

FHWA Pricing Workshop: Shoulder Conversion to HOT

Planning Best Practices and Lessons Learned

- **Establish goals and objectives and clearly communicate a vision**

Projects must have clear objectives and a vision of how to achieve objectives in order to measure success. Determine the goals of the project and how success will be measured.

- **Take advantage of opportunities**

Several successful projects have been the result of taking advantage of opportunities whether it is underutilized capacity on an HOV lane, new legislation encouraging innovative partnerships or even popularity of an operating strategy.

- **Maintain flexibility**

Decide upfront on priority users and how or what may cause changes in this operating strategy over time. Establishing threshold values will enable operators to easily recognize when a project is not performing as intended. Knowing these threshold values in advance allows operational changes to be more easily implemented. Moreover, incorporating flexibility into the design of the facility may extend the life of the facility because operations can be adjusted as corridor conditions change or community goals change.

- **Engage project partners and encourage agency cooperation**

Successful projects have been the result of cooperative efforts from many agencies. The projects often cross jurisdictional boundaries and may require new institutional arrangements. These agreements should be drafted early in the planning process and should clearly define the roles and responsibilities of all parties. While being clear in responsibilities, the agreements should also contain enough flexibility to provide for unforeseen circumstances. Agency cooperation results in seamlessness to the customer.

Planning Group Exercise

Develop an action plan that identifies the steps necessary in the planning process to support the project.

What are the sequential steps to plan project?

What are the project goals?

Who are the players and what are their roles?

What information/analyses are needed?

What are the potential pitfalls?

Consider the following questions:

- What are the project goals, prioritize if necessary?
- Is project included in long-range plan and TIP? If not, how will this be addressed?
- Who are your project champions? How will they help implementation?
- What institutional arrangements are necessary? Who are the players and what are their roles? How are the existing relationships?
- Are regional pricing policies already in place?
- What institutional arrangements are currently in place?
- What operational strategies are being considered?
- What is the existing legal authority? Will additional legislative authority be required?
- Is this an interim project or will it be permanent for the foreseeable future?
- How will toll rates be set?
- What will excess revenues, if any, be used for?
- What environmental approvals are required?
- Are there environmental justice concerns? If so, how will they be addressed?
- What are the occupancy requirements?
- Who are the priority users?
- How will operations be adjusted over time?
- How will performance be monitored?

Operations Best Practices and Lessons Learned

- **Develop a Concept of Operations to describe the shoulder conversion to HOT operations to guide the process**

To begin, agencies involved should develop a concept of operations clearly outlining the roles and responsibilities for each agency in the design, construction, operation and maintenance of the HOT lanes utilizing the shoulders. Many of these roles may already be in place for HOV or HOT lanes in the region, for example, debris removal, and may require only minor adjustments. Other areas, like toll collection, will be new and require new discussions and, often, memorandums of understanding developed between agencies.

- **Establish a minimum operating speed threshold of 45 mph.**

Most projects explicitly state that their goal is to maintain the free flow of traffic on the HOT lane. The FHWA guideline is to exceed 45 mph for 90% of the peak period. Many agencies use that standard, while some use 50 mph, level of service C, or the travel time of the buses on the lane. To measure the ability of the lane to meet the goal will require consideration of monitoring and evaluation plans and equipment.

- **Select the appropriate user group to best optimize the added capacity.**

Facilities must have a clearly established hierarchy of users to provide a reliable trip without compromising safety, especially since the safety benefits of the shoulder are removed during operations.

- **Ensure that the temporary use of the shoulder as a HOT lane is only deployed when needed.**

The temporary removal of shoulders eliminates the ability for disabled vehicles to find refuge and can hinder incident management efforts. Thus, it is important that the shoulder be converted only during periods when it can relieve congestion and provide a reliable trip for users. Clear threshold limits that will trigger operations can be a key to this process.

- **Establish operational procedures that ensure the safety of the users and help maximize the potential benefits of using the shoulder during congested periods.**

Operational procedures that are critical include ensuring the shoulder is clear of debris and disabled vehicles prior to opening, monitoring, maintenance, and

enforcement. Establishing such procedures, including roles and responsibilities of partner agencies, and dedicated funds, will ensure the smooth and efficient operation of the facility with minimal negative impacts.

- **Ensure operations integrate with existing systems.**

Most regions will have some measure of ITS deployment in congested urban corridors, including such system components as video surveillance, speed and volume data collection technology, and other aspects that are part of an overall transportation management system run from a transportation management center. It is important that the operations of the shoulder HOT lane be integrated with any existing systems to ensure full control, operations, and maintenance are handled in a consistent manner.

- **Determine if existing incident management protocol will be applicable to shoulder operations.**

Large urban areas typically have a comprehensive incident management process and protocol to handle the wide variety of incidents that occur within the roadway environment. This protocol includes memoranda of understanding between participating agencies and roles, responsibilities, and procedures for all parties. Incident management for a shoulder HOT lane may not require special incident management processes if those already in place are sufficient.

Operations Group Exercise

Develop an action plan that identifies critical operational issues that need to be addressed to support a successful project.

What are the roles and responsibilities of partner agencies?

How will the facility integrate into existing systems?

What are the appropriate measures of effectiveness and thresholds for performance?

Establish monitoring, maintenance, and incident management processes.

What are the potential pitfalls?

What is maximum speed on the shoulder, either absolute or in terms of a speed differential with adjacent general purpose lanes?

Consider the following questions:

- What are the roles and responsibilities of the partner agencies?
- Who will operate the facility?
- Who will handle the different operational elements?
- How will tolls be collected and transactions processed?
- How will access design work with the tolling scheme?
- What are the implications for the network?
- How will the facility be integrated into existing ITS infrastructure?
- How will the facility interface with other components of the regional transportation system?
- How does the toll policy affect operations?
- How do the priority user groups affect operations?
- How will operations be monitored?
- Will operations change over time? If so, how?
- How will enforcement be handled?
- Are the enforcement areas in the design of the project?
- When a violation occurs, what will be the fine?
- How will the fine be processed?
- What agency will be responsible for enforcement?
- Who is responsible for incident management on the facility?
- Will performance measures for incident management be defined in operating agreements? If so, what will they be?
- How will incident management be funded?
- What agency will maintain the facility?
- Will the facility have any unique maintenance requirements?
- What will be the policy for clearing shoulders or unused lanes of vehicles – other than as part of incident management?
- Who is responsible for monitoring performance?
- What will trigger an operational change? How will changes be implemented?
- Are there specific operating thresholds that must be maintained per agreements with other agencies?
- What are the consequences of not meeting these thresholds?
- Will the shoulder HOT lane be deployed in conjunction with other operational strategies, such as dynamic speed limits?

Design Best Practices and Lessons Learned

- **Ensure the safest design possible that provides adequate space for identified users and necessary maneuvers.**

When converting a shoulder for use by traffic on a regular basis, various design parameters need to be addressed to ensure the safe use of the lane. Of particular importance are design features typical for shoulders which are not compatible with high travel speeds and which impact the profile of the pavement and the safety of travel with respect to the clear zone. It is important to address these issues to minimize the negative impact of converting the shoulder.

- **Provide adequate space for emergency refuge and/or enforcement whenever possible.**

As with other HOT lane facilities, enforcement can be critical to successful use. Moreover, using the shoulder for travel eliminates it from being used for emergency refuge in the event of breakdown. Thus, whenever possible, designers should work to provide additional pullout areas for breakdowns and incident clearance when converting a shoulder to HOT lane use.

- **Provide clear information to users, through a variety of mechanisms, to ensure their comprehension of the facility and the specifics of operation.**

Potential users need clear information on the type of facility in operation, its availability to users and hours of operation, and location of entrances and exits with respect to general purpose lanes. This information needs to be conveyed to the users at appropriate locations and in other feasible manners to optimize use of the facility.

Design Group Exercise

Develop an action plan that identifies critical design issues that need to be addressed to support a successful project.

Who are the appropriate user groups?

Identify and establish fundamental design parameters of the facility.

Identify and establish related design parameters of the facility.

What are the design-related issues that can impact facility operations?

How will the facility integrate into existing systems?

What are the potential design challenges?

Consider the following questions:

- Will new lanes be added?
- How will allowable user groups influence design? (i.e., large trucks)
- Will the left or right shoulder / left or right lane be used for the facility?
- What will be the final lane width of the shoulder facility?
- Will the facility be separated from general-purpose traffic by a fixed barrier?
- Will a new shoulder be installed?
- Will emergency pull-outs be constructed? If so, how wide will they be, what will be their spacing, and what will be the tapers?
- How will the lane traverse entrance and exit ramps (if right shoulder)?
- How will existing drainage inlets be addressed?
- Are rumble strips present on the shoulder? How will they be handled?
- Does the use of the shoulder for travel impact guardrails and fixed object shielding? How will it be addressed?
- Grade-separated access versus slip ramp?
- Are there phasing issues that may influence the design? What level of flexibility is needed?
- Is there adequate ROW for enforcement? If not, how will enforcement be addressed?
- What pavement markings will be installed on the facility?
- What overhead and post-mounted informational and lane control signs will be installed?
- What messages will need to be conveyed to travelers?
- How will messages be conveyed?
- Will the creation of a shoulder HOT lane shift the location of a bottleneck elsewhere on the system?

Finance Best Practices and Lessons Learned

- **Consider any and all funding and/or financing mechanisms**

Successful projects have cobbled together funding packages. There are no straightforward funding strategies. In many instances, financing has been the result of taking advantage of opportunities.

- Depending on the scale of changes required for the shoulder to HOT conversion, the required funding varies to a large extent from one project to another. For example, some conversions include not only the installation of toll collection zones and increased enforcement (I-15 in San Diego and I-25 in Denver) but also the addition of capacity to the corridor (one HOV lane to two HOV lanes per direction in I-95, Miami), restriping the corridor (SR 167 in Seattle and I-394 Diamond section) or changing the separation mechanism (double white lines to flexible pylons in I-95, Miami). If FTA funds were used to help construct the facility specific guidelines must be followed or funds must be repaid.

- **Available assistance through Federal programs**

Public agencies interested in implementing and evaluating HOT lane projects are eligible to apply for grants under the Value Pricing Pilot Program (VPPP). VPPP grants have been essential funding source for some HOT lane projects. However, the grant provided to the different projects varies in amount depending on whether the grant is provided for a) the pre-implementation costs (e.g. VPPP grant of \$925,000 in I-394 covered planning, outreach and education while the total project cost was \$12.9 millions) or b) the project implementation costs (e.g.VPPP grant of \$2.8 million out of \$ 9.9 million project cost in I-25 and \$2 million out of \$17.9 million total project cost of SR 167).

- **Stakeholders**

The Federal grant plays an important role in the funding of the HOT lane development. However, the Federal grant is sometimes a part of the total funding required in which case funding is supplemented by other stakeholders of the project which might involve state DOTs, (e.g. Katy, Houston) transit service providers (e.g. Regional Transit District in I-25, Denver) and toll authorities (HCTRA in Katy, Houston), the gas tax (SR 167 in Seattle) or the private sector (I-394, Minneapolis). In most instances, funding has been cobbled together from several sources. Agreements can be made with the private operators to construct and operate the HOT lane facility and collect the revenues for a certain period of time (SR 91 Express lanes).

- **Revenue Sharing**

The demand for continued funding of a project being implemented in phases also depends on the excess revenue generated by the HOT lane (e.g. I-25 Express Lanes generated revenue exceeding the estimated revenue to cover operations and maintenance; revenue generated in I-394 was half as estimated and I-15 in San Diego generated enough revenue to fund express bus operations).

Finance Group Exercise

Develop a financial plan that will allow for the successful design, construction, operations and maintenance of the facility.

Who owns the lane(s) and right of way (ROW)?

Would having the private sector operate the facility as a PPP prove beneficial? If so, how?

What revenues can be expected from toll paying patrons? Who wants a share of those?

What are the ongoing operation and maintenance costs?

Can/should revenues from fines be used to help finance the facility/enforcement?

Consider the following questions:

- How will the project be funded?
- Will financing be required? If so, what financing mechanism will be used?
- If debt will be issued, how will it be repaid?
- How will construction be funded?
- How will operations and maintenance be funded?
- How will enforcement be funded?
- If excess revenues are generated, how will they be used?
- What is the potential users' willingness to pay?
- Are other innovative financing mechanisms able to be considered? (e.g. development impact fees, special assessment districts, etc.)
- How will toll policy be decided?
- How will changes in toll policy affect project financing?
- Is a private developer involved? How does this impact the project's acceptance?
- Can back-office operations be leveraged with other entities?
- What are the origin-destination patterns in the corridor? How will access design affect these?
- What are the travel characteristics of the corridor users?
- What alternative routes are available? Are there plans to add capacity to these options?

Outreach Best Practices and Lessons Learned

- **Identify project champions**

Many projects have benefitted from the support of trusted individuals in the community or state. Project champions, other than the implementing agencies, can lend credibility to the project. Additionally, if enabling legislation is required a project champion that can accomplish this is an indispensable asset.

- **Conduct market research and identify issues**

Market research should be conducted to identify what the issues are that are problematic for the community. This should include research of current HOV and transit users as well as potential users of HOT lanes. This information is crucial to develop materials and messages to educate and inform.

- **Develop clear and concise messages**

The messages that are used to communicate project specifics, including project goals, need to be clear and concise. They must clearly convey what the purpose of the project and the project implementation hopes to achieve.

- **Communicate project goals**

In many communities HOT lanes and pricing are new and complex concepts. The goals that are communicated must resonant with the public. Successful projects clearly articulate the goals of project. The I-15 project in San Diego showed how the project revenues would be used to implement new transit service in the corridor; a service that was desired by the public. Without clearly defining and communicating project goals even potentially successful projects can be killed before implementation because of misunderstanding.

- **Continue from project development through operations**

Projects benefit from continued outreach to the users and general public. It is important to continuously market the project. Market research conducted throughout the life of the project allows agencies to adjust messages as needed to address concerns. The public also needs to be kept aware of how operational changes may occur over the life of a project.

- **Create brand awareness**

In some communities it may be necessary to distinguish a HOT project from other tolling projects in the area. A different brand may be used for this purpose. If this is not the cause, it is still useful to promote project awareness.

Outreach Group Exercise

Develop a communication/marketing plan that will support project implementation and operation.

What are sequential steps in the outreach plan?

Who are the stakeholders?

What are the most appropriate communication methods? Will they vary throughout the corridor? If yes, how so?

What messages should be communicated?

Who are the appropriate messenger(s)?

Consider the following questions:

- What are the area demographics?
- Are there currently operating HOV lanes in the area? What is the public's acceptance of them?
- Are there currently operating toll roads in the area? What is the public's acceptance of them?
- How does the public feel about current toll rates?
- How does the public feel about the level of service on the toll roads?
- What is the toll tag penetration rate?
- What is the public's trust level with the agency implementing the project?
- How will the public react to a private developer implementing the project?
- Will there be confusion over which agency is implementing and/or operating the project?
- Has there been previous media attention on pricing/transportation funding?
- What are the equity issues associated with the project? If any, how will they be addressed?
- Are there project champions? How can the project champions be used to garner support for the project?
- Is there known opposition to the project? If so, what are the issues and how might they be addressed?
- How will the project be marketed?
- Will marketing continue throughout operation of the project?