Florida Department of Transportation Central Office

Transit Signal Priority Implementation Guidance

Executive Summary

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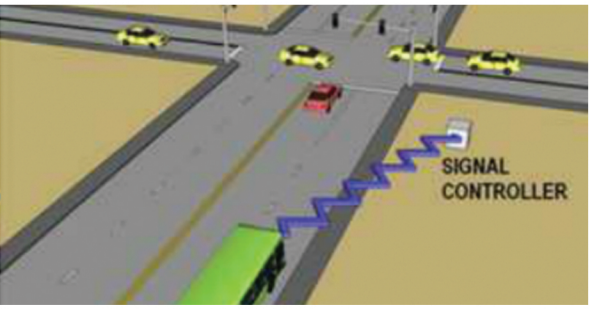

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STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
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Project Overview

Transit Signal Priority (TSP) collectively refers to various techniques used to improve service and reduce delay for transit vehicles at signalized intersections. By its nature, implementing a TSP program is a collaborative practice, requiring coordination between multiple stakeholder agencies on key elements ranging from planning to operation to system evaluation.

The implementation guidelines presented in this report serve to enhance interagency coordination between transit agencies and local transportation/traffic operations departments during the planning, implementation, operation, and evaluation phases of a TSP system.

Case Study Interviews

To help establish such guidance, a set of national case studies in which transit and transportation/traffic agencies have worked together to successfully implement TSP systems were identified and interviews were conducted with key personnel involved in the process. During this process, 20 individuals were interviewed for the 10 transit agency case studies.

Transit Signal Priority Stakeholders

Most case study agencies cited the decision of which stakeholders to involve at different stages of the TSP implementation process as the most difficult decision. The specific circumstances of each case study strongly influenced the transit agency and traffic operations personnel involved, as well as other external stakeholders.

The interviews identified a set of consistent factors that influenced which stakeholders to involve in the TSP implementation process. During the interviews, there was general consensus that a core group of stakeholders should be developed and include a lead person (or project manager) from the transit agency and a counterpart lead person from the appropriate traffic operations department. A range of stakeholders should be included throughout the planning, implementation, and operational/evaluation phases of developing a TSP system, and there was general consensus that all parties should be involved, to some degree, during the initial planning and project development stages to ensure that project goals, approach, and timeline are clear.

Implementation Guidelines

The input provided from the case study agency interviews was reviewed and synthesized to discern key topics and themes as well as similarities and differences among the different experiences and perspectives. From this effort, a set of implementation guidelines were prepared. For each implementation guideline identified in the following table, key findings and "lessons learned" or recommendations for carrying-out the application of the implementation guideline are provided, based on the case study interviews and research conducted as part of this effort.

Transit Signal Priority Interagency Implementation Guidelines

IMPLEMENTATION GUIDELINE (Applicable Phase of TSP System Development)	KEY FINDINGS	"LESSONS LEARNED" OR RECOMMENDATIONS FROM OTHER AGENCIES
Leverage Existing Relationships (establish during planning phase; continuously strengthen and develop throughout all project phases)	• **The benefit of existing relationships was cited as the most important element to successful communication** between the transit agency and traffic operations personnel.	• Consider the strength of existing working relationships as a key asset when identifying key stakeholders and core project team. • Hold in-person meetings to continue/strengthen relationships of TSP project team. • Ensure that the transit agency project manager has a good working relationship with the traffic engineer(s).
Identify Core Stakeholders/ Project Team (establish during planning phase)	• While the involvement of various stakeholders will fluctuate throughout the TSP system process, **a core project team should remain constant through planning, implementation, and operation phases**.	• Identify core project team members, organizational structure, and roles/responsibilities early in the planning process. • Include a primary contact/project lead from both the transit agency and traffic agency/operations department(s). • When possible, include a transit agency staff person with an engineering background on the core project team who can "speak the same language" as traffic operations personnel.
Identify and Leverage TSP "Champions" (establish during planning phase)	• As with most projects, **leveraging the enthusiasm and support of one or more project champions is critical to the successful outcome** of TSP system.	• Identify and engage TSP champions early on who are well-respected by both the transit agency and traffic operations personnel.

IMPLEMENTATION GUIDELINE (Applicable Phase of TSP System Development)	KEY FINDINGS	"LESSONS LEARNED" OR RECOMMENDATIONS FROM OTHER AGENCIES
Hold Regular Communication/Meetings (establish during planning phase; carry-on throughout project)	• **No case study agencies set any formal communication policies or procedures specific to the TSP project** outside of regular coordination meetings and identifying a project team organization/project lead(s). • Most of the case study agencies cited the **occurrence of regularly-scheduled meetings as very important to the communication process** of the core stakeholder group.	• Hold regular project team meetings to establish a predictable meeting schedule and to maintain continuity of process, strengthen project team relationships, and ensure open communication. • Adjust the frequency of project team meetings based on the specific phase of the project. • Although less frequent once the system is implemented, hold regular "touch base" meetings between the transit agency and traffic operations staff to discuss system performance, ongoing protocols, and other issues, as appropriate.
Establish a Bottom-Up Process for Information Flow (establish during planning phase; carry-on throughout project)	• Based on the experience of the case study agencies**, the core project team will likely consist of staff-level transit agency and traffic operations representatives.**	• Encourage frequent communication at the staff level, then bring this information to the director and policy leader levels at key-decision points during the planning process.
Provide Early Fundamental Education (establish during planning phase; carry-on throughout project)	• For areas where TSP is a brand new concept, it will be **important to provide a more broad-based fundamental educational component very early in the project process**, often when TSP is initially being considered or explored. • **Conduct a solid analysis (such as a simulation) to demonstrate the benefits of TSP and include in educational process.** Demonstrable planning evidence for operations will help illustrate the quantifiable benefits of TSP to all parties.	• Hold an educational summit where outside experts from both the transit agency and traffic operation perspectives speak to the group of stakeholders. This can be done for broader regional forums as well as for smaller, more specific stakeholder groups. • For region-wide interest in TSP, explore the possibility of hosting an FTA-sponsored workshop. This was done by Lane Transit District and found to be a very informative forum. • Include an interactive component between transit and traffic operations professionals to gain insight into the difference of perspectives from the two sides.

IMPLEMENTATION GUIDELINE (Applicable Phase of TSP System Development)	KEY FINDINGS	"LESSONS LEARNED" OR RECOMMENDATIONS FROM OTHER AGENCIES
Balance Existing and Future Stakeholders in the Education and Planning Process (establish during planning phase; carry-on throughout project)	• **Consider the extent to which potential TSP stakeholders (those likely to become active stakeholders upon system expansion) should be involved in the early education and planning processes**, especially if expansion plans are more near term.	• In addition to current stakeholders, identify potential stakeholders based on future TSP expansion plans. Evaluate the appropriateness of their involvement in the process, especially during the early discussions of TSP and educational components to provide general agreement and knowledge about the approach and identify compatibility issues up front. This will more easily allow the system to be expanded when the time is right, as the goal is to avoid having "pockets" of separate systems.
Educate from All Perspectives (establish during planning phase)	• **Touting only the benefits of TSP is unrealistic.** Ensure that the education does not *feel* one-sided (i.e., discusses only the benefits to transit).	• Include both transit agency and traffic operations professionals as part of the educational process to give a realistic expectation of what to expect from both viewpoints.
Leverage Peer Experiences and Exchanges of Information (establish during planning phase; carry-on throughout project)	• One of the most successful educational tools cited by case study agencies was **leveraging the prior experiences of peer agencies through a peer exchange of information**.	• Conduct on-site visits or tours of peer agency systems. • Hold conference calls with peer agencies when in-person visits are not possible. • Attend peer exchange working groups where TSP is discussed. • Include funding for peer agency visits as part of the TSP budget. Lane Transit District used FTA funds to fund a scanning tour where transit agency and city traffic engineers went to see first-hand how Chicago's TSP system was developed and functioned.

IMPLEMENTATION GUIDELINE (Applicable Phase of TSP System Development)	KEY FINDINGS	"LESSONS LEARNED" OR RECOMMENDATIONS FROM OTHER AGENCIES
Identify Appropriate Professional Resources (identify during planning phase; carry-on throughout project)	• **Considerably underestimating the required time commitment by the core project team, especially the Project Manager(s) in the planning and implementation of the TSP system, was cited as a barrier** to the overall project process. • **The use of consultants/outside experts was cited as a frequent resource in the educational process** during initial implementation of new TSP programs.	• Universities and research centers can be a good source of information concerning TSP and often at less cost than a private consultant. A university/research center also may provide a more neutral perspective on technology than a consultant who is invested in a particular type of technology.

IMPLEMENTATION GUIDELINE (Applicable Phase of TSP System Development)	KEY FINDINGS	"LESSONS LEARNED" OR RECOMMENDATIONS FROM OTHER AGENCIES
Understand Technology Goals and Limitations (establish during planning phase)	• **Identify and agree on technology goals up front** in terms of leveraging the capabilities of the existing signal system(s) or pursuing new infrastructure. Education about technology/systems should be conducted according to this goal. • **Ensure that education about technology options is thorough and wide-ranging.** Once you select a vendor, you are essentially selecting the technology that they provide. • For multi-jurisdictional TSP systems, it is very important to **understand the differences in technology and capabilities of the different signal systems** to determine what technology will work or what system upgrades are needed to develop a multi-jurisdictional or regionally-compatible system. • A **cost/benefit analysis** of how much money will be spent for new/upgraded equipment versus how much time and money (fuel, etc.) will be saved once the TSP system is operational should be conducted.	• Invite TSP vendors for discussions and demonstrations with the stakeholders to provide valuable insight into how complex TSP could be, as well as to discuss potential issues with existing system compatibility. • Consider the geography/terrain when evaluating hardware and technology. For Sun Tran, a GPS-based system would have solved many issues that the agency encountered with the TSP system for its Mesa Line due to hills and uneven terrain. • Bring all parties to the table during the RFP process to select a technology. • Know how the project will be placed out for bid ahead of time so it is clear how the project will be categorized (i.e., do not have a TSP project bid as a construction contract).

IMPLEMENTATION GUIDELINE (Applicable Phase of TSP System Development)	KEY FINDINGS	"LESSONS LEARNED" OR RECOMMENDATIONS FROM OTHER AGENCIES
Maximize Financial Benefit for All Parties (establish during planning phase; carry-on throughout project)	• Implementing a TSP system can provide the **opportunity for complementary capital improvements to antiquated traffic control systems**. • **Design of traffic signal cabinets that allow transit agency access to their equipment** can reduce the in-field time requirement of traffic operations staff to address in-field issues and complications. • **The ability to make remote field adjustments through a central traffic management center provides a great benefit**, as opposed to in the field, which can become cumbersome and time consuming depending on the jurisdictional policies for accessing controller cabinets. • **A lack of reliable information available about existing equipment or infrastructure in the field** (e.g., fiber optic cables) can cause significant cost increases and time delays.	• If enough capital dollars are available, the transit agency should consider including projects that traffic engineers would like but do not have the resources for, so long as it benefits the system (e.g., upgrading antiquated traffic signals). • Include costs of providing extended warranties (where available) on new technology purchases to help mitigate costs associated with the long-term maintenance. • During signal system replacement, explore the feasibility/policy for providing localized cabinet access by transit system personnel to their equipment. • If not already available, use the development of the TSP system as an opportunity to update the local infrastructure inventory and make it available to both transit agency and traffic operations staff.

IMPLEMENTATION GUIDELINE (Applicable Phase of TSP System Development)	KEY FINDINGS	"LESSONS LEARNED" OR RECOMMENDATIONS FROM OTHER AGENCIES
Develop the Public "Message" and Outreach Plan (develop during planning phase; execute throughout project)	• The project team, consisting of both transit agency and traffic operations personnel, should work together to **develop a clear and consistent message for TSP and an accompanying outreach plan.**	• Develop a specific message about what TSP is (and is not) to help prevent misinformation from being published (i.e., TSP will cause renegade buses running through green lights). • Leverage consultant or other external resources (e.g., MPO planning liaisons) to conduct outreach if such effort exceeds the capabilities of the internal project team. • Engage and educate the press, as needed and appropriate, to control the message concerning TSP.
Educate Internally within the Transit Agency and Traffic Operations Departments (conduct during planning phase)	• **Include high-level transit agency personnel/policy leaders in the education process to manage expectations.**	• A policy leader educational session where transit agency and local jurisdiction policy leaders come together with the core project team, including transit agency and traffic operations representatives, can not only serve as an educational session, but also provide a unified front as to the goals and expectations of the TSP system.
Begin the Interagency Agreement Process Early On (establish during planning phase; carry-on throughout project)	• **Formalizing the interagency agreement process and content was frequently cited by those case study agencies involved in initial TSP system implementations as being a significant hurdle.** Several case study agencies indicated that it took several years to get agreements in place, often after the system was operating. • **Ensure that the responsibility for operation and maintenance of the equipment after the system is implemented is clearly stipulated in the agreement** very early in the process so that there is no confusion.	• Begin formulating interagency agreement language very early in the process. Use existing agency service and maintenance agreements, where available, as a starting point. • Review copies of other agency's TSP interagency agreements to identify core areas and topics to consider and address. • Establish and implement the framework for the core agreement early on and then adjust later as necessary.

IMPLEMENTATION GUIDELINE (Applicable Phase of TSP System Development)	KEY FINDINGS	"LESSONS LEARNED" OR RECOMMENDATIONS FROM OTHER AGENCIES
Establish Communication Protocol for Reconciling System Issues and Efficiencies (establish during planning phase; carry-on throughout project)	• Once the TSP system is operational, a **process for addressing in-field system issues must be established.** • **Consider the appropriate financial responsibility for pre-planning signal timing optimizations** needed for future TSP corridors if outside of the regularly scheduled optimization schedule.	• The process for addressing system issues and funding agreements should be formalized as part of the interagency agreement. • Involve different stakeholders in the development of the interagency agreement(s) to consider all aspects/scenarios, such as stipulating the fiscal responsibility for unscheduled signal optimization on TSP corridors.
Identify and Agree Upon Parameters for Giving Priority (identify during planning phase; carry-on throughout project)	• **Low allocations of signal "green" time that allows for priority can be very challenging** when planning for TSP, especially in very urban areas.	• Include discussions among the stakeholders early on to agree upon what the parameters are for giving priority.
Establish Performance Measures (establish during planning phase; evaluate periodically once system is operational)	• Several case study agencies indicated that an area lacking in the planning process was the **establishment of performance measures to evaluate how the system is functioning once operational.**	• Establish performance measures to evaluate how the TSP system is functioning in relation to established goals. • During the technology selection process, understand the capabilities of the potential system in regard to providing the necessary data to monitor identified performance measures.
Establish Pre-Implementation Testing Process (establish during planning phase; carry-on throughout project)	• **Several case study agencies cited technological glitches or difficulties as adversely impacting the success (or perceived success) of the system.** Transit agency personnel indicated that unnecessary technology issues should be avoided at any cost, as they can taint the perception of TSP to the public and traffic agency personnel.	• Have a robust testing process on the software before it goes into the field and then retest again in the field. This provides assurances to all parties (transit agencies and traffic operations personnel) that system has been tested and will perform as expected when "live."

IMPLEMENTATION GUIDELINE (Applicable Phase of TSP System Development)	KEY FINDINGS	"LESSONS LEARNED" OR RECOMMENDATIONS FROM OTHER AGENCIES
Conduct Periodic Monitoring and Maintenance Review (conduct during operation/evaluation phase)	• Once the TSP system is operational, it is necessary to **conduct periodic monitoring of the system operations and establish a formal protocol for monitoring and periodic maintenance needs**.	• Establish a protocol for monitoring and making sure that ongoing maintenance is being performed. • Conduct a maintenance review 10 years after the original TSP system was implemented to determine what adjustments were needed to ensure that the system would provide benefit long into the future. • Include a continuous quality control process in the interagency agreement. • Understand who the "client" is for the traffic signal equipment vendor to determine the appropriate process that the transit agency will need to use to have any issues addressed by the vendor.