10 PROJECT FUNDING

10.1 Funding Trends and Issues

10.1.1 TRANSPORTATION REAUTHORIZATION BILL

The 2005 Transportation Reauthorization Act, known as the "Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users" (SAFETEA-LU), provides the largest amount of federal funding for highways, highway safety, and public transportation in the nation's history. SAFETEA-LU replaced the Transportation Equity Act for the 21st Century (TEA-21), authorized in 1998. This act has made a significant impact on the resources available for transportation in general, and ITS in particular. The act emphasized a number of issues:

- Safety
- Congestion Relief
- Mobility and Productivity
- Efficiency
- Environmental Stewardship
- Environmental Streamlining
- Equity
- Innovative Finance

Of these issues, ITS can be used to enhance safety, provide congestion relief, improve mobility and productivity, promote efficiency, and support environmental stewardship.

There were changes in the act regarding the use of funding for ITS projects. One of the most significant changes is the discontinuation of dedicated funds for ITS deployment. After Fiscal Year 2005, there will be no money set aside for deploying ITS projects. However, money for highway construction or enhancements, such as from the National Highway System (NHS) Program, can now be used to deploy ITS equipment as long as it addresses the goals of the funding program, such as reducing congestion or improving operations. While this eliminates the assurance of funding specifically set aside for ITS deployment, it creates the opportunity to access a greater amount of funding, can help tie ITS to other projects the state is pursuing, and helps mainstream ITS with other state and agency initiatives. The ITS Research program was retained, as were several other programs that can be used to fund ITS solutions.

10.2 Funding Environment

In recent years, there has been less transportation funding available at the federal, state, and local levels. While safe and efficient transportation is still a priority for government at all levels, the trend towards greater accountability and lower taxes results in fewer resources to spend on transportation. In this environment of static funding, agencies must carefully choose what projects they pursue with an eye toward activities that derive the most benefit from the available resources. It does not appear that this outlook will change significantly in the near future, so agencies should be very selective when determining projects for deployment, enhancement, and/or operation.

Federal funding often requires states to provide matching funds to access the federal funding source. State agencies or legislatures may not be able, or willing, to provide the matching funds, so an agency may not be able to access existing federal funds that are earmarked for a particular agency or initiative. The best way to address this is to make the decision makers aware of the importance and benefits of the project. Benefits of projects should be presented in a clear, concise manner so they are easy to understand and make a positive impact on the decision makers.

While a state will have to find the resources for a match, its investment is leveraged significantly with federal funds. Agencies should also be aware of different types of resources that can be used as matching funds, such as operations staffing hours or previously deployed systems or equipment that can be included as "in-kind" match.

10.3 Operations and Maintenance

In addition to deployment costs, projects also have on-going operations and maintenance costs (see Section 9). Agencies should address these ongoing costs during the planning stage of the process. Annual operating costs should be part of the project estimates so that an agency clearly understands the resources necessary to sustain the project. This should eliminate "hidden costs" in a project and help an agency determine if the project is worth being deployed.

As available funding for new deployments declines, many states are shifting their focus toward improving the operation of transportation networks and systems that have already been built. ITS solutions can be used to improve on-going operations of transportation systems, making them more efficient and effective. For example, traffic cameras can be used both to monitor traffic and to verify changeable message sign messages, identifying issues faster and more cost-effectively than sending personnel into the field to confirm an incident.

10.4 State Procurement Process

The Illinois Central Management Services (CMS) establishes the policies and procedures governing procurement for state agencies. There are three basic routes that ITS procurements can take, depending on the type of project:

- Technology - if IDOT is procuring technology that is not included in an existing master contract, its procurement goes through the IDOT Information Technology (IT) unit. This requires the procurement to go through the Request for Proposal (RFP) process described below. For technology, this includes review by CMS.
- Equipment and Standard Services - if IDOT is procuring equipment or a non-technical service that is on an existing master contract, it goes through the IDOT Supplies and Services unit.
- Professional Services - if IDOT is procuring specialized technical services, it goes through the IDOT professional services unit. This requires the procurement to go through the RFP process.

For procurements that go through the RFP process for the Information Technology or Professional Services units, selection of a vendor uses the following process before an agency can negotiate with a vendor:

1) Advertise RFP
2) Receive proposals
3) Administrative review of submitted proposals
4) Technical review of submitted proposals
5) Central Management Services (CMS) review (required only for IT technology, not services)
6) Selection committee review and recommendation
7) Price evaluation

The RFP process usually takes a 45-day advertising period followed by a two-month evaluation period starting from the date that all proposals are received. Some minor changes have recently been made in the selection committee process to speed up the process. A new database is now being used to track vendors that have delinquent debts to Illinois. This will be used to identify vendors that are not qualified for Illinois contracts.

For procurements that go through the Supply and Services Unit, the process has two tracks:

1) If a supply or service is already on a master contract, the order can be placed right away with a pre-approved vendor.
2) If a supply or service is not on a master contract, an invitation for bid is posted, which allows vendors to submit bids to perform the service. The lowest cost qualified bid is then selected.

There are a number of issues that can slow down the award of an RFP or signing of a contract:

- Number of legal departments involved – Review by agency or company legal departments can be a lengthy process. The more entities involved increases the number of legal departments that need to review documents.
- Required Forms – Not filling out forms required for procurement within the designated time period can delay the procurement process or even necessitate the process to start over.
- Identifying and securing funding – funding that is identified at the beginning of the procurement process might sometimes be sidetracked for other purposes by the agency, causing a funding shortfall for the project.
- Review by CMS – CMS review for technology procurements can be lengthy and checking their progress on the review can be difficult.
- Number of requests to units – Project managers have no control over this, but a large number of simultaneous requests for procurement review and approval by the unit will slow down the process significantly.
- Request for Information (RFI) - Involving an RFI prior to issuing an RFP to get a better idea of the work that will need to be accomplished in the project can add time to the

project, though it can provide worthwhile information on what should be included in the RFP.

In general, using equipment or services included in a master contract is the fastest, easiest way to procure goods or services for a project. Reviews are performed and agreements are already in place, so the RFP process is not required, reducing project implementation by months.

10.5 Potential Funding Sources

Funding is the major concern Illinois faces in pursuing the projects suggested in this Statewide ITS Strategic Plan. Illinois recognizes the realities of the current and anticipated future ITS funding environment. SAFETEA-LU will be the largest source of funding for transportation projects over the next five years and will significantly influence both federal and state funding availability.

The following is an overview of potential funding sources.

10.5.1 Federal and State Funds

A combination of federal and state funds is a likely scenario to pay for the implementation and operation of projects. Traditionally, federal funds have been used for deployment only. States have been required to provide their own operations resources. SAFETEA-LU has changed this scenario, allowing greater flexibility in how federal funds can be applied.

10.5.2 Transportation Security Funds

Transportation security funds are another opportunity for funding projects with security applications, such as surveillance cameras or communications devices. Transportation enhancements and ITS projects can address security concerns by detecting threats, maximizing the movement of people, goods, and services, and supporting response activities. Security funds could be available through the Department of Homeland Security, Department of Agriculture, or the Department of Energy, as well as other agencies.

10.5.3 Federal Earmarks

Federal earmarks are attached each year by the U.S. Congress for specific projects to various appropriations bills or in the conference or committee reports accompanying the bill. Earmarking is the allocation of a lump sum appropriated for a specific purpose, usually a purpose within the general authority of the entity or program being funded. Under the new transportation act, money from these earmarks can be used to deploy ITS projects.

Transportation earmarks for Illinois in SAFETEA-LU are contained in Appendix K.

It is often acceptable to build out planned ITS infrastructure as line items in construction or rehabilitation projects. These features often serve a dual purpose in that they can serve as traffic management tools during construction and then are left in place as permanent congestion management tools. This is allowed under SAFTEA-LU funding and helps to mainstream ITS.

10.5.4 FEDERAL TRANSPORTATION PROGRAMS

SAFETEA-LU continued or established a number of programs which are applicable to the deployment or operation of ITS technologies. With the removal of ITS Deployment funds, non-earmarked programs such as the National Highway System (NHS) and Surface Transportation Program (STP) can now be used to support ITS solutions.

In addition to those broader programs, specific programs from SAFETEA-LU with potential to fund ITS solutions include, but are not limited to:

- Real-Time System Management Information Program – promotes monitoring and sharing information on traffic and travel conditions on major highways (this program does not have any designated funding)
- Congestion Mitigation and Air Quality (CMAQ) Improvement Program – promotes improved traffic flow and air quality
- Highways for LIFE Pilot Programs – promotes the demonstration of new technologies, improved standards, and business practices in the highway construction process
- Work Zone Safety Provisions – promotes the prevention and reduction of work zone injuries and fatalities
- Highway Safety & Improvement Program – promotes reduced traffic fatalities and serious injuries on urban and rural public roads
- Railway/Highway Crossings – promotes reductions in the number and severity of injuries at public highway-railroad crossings
- Commercial Vehicle Information Systems and Networks (CVISN) Deployment – promotes improved safety and productivity of commercial vehicles and drivers
- ITS Research – supports research of ITS technologies to improve operations and congestion
- Surface Transportation Research Development, Deployment Program – promotes innovations in surface transportation infrastructure, services, and operations through research, development, and deployment

Additionally, several programs aim at enhancing freight management and capacity.

Funding from these sources require matching funds to access. The exact percentage of matching funds varies by program, as do restrictions on what can be used as a match.

Federal funding from the transportation act is usually distributed through the Illinois DOT, though funding from some programs is assigned directly to planning organizations or transit agencies. Local agencies should work with the IDOT ITS Program Office to determine what federal money is available for district projects.

10.5.5 FEDERAL GRANTS

The principal purpose of an award of financial assistance is to transfer a thing of value from a Federal agency to a recipient to carry out a public purpose of support or stimulation authorized by a law of the United States. A grant differs from a contract, which is used to acquire property or services for the Federal government's direct benefit or use.

Federal grant information is available electronically at www.grants.gov.

10.5.6 PUBLIC/PRIVATE PARTNERSHIPS

A number of projects outlined in this Illinois Statewide ITS Strategic Plan could potentially include a match of private funding, such as Satellite Radio Information Service, the 511 Traveler Information System, and Enhanced Communications Links. The State of Illinois could aggressively pursue private partners for applicable projects. Private parties could provide goods or services, such as advertising time, equipment, or permission to place equipment on their property, instead of funding. One example of a public/private partnership in Illinois is the agreement between the Illinois Tollway and Chicago television station NBC 5, where the Tollway provides exclusive video camera feeds to the news station in return for advertising time it uses to promote the use of I-Pass transponders.

There are three general categories of Public/Private Partnerships:

- **Privatization of Public Sector Functions**: The public agency allows private entities to engage in certain activities the public sector has legal authority over through a lease, license, franchise, or sale. The private sector uses its own capital to provide the service. For this kind of partnership to be effective, there must be enough of a consumer market to make the activity profitable for the private entity.
- **Joint Ownership**: The public agency and private entity enter into an arrangement where they share the responsibility and benefits of owning and operating a facility, system, or service. Costs, risks, and rewards are determined in advance of the agreement.
- **Innovative Institutional Arrangements**: The public agency and private entity enter into an agreement short of joint ownership, such as revenue sharing or division of responsibilities.

10.6 Legal Issues

There are a variety of issues involved in entering into an agreement/contract with different agencies for ITS projects. As new technologies and delivery systems have advanced, a number of potential legal problems have developed which had not been addressed in previous transportation projects. Many relate to computer software and traveler information distribution, though they have parallels with traditional physical improvements. These legal issues often arise after the initial deployment of a project and frequently deal with ownership of data, data processing, or operations. A Concept of Operations should be developed that covers the expected life span of the system. Language should also be included in an initial agreement with contractors, partners, or other agencies to address future maintenance, operations, improvements, and data sharing to ensure that the project will be able to evolve equitably.

10.6.1 PROPRIETARY SOFTWARE

Proprietary software is a term used to describe software in which the user does not control what it does or cannot study or edit the code, in contrast to free or open software. If a contractor is hired to develop software or pre-developed software is used, the original developer usually owns the rights to that code. Only that original developer is allowed to make changes to the code to

modify the software, so if an agency wants any modifications or enhancements, they must deal with the developer. This can leave the agency in a poor position to negotiate what it sees as a reasonable price for these changes. While a software package can be purchased at a low initial price, if there are no safeguards in the initial agreement, the cost can increase greatly with future modifications.

The best strategy is to address this in the initial agreement with the software developer, either allowing the agency to assume the rights to the software, including a warranty that covers future modification for a defined number of years, or by specifying a price or rate for the cost of future work on the software by the agency.

10.6.2 "NO COMPETE" CLAUSES

Some private firms include language in their agreements that their software, system, or process cannot be used by a competing firm. While this might not seem like a major issue for a public agency, it can cause problems in partnering with private agencies or future plans to generate revenue for the agency. If information generated using the private firm's software ends up being sent to another private firm, even if it is through another public agency, the first firm could consider such action a violation of the agreement. This is usually not a problem if private entities receive the information in the same way the general public does, but it can become one if they have a direct line to the data source.

The best strategy is to address this in the initial agreement negotiations with the software developer by specifying where the information will go and whether it is used by any of those entities for profit. An agreement with the software developer may be able to be reached if a third party is passing along information to private entities, or the agency may need to filter the information before redistributing it to all or some of its contacts. Agencies should be aware of who receives the information or benefit from a project and how private firms relate to a project.

10.6.3 INTERSTATE COORDINATION

With some projects it will make sense to coordinate or integrate with other jurisdictions or states. While coordinating with agencies from another state, there are an increased number of issues that must be addressed, as agencies will be operating under different laws and state regulations.

It is important to make sure that the agreements an agency already has in place do not conflict with new agreements with another state, or existing agreements that the second state has in place.

In addition, some jurisdictions have different regulations and responsibilities. Even though the agency may share several areas of responsibility, they might not share all, such as maintenance. When coordinating between districts, it is important to ensure that the agencies and individuals who will be responsible for all aspects of the projects are clearly defined.

In projects where both states will be providing funding, either for initial deployment and/or for operations and maintenance, it is critical to define how funding will be collected and distributed beforehand. Some state agencies are able to receive funding transfers from other states, while payments to others may be routed through the state's general funds, making it difficult to allocate money directly to a specific project. Once in the General Fund, that money is available to all

IDOT divisions and the project must compete with other initiatives. Also, states may have different regulations on their procurement processes. By examining these issues early in an agreement and developing a strategy to use funding and procure equipment within both partners' regulatory framework, the project can avoid confusion and delays.

Formal inter-agency agreements (IGA) or memoranda of understanding (MOU) may be necessary, especially for transferring funding between states or if personnel from one state do any work in the neighboring state. These agreements will detail what actions can or cannot be taken, ensure that these activities receive appropriate review from agencies' legal counsel, and provide a legal basis for the agencies' actions. Examples of activities near border areas that may need to be covered under these formal agreements include roadway maintenance, motorist assistance, equipment installation, and remote operation of a neighboring state's equipment.

10.7 Recommended Process to Consider the Impacts of Life Cycle Costs

When considering the cost of an ITS project, it is very important to consider life cycle costs, in terms of both the ITS technologies and the effect those technologies will have on infrastructure life cycles. Closer examination of life cycle costs and effects provides a more accurate view of a project and minimizes the surprises from hidden costs, such as frequent upgrades. New technologies, applications and institutional arrangements, including public and private sector ITS implementation and operation roles and responsibilities, are emerging at a rapid pace. These variables can have a substantial impact on the bottom line. ITS projects should plan for these changes as much as possible by considering the life cycle of similar projects and equipment costs in the project budget. Different projects require different levels of effort to operate and maintain. Some projects, such as Emergency Vehicle Preemption, are fully automated and require relatively little maintenance once they are set up, while others, such as a Traveler Information Website, require frequent updates and regular monitoring. Adequate consideration is also needed for operation of a system that may include periodic updates and integration with other systems.

The general stages in the lifecycle of a project are:

1. Plan
2. Design
3. Deploy/Implement
4. Operate & Maintain

If a more detailed lifecycle analysis is needed for very large or complex projects, then the lifecycle can be further broken down in the standard Systems Engineering phases, producing estimates of duration and cost for each phase. These steps include the following:

1. Concept of Operations
2. High Level Requirements
3. Detailed Requirements
4. High Level Design
5. Detailed Design

6. Implementation
7. Integration and Testing
8. Subsystem Verification
9. System Acceptance
10. Operations and Maintenance

In some cases the costs of dismantling the system after its useful life has passed can be significant and should also be included in the lifecycle cost estimate. This would include any salvage value that can be recovered.

Some things to consider when looking at life cycle cost include:

- **Useful equipment life** – Manufacturers should have an estimate for the durability of their equipment. This can be supplied during the Design phase. It provides an estimate of how long the equipment should last under normal operating conditions. These estimates can also be acquired from other end users of the products, who may have a different perspective on the issue of longevity and durability.
- **Useful technology life** – It is critical to research whether technology will be outmoded or is likely to fall out of common use. While the technology for a project may be operational for a long time, if it is no longer commonly used in the future it may be harder to find replacement parts and upgrades. Addressing these concerns is essential at the time of deployment. While it is often hard to determine what technologies or software will be used in the future because of the rapidly changing nature of the field, it is still instructive to look at whether the market for the technology is developed, identify whether the technologies are compatible with other developed technologies, and whether there are competing types of technologies that may be more prevalent in the future.
- **Maintenance and replacement parts** – In order to maintain equipment, extra parts will often be used during the Operations & Maintenance phase. Contractors or manufacturers can supply the estimated number and cost of replacement parts necessary under the manufacturer's recommended equipment life during the Design phase of a project. Additional estimates can also be acquired from other end users of the products.
- **Operator training** – When a project is deployed, the operations staff needs to be adequately trained to operate and maintain the equipment. The amount of this training varies with the complexity and robustness of the equipment. Training is often included in the Deployment/Implementation phase of a project. Further training may be necessary if there are significant enhancements to equipment or if employee turnover is expected during the useful life of the system. To be completely self-sufficient, an agency may also want to consider purchasing reproducible training materials, "train-the-trainer" programs, and allocating resources for employees to join industry user groups relevant to the equipment.
- **Specialized equipment** – Some systems require specialized equipment to operate and this equipment may be harder to find or more expensive to replace in the Operations & Maintenance phase. Equipment may even be custom built and require special maintenance. The increased cost of specialized equipment, including maintenance, should

be measured against the utility it provides. A specialized unit at a higher cost may be able to perform unique actions that justify the cost over a lower-priced unit.

- **Specialized expertise** – During the Design phase, it should be determined whether specialized expertise is needed to deploy, operate, or maintain a system. The ability to install, integrate, or operate some systems may be beyond the experience of many contractors or agency personnel. If specialized expertise is needed, it can significantly increase the initial and/or on-going costs of a project.
- **Evaluation** – The Operations & Maintenance phase should include periodic tests to make sure that the system is working at an acceptable level and performing necessary functions.
- **Configuration management** - Configuration management is a process to ensure that only authorized changes are made to a system, and it provides an organized method for tracking changes and a detailed history to check and make sure that system upgrades are compatible with other integrated systems. Configuration management should be conducted over the entire life of an ITS project and factored into Operations & Maintenance costs. The configuration management process creates an environment where the details of a variety of complex systems can be efficiently managed. There are four main steps to the configuration management process:
    - Configuration Identification – the process of creating and maintaining documentation describing the Configuration Items in a system and determining the hierarchy of components of a system.
    - Change Control – managing changes to the configuration of a system by evaluating the overall impact of the change, tracking the progress of the alteration, and ensuring that the change is properly documented. This will ensure that any changes to the system are managed carefully and each change is uniquely identified to minimize confusion.
    - Configuration Status Accounting – this action records all relevant information about Configuration Items for the entire system. Each Item's documentation is updated with changes to ensure that the records accurately reflect the Item's current status.
    - Configuration Audits – a process to confirm that the documentation for all elements within the system is consistent with the Item's current state. This is a safety check to ensure that all procedures in the Configuration Management Plan are correctly followed. Any discrepancies between what is occurring and what needs to take place are documented and auditors provide suggestions for returning to compliance.

ITS projects can also affect the life cycle of more traditional transportation infrastructure. Systems that regulate use of infrastructure can reduce the amount of maintenance or repairs. For example, Virtual Weigh Stations that identify grossly overweight commercial vehicles can reduce the deterioration of roads and preserve pavement life. These impacts should be considered as benefits when selecting projects. While a project may require a large capital investment, it may be justified if it reduces infrastructure maintenance costs in addition to reducing congestion.

10.8 Recommended Process

While the exact types of costs and benefits will vary by project, the general areas below should be examined when determining which project, if any, should be deployed or implemented. The results of the benefit/cost analysis can be used for both a traditional project and an ITS project to compare the effectiveness of the two projects. (A present worth cost comparison is recommended to compare projects with similar benefit cost ratios, but have different life expectancies.) Example categories of benefits and costs are listed below. These are not intended to be comprehensive, but provide a good beginning for analysis for individual project analysis.

10.9 Example Project Costs (include expected Project Life Span)

- Design (agency and consultant design labor costs, prototyping, surveys and inventory)
- Deployment (modification of existing equipment and facilities, new equipment costs, installation, integration, training, downtime costs during construction, utility setup charges)
- Operations and Maintenance (operating, maintenance labor, replacement parts, updates/enhancements, evaluation, configuration management, utility costs, specialized test equipment)
- One additional issue to consider while assessing the costs of a candidate project is performance measurement. The current trend in ITS is to utilize system performance measures to identify needs, assess countermeasures, and refine procedures. The process of implementing performance measures can require additional human resources and, in some cases, can require additional technical resources as well.

10.10 Example ITS Project Benefits

- Reduced Congestion (measured by hours saved X median hourly income rate)
- Improved Safety (measured by percentage reduction in accidents X current total number of accidents in area affected X average cost of fatal and non-fatal accidents as accepted by Illinois DOT)
- Increased Capacity (measured in terms of the effective increase in the number of vehicles or travelers per unit of time that pass through the facility)
- Air quality improvements (measured in pounds of each pollutant that are not introduced into the environment. This value is then converted into a societal cost savings in dollars.)
- Increased Life Span of Infrastructure (improvement/replacement cost X percentage increase in infrastructure life span)
- Security (measured in terms of the consequences of failure.) Comparison of security initiatives would not follow the typical benefit/cost ratio analysis process. Instead, it would be more of a risk comparison between alternatives. Once alternative project approaches that have acceptable risks are identified, those projects could then be compared on a cost basis.

Performance measures (discussed in Section 2) might also be a consideration during benefits analysis in several ways. Similar projects that have instituted performance measures might

provide some information that can be used to estimate benefits. For new or unique projects it is sometimes prudent to roll out the project in phases with each subsequent phase modified from the original plan based on subsystem or prototype system performance. This minimizes risk, allows for mid-course corrections, and enables the agency to adopt new technologies that were unanticipated during the project planning and design phases.

One possible process to use when determining which activity to pursue is:

1. Survey stakeholders to identify and prioritize needs
2. Determine potential ITS projects to address identified needs (possibly including literature searches, stakeholder workshops, vendor and contractor interviews, and interviews with frontline operators)
3. Estimate costs for each potential project (including alternative approaches within each candidate project)
4. Estimate benefits for each potential project (including alternative approaches within each candidate project)
5. Conduct a benefit/cost comparison to prioritize the list of potential projects
6. Determine funding support for highest priority options (including capital investment programs, operations and maintenance funding sources, public/private cost sharing opportunities, and labor availability)
7. Consider security implications to compare vulnerability risk reduction potential for prioritized projects
8. Modify project scopes, schedules and budgets based upon funding, operations resources and security implications
9. Select project.