge about each state's pavement preservation program.
- Provide a means to define, support and share technology of

mutual interest.

- Establish and maintain MPPP's web site that would display meeting reports, state guidelines, specifications, and allow users to post help questions.
- Provide funds for formal training presentations during the annual workshop.
- Provide funds for management support of MPPP through the National Center for Pavement Preservation at Michigan State University.

The following benefits are expected to be derived from this project:

1. More timely solutions for common issues from shared experiences, technology transfer, and research initiatives resulting from collaboration.
2. Minimal effort duplication and wasted resources resulting from an ability to focus on common objectives.
3. Increased learning from group training with Timely discussion and consensus on the value of the material presented.
4. Identification of common research needs, funding mechanisms, and priorities for the work studies.
5. Reduction of the states' program costs as a result of adopting common procedures, materials, and treatment specifications.

Scope of Work:

There is a need to assist states in developing sound pavement investment programs to gain infrastructure and operational efficiencies and also satisfy the new reporting requirements of GASB 34.

While some of the MPPP states have developed preventive maintenance programs as a key step in preserving their pavement investment and extending their serviceability with cost effective preservation treatments, other states could benefit from a sharing of the knowledge gained from this experience. Such a partnership would develop sound preservation practices by a beneficial sharing of information on treatment designs, construction practices, performance measures, and research needs. Specific funding is needed to:

1. Assure participation and collaboration among the states at an annual workshop meeting;
2. Implement task operations, as designated by MPPP's Steering Committee; and,
3. Managing the MPPP's operations to include an annual meeting, reporting, and developing and maintaining an informational web-site.

Study Number:	TPF-5(114)
Status:	Cleared by FHWA
Title:	Roadside Safety Research Program
Sponsoring Agency:	Washington State Department of Transportation
Lead Agency:	Washington State Department of Transportation
Study Partners:	AK, LA, MN, TN, TX, WA
Commitments Received:	\$500,000
100% SP&R Approval:	Approved
Background:	Many state DOT's have sponsored research on roadside safety issues that include crash testing of features in accordance with FHWA adopted standards (NCHRP Report 350). Many of the research and functional problems are common to more than one state and so there is efficiency and cost effectiveness in pooling resources to conduct certain crash tests.
Objectives:	To establish an ongoing roadside safety research program that will meet the research and functional needs of participating states in a cost-effective and timely manner.
Scope of Work:	A committee of representatives from participating states will form a technical committee to identify common research needs, select projects for funding and oversee implementation of results. Specific research activities addressed within the program will include the design, analysis, testing, and evaluation of crashworthy structures, and the development of guidelines for the use, selection and placement of these structures. Crashworthy structures to be addressed include bridge rails, guardrails, transitions, median barriers, portable concrete barriers, end treatments, crash cushions, culverts, breakaway support structures (e.g. sign supports, luminaire supports, mailboxes), and work zone traffic control devices. Research will also address the influence of highway features such as driveways, slopes, ditches, shoulders, medians, and curbs on single vehicle collisions. The problems identified with these structures and features will be addressed through in-service performance evaluation studies, computer simulation, full-scale crash testing, clinical analyses, real-world crash data, and benefit costs analyses. The specific identification, selection and prioritization of research issues will be made by the technical committee on an annual basis, unless emerging issues require committee decisions in the interim.
Study Number:	TPF-5(116)
Status:	Cleared by FHWA
Title:	Investigation of the Fatigue Life of Steel Base Plate to Pole Connections for Traffic Structures
Sponsoring Agency:	Texas Department of Transportation
Lead Agency:	Texas Department of Transportation
Study Partners:	CA, CO, IA, MN, NC, PA, TX, WY

Commitments Received: \$286,000

100% SP&R Approval: Approved

Background: The project is proposed to investigate what improvements can be made to the base plate to pole connections for traffic structures, such as socket welds, to improve their fatigue life. Recent research on the fatigue life of traffic signal mast arm to pole socket welded connections has shown that the fatigue category of this detail is E₂ and sometimes less. The addition of stiffeners did increase the fatigue performance, but not to the level predicted by the AASHTO Specifications. This research has also shown that small changes in various connection details, such as plate thickness, bolt pattern, and stiffener pattern, can improve the fatigue life of the connection. More research is needed to develop a better understanding of the effect of these changes, and to provide a systematic way that this knowledge can be incorporated into the design process and the AASHTO specifications for signal poles, high mast illumination poles, and other traffic structures.

Objectives: Objectives

1. Develop a comprehensive list of connection details that affect the fatigue life of various commonly used connection details
2. Determine which changes to these details could feasibly and most cost effectively be used to increase the fatigue life of base plate to pole connections, with and without stiffeners
3. Determine a quantitative relationship between the changes in the details and their effect on the fatigue life of the connection
4. Develop a fatigue design guide that would show designers how they could quantitatively use the various recommended changes for use in their fatigue designs
5. Develop language to incorporate the above guide into the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals

Scope of Work: Phases

1) Literature review

A review of literature and recent research in the field of fatigue to provide a good idea of what kind of tests have been performed, which ones are worth expanding on, and what factors effect the fatigue life of the connection.

2) Develop test plan

After a list of fatigue life influencing factors has been put together, develop a test matrix. The matrix will show which factors or details are going to be tested, the range to test over, the number of tests required, and any combination of factors or details that should be tested together. The matrices shall then be reviewed by fabricators and contributing agencies to ensure that all tests are worthwhile and that other factors that may be important or useful

will also be considered. This will help to ensure that the results from testing will yield feasible and cost effective solutions.

3)Testing

Since the number of tests required to develop an in depth understanding of the wide gamut of connection possibilities would be quite large, and the costs and time required for such tests also quite large, Finite Element Models (FEM) may be used. These models will be correlated with actual tests, and they will allow an increase in the number of combinations and changes that can be evaluated with a fixed budget and in a reasonable amount of time.

4)Summarize Results

The results should be summarized in three ways.

1. A final report detailing all of the tests, the test methods, literature review, results, and conclusions.
2. A fatigue design guide which outlines how to quantitatively include improvements in the connection detail in the design process.
3. A list of changes to the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals to recommend to the AASTHO T-12 Committee.

Study Number:	TPF-5(118)
Status:	Cleared by FHWA
Title:	Upper Midwest Freight Corridor Study, Phase II
Sponsoring Agency:	Ohio Department of Transportation
Lead Agency:	Ohio Department of Transportation
Study Partners:	IA, IL, IN, MI, MN, OH, WI
Commitments Received:	\$140,000
100% SP&R Approval:	Approved
Background:	National transportation legislation is increasingly moving into the area of freight movement. The alternative reauthorization bills currently under consideration deal with the issue in different ways. This element of phase two efforts would facilitate the development of a regional freight agenda.
Objectives:	The objectives of the study are to develop a regional freight agenda, facilitate the beginning of a regional approach to deploying commercial vehicle-related intelligent transportation systems, and to maintain and improve the regional information system on freight.
Scope of Work:	The scope of work includes the following tasks: <ul style="list-style-type: none">- Research and document national freight programs- Review and document the impact of participation in those programs on the funding received by states in the region.- Prepare whitepapers on policy options that the region could

consider for freight

- Facilitate a regional dialog.
- Draft a regional freight agenda.
- Prepare outreach materials to explain the importance of freight for the region and the agenda adopted by the region.
- Make presentations on regional freight, as requested by the states.
- Develop and maintain communication links with key national organizations on freight, including TRB, AASHTO, FHWA, FRA, etc.
- Prepare a white paper outlining the current state of CVO-related ITS in the region.
- Prepare white papers outlining the probable benefits of ITS implementation.
- Facilitate a dialog within the region on ITS
- Draft a conceptual regional deployment plan.
- Improve the documentation of the existing information
- Develop inquiry routines to answer frequently asked questions.
- Begin a dialog with regional freight analysts on regional freight information needs.
- Review and summarize national efforts to improve freight data sources.
- Begin a dialog with state information managers to determine what information is available related to freight.

Study Number:	TPF-5(119)
Status:	Cleared by FHWA
Title:	(Frozen Four) North Central Pavement Research Partnership
Sponsoring Agency:	Wisconsin Department of Transportation
Lead Agency:	Wisconsin Department of Transportation
Study Partners:	IL, MN, WI
Contract Amount:	\$30,000
Commitments Received:	\$30,000
100% SP&R Approval:	Approved
Background:	The overall goal of the North Central Pavement Research Partnership is to improve the roads in the region by delivering thoughtful and timely research findings for implementation. This will be done by integrating and coordinating the research efforts of the member agencies in order to reduce research duplication, to engage the best research teams, to optimize the use of research dollars, to expedite research solutions, and to effectively communicate research results and issues.
Objectives:	In order to maximize the impact of available highway research monies, the partnership has the following objectives:

1. Share research problem statements from individual partner

agencies.

2. Establish common short and long term research objectives in specific areas

3. Assess and prioritize common research objectives.

4. Identify means (including pooled funds) to initiate and monitor priority research projects of common interest.

5. Share and review the results from research projects of common interest.

6. Collaborate on the implementation of research results of common interest.

7. Transfer technology to improve highways

8. Share issues, research needs, data, and solutions on an on-going basis.

9. Fund and execute short-term research and technology transfer activities as needed and as able.

Scope of Work:

Proposed deliverables:

- Meeting notes.

- Organizational structure, by-laws, and procedures.

- Partnership web site.

- Short and long term research needs and objectives.

- Collaborative research efforts.

- Inventory of partnership pavement research resources.

- Summaries of member research to support technology transfer.

- Annual conference to facilitate sharing of research results.

- Agreements to expedite research administration (i.e. overhead rates, intellectual property, etc.)

Study Number:

TPF-5(120)

Status:

Cleared by FHWA

Title:

**Deer Vehicle Crash Information and Research (DVCIR)
Center Pooled Fund**

Sponsoring Agency:

Wisconsin Department of Transportation

Lead Agency:

Wisconsin Department of Transportation

Study Partners:

IA, MN, NY, OH, WI

Commitments Received:

\$250,000

100% SP&R Approval:

Approved

Background:

A significant amount of money has been spent on the implementation and study of deer-vehicle crash (DVC) countermeasures in the last several decades, but their expected crash reduction effectiveness is still largely unknown. The complexity and interdisciplinary requirements of implementation and long-term study of the correct potential DVC countermeasure(s) in the appropriate locations has limited the usefulness and transferability of past studies. A need exists to create a focal point for the definition and implementation of DVC-related research. This pooled fund would allow for the creation of a

DVC Information and Research Center (DVCIR Center) to more properly address issues related to the DVC problem. This center would expand upon the ongoing data and information-sharing activities of the Wisconsin Department of Transportation (WisDOT) funded Deer-Vehicle Crash Information Clearinghouse (DVCIC) (www.deercrash.com) at the University of Wisconsin-Madison Midwest Regional University Transportation Center (MRUTC). The Departments of Transportation (DOTs) and Departments of Natural Resources (DNRs) from five states guide the DVCIC activities, but it has provided unbiased information to DOTs, DNRs, insurance company representatives, the news media, and local safety officials throughout the United States and Canada. The widespread significance of the DVC problem, its complexities, and the need for a well-defined, interdisciplinary, and multi-jurisdictional research strategy were quickly recognized by the DVCIC advisory groups. The DVCIR Center proposed is a mechanism to address these issues and the very limited safety-focused state-of-the-knowledge in the area of DVCs and their potential countermeasures.

Objectives:

This study will:

- Expand on the critical evaluation of past and current research in the DVC problem area, and become the repository for safety-focused summaries of this work. Critically evaluate the validity of past and current DVC-related research. Summarize and disseminate the relevant study details, implementation issues, and safety results.
- Expand on the existing DVCIC activities as a repository for deer population estimates, vehicle-travel amounts, reported DVC or animal-vehicle crash data, and roadside carcass (if available) information from participating states. Summarize and disseminate data by state and region and, as appropriate, define relevant trends.
- Identify and prioritize gaps in DVC-related research, define a strategy, and create requests for proposal (RFPs) for projects to evaluate the DVC questions identified by participating states. Provide funding for properly designed DVC-related research. Potential research areas include: Identification and definition of DVC-related data sources, collection, estimation, and management techniques; Definition and/or prediction of the magnitude and locations of DVC problem segments; Evaluation of existing and potential DVC countermeasure crash reduction capabilities and their implementation issues; and Investigation of and options to DVC-related roadway development programming, planning, design, operations, and maintenance decision-making approaches and policies.

Scope of Work:

This pooled fund will create a focal point (and/or location of first consideration) for the collection of DVC-related data/information (e.g., deer populations, vehicle travel, reported DVCs, and roadside

carcasses). It will also guide, define, and fund an organized strategy of well-designed and properly staffed DVC-related research. The focus of this pooled fund does not overlap with any other existing projects (e.g., the Animal-Vehicle Crash Mitigation pooled-fund), and should assist with the dissemination of the results from ongoing projects. The center created by this pooled fund is expected to become the primary resource for well-defined DVC-related data/information and research results, and an entity where only those projects that meet minimum scope, experimental design, staffing, and documentation requirements are funded.

Study Number: TPF-5(126)
Status: Cleared by FHWA
Title: **Geocomposite Capillary Barrier Drain (GCBD) for Limiting Moisture Changes in Pavements: Product Application**
Sponsoring Agency: Minnesota Department of Transportation
Lead Agency: Minnesota Department of Transportation
Study Partners: MI, MN, NY
100% SP&R
Approval: Approved
Background: The problems associated with excessive moisture in pavement bases and subgrades are numerous and well known. Conventional drainage may not be wholly effective in reducing water-related problems (e.g., Christopher and McGuffey, 1997; Hall and Correa, 2003). Conventional drainage is designed for saturated conditions, however, most water movement near the surface occurs under unsaturated (partially saturated) conditions. Recent studies suggest that conventional drainage systems can only be understood if unsaturated flow principles are considered (Birgisson and Roberson, 2000; Stormont and Zhou, 2004). The performance of GCBD systems has been evaluated in the laboratory and in a limited field test (in the Muddy Roads project sponsored by the Vermont Agency of Transportation). The next step in GCBD development is to document its drainage performance in a field scale pavement section and to obtain related mechanical performance indicators. Field scale testing includes conditions that are more realistic for the eventual deployment of the GCBD technology, including pavement cracks and variability in base course properties. Field scale testing should include a side-by-side comparison with a control section. In this way, the benefits of the GCBD can be clearly demonstrated.
Objectives: This project is geared toward implementing GCBD technology. A key objective of the project is to select the most effective transport layer for use in a prototype GCBD. A second objective of the project is incorporation of the prototype GCBD into a full-scale test section at the Minnesota Road Research Facility (MnROAD), a comprehensive pavement test track facility. In addition to demonstrating construction using the GCBD, measurements of GCBD test section performance, side-

Scope of Work:

by-side with a control section will quantify its benefits. The final objective is development of design tools to aid in the design of the GCBD for specific climate, geometry, and soils.

Utilizing a GCBD for pavement drainage explicitly targets and provides for unsaturated flow, and will result in greater drainage efficiency compared to conventional drainage, which is designed for saturated flow. With a GCBD, the base and subgrade will contain less water than a pavement without a GCBD at any point in time. This is important because the strength of both the base course and subgrade degrades with increased moisture, and ultimately reduces pavement structural durability. Thus, a GCBD will result in increased longevity of the pavement. Expected benefits of the GCBD include:

- Reduced equilibrium water content in base
- Prevent positive pore water pressures in base
- Prevent wetting of underlying subgrade due to infiltration
- Prevent capillary rise of water from subgrade into base
- Provide complementary separation and stabilization

Comments:

This project will provide important information to state and local transportation engineers which will allow them to make informed decisions and improved pavement design. By pooling resources, agencies will be able to conduct more extensive studies across a greater range of conditions than could be done by a single agency with only its own funds. The NCHRP-IDEA Program has already committed \$100,000 (see attached PDF format work plan). We are seeking \$165,000 in pooled funds to construct one pavement test section at the MnROAD research facility. Minnesota, New York, and Michigan have already expressed interest in participating. Our target and ultimate goal is to have five agencies participating at \$25,000 per year for two years, yielding \$250,000 for the construction of two test sections.

APPENDIX C

MINNESOTA POOLED FUND PROJECTS

MN POOLED FUND PROJECTS WITH BALANCES BUT NOT CONTRIBUTED TO IN THE 2006 PROGRAM**The table does not include NCHRP numbers.**

STATE	PROJ. NO.	PROJECT NAME	PROJECT STATUS	PROG. CODE	UNDER AGREEMENT	EXPENDITURE	BALANCE*
MINN	0002001	Application of Global Positioning System for Planning	Unknown	0800	15,000.00	11,368.44	3,631.56
MINN	0002002	Geographic Information System-Transportation ISTEAM Management Systems Server-Net Prototype	Unknown	0860	25,000.00	13,750.00	11,250.00
MINN	0002212	Non-nuclear Testing of Soils and Granular Bases Using the GeoGauge	Active	0860	12,000.00	0.00	12,000.00
MINN	0002212	Non-nuclear Testing of Soils and Granular Bases Using the GeoGauge	Active	Q560	24,000.00	13,501.17	10,498.83
MINN	0002126	Integrated Drainage Design Computer System (later labeled HYDRAIN)	Active - Completion Date: March 2, 1994	0800	38,000.00	37,260.03	739.97
MINN	0002136	FHWA Traffic Noise Model (FHWA TNM) Software, Validation, and Training	Active	0860	5,000.00	4,900.00	100.00
MINN	0002144	Testing of Large and Small Support Signs	Testing has concluded.	0800	10,000.00	9,900.00	100.00
MINN	0002146	Testing of Roadside Safety Systems	Unknown	0860	42,000.00	36,833.43	5166.57
MINN	0002146	Testing of Roadside Safety Systems	Unknown	Q560	50,000.00	20,688.97	29,311.03
MINN	0002155	Durability of Geosynthetics for Highway Application	Three final reports on task areas have been published. A 4 th final report on another task area is being processed.	0860	30,000.00	23,072.26	6,927.74
MINN	0002157	Detection Technology for IVHS	Project is complete - final report has been posted	0800	20,000.00	9,212.94	10,787.06

STATE	PROJ. NO.	PROJECT NAME	PROJECT STATUS	PROG. CODE	UNDER AGREEMENT	EXPENDITURE	BALANCE*
MINN	0002159	Interpretation of Road Roughness Profile Data	Cleared by FHWA but pending approval on 100% SPR	0860	30,000.00	23,428.25	6,571.75
MINN	0002163	Calcium Magnesium Acetate (CMA) at Lower Production Costs	Final report completed, project closed	0860	25,000.00	23,997.41	1,002.59
MINN	0002165	Horizontally Curved Steel Bridge Research Study	As of 6/22/01 the final rpts. are still in draft form	0860	15,000.00	12,702.31	2,297.69
MINN	0002166	Performance Evaluation of Crumb Rubber Modifier (CRM) in Asphalt Pavements	Project deliverables have been completed and the project has been closed out	0860	20,000.00	15,605.88	4,394.12
MINN	0002167	Development of Anti-Icing Treatments	The final rpt has been completed, project closed out	0860	20,000.00	19,900.00	100.00
MINN	0002168	Management of the Discharge and Quality of Highway Runoff in Karst Areas to Control Impacts on Ground Water	The final report for this study has been received and is under review. Plans are being considered for public release of the report	0860	23,000.00	22,746.49	253.51
MINN	0002168	Management of the Discharge and Quality of Highway Runoff in Karst Areas to Control Impacts on Ground Water	The final report for this study has been received and is under review. Plans are being considered for public release of the report	Q560	5,000.00	639.50	4,360.50
MINN	0002170	High Strength Concrete for Bridges	Supposed to be completed in '01 – delayed because of an environmental lawsuit	0860	180,000.00	27,460.03	152,539.97
MINN	0002171	Predicting HOV Facility Demand	Pending Approval	0860	30,000.00	24,980.02	5,019.98
MINN	0002174	Accelerated Pavement Testing of Crumb Rubber Modified Asphalt Pavements	FHW would like funds for this program to be used for another project	0860	87,000.00	61,129.00	25,870.50

STATE	PROJ. NO.	PROJECT NAME	PROJECT STATUS	PROG. CODE	UNDER AGREEMENT	EXPENDITURE	BALANCE*
MINN	0002176	Validation of SHRP Asphalt and Asphalt Mixture Specifications Using Accelerated Loading	Study is complete. Awaiting the final report	0860	40,000.00	15,988.46	24,011.54
MINN	0002177	Fatigue Test of High Strength Prestressed Concrete Bridge Girders	MN was lead state on this-we show the project as closed	0860	60,000.00	0.00	60,000.00
MINN	0002178	Seasonal Changes in Pavement Material Properties	MN was lead state on this-we show the project as closed	0860	60,000.00	41,871.83	18,128.17
MINN	0002179	Load Testing of Instrumented Pavement Sections	Final report for this study is number 2000-35. Project is completed but needs to be closed out	0860	90,000.00	62,807.80	27,192.20
MINN	0002180	Pavement Performance Model Development	As of 6/12/01 final report is available	0860	10,000.00	0.00	10,000.00
MINN	0002182	Development and Validation of Traffic Data Editing Procedures (TDEP)	As of 2/5/02 study was finishing up. Final was to be issued within 2 months	0860	30,000.00	20,935.91	9,064.09
MINN	0002182	Development and Validation of Traffic Data Editing Procedures (TDEP)	As of 2/5/02 study was finishing up. Final was to be issued within 2 months	Q560	20,000.00	13,608.34	6,3091.66
MINN	0002184	Long Term Monitoring of Mitigating Corrosion Measures	Active - Final report will be completed by 3/31/03.	0860	20,000.00	19,900.00	100.00
MINN	0002185	Development of Fiber-Optic Sensors to Monitor the Impact of Truck Weights on Pavements and Structures [Completion date September, 2002]	Final draft was in prep on 5/9/01	0860	5,000.00	2,701.43	2,298.57
MINN	0002186	Safety Evaluation of Intersection Design Improvements for Safety Management	The study has proven successful, and the draft final report is currently under review. (2/05/02)	0860	75,000.00	63,455.48	11,544.52
MINN	0002187	Roadside Safety Hardware Crash Tested to NCHRP Report 350	Active	0860	50,000.00	20,109.65	29,890.35
MINN	0002188	Crash-Tested Safety Appurtenances for Work Zones	Active	0860	50,000.00	44,676.19	5,323.81

STATE	PROJ. NO.	PROJECT NAME	PROJECT STATUS	PROG. CODE	UNDER AGREEMENT	EXPENDITURE	BALANCE*
MINN	0002189	Support, Maintenance, and Refinement of the National Transportation Control/ITS Communications Protocol (NTCIP) [Completed]	Unknown	0860	5,000.00	0.00	5,000.00
MINN	0002191	Public Service Campaign - Work Zones	COMPLETED. A new campaign, entitled Get The Picture. Listen To The Signs was developed	0860	5,000.00	0.00	5,000.00
MINN	0002192	Durability of Geosynthetics - Phase II	Active - As of 2/2002, the final report is being written. All of the field and lab work have been completed.	0860	20,000.00	5,489.41	14,510.59
MINN	0002193	Accuracy of Traffic Load Monitoring and Projections Related to Traffic Data Collection Parameters	Active as of April of 2000-several deliverables are available on the web	0860	15,000.00	11,588.24	3,411.76
MINN	0002194	Collection of Data to Relate Vehicle Operating Weights to Registered Weights for Highway Cost Allocation and User-Fee Analysis [Completion date 3/31/02]	Active	0860	10,000.00	66.79	9,933.21
MINN	0002195	Resistance Factors for Drilled Shafts with Minor Defects	Complete - Final report disseminated to participating states. Study went as planned and met objectives of FHWA. (2/4/02)	0860	15,000.00	12,667.82	2,332.18
MINN	0002196	Electrochemical Properties and Reactions at the Surfaces and Interfaces of Concrete Aggregates, Cement and Mineral Admixtures	Active -MN not listed as a participant on web – Fed – Aid form dated 2/11/99 to de-obligate in file. File notes indicate continued interest.	Q560	15,000.00	9,149.60	5,850.04

STATE	PROJ. NO.	PROJECT NAME	PROJECT STATUS	PROG. CODE	UNDER AGREEMENT	EXPENDITURE	BALANCE*
MINN	0002197	Bridge Fatigue Screening, Monitoring and Retrofitting Manual	Unknown	Q560	40,000.00	0.00	40,000.00
MINN	0002198	Engineered Flowable Fill Bridge Approaches plus Abutment and Culvert Backfill using Inexpensive Recycled Materials [Cancelled]	Project cancelled – 1998 This study has been merged with NCHRP 24-12 since both studies dealt with the same problem and all concurred.	Q560	20,000.00	12,288.00	7,712.00
MINN	0002199	Optimal Acceptance Procedures for Statistical Construction Specifications	Active -Currently reviewing the draft manual submitted by the contractor. Therefore, completion date of the study has been extended an additional six months through 8/28/02. (2/7/02)	Q560	25,263.00	9,598.58	15,664.42
MINN	0002200	Compilation and Evaluation of Results from High-Performance Concrete Bridge Projects	Active	Q560	4,000.00	14.67	3,985.33
MINN	0002202	HPMS Computer Based Training	The final product has been delivered by the contractor and the software is being disseminated to all of the state DOTs. (2/5/02)	Q560	20,000.00	19,293.26	706.74
MINN	0002208	Pavement Subgrade Performance Study	Active	0860	60,000.00	29,096.65	30,903.35
MINN	0002208	Pavement Subgrade Performance Study	Active	Q560	60,000.00	41,683.39	18,316.61
MINN	0002209	Enhanced Guidance for Implementation of Safety Strategies	Active	Q560	150,000.00	0.00	150,000.00
MINN	0002210	Comprehensive Highway Safety Improvement Model	Active	Q560	50,000.00	7,124.76	42,875.24

STATE	PROJ. NO.	PROJECT NAME	PROJECT STATUS	PROG. CODE	UNDER AGREEMENT	EXPENDITURE	BALANCE*
MINN	0002211	Bulk Specific Gravity Round Robin Using the Corelok Vacuum Sealing Device	Active – final report being readied	Q560	10,000.00	5,076.56	4,923.44
MINN	0002800	SHRP Implementation Asphalt Test Equipment	Active	0860	335,000.00	266,578.62	68,421.38
MINN	0003010	Crescent Study (Part I Funds) (This study not monitored by R&D)	Unknown	0860	70,000.00	37,556.95	32,443.05
MINN	0003024	HELP, Inc	Unknown	0860	40,000.00	30,000.00	10,000.00
MINN	0003027	Ohio SHRP Test Road-Instrumentation	COMPLETED IN 1998.	0860	4,400.00	0.00	4,400.00
MINN	0003037	Public Perceptions of the Midwest's Highway Pavements	As of 7/7/01 the final reports have been completed. Our files do not indicate receipt.	Q560	146,405.00	135,707.34	10,697.66
MINN	0003044	Base Funding for Northcentral Superpave Center	See TPF-5(021)	0860	20,000.00	18,902.41	1,097.59
MINN	0003044	Base Funding for Northcentral Superpave Center	See TPF-5(021)	Q560	85,000.00	74,468.06	10,531.94
MINN	0003046	Fillet Welding Procedure Qualification Research	Unknown	Q560	20,000.00	13,020.63	6,979.37
MINN	0003055	R&D of the 3rd Phase of an Autonomous Shadow Vehicle Prototype	As of 2/5/02 final rpt is under review	Q560	50,000.00	48,318.51	1,681.49
MINN	0003062	ITS Deployment Research and Professional Capacity Building	File notes state project is cancelled	Q560	50,000.00	17,271.16	32,728.84
MINN	0003063	IVI Specialty Vehicles Program	Active – draft final in review process	Q560	400,000.00	321,543.98	78,456.02
MINN	0003064	Developing a National Strategic Plan for Advanced Construction and Maintenance Systems	Complete per note from Tom West in CA	Q560	60,000.00	45,988.02	14,011.98
MINN	0003065	Geosynthetic Reinforcement of Base Course Layer of Flexible Pavements	Complete – as of 11/15/01	Q560	20,000.00	19,529.80	470.20
MINN	0003068	Field Evaluation of the CTCLS Traffic Signal Load Switches	Unknown -	Q560	135,497.00	23,415.66	112,081.34

STATE	PROJ. NO.	PROJECT NAME	PROJECT STATUS	PROG. CODE	UNDER AGREEMENT	EXPENDITURE	BALANCE*
MINN	0003069	Eastern State Transportation Coalition Train Study	Unknown	Q560	35,000.00	22,445.00	12,555.00
MINN	0003072	Strength and Deformation Analysis of MSE Walls at Working Loads	Active	Q560	20,000.00	15,551.49	4,448.51
MINN	0003073	Micro-Surface Mix Design Procedure	Active	860	25,000.00	4,774.30	20,225.70
MINN	0003073	Micro-Surface Mix Design Procedure	Active	Q560	50,000.00	9,538.68	40,461.32
MINN	0003079	REPORT	Active	Q560	232,500.00	220,477.98	12,022.02
MINN	0003081	HERMES II	Active?	Q560	125,000.00	90,735.87	34,264.13
MINN	0003083	FIXS-Fabrication error Indexed examples and Solutions	Active	Q560	17,500.00	16,462.77	1,037.23
MINN	0003092	Fiber Reinforced Polymer Composite Prestressing Strands	Active - Study has been established and will be initiated when adequate funding commitments have been received.	Q560	25,000.00	24,995.00	5.00
MINN	0003093	Environmental/Durability Evaluation of Externally Bonded Composites for Concrete Strengthening	Active - Study has been established and will be initiated when adequate funding commitments have been received.	Q560	25,000.00	15,281.35	9,718.65
MINN	0003094	Pavement Marking Life Cycle	Active - Study has been established and will be initiated when adequate funding commitments have been received.	Q560	40,000.00	13,902.72	26,097.28
MINN	0003097	Machinability of High-Performance Steel	Active	Q560	10,000.00	366.70	9633.30
MINN	0003100	The Impact of the ISO 9000 Quality Assurance Standard on Safety Performance in the Trucking Industry	Final report approved and published – will be on the web site shortly	Q560	20,000.00	12,099.00	7,901.00
MINN	TPF5001	Soil Mix Methods for Highway Application	Active	0860	20,000.00	3,929.08	16,070.92

STATE	PROJ. NO.	PROJECT NAME	PROJECT STATUS	PROG. CODE	UNDER AGREEMENT	EXPENDITURE	BALANCE*
MINN	TPF5001	Soil Mix Methods for Highway Application	Active	Q560	40,000.00	8,116.54	31,883.46
MINN	TPF5005	Study of Erection Issues and Composite System Behavior of the Full-Scale Curved Girder Bridge Currently under Test at the Turner-Fairbank Highway Research Center	Active	Q560	60,000.00	51,816.12	8,183.38
MINN	TPF5023	Investigation of Aggregate Shape Effects on Hot Mix Performance Using An Image Analysis Approach	Active	Q560	20,000.00	13,687.75	6,312.25
MINN	TPF5039	<u>Falling Weight Deflectometer (FWD) Calibration Center and Operational Improvements</u>	Active	Q560	30,000.00	7,927.58	22,072.42
MINN	TPF5042	Investigation of the Long-Term Effects of Magnesium Chloride	Active - Quarterly Progress Report (April 15 - July 15, 2004)	0860	20,000.00	6,358.99	13,641.01
MINN	TPF5042	Investigation of the Long-Term Effects of Magnesium Chloride	Active - Quarterly Progress Report (April 15 - July 15, 2004)	Q560	20,000.00	7,800.30	12,199.70
MINN	TPF5045	Performance Guidelines for the Selection of Hot-Pour Crack Sealants	Active	0860	20,000.00	0.00	20,000.00
MINN	TPF5045	Performance Guidelines for the Selection of Hot-Pour Crack Sealants	Active	Q560	60,000.00	0.00	60,000.00
MINN	TPF5051	Construction of Crack-Free Concrete Bridge Decks	Active	0860	15,000	0.00	15,000
MINN	TPF5051	Construction of Crack-Free Concrete Bridge Decks	Active	Q560	45,000	0.00	45,000
MINN	TPF5055	Rapid Bridge Replacement Techniques	Active	Q560	10,000.00	5,777.26	4,222.74
MINN	TPF5068	Long-Term Maintenance of Load and Resistance Factor Design Specifications	Active - <u>Quarterly Report - Ending August 31, 2004</u>	Q560	40,000.00	0.00	40,000.00

STATE PLANNING & RESEARCH PROGRAM

Feb-2006

STATE	PROJ. NO.	PROJECT NAME	PROJECT STATUS	PROG. CODE	UNDER AGREEMENT	EXPENDITURE	BALANCE*
MINN	TPF5069	Core Program Services	Active	0860	104,315.00	62,201.13	42,113.87
MINN	TPF5069	Core Program Services	Active	Q560	208,630.00	62,201.13	146,428.87
MINN	TPF5070	International Conference on Accelerated Pavement Testing	Active	Q560	15,000.00	8,007.13	6,992.87
MINN	TPF5073	Portable Non-Intrusive Technologies	Active	Q560	15,000.00	14,067.71	932.29
MINN	TPF5078	Upper Midwest Freight Corridor Study	Active	Q560	60,000.00	0.00	60,000.00
MINN	TPF5090	Pavement Tools Consortium	Active – Quarterly Progress Report <u>January 1, 2004 - June 30, 2004</u>	Q560	20,000.00	0.00	20,000.00
MINN	TPF5093	North/West Passage Transportation Pooled Fund Program, Phase 1	Active	Q560	50,000.00	0.00	50,000.00

TOTAL BALANCE**\$2,083,116.97**

* Balances are good as of the date the FMIS report -12/15/05