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Working Paper:
Estimating the Federal Proportion of Funds Expended on ITS Infrastructure for Fiscal Year (FY) 2000

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16. Abstract
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The primary objective of this working paper is to estimate the federal proportion of expenditures for ITS infrastructure deployments in FY 2000 as a range (using actual state DOT budget and planning data). A secondary objective is to provide insight into how states fund ongoing operations and maintenance costs for their ITS deployments.

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Working Paper: Estimating the Federal Proportion of Funds Expended on ITS Infrastructure for Fiscal Year (FY) 2000

Purpose

The purpose of this working paper is to provide an estimate of the federal proportion of funds expended on ITS infrastructure deployments for fiscal year (FY) 2000 using budget and planning data from state departments of transportation (DOTs). Expenditures associated with ITS infrastructure deployments include: capital, operations, management, and maintenance. The intent is to update this working paper as additional state DOT ITS budget and planning data become available.

Objectives

The primary objective of this working paper is to estimate the federal proportion of expenditures for ITS infrastructure deployments in FY 2000 as a range (using actual state DOT budget and planning data). A secondary objective is to provide insight into how states fund ongoing operations and maintenance costs for their ITS deployments.

Background

There is no accounting system that tracks federal expenditures of ITS infrastructure elements. In the past, FHWA and Congressional aides have *estimated* the percentage of federal expenditures for ITS at 80% – the typical federal match for ITS projects. Mitretek has previously suggested that this estimate is closer to 50%. This lower percentage reflects state and local contributions for ITS projects not receiving any federal funds and hence lowers the federal share (see figure 1 below).

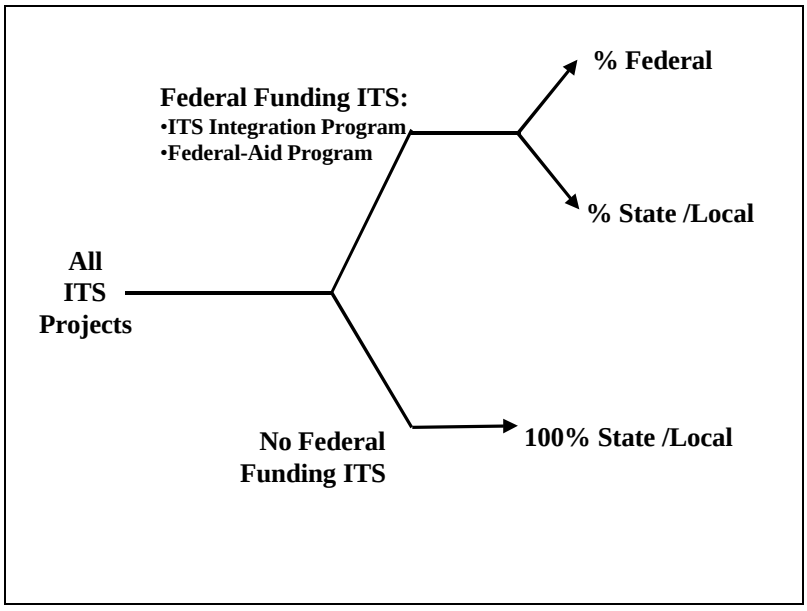

Figure 1. ITS Project Funding Source Tree

The analysis documented in this paper does not attempt to include all ITS deployments at the local/municipality level. Such an analysis, although a worthwhile exercise to explore in the near future, is beyond the scope of this paper.

FHWA has asked Mitretek to provide information that supports the position of less than 80% federal funding. Mitretek believes, given the availability of ITS budget data, that the best method for estimating the percentage of federal funds for ITS infrastructure is to analyze a sample of state DOT ITS budgets and planning data and use the results of the analysis to estimate the national percentage.

Federal Funding Sources for ITS

In general and for the purposes of this analysis, the Transportation Equity Act for the 21st Century (TEA-21) calls out funding for ITS in two major areas: the Intelligent Transportation Systems Act of 1998, and eligible Federal-Aid Highway Program (FAHP) categories and other infrastructure programs. Federal funding for the ITS Integration Program (which has been appropriated discretionary for Congressionally designated earmarked projects) is specified in the Act for each fiscal year beginning 1998 and ending 2003. Therefore, the amount of federal funds from this source can be accounted for with a high degree of accuracy. ITS funding from the federal-aid programs; however, is not as easily determined. Although funding levels for each fiscal year (1998 - 2003) are specified for ITS-eligible federal-aid categories, there is no minimum or maximum limit, or formula for determining the limit of federal-aid that can be expended on ITS infrastructure. Furthermore, while FHWA does have an accounting system for these programs, they do not track the amount of federal dollars expended on ITS. Hence, the need to consider analyzing various state DOT ITS funding and budget data.

Note that the funding sources emphasized in this paper are those geared towards highway infrastructure rather than transit or motor carrier operations.

The ITS-eligible federal-aid programs include the National Highway System (NHS), the Surface Transportation Program (STP), and the Congestion Mitigation and Air Quality Improvement Program (CMAQ). NHS and STP specifically allow federal expenditures on infrastructure-based ITS capital improvements. CMAQ funding includes programs or projects that implement ITS strategies. Furthermore, TEA-21 specifies that federal-aid funds can be used not only for ITS capital projects, but also for ITS operations and management.

Funding under the Act and eligible federal-aid programs have state matching requirements. For earmarked projects receiving funds as part of the ITS Integration Program under the Act, the federal ITS program share is not to exceed 50%. However, up to an additional 30% of the cost can be funded using other federal-aid funds, bringing the total federal share from all federal sources to 80%. For ITS projects receiving federal-aid funds, the federal share is *usually* 80%, but can be higher depending on the particular project.

Approach to Deriving the Estimate

Rather than basing the percentage of federal ITS expenditures totally on a federal/state matching basis, Mitretek developed the estimate from actual budget data from a sampling of states that have deployed ITS. This approach incorporates the state and – to some degree – locally supported ITS projects that do not include any federal funding. Such projects normally would not be captured in a top-down federal/state match analysis, but should be included to reflect a more accurate federal percentage.

Several geographically dispersed states rich in ITS have been targeted as candidates for analysis. One state that is *not* rich in ITS deployments (Vermont) has been included to provide a more complete and comprehensive analysis. States selected for this analysis include:

- Virginia
- Arizona
- Minnesota
- Vermont

ITS budget and funding information also has been requested from Florida DOT. ITS deployments and project funding are handled at the district level within the Florida DOT, which includes 7 districts and a central office. To date, not all districts have reported information, hence Florida DOT was not included in this analysis.

Analysis and Calculations

Just as there is no accounting system to track the amount of federal dollars spent on ITS infrastructure at the federal level, there is no system at the state level either (at least for the states in this analysis). This is not to imply that federal, state, and local dollars allocated to ITS are not monitored and accounted for; rather, it is to stress that such information is not readily available at the push of a button. The type of information available to determine the percentage of federal funds expended on ITS within a state varies from state-to-state. The information needed to determine the percent of federal versus state/local ITS expenditures is often "buried" within statewide budgets/plans (often the construction budget), and/or Statewide Transportation Implementation Plans (STIPs), or budget spreadsheets developed for in-house use.

ITS infrastructure deployment expenditures are usually covered in a state's 5- or 6-year construction plan. These construction plans often list projects with funding source (e.g., state/local, CMAQ, STP, etc.) and total project cost. However, additional information identifying which projects are ITS-related is required as state DOT organizations do not categorize or label projects as either ITS or non-ITS. A state's ITS budget, however loosely defined, not only includes line items for the deployment of ITS infrastructure, but also includes line items for the operation (including management) and maintenance (hereafter referred to as O&M) of these systems. Budget amounts for ITS O&M are usually covered either in a state's operating budget (i.e., combined operations and

maintenance budget), or separate operations and maintenance budgets. Identification of ITS-related activities is again required, because as with construction budgets, projects and activities are not categorized as ITS or non-ITS.

The analysis accounted for ITS projects as identified by the state point of contact (examples can be seen in this section). State identified ITS projects include capital – initial installation of ITS equipment and systems, as well as O&M – operation and management of centers, and equipment operation and maintenance. Note that state-level ITS planning documents rarely include ITS deployments planned and funded by local municipalities.

For the four states listed above, federal and state/local percentages of FY 2000 ITS infrastructure deployments were calculated. An estimate of FY 2000 O&M costs of ITS deployments was calculated for the three states rich in ITS. Source information and project descriptions (which will vary depending on type of information available from each state) are described briefly. Any assumptions made are also described.

Summary of Virginia DOT ITS Federal Funding

Of all the state DOTs included in this analysis, Virginia has the most comprehensive ITS budget information. The analysis of the Virginia DOT ITS program was based on phone conversations with Kevin Barron, Assistant Director of ITS, VDOT's 6-year improvement plan (construction only), and the Statewide ITS Program Expenditures spreadsheet.

VDOT is somewhat unique compared to other state DOTs with regard to area of responsibility. VDOT is responsible for constructing, maintaining, and operating all of Virginia's primary and secondary roads. Counties, cities, and local municipalities usually have the responsibility of secondary roads in other states. Therefore, the VDOT information provides a more complete picture of the local-level ITS spending compared to the information from other states included in this analysis.

VDOT's total budget for FY 2000 is approximately $2.7B. This figure includes budgets for the three major transportation categories: maintenance, construction, and operations. The FY 2000 budget for the construction component, which is called out in the 6-year improvement plan, is approximately $1.2B. The combined operations and maintenance budgets are approximately $1.5B. In general, ITS projects and their associated estimated costs, with the exception of ITS O&M, are included in this category. Virginia DOT received approximately $711M in federal funds for FY 2000. VDOT's FY 2000 ITS budget (see table 1) is estimated at approximately $61.7M, but does not reflect *all* district and local ITS programs, or all ITS programs in the operations and maintenance budgets. This amount; however, does include O&M budgets (indicated with an asterisk in table 1) for the major traffic management centers throughout the state, which are almost totally funded with state funds. The ITS O&M budget, estimated at $13.4M for FY 2000, includes the costs of operating and managing systems, and maintaining equipment and facilities.

Table 1. Modified Virginia DOT Statewide ITS Program Expenditures
(FY 2000)

Region	ITS Project	FY00 $	Funding Source	Federal Amount	State Amount
Toll Roads					
Dulles Toll Road	ETC/AVI	$436,000	Federal	$348,800	$87,200
Dulles Toll Road	VMS	$0	Federal		
Dulles Toll Road	ETC @ parking lot	$0	Federal		
Bristol					
Districtwide	VMS	$520,000	Federal	$416,000	$104,000
Districtwide	HAR	$0	Federal		
Districtwide	FO Resource Sharing (Int)	$0	Federal		
I-81	ITS&TMS	$0	Federal		
Culpeper					
I-64	Afton Mtn. Fog System	$296,000	Federal	$236,800	$59,200
Districtwide	VMS(int)	$0	Federal		
Districtwide	FO Resource Sharing (Int)	$0	Federal		
Districtwide	VMS(primary)	$0	Federal		
Districtwide	FO Resource Sharing (p)	$0	Federal		
Fredericksburg					
Districtwide	VMS(int)	$306,000	Federal	$244,800	$61,200
Districtwide	FO Resource Sharing (Int)	$188,000	Federal	$150,400	$37,600
Lynchburg					
Districtwide	VMS(primary)	$583,000	Federal	$466,400	$116,600
Districtwide	HAR(primary)	$40,000	Federal	$32,000	$8,000
Districtwide	FO Resource Sharing (p)	$0	Federal		
Northern Virginia					
I-66	TMS expansion	$1,500,000	Federal	$1,200,000	$300,000
I-66	TMS expansion	$600,000	Federal	$480,000	$120,000
I-95	TMS expansion	$500,000	Federal	$400,000	$100,000
I-95	Congestion Mgmt.	$800,000	Federal	$640,000	$160,000
I-95	Local Network Ops	$500,000	Federal	$400,000	$100,000
I-395	TMS expansion	$850,000	Federal	$680,000	$170,000
District planning study	TMS	$0	Federal		
Umbrella study	Study	$0	Federal		
Districtwide	VMS(int)	$0	Federal		
Districtwide	HAR (int)	$0	Federal		
Districtwide	FO Resource Sharing (Int)	$388,000	Federal	$310,400	$77,600
Arlington	Signal system study	$0	Federal		
Districtwide	Partners in Motion	$0	Federal		
Districtwide	Signal system	$863,000	Federal	$690,400	$172,600
Districtwide	Signal optimization	$0	Federal		
Northern Virginia	Go Card Expansion	$0	Federal		
Districtwide	FO Resource Sharing (p)	$50,000	Federal	$40,000	$10,000
Operations: TMS	OM Budget *	$3,223,858	State		$3,223,858
Operations: SOC	OM Budget *	$3,064,762	State		$3,064,762
Richmond					
I-95 Bridges	Traffic mngmt plan	$0	Federal		
Areawide	Smart Traffic Center	$1,200,000	Federal	$960,000	$240,000
Districtwide	VMS(int)	$560,000	Federal	$448,000	$112,000
Districtwide	HAR(int)	$0	Federal		
Districtwide	FO Resource Sharing (Int)	$225,000	Federal	$180,000	$45,000
Districtwide	FO Resource Sharing (p)	$0	Federal		
Salem					
I-77, Fancy Gap	Fog system	$1,000,000	Federal	$800,000	$200,000
I-81	TMS	$0	Federal		
Districtwide	VMS(int)	$118,000	Federal	$94,400	$23,600
Districtwide	HAR(int)	$0	Federal		
Districtwide	FO Resource Sharing (Int)	$0	Federal		
Smart Road	Testbed	$5,783,000	Federal/State #	$1,098,770	$4,684,230
Districtwide	VMS(primary)	$100,000	Federal	$80,000	$20,000
Districtwide	FO Resource Sharing (p)	$0	Federal		
Staunton					
I-64	Afton Mtn. Fog System	$640,000	Federal	$512,000	$128,000
I-81	TMS	$0	Federal		
Districtwide	VMS(int)	$470,000	Federal	$376,000	$94,000
Districtwide	HAR (int)	$0	Federal		
Districtwide	FO Resource Sharing (Int)	$113,000	Federal	$90,400	$22,600
Suffolk					
I-64	TMS expansion	$1,500,000	Federal	$1,200,000	$300,000
I-64	TMS expansion	$1,000,000	Federal	$800,000	$200,000
I-64	TMS expansion	$1,000,000	Federal	$800,000	$200,000
I-64	TMS expansion	$1,450,000	Federal	$1,160,000	$290,000
I-64	TMS expansion	$1,535,000	Federal	$1,228,000	$307,000
I-64	Bridge Comm. Upgrade	$0	Federal		
I-64	TMS expansion	$750,000	Federal	$600,000	$150,000
I-64	TMS facility expansion	$1,000,000	Federal	$800,000	$200,000
I-264	TMS expansion	$1,000,000	Federal	$800,000	$200,000
I-264	TMS expansion	$0	Federal		
I-264 (44)	TMS expansion	$0	State		
I-264 (44)	TMS expansion	$0	State		
I-464	TMS expansion	$1,000,000	Federal	$800,000	$200,000
I-564	TMS expansion	$0	Federal		
I-664	TMS expansion	$801,000	Federal	$640,800	$160,200
I-664	TMS expansion	$1,084,000	Federal	$867,200	$216,800
I-664	TMS expansion	$2,000,000	Federal	$1,600,000	$400,000
Smart Traffic Center	Software Integration	$650,000	Federal	$520,000	$130,000
Districtwide	FO Resource Sharing (Int)	$288,000	Federal	$230,400	$57,600
Districtwide	VMS(primary)	$0	Federal		
Districtwide	FO Resource Sharing (p)	$0	Federal		
PTDC	AVL/GPS System	$500,000	Federal	$400,000	$100,000
Va. Beach	VMS	$1,104,000	Federal	$883,200	$220,800
Va. Beach	Video detection	$0	Federal		
CMAQ: Chesapeake	FO Ring	$1,700,000	Federal	$1,360,000	$340,000
CMAQ: Hampton	TMS/STC Interconnect	$0	Federal		
CMAQ: Newport News	ITS FO Link	$0	Federal		
CMAQ: Newport News	ITS FO Link	$0	Federal		
CMAQ: Norfolk	TMS/STC Interconnect	$370,000	Federal	$296,000	$74,000
CMAQ: Norfolk	TMS Operations *	$200,000	Federal	$160,000	$40,000
CMAQ: Smart Traffic Ctr	Roadway Info System	$0	Federal		
Operations: TMS	OM Budget *	$5,300,000	State		$5,300,000
Central Office ITS Group					
Statewide program	Program management *	$1,696,636	State		$1,696,636
Federal Earmarks	Multiple projects	$9,043,842	Federal	$7,235,074	$1,808,768
CVO Program	CVISN	$1,835,000	Federal	$1,468,000	$367,000
FY00 Total		**$61,725,098**		**$35,224,244**	**$26,500,854**
FY99 Total		$47,205,488			
FY98 Total		$77,642,198			

= 19% federal share and 81% state share

The majority of VDOT ITS projects receive some funding from federal-aid programs such as NHS, STP, CMAQ, or Interstate Maintenance (IM). VDOT also received federal earmark or ITS Integration Program funds. There are a few ITS projects that are funded solely by state funds.

To achieve an estimate of federal funding, the state's contribution to the ITS program was factored into the calculation. Each project listed in the Statewide ITS Program Expenditures (see table 1 for modified version) was identified as one of two possible classifications: federal (meaning that the project receives a portion of its funding from federal sources), or state (meaning that the project receives all of its funding from state funds). To simplify the calculations and because precise cost sharing data was not available, it is assumed that each project receiving federal funds receives 80% of its total cost from federal sources.

In cases where the funding source for a project was unknown in one district, but known for a similar project in another district, it is assumed that the known funding source would also apply to the project with no identified source. Projects classified as state are related to the operations of an ITS project, or receive funding from the Toll Facilities Revolving Account. One project, Smart Road, received funding from both the state and federal-aid program. The breakdown of funding by source was provided and, the costs have been separated accordingly in the calculations.

Based on the FY 2000 funding allocation presented in table 1, federal funding for ITS programs in Virginia is estimated at $35.2M or approximately 57% of the total ITS budget. State/local funding for ITS programs is estimated at $26.5M or 43% of the ITS budget.

It is interesting to note that of the $711M federal funds obligated to VDOT for FY 2000, approximately $35M or 5% was expended on ITS infrastructure. With the exception of the Norfolk TMS operations project, all of the O&M projects are funded with state dollars. Using the $13.4M O&M estimate, VDOT's ITS O&M budget is approximately 22% of the total ITS budget and less than 1% of the total O&M budget.

Summary of Arizona DOT ITS Federal Funding

The analysis of the Arizona DOT ITS program was based on phone conversations with Tim Wolfe, Assistant State Engineer, Arizona DOT. ITS budget information was not as detailed as that of VDOT; however, the budget information does include local expenditures as well as ITS O&M "line items."

ADOT's total budget for FY 2000 is $1.143B: $274M in operating and $869M in construction. ADOT received approximately $429M in federal funds for FY 2000, which are used in the construction category.

Table 2 contains cost estimates (average costs per year) for Arizona DOT ITS projects for FY 2000. ITS projects are categorized as either regional or statewide. The total

estimated cost for each project is presented along with the type of funding or funding source. For projects receiving a portion of funding from federal-aid or the ITS Integration Program (earmark projects), the federal/state share is provided. Based on this share, the cost for each funding source is provided. ITS O&M projects (indicated with an asterisk) are included under statewide projects.

Table 2. ITS Funding Sources and Amounts for Arizona DOT (FY 2000)

ITS Project	Total Cost	Funding Source	Federal Amount	State/Local Amount
Regional Projects				
Phoenix FMS	$10M	CMAQ (80/20)	$8M	$2M
Tucson FMS	$3M	State (100)		$3M
MAG[1] (local MPO)	$4M	CMAQ (80/20)	$3.2M	$.8M
Pima/Tucson	$1M	STP (80/20)	$.8M	$.2M
Phoenix Local Gov't	$2M	Local (100)		$2M
Statewide Projects				
VMS	$2.5M	State (100)		$2.5M
RWIS	$1M	State (100)		$1M
TOC Operations *	$2M	State (100)		$2M
O&M Field Equip *	$2M	State (100)		$2M
CVO	$1M	State (100)		$1M
Research	$.25M	SPR[2] (80/20)	$.2M	$.05M
Maricopa Cty O&M *	$1.5M	Local (100)		$1.5M
Earmark	$.78M	Earmark (80/20)	$.624M	$.156M
Total	**$31.03M**		**$12.824M**	**$18.206M**

In 1997, Arizona received a one-time federal grant for the Phoenix Model Metropolitan Deployment Initiative (MMDI). The total MMDI project cost was $32M of which $7.5M was from federal-aid with the remaining $24.5M from state/local and private funds. This one-time MMDI federal grant is not factored into the calculation because it occurred in a different year than the above expenditures.

Based on the funding allocation presented in table 2, the federal funding for ITS programs in Arizona is estimated at $12.824M or 41% of the total ITS budget. State/local funding for ITS programs is estimated at $18.206M or 59% of the total budget.

For FY 2000, ITS O&M (indicated with an asterisk in table 2) accounts for approximately $5.5M or approximately 18% of ADOT's total ITS budget and is approximately 2% of the total operating budget. ADOT uses state and local funds for ITS O&M.

For ADOT, ITS O&M costs include the day-to-day operations and management of the traffic center, and maintenance of the center facilities and field equipment. The Traffic

[1] Maricopa Association of Governments
[2] State Planning & Research

Operations Center (TOC) operations includes 33 full time employees: 10 operators, 11 computer technicians, 2 traffic analyst, 3 project managers, 1 public relations staff, 1 trainer, 3 administrative assistants, 1 TOC manager, and 1 Group Manager. The functions under this area include ITS planning, project management, TOC operations, systems integration, incident management coordination, public relations, and overall coordination of ITS activity. The O&M for field equipment includes personnel costs for traffic signal technicians in each of the four ADOT regions, vendor cost, parts, materials, and equipment. The Maricopa County O&M item includes personnel for planning, project management, TMC operations, incident management, systems integration, and overall coordination of the County ITS Program.

None of the three ITS O&M projects described above include costs for freeway service patrols and incident response teams. It is believed that these are non-ITS freeway services. However, there is a linkage to ITS through the use of ITS equipment at the roadside and systems operated at the traffic center. Incident or emergency information can be detected and verified using ITS technologies and communicated to the appropriate service patrol.

Summary of Minnesota DOT ITS Federal Funding

The analysis of the Minnesota DOT (Mn/DOT) ITS program was based on phone conversations with Patty Bednarz, Orion Project Coordinator, Glen Carlson, Manager TMC, Mn/DOT, and Mr. Gordy Kordosky, Budget Manager, Mn/DOT, and ITS funding source worksheets developed for in-house use. Minnesota DOT is divided into eight areas, seven districts plus the Metro Division (the largest of the eight areas), and the Central Office. The Metro Division, representing the cities of Minneapolis and St. Paul, contains the majority of ITS infrastructure deployment for the state. The funding information presented in this paper is based on data for the Metro Division and it is assumed that this data is sufficient to represent ITS funding for Minnesota.

Mn/DOT's total budget for FY 2000 is approximately $1.6B. This figure includes budgets for construction, maintenance, and operations. Mn/DOT received approximately $476.9M in federal funds towards the construction category. The FY 2000 budget for operations and maintenance is approximately $870.4M. Although this figure is just over half of the department's budget, it includes maintenance, contract construction inspection, design, research, and vehicles. Costs of buildings, general support (e.g., top management, Human Resources, administrative services, legal), and local road operations are not included in operations and maintenance.

Table 3 lists the funding sources for ITS projects in the Metro Division for FY 2000. The total amount of funding from each source is provided. For sources receiving a portion of funds from federal-aid programs or the ITS Integration Program, the federal/state share is indicated. Using this cost share, the amount of funds from each source is calculated.

CMAQ funds are spread throughout the MPO (metropolitan planning organization – in this case the Metropolitan Council) – 8 counties, numerous cities, including the two

largest, St. Paul and Minneapolis, and transit organizations. The Metro Transportation Improvement Plan (TIP) is a 3-year program for the Metro Division only. The amount of federal funds from this source could be greater than estimated; however, additional information is not available. The ITS Management Team (IMT) sets the policies and guidelines for ITS activities in Mn/DOT, including the use of the ITS earmarked funds. The Office of Advanced Transportation Systems (OATS) administers the actual use of the earmarked funds. The funding share for the earmarked project is not a standard 80/20 split and is further explained in footnote 5. Mn/DOT applied for a one-time federal grant for its Orion Metropolitan Deployment Initiative (MDI). Although the project was not federally funded, it was continued using state funds. A total of $6M of state funds was expended on the Orion MDI during FY 2000 and has been included in table 3 for completeness. The $750K funding for ITS research is based on an assumption that approximately 25% of the $3M Mn/DOT Research budget is allocated for ITS.

Table 3. ITS Funding Sources and Amounts for Mn/DOT (FY 2000)

Funding Source	Total Amount	Federal/State Share	Federal Amount	State Amount
CMAQ	$18M	80/20	$14.4M	$3.6M
Metro TIP - Management	$10M	80/20[3]	$4M	$6M
Metro TIP - Preservation	$3M	State only		$3M
IMT (Earmark)	$12M	[4]	$8.88M	$3.12M
TMC Operations *	$.47M	State only		$.47M
Ramp Metering Operations *	$.21M	State only		$.21M
HOV Operations	$.18M	State only		$.18M
Traveler Information Program *	$.68M	State only		$.68M
ITS Equipment Maintenance *	$.96M	State only		$.96M
Orion MDI Project	$6M	State only		$6M
ITS Research	$.75M	State only		$.75M
Total	**$52.25M**		**$27.28M**	**$24.97M**

Based on the FY 2000 funding allocations presented in table 3, Mn/DOT receives $27.28M or approximately 52% of its ITS funding from federal sources. State/local funding for ITS programs is estimated at $24.97M or 48% of the ITS budget.

For FY 2000, ITS O&M projects (indicated with an asterisk in table 3) account for approximately $2.5M or approximately 5% of Mn/DOT's total ITS budget and is roughly

[3] The 80/20 split is applied to only $5M. The remaining $5M is from state funds.
[4] The funding share is assumed to be 50% for federal, 20% state, with the remaining 30% split at 80% for federal and 20% for state. OATS is the funding source for the hard state dollars for the earmarked funds.

less than 1% of the total operations and maintenance budgets. Mn/DOT uses state and local funds for ITS O&M.

Although Mn/DOT, like many other state DOTs, maintain separate budgets for operations and maintenance activities, ITS O&M activities cannot be thought of as separate and unrelated. Within each of these two budgets, ITS-related activities are not always implicitly identified. ITS-related O&M activities may be "buried" within various line items.

The Traffic Management Center operations include staff to operate and manage the automated freeway surveillance, control, and information systems. Operating costs for the Ramp Metering Program includes staff to monitor and adjust the settings of the ramp meters, perform field reviews, and respond to public and media inquiries. The HOV operations costs include 3 full-time staff responsible for managing the three Mn/DOT HOV garages, administering and operating the HOV gate system, and responding to public and media inquiries. The costs to operate the Traveler Information Program include technical support to disseminate traffic flow information and TV video to information service providers, to operate and maintain the traffic radio partnership on radio station KBEM 88.5 FM, and to provide information to, and monitor six traffic information web sites (sites run by private partners). A traffic TV partnership with the private sector is currently being developed. The "ITS Equipment Maintenance" line item in table 3 covers the maintenance costs for all ITS equipment. Specifically, it includes repairing and/or replacing parts, replacing cabinet equipment, and maintaining the fiber optic cabling system. The above ITS operations costs do not include Mn/DOT's Highway Helper Program as it is not considered an ITS program. However, there is a linkage to ITS through the use of ITS technologies at the roadside and communication from the operations center to the field staff.

The $2.5M in O&M costs for Mn/DOT covers approximately 230 miles of fully instrumented highway. All O&M activities are performed by in-house Mn/DOT employees. Mn/DOT does not out-source system development, maintenance, or administration jobs.

Summary of Vermont DOT ITS Federal Funding

The analysis of the Vermont DOT ITS funding was based on phone conversations with Bruce Bender, Vermont DOT. Vermont is a rural state and has not deployed much ITS-related infrastructure. However, there are 2 ITS Earmark projects in progress:

- FY 1999, Brandon, VT ITS Project
- FY 2000, Vermont Rural System

Costs of the earmarks are shared between state funds and ITS Integration Program funds with an equal split of 50% from each. The FY 1999, Brandon, VT ITS Project has a total cost of approximately $594K with federal funds providing approximately $297K. The

FY 2000, Vermont Rural System has a total project cost of approximately $1.572M, with federal funds providing approximately $786K.

For Vermont, a rural state with minimal ITS deployed to-date, federal expenditures for ITS are approximately 50%. As noted earlier, for federal ITS earmark projects the total amount of federal funds from all federal sources can be a high as 80% if a state chooses to use (up to 30% of) its federal-aid funds to meet the 50% state match.

Results

For the four states included in this analysis, the estimate of the percentage of federal funds expended on ITS ranges from 41% to 57% (see figure 2). Mitretek's original estimate of 50% federal funding is within this range. Furthermore, the 50% federal funding rate for Vermont, the only non-ITS-rich state included in this analysis, is also within this range. Weighted by the amount of ITS budget in each state, the average federal funding share in this analysis would be 52%.

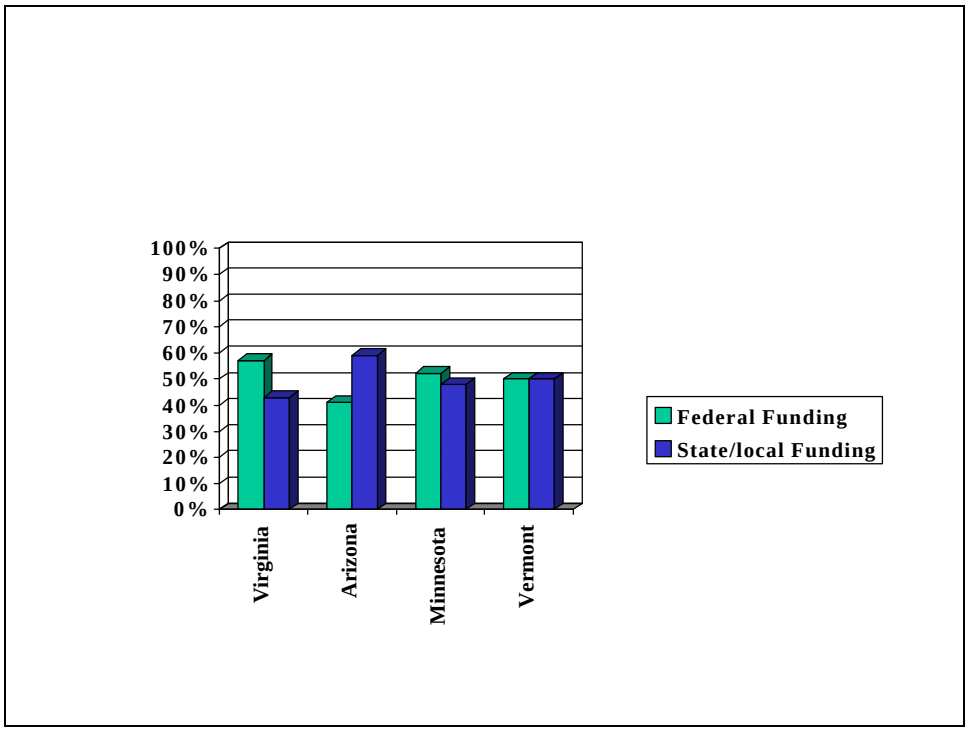

Figure 2. Federal and State/local ITS Funding by State (FY 2000)

As can be seen from table 4, there appears to be little correlation between percent federal funding and ITS budget per state. One could hypothesize that after reaching a certain budget amount, the percentage of federal funds begins to decrease. Furthermore, one could speculate that to achieve the larger ITS budget would require an influx of state/local funds thereby naturally lowering the federal contribution. Further research on a larger number of states is needed in order to determine if this is the case nationwide.

Table 4. Summary Federal Percentages and ITS Budget (FY 2000)

	Vermont	Arizona	Minnesota	Virginia
Federal Funding	50%	41%	56%	57%
ITS Budget	$1.572M	$31.03M	$52.25M	$61.7M

ITS budgets and federal funding levels will vary from state to state. Likewise, ITS budgets for a given state will vary from year to year. Consider VDOT's estimated ITS budget over the past 3 fiscal years (see table 1) – over $77M for FY 1998, down to $47M for FY 1999, and back up to $61.7M for FY 2000.

In analyzing the results, possible limitations of the analysis should be considered:

- Level of data and detail differed for each state
- Unclear if all ITS expenditures/projects were captured
- Difficult to separate ITS O&M costs from statewide O&M budget and infrastructure projects
- In some cases, incomplete data had to be used

Even with the above limitations, the analysis was based on comprehensive, actual budget/planning data, rather than estimates based on federal/state funding formulas. This analysis also provides new insight into the levels of federal and state/local spending for ITS infrastructure, and operations and maintenance.

Summary of O&M Analysis

How a state DOT chooses to use federal-aid funds likely impacts the percentage of federal funding for ITS programs. With the exception of one VDOT operations project, the states included in this analysis used state and local funds for ITS O&M. TEA-21, enacted in June 1998, clarified the eligibility of state and local governments to use funds from federal-aid programs for ITS projects. In January 2000, the FHWA Operations Core Business Unit (CBU) issued a memo and guidance (http://ops.fhwa.dot.gov/Travel) to Resource Center Directors, Division Administrators, and Federal Lands Highway Division Engineers on federal-aid eligibility of operating costs for transportation management systems. The guidance contains interpretation of TEA-21 legislation for the eligibility of typical operating costs and expenses for traffic monitoring, management, and control under federal-aid funding. ITS O&M costs for state DOTs in this analysis account for less than 1 – 2% of the states' total transportation operating and maintenance budgets (see table 5). Based on this analysis, it is unclear if state DOTs choose not to use federal-aid funds for ITS O&M because of the comparatively small budgets, or if the DOTs are unaware of the eligibility of federal-aid programs for this use.

Although O&M budget data was analyzed from only three states, there are several lessons learned from this analysis. Most importantly, what is meant by and included under ITS operations and maintenance is fairly consistent across the state DOTs. In

general, ITS operations and maintenance includes the daily operations of traffic centers and systems, management of these systems and the staff that operate them, and the maintenance of the center facility, system, and field equipment. It is worth noting that separate O&M budgets are not maintained for ITS projects and non-ITS projects; therefore, expenditures for ITS O&M must be estimated. Many ITS O&M activities could be hidden in construction startup costs or rolled-up in other O&M activities. Hence, it is safe to assume that the ITS O&M budgets in this analysis are under-estimated. ITS O&M budgets range from 5% to 22% (see table 5) of a states' ITS budget. In general, state and local funds are the source for ITS O&M expenditures.

Table 5. Summary Funding Information (FY 2000)

	Virginia	Minnesota	Arizona
Total DOT Budget ($B)	$2.7	$1.6	$1.14
Total Construction Budget ($M)	$1,200	$730	$869
Total O&M Budget ($M)	$1,500	$870	$274
Total Federal Funding ($M)	$711	$476.9	$429
Total ITS Budget ($M)	$61.7	$52.25	$31.03
ITS Funding- Federal Sources ($M)	$35.2	$27.28	$12.824
ITS Funding - State Sources ($M)	$26.5	$24.97	$18.206
Total ITS O&M Budget ($M)	$13.4	$2.5	$5.5
Percent Federal Funding for ITS	57%	52%	41%
Percent State Funding for ITS	43%	48%	59%
ITS O&M as % of Total ITS Budget	22%	5%	18%
ITS O&M as % of Total O&M	0.89%	0.3%	2%

Recommended Next Steps

The ITS Joint Program Office may want to consider periodic updates to this working paper and to broaden the number of state DOTs participating in the analysis. By incorporating ITS budget data from a greater number of state DOTs, the ITS JPO will be better able to assess the proportion of federal spending on ITS programs nationwide as well as to estimate the federal-aid spending on ITS O&M. Based on recent conversations with other state DOTs not included in this analysis, federal-aid program funds *are* being used for ITS O&M.

As was noted earlier in this paper, inclusion of detailed local ITS spending was beyond the scope of this paper. However, based on conversations with various state ITS engineers regarding the amount of and budget for local ITS deployments, it is recommended that the ITS JPO consider researching the amount of local funds expended on ITS. The state(s) selected should have sufficient ITS deployments at the local municipality level in order to provide enough data for analysis. The state(s) should have a broad range of ITS deployments such as rural and metropolitan/congested areas throughout the state. Results of the local municipality analysis should be factored into this analysis to determine if the estimate of the overall percentage of federal funding for ITS should be adjusted.

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