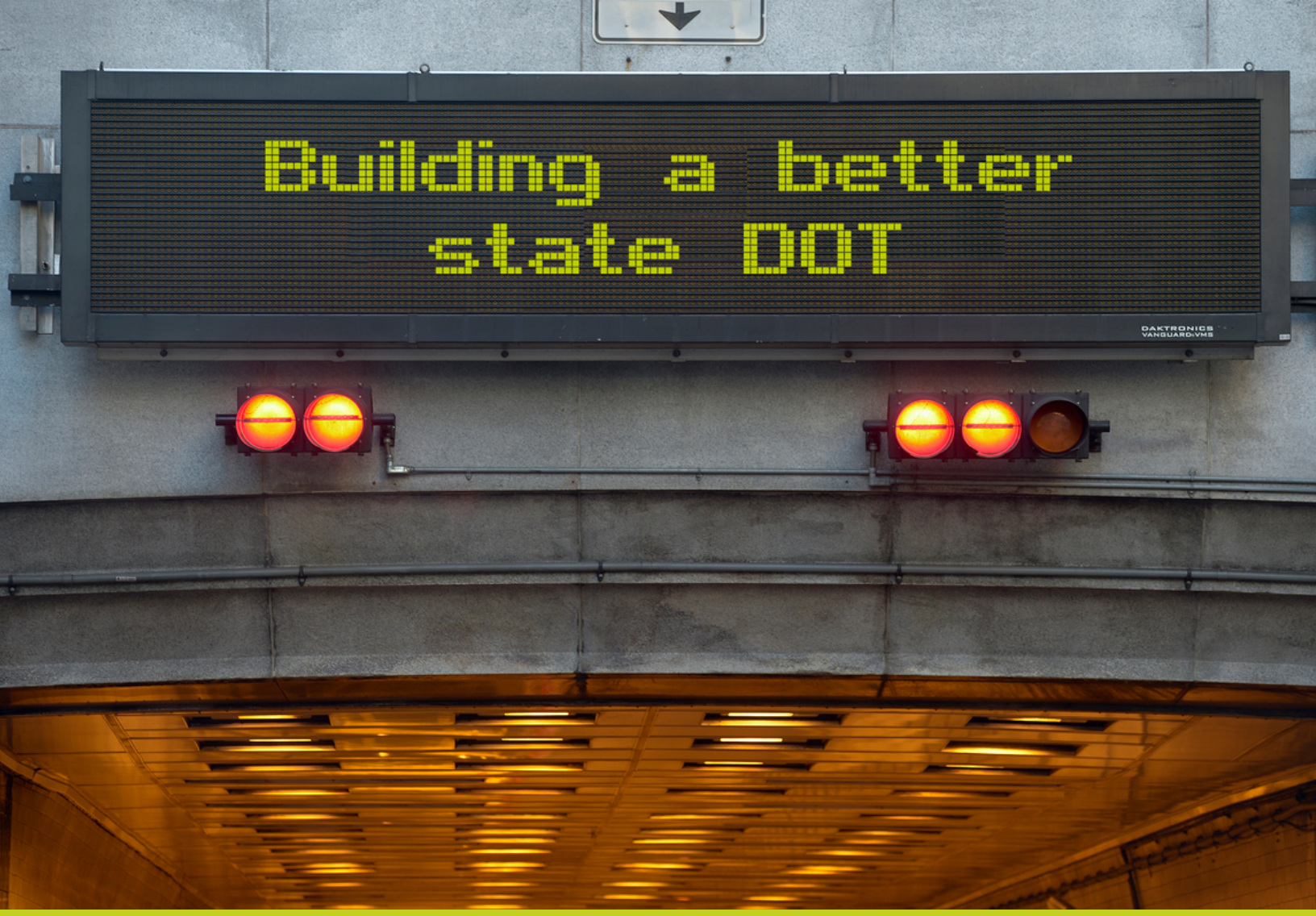

MEMOS ON

Practical Solutions

Smart Growth America
Improving lives by improving communities

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The Governors' Institute on Community Design worked throughout 2017-2018 helping a small group of state departments of transportation question and assess the underlying assumptions that result in giant highway solutions for every transportation problem. This memo is part of a series about the states that are finding success through what's known as practical solutions, a way for transportation departments to meet changing demands and plan, design, construct, operate, and maintain context-sensitive transportation networks that work for all modes of travel.

The Governors' Institute on Community Design, a program of Smart Growth America, helps state leaders address economic development, housing, transportation, and other pressing issues that relate to how communities grow and develop.

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Updating agency administration and culture

Why?

Successful DOTs will need to provide unwavering leadership and support in rolling out a practical solutions approach. Prioritizing the efficient use of limited funds, the safety of all users, and smaller impacts and footprints will take a significant amount of effort, dedication, and time. Implementing practical solutions includes providing direction to supervisory and management staff that all staff will be held accountable in annual reviews and supplying the training and mentoring necessary to apply this approach. New performance metrics for the outcomes of projects to the system will need to be defined, measured, and reported.

Most importantly, senior leadership should understand that real changes in rules, guidelines, standards, performance measures, training and job reviews will have to be instituted by them in order to change their agency's products.

Update organizational procedures to drive implementation

A practical solutions approach and policies will not be immediately integrated into day-to-day project level decisions. This challenge is not unique, though the size and dispersed structure of any agency is likely to obstruct the speed of culture change.

In addition, agencies should consider new performance measures for DOT programs to track implementation of practical design across divisions and evaluate the success of projects that take a practical design approach.

The following actions can support the transition from policy adoption to implementation.

Establish a set of principles and messages for leadership to deliver from the top down

Regardless of Headquarters' efforts, project teams will be unlikely to change how they currently do business unless they feel that their managers will support them. Likewise, managers will be unlikely to encourage their teams to change their approaches unless they feel confident that they have the support of their district leadership.

If leadership recognizes that simply adopting forward-thinking policies is not enough, District and Headquarters staff should conduct presentations for staff around the state to encourage the use of design flexibility and context-sensitive solutions and address perceived barriers to doing so, including concerns about liability.

Developing a clear set of principles for leadership to convey to their staff will help promote this shift in culture. These principles should be integrated into the onboarding procedures for new staff, the process for approving contractors, and staff performance reviews. District leaders should recognize and praise staff who adhere to them. Job reviews should include these principles to ensure that those following them are promoted and rewarded and those who do not are redirected and retrained.

Some of these principles might include versions of the following:

- Staff are encouraged to work toward a clear understanding of the need for a project, even if this extends the scoping process. Doing so will save time and costs later.
- The role of each staff member goes beyond the facilities he or she builds or operates directly. He or she is contributing to a system that should work for all users, which in turn is contributing to the economic prosperity of the state and quality of life of its residents.
- Staff should think of themselves as facilitators and consensus-builders, bringing together the right stakeholders for collaborative problem solving.
- Staff are encouraged to utilize informed engineering judgment (rather than just "standard" design) and innovative multimodal roadway treatments tailored to the specific context and needs of the community.
- Every project delivered should play a role in advancing identified state goals and relevant plans. Project teams should always be able to articulate how their projects do so.

Update procedures and criteria for evaluating the performance of staff, leadership, and contractors

DOTs can consider establishing a performance review framework for staff that reflects practical solutions principles like those discussed in the section above. Broadening the criteria used to evaluate project teams will help remove pressures to move projects quickly through the scoping process at the expense of planning and community engagement. This will mean supplementing existing measures with criteria that assess and reward the use of innovation, collaboration, context-sensitivity, and attentiveness to the needs of all modes of travel.

- Consider evaluating staff according to how well they:
- Further the agency's vision, mission, and/or other identified goals through their work, and utilize the appropriate metrics to measure success of projects (rather than simply auto delay).
- Think about and tie their work to the larger systems, not just their own projects/facilities.
- Work collaboratively across teams and functional units.
- Articulate the true need(s) for projects and identify solutions tailored to that need.
- Consider and work to balance the needs of all users and modes.
- Meaningfully engage the communities they work with and other stakeholders.

These and other principles identified by each district should guide annual performance evaluations for staff at all levels, the criteria used in hiring new staff, and the criteria used in hiring and evaluating contractors. Staff should be given access to the evaluation criteria so they can update their work approaches accordingly.

Utah DOT tracks successful implementation through the following performance metrics:

- Total cost savings for the overall program.
- Percent savings for the overall program.
- Percent savings per project.
- Percent of projects using Practical Design.
- Percent savings by project type (new construction, maintenance, etc.).
- Percent savings by project size.

Link updated organizational procedures with ongoing training

State DOTs will need to continue to provide ongoing training on how to implement elements of practical solutions—considering all users, design flexibility, performance-based project development, and more. The steps and strategies below may be helpful in supporting agency staff:

- Put training in the budget.
- Advocate for and defend funding for training to legislators and the general public.
- Make a basic level of training mandatory for all staff
- Make taking the training a mandatory part of the annual review process.
- Make advanced training mandatory for advancement

Incorporating a practical solutions approach into DOT practices will require a broad culture change within the agency. With updated documents and procedures, providing ongoing education and training for staff and consultants will help create an internal culture in which key elements of practical solutions are a core part of the agency's work.

Conducting ongoing training will also provide a variety of additional benefits, including:

- Ensuring that the changes to specific documents and procedures are interpreted correctly and used effectively throughout the agency;
- Helping to support broad adoption of a context-sensitive planning and design approach and preventing a "one-size-fits-all" interpretation; and
- Helping to improve coordination between DOT programs and external partners.

The Florida Department of Transportation details the implementation of their Complete Streets with a great deal of focus and planning around internal communication, collaboration, and training.[1] They developed five categories of training and versions for different audiences, purposes, and formats to best meet the needs of staff, partners, and stakeholders.

[1] Complete Streets Implementation Plan. The Florida Department of Transportation and Smart Growth America. December 2015. https://smartgrowthamerica.org/app/legacy/documents/fdot-cs-implementation-plan.pdf

Provide tools

Create a usable checklist for how elements of a project are considered—like context, purpose and need, impact on the surrounding area, and costs—to support DOT staff's implementation and provide guidance on how to meet the agency's goals. More information about tools used by other states can be found in the Practical Solutions Memos in this series titled *How to address land use and context* and *Getting project scopes right*.

Integrate field visits and walking audits into training as frequently as possible

Participants at GICD's workshops over the past two years consistently pointed to walking audit as one of the most valuable and eye-opening aspects of the training. Visiting a community in-person can drastically change the perspective of the engineers working on a project and can support a much clearer and more nuanced understanding of the needs of that community. DOTs may want to consider integrating field visits into training the department currently offers. Doing so could:

- Educate participants on how to conduct field visits/walking audits in their own work;
- Help participants connect the concepts covered during training to real-world examples and engage in creative problem-solving;
- Highlight the importance of meaningful community engagement; and
- Support bonding among training participants and a sense of team cohesion.

Encourage cross-disciplinary teams

As discussed in the memo on "Getting project scopes right," DOTs should prioritize empowered, multi-disciplinary team with a committed, strong leader and advocate for the goals of the project. It should be standard practice to establish a core project team with diverse multimodal expertise across disciplines working consistently on the project from start to finish, even if other members of the team evolve as it moves from one phase to another. Routinely including a planner who has worked on the area or corridor in question in each project development team can bring context to the scoping process and later phases of project delivery.

This continuity will help ensure that engineers involved in the later phases of project delivery have a clear and nuanced understanding of the goals of the project and prior conversations with community members and stakeholders do not get lost in translation. It will also help bring a wider range of perspectives and problem-solving expertise to each phase of project development. Planners often have established relationships with the community and other stakeholders that can help provide the continuity and consistency necessary for robust stakeholder engagement throughout project delivery and more successful project teams overall.

Getting project scopes right

Why?

Tailoring a project to a well-defined understanding of the problem or need helps agencies consider potential solutions beyond using maximum design standards by default. This helps avoid over-engineered project scopes that are high in cost, high in environmental impact, and that may induce travel demand requiring further intervention and expenditure. It also allows state DOTs to bring considerations for the safety of all roadway users, including pedestrians and bicyclists, into projects early enough to be part of the core project scope, rather than secondary to vehicle needs.

Define Purpose and Need carefully

One of the biggest barriers to Practical Solutions is the practice of defining the need for a project as a specific improvement (ex. add a turn lane) instead of a problem to be solved. Jumping to the solution prematurely in a project Purpose and Need statement limits the investment approaches available to meet any given transportation need, making it harder to find the most effective solution. For example, reducing congestion on a corridor could be addressed by widening the road, providing better transit service, promoting teleworking to reduce trips, directing travel to parallel routes, or any number of other strategies. Focusing on the desired outcome early in the process allows the state and the community to consider all possible approaches and pick the most cost-effective option. This can also lead to more streamlined project delivery.

Setting the Purpose and Need as a problem to be solved rather than a specific solution also lays a better foundation for addressing the safety and access of all users of the transportation system. When a Purpose and Need statement includes a specific investment approach, other features like sidewalks, crosswalks, pedestrian refuge islands, and bicycle facilities become “add-ons” or “amenities” when localities want to include them in the project later in the process. This means they are also the first parts of the scope to be removed due to funding constraints. These types of design elements need to be considered and included as a core part of the project scope from the beginning, which requires having a Purpose and Need statement focused on the outcome needed with enough flexibility to consider multiple solutions.

Purpose and Need statements can also be used to assess whether the need is substantial enough to warrant investment. The Washington State Department of Transportation (WSDOT), which has pioneered a statewide practical solutions approach, includes “accepting lower performance” as one of six strategies staff should consider to address performance gaps. As WSDOT notes, the benefits of addressing the performance gap do not always outweigh the cost of investing in a solution. Relaxing expectations around level-of-service can remove one of the biggest barriers to making lower-cost investments while still addressing much of the identified need.

Providing clear guidance on Purpose and Need is a key step, particularly for different types of projects. A Purpose and Need statement should generally include the following info:

- What is the problem/What is wrong?
- Where is it happening?
- When is it happening?
- What is the magnitude of the problem?
- Why is it important to solve it now?

WSDOT Purpose and Need guidance

WSDOT has launched a comprehensive Practical Solutions initiative to work toward their mission in every aspect of the department's work, including planning designing, building, operating, and maintaining the state's transportation system. WSDOT's goal is to use performance-based, data-driven decision making and early community involvement to guide every transportation investments.

As part of its Practical Solutions effort, WSDOT has integrated guidance on identifying and documenting the need for a project in the agency's design manual. The manual provides guidance on how to develop a project need statement in clear and simple terms that is quantifiable and performance-based and does not prescribe a solution. It also outlines an approach for translating the identified needs into specific performance metrics and targets.[2]

Engage multidisciplinary scoping teams

States should make it a standard practice to have multidisciplinary project development teams with diverse expertise across disciplines work consistently on each project from start to finish. For example, one key addition to many states' current practices that could significantly improve coordination is to routinely include planners working in the area in question on the project development team. Ideally these planners will have been directly involved in the initial identification of needs for the project and can bring that context to the scoping process and later phases. Planners also frequently have established relationships with the community and other stakeholders, which can help provide the continuity and consistency necessary for meaningful engagement throughout project delivery.

How Virginia DOT helps localities identify innovative, lower-cost solutions

VDOT recently developed a new project selection process, Smart Scale, to evaluate, score, and rank all capital projects for funding based on the state's six policy goals (for more information about Smart Scale, see the Practical Solutions Memo in this series titled

[2] Guidance Documents: Information about WSDOT's Practical Design Procedures. Washington State Department of Transportation, Development Division, Design Office. July 2017. http://www.wsdot.wa.gov/publications/fulltext/design/ASDE/Practical_Design.pdf

Prioritizing projects based on outcomes.[3] This new approach has produced many benefits for the state and has also produced some challenges, one of which is getting good scopes for projects submitted by localities before they are scored for funding. Once projects are selected for funding, the scope is supposed to be relatively set, and if it changes, VDOT must rescore the project.

VDOT has found that having staff with a variety of expertise help localities develop their project scopes for submittal in Smart Scale makes a big difference in the quality of the projects. As part of the Smart Scale program, VDOT accounts for both the benefits of each proposed project and the cost. As a result, local projects are most competitive in the prioritization process if they accomplish the identified objectives at relatively low cost. VDOT has found also through the scoring process that traditional highway widening projects do not tend to rank well in Smart Scale. This is because they are generally not cost-effective in terms of the benefit in reduction in delay compared to the project cost. By contrast, projects that include lower-cost and more targeted strategies for addressing the specific congestion issues such as signal timing improvements and intersection treatments tend to perform significantly better. Having a variety of perspectives and expertise in the scoping process helps localities analyze the existing conditions and context of the roadway more effectively and produces a greater range of potential solutions to meet the identified need.

Based on these findings, VDOT has developed a program, Strategically Targeted Affordable Roadway Solutions (STARS), to help localities develop projects that will be more competitive to receive state funds. The objective of STARS is to develop comprehensive, innovative transportation solutions to relieve congestion bottlenecks and solve critical traffic and safety challenges. VDOT has created a streamlined STARS project development process to assist localities with data analysis and mapping, scope projects, and submit them for scoring in Smart Scale over the course of one year. The process includes bringing together VDOT engineers and specialists with different areas of expertise to help localities evaluate potential solutions more carefully and build stakeholder consensus.[4]

Create a routine visioning process to discuss and document tradeoffs

States should establish a specific point in the process to routinely have corridor or project visioning sessions with localities. The purpose of this practice is to prompt a discussion and decision about tradeoffs between the role of the road in serving regional and local trips, community goals, and modal needs that should be prioritized in the project. It will also provide guidance for both the state and the locality for what can be expected from corridors in the future, and how needs might change in the longer-term.

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[3] Smart Scale: A Commonwealth of Virginia Website. Virginia Department of Transportation. Visited December 2018. http://vasmartscale.org

[4] Strategically Targeted Affordable Roadway Solutions. Virginia Department of Transportation. Visited December 2018. http://www.virginiadot.org/projects/stars.asp

State DOTs and their local partners make a number of tradeoffs during planning and project development: prioritizing regional throughput versus local travel and economic development, prioritizing the needs of different roadway users, and balancing those needs with other considerations like maintenance costs. If a road's primary function within the context of the broader network is to serve shorter local trips, it may make sense to prioritize the needs of people walking and biking. However, a road that serves as a major regional connection might require more focus on higher-speed car travel and potentially transit.

As the state agency, DOTs are traditionally focused on serving regional and statewide throughput. Some state engineers likely default to using roadway design standards in line with this objective during project development. However, designing roadways for regional throughput often presents a direct conflict to pedestrian and bicycle safety and access. This includes design decisions related to lane widths, travel speeds, frequency of pedestrian crossings, crossing distances, vehicle turning movements, and a host of additional considerations.

Therefore, states and local partners must make decisions upfront about what role the road should play within the surrounding community and region to provide a framework for guiding future design decisions during project development.

The best way to address this is having the tough but necessary conversations about these tradeoffs upfront—a challenge all state DOTs face. While none have implemented a comprehensive approach yet, the work of several states provided in this document can be used as models to support parts of the process. State DOTs should consider the following actions to support the recommended visioning sessions:

- Use a checklist of questions/considerations to guide the visioning session: Without a formal procedure, the process of considering tradeoffs will vary substantially depending on the project manager.
- Document a clear decision: States should use the checklists and worksheets to formally document the outcomes of the visioning sessions, including specific determinations about the role of the corridor, surrounding land use, and which modal needs should be prioritized. This will serve as a basis for decisions during scoping and design.
- Establish criteria to make a determination about through versus local trips (and integrate them into the checklist): Basic criteria will make conversations with stakeholders easier and decisions about priorities more transparent. Criteria can include evaluating parallel roads or highways that serve through or local traffic, the current land use context, future planned growth, current travel patterns, economic development benefits of promoting travel within the area versus through the area, and other considerations to determine what the primary role of the road should be in relation to the community and surrounding transportation network.

Provide guidance to raise the right questions and engage the right stakeholders routinely

Coordination during scoping is a challenge for many state DOTs, who often find that the level of stakeholder engagement and consideration of the project context can vary widely from region to region and between individual staff.

One way to encourage staff to do robust analysis and engagement during scoping is to change how they are evaluated internally to prioritize the process and the outcomes achieved, rather than simply rewarding on-time and under-budget project delivery (see the Practical Solution Memo in this series titled *Culture & Administration*).

Another key step is to require that project teams do a field visit to walk the area surrounding the project as part of the initial engagement process, and provide guidance on what staff should be looking for in observing the current conditions for all modes of transportation and the surrounding land use.[5]

A third approach is to provide better structure in terms of what types of questions project teams must answer and document during the scoping process, either through required worksheets or supporting guidance. Providing staff with the right questions to ask and people to engage during scoping can help bring a practical solutions approach into the process more consistently.

The following examples of worksheets from state DOTs can help provide models. Some of these examples are profiled in other white papers.

Washington State DOT's Context and Modal Accommodation Worksheet

WSDOT recently developed a "Context and Modal Accommodation Report" to help project teams think through which modes should be accommodated at what level on non-freeway state projects.[6] The report provides a structure for having conversations about and documenting discussions around tradeoffs during early project development. The worksheet establishes a suggested baseline for which modes should be prioritized based on the roadway type and land use context, and then provides a series of factors and questions to consider that could raise or lower the priority of each mode. WSDOT has also

[5] The following resources provide sample questions that can be used during a field visit to assess the current context:

- Bicycle Road Safety Audit Guidelines and Prompt Lists. FHWA. 2012. http://safety.fhwa.dot.gov/ped_bike/tools_solve/fhwasa12018/
- Pedestrian Road Safety Audit Guidelines and Prompt Lists. FHWA. 2007. http://www.pedbikeinfo.org/data/library/details.cfm?id=3955

[6] WSDOT's Context and Modal Accommodation Report and accompanying guide. Washington State Department of Transportation. Retrieved October 2018. https://www.wsdot.wa.gov/planning/default.htm

integrated this framework into the Practical Design section of the statewide design manual.[7]

Minnesota DOT's worksheets to identify context and modal needs

The Minnesota Department of Transportation (MnDOT) has a series of project Scoping Worksheets[8] with detailed checklists of considerations to help identify the needs for a project and other context. These include checklists of stakeholders to engage, local businesses to consider, and possible issues that should be identified in advance (land owner issues, access issues, utility issues, etc.). In addition to the Scoping Worksheet, MnDOT has also developed a Planning Worksheet Scoping Guide.[9] Project managers answer a short series of yes or no questions about the project such as the following, which guide them to consult specific stakeholders and emphasize the needs of specific modes of travel:

- Is there a school within a 1-mile radius of the project?
- Are there medical facilities within 1 mile of the project?
- Is the project occurring near significant freight or truck traffic generators, or near a significant freight route?

While optional, these worksheets can help encourage project teams to do their due-diligence to understand the project context upfront while also providing documentation of that context that can be referenced and updated later in the project development process. Requiring their use would improve the process.

Coordinate needs for state of good repair projects earlier

Asset management projects make up a substantial portion of most state DOTs' budgets. Repair and preservation investments often present opportunities to make other improvements at the same time and meet community needs, either by making simple changes like striping the road differently to accomodate different users—adding a new bike lane—or by coordinating local investments at the same time—making utility repairs that would otherwise have meant digging up the same road a year later. Coordinating these types of improvements with repair projects can meet community goals and save money for both the DOT and the locality.

Yet too often states are not aware of local needs or desires that could potentially be addressed at the same time, or localities find out too late about the upcoming project to influence the scope. State of good repair projects typically have their own funding sources

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[7] Design Manual. Washington State Department of Transportation. July 2018. https://www.wsdot.wa.gov/Publications/Manuals/M22-01.htm

[8] Scope Guidance. Minnesota Department of Transportation. Retrieved December 2018. https://www.dot.state.mn.us/pm/scope.html, http://www.dot.state.mn.us/pm/documents/scoping-worksheets.doc

[9] Planning Scoping Worksheet Guide. Minnesota Department of Transportation. Retrieved December 2018. http://www.dot.state.mn.us/planning/completestreets/docs/PlanningScopingWorksheetGuide.pdf

and associated processes, with a shorter scoping timeline with less community engagement built in to identify the project context and needs than capacity projects.

While asset management projects should have a relatively streamlined project delivery process, states can build in more room for low-cost modifications to project scopes simply by announcing and publicizing their work program of state of good repair projects to their stakeholders earlier. This allows local agencies and communities to raise other investments they would like to see coordinated with the project, and gives states the opportunity to change the timing of projects in their work program to better coordinate with local investment.

TDOT announces upcoming resurfacing projects earlier

The Tennessee Department of Transportation recently began a process to announce upcoming repaving projects further in advance so that stakeholders have the chance to raise needed Complete Streets improvements and other desires or needs that could be addressed as a part of the project (including through a local funding contribution). This has involved switching from a one-year project list to a three-year list to give partners time to weigh in, and sharing the list more proactively with TDOT's Office of Community Transportation (local liaison) staff, and MPOs, RPOs, and local governments as appropriate. While the new process is still being refined, TDOT plans to make the project list available online and provide the information in map format to make it easier for stakeholders and members of the community to see that a project is coming up in their neighborhood.

Previously, TDOT typically did not reach out to localities so far in advance unless TDOT project staff proactively identified an improvement that might be valuable, such as a lane elimination, in which case they would seek input from the local government, the local transit authority, and other relevant partners. The new process allows TDOT to continue to reach out when they identify potentially beneficial improvements that could be added to the project scope, but also allows local governments to reach out themselves based on their own upcoming work.

This is already resulting in better coordination. For example, it has led to cities pointing out that they will soon be tearing up the road to replace water lines, allowing the two agencies to align the timing to reduce the cost to both. The City of Bolivar in TDOT's Region 4 recently replaced water valves in a number of areas where TDOT has an upcoming resurfacing project planned. The City was in the process of hiring a contractor to re-stripe pavement, but TDOT's new process enabled them to hold off and coordinate the timing with TDOT's regional office, avoiding wasting funds to re-stripe pavement that would soon be removed.

Maine DOT's three-year work plan

The Maine Department of Transportation also makes an effort to publicize upcoming asset management projects by including them in the state's three-year MaineDOT Work Plan, which is updated annually and documents funded projects for the upcoming three years.

In addition to a traditional PDF plan, Maine DOT also includes a map of upcoming projects on its website for the Work Plan, as well as an "interactive work plan" that allows local agencies and the public to search for upcoming projects by town. Providing this information in more user-friendly ways increases transparency and helps give stakeholders the change to raise their priorities and needs if a project is coming up in their community.[10]

Revisit the scopes of projects that have been in the queue for funding for a long time

States should also consider facilitating a process with its stakeholders to revisit the needs behind some of the regional projects that are already in the statewide plan. The purpose would be to identify potential project scope changes to make them more cost-effective while still accomplishing most of the identified objectives, such as operational improvements. These savings can then be redirected to fund more projects. Several state DOTs have conducted this type of evaluation to achieve cost savings across their program.

TDOT revisits need and scope for projects already in the pipeline

Tennessee DOT created the Expedited Project Delivery (EPD) process to address decades of project backlog. TDOT had a backlog of more than 800 roadway projects in various phases of development, with total costs estimated at $6.1 billion. Several projects had been in the TDOT work program for many years with little to no progress, mainly due to high estimated costs and lack of funding.

TDOT began by identifying projects that had been on the books for a long time and were not slated for funding in the near term. TDOT reevaluated the scopes, specified the intended outcomes of each project, and then staff looked for less expensive alternatives that accomplished the same or a substantially similar result. Some projects were reduced to 1/20th the cost of the original design while accomplishing 80-90 percent of the goal. For example, TDOT reevaluated an expansion project on SR-52 in Fentress County that proposed converting a 2-lane road into a 4-lane road. The cost was estimated at $58 million. Instead, TDOT introduced curve warnings, school speed limit signs, stop signs, and other pavements and signage improvements at a cost of $85,000. This improved safety, while reducing costs by more than $57 million. Traffic analysis conducted for this segment of SR-56 demonstrated that the facility would operate at an adequate Level of Service with the reduced scope.[11]

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[10] Interactive Work Plan. Maine Department of Transportation. Visited December 2018. https://www.maine.gov/mdot/projects/workplan/search/

[11] TDOT Expedited Project Delivery. Gresham, Smith, and Partners. August 2014. https://issuu.com/gresham-smith/docs/tdotexpedite_web/7

Improving public engagement

Why?

State DOT leadership and staff generally understand the importance of robust community engagement. However, that level and quality of engagement happens less frequently in practice because it is expensive and time consuming to conduct for every project. In reality, DOTs generally go to the public seeking approval and buy-in for a concept staff have already developed, rather than to seeking meaningful input that could change their approach.

The recommendations below all aim to change the agency's approach to public engagement, as well as how it is conducted.

Strategies

Recognize the value in public engagement

Current measures of success, particularly the expectation of on time and under-budget project delivery, can directly conflict with a context-sensitive design approach. The steps required—defining the project need carefully, conducting thorough community engagement, and seeking lower-cost solutions instead of automatically designing to standard—can add time and complexity to project development. However, the same steps often prevent delays and cost increases later in the process by producing a scope with greater community support upfront. Balancing this requires setting an expectation for staff that the outcomes of projects are as important as the speed of project delivery.

To work effectively with community organizations and individuals, DOTs must increase capacity and provide training and staffing support for communication and community engagement to their planners and engineers. Real community engagement requires an understanding and acceptance that the project team may have to let go of their preferred solution for something that better reflects community needs but still meets the problem statement or purpose and need. In addition, transportation professionals should consider stakeholders the experts on their community, how it functions, and its priorities and concerns.

Be explicit about what impact the public can have

DOTs should make clear to stakeholders how the outcomes of engagement will be used moving forward. Community residents who tend to be active around these issues can face engagement fatigue from participating in a number of meetings if they do not appear to produce immediate outcomes or change how decisions are made. This can be especially frustrating when residents have taken time off of work or overcome other hurdles to attend workshops and forums, only to feel that their voices have not been heard. Articulating

clearly how feedback from community members will feed directly into future projects or policy decisions and providing concrete next steps can encourage better attendance.

This first step is to be clear internally on how much influence stakeholders will have. For example, will stakeholders be driving the process? Can their input lead to substantial changes in the scope? Or is the project at a point in the process where their feedback could only produce minor changes? Is the purpose of the engagement more about conveying information? Being clear about this internally helps guide how project teams approach the engagement and makes it easier to communicate expectations explicitly with stakeholders, which can reduce their frustrations and build trust.

It is critical to be upfront and clear about the purpose of each engagement and how the outcomes of engagement will be used moving forward. The spectrum of public participation below from the International Association for Public Participation is a valuable resource for defining and setting expectations around engagement.[12]

IAP2 Spectrum of Public Participation

IAP2's Spectrum of Public Participation was designed to assist with the selection of the level of participation that defines the public's role in any public participation process. The Spectrum is used internationally, and it is found in public participation plans around the world.

INCREASING IMPACT ON THE DECISION

	INFORM	CONSULT	INVOLVE	COLLABORATE	EMPOWER
PUBLIC PARTICIPATION GOAL	To provide the public with balanced and objective information to assist them in understanding the problem, alternatives, opportunities and/or solutions.	To obtain public feedback on analysis, alternatives and/or decisions.	To work directly with the public throughout the process to ensure that public concerns and aspirations are consistently understood and considered.	To partner with the public in each aspect of the decision including the development of alternatives and the identification of the preferred solution.	To place final decision making in the hands of the public.
PROMISE TO THE PUBLIC	We will keep you informed.	We will keep you informed, listen to and acknowledge concerns and aspirations, and provide feedback on how public input influenced the decision.	We will work with you to ensure that your concerns and aspirations are directly reflected in the alternatives developed and provide feedback on how public input influenced the decision.	We will look to you for advice and innovation in formulating solutions and incorporate your advice and recommendations into the decisions to the maximum extent possible.	We will implement what you decide.

At what point(s) in the process are locals, districts, and other stakeholders included?

DOTs should establish a process to routinely have corridor or project visioning sessions with localities. The purpose would be to prompt a discussion about tradeoffs between the

[12] Spectrum of Public Participation. International Association of Public Participation. 2018. https://www.iap2.org/page/pillars

role of the road in serving regional and local trips, community goals, and modal needs that should be prioritized in the project. GICD suggests that this happen as a requirement when projects are added to the 3-Year Plan.

It is important for DOTs to engage local partners early and often when deciding what role the road *should* play within the surrounding community and region to provide a framework for guiding future design decisions during project development. The goal should be to build trust with the community and generate support for projects later in the process. Rather than holding hearings or informing the public once the process is underway and a preferred design has been chosen, efforts should be made to go out into the community to get a better sense of the issues and hear the public's priorities. Later on, if there is opposition from a vocal minority, opponents or others intent on disrupting the process will have to answer to a base of supporters who have bought into the project, not just the DOT or other transportation professionals.

This approach can help to prevent the development of a project that aims to address one priority while residents and stakeholders are seeking to address totally different—and even contradictory—challenges.

Identify the right spokespeople.

Often the most compelling messengers for skeptics are stakeholders whose interest in the project is somewhat unexpected. For example, depending on the project, this could mean business owners, chambers of commerce, and real estate developers who see the benefits of the project for local economic development or their bottom line.

To engage residents that have not traditionally participated in the transportation decision-making process, DOTs should engage trusted community leaders to act as liaisons and spokespeople. Some residents will be more comfortable engaging with a community leader whom they know and trust. Hiring liaisons to support engagement efforts can cultivate longer-term relationships with residents who might otherwise be hesitant to engage. Moving beyond public meetings can also open the process to new stakeholders and groups.

Can we meet people where they already are?

Rather than hosting separate workshops and events, DOTs and localities should attend existing standing neighborhood meetings, school functions, or community events. This provides an opportunity to collect feedback from a broader group of residents that may not attend separate sessions. In addition, holding meetings and events at different times of day can help reach a range of community members with different work schedules and needs. While decision-makers and stakeholders from DOTs and local governments can attend public meetings through their jobs, some community residents would need to take the day off of work to do so. DOTs can collect broader input by providing multiple ways for residents to provide feedback on a topic, such as online or phone surveys or social media in addition to in-person events.

Don't forget the human element.

The general public and other stakeholders may not be transportation engineers, but they are the experts on their neighborhoods and region. They have a set of values that will not translate perfectly into LOS, delay, or throughput. Transportation agencies should focus on communicating values rather than data and use terms that those outside the transportation industry can understand. Further, it is okay to use humor and be light, especially when using social media to communicate. Knowing there is a real person on the other side of an agency's Twitter account can go a long way.

Examples & Tools

TDOT's Office of Community Transportation

TDOT has improved its community and stakeholder engagement by creating a dedicated public facing Office of Community Transportation (OCT)[13] in each TDOT region charged with better linking TDOT's projects and designs to local needs and aspirations. OCT offices work directly with community and regional planning agencies to integrate land use and transportation decisions and provide access to tools and resources to localities available through TDOT and national best practices. Many communities also already have local organizations focused on advancing quality of life and economic vitality, and through public outreach these groups can readily become planning partners. OCT works through the TDOT Rural Planning Program with their RPO coordinators and MPO partners in the urbanized areas to understand upcoming local development and lessen any negative impacts TDOT projects would have on local and state transportation systems and finances. In addition, TDOT staff proactively make presentations and answer questions about upcoming projects at existing community meetings and events.

Hawaii's Guide for Public Involvement

The Hawaii Department of Transportation has developed an excellent *Guide for Public Involvement* for its Highway Division that could provide a model for guidance. The Guide discusses the values of Hawaii culture, different levels and types of engagement for different purposes, and how to make engagement successful. It also includes a detailed Project Delivery Checklist at the end with steps for identifying the community context and risks and benefits of the project, determining the appropriate engagement strategies, and identifying key messages to share with the public.[14]

The guide includes a public involvement continuum, guidance for involvement during corridor studies, and a public involvement workbook. The guiding principles are partuarly noteworthy:

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[13] Office of Community Transportation. Tennessee Department of Transportation. Retrieved December 2018. https://www.tn.gov/tdot/long-range-planning-home/longrange-oct.html

[14] Guide for Involvement Public. Hawai'i Department of Transportation, Highways Division. June 2012. http://www.oahumpo.org/wp-content/uploads/2013/02/Final-HDOT-Guide-for-Public-Input-7-27-12.pdf

- Build public trust: Build public trust in the Highways Division through public involvement that is honest, transparent and that demonstrates a sincere interest in community values.
- Early and continuous information and input: Throughout each phase of project delivery, provide early and continuing opportunities to share information with and/or gather input from a wide range of stakeholders.
- Consistency and coordination: Conduct consistent public involvement for similar efforts throughout the Highways Division and provide an appropriate level of coordination and consideration for each project and its stakeholders that use the Highways Division's resources effectively.
- Public involvement strategies, techniques, and methods: Utilize a wide range of public involvement strategies and techniques to meet the diverse needs and characteristics of the Highways Division's plans, programs, projects, and stakeholders.
- Documentation: Support accountability and coordination by documenting public involvement activities, input, and follow up responses throughout the life of the effort.

Pennsylvania's Smart Transportation Guidebook

The *Smart Transportation Guidebook* developed by PennDOT and NJDOT could also provide a model for guidance on community engagement.[15] In addition to offering stakeholder engagement tools and approaches, it includes a section on the crucial role local agencies must play in creating connected multimodal transportation networks and encouraging supportive land uses.

[15] Context Sensitive Solutions and Design. U.S. Department of Transportation, Federal Highway Administration. August 2018.
http://contextsensitivesolutions.org/content/reading/dots_release_smart_transportation_guidebook/

Reevaluating level-of-service as both a measure and its weight

Why?

Level-of-Service (LOS) has been the dominant performance measure for roadway design, and continues to drive transportation agencies toward overbuilt, expensive, car-oriented highways and sprawling development. No statement encouraging design flexibility and innovation or new design guidance will shift practices away from over-designing roadways unless state DOTs take steps to change expectations around LOS.

Currently, engineers are tasked with finding the ideal solution for every congestion and safety issue, but most DOTs simply do not have the resources to build every large project to address every issue. This is particularly important because there is often a sharp increase of marginal costs for improvements made to keep LOS above a certain threshold at all times. The cost to maintain a LOS B or C through the peak 15 minute period could drive project costs up dramatically, when it may actually be reasonable and acceptable to allow LOS D or F for that small window.

Additionally, the current project development process in many states consider the needs of vehicles, including speculative long-term increases in traffic volume that may not come to pass, without an understanding or discussion with the community about other needs in the corridor. This focus can lead to the development of large, expensive projects that takes a DOT decades to fund and build, drain resources, and may not address the concerns of the community.

There are several options for state DOTs to replace, supplement, or change how they use LOS in design and funding decisions. DOTs can change guidance on LOS applications by (1) relaxing LOS standards in urban/urbanizing contexts, (2) changing the weighting of LOS in comparison to other measures in urban environments, and (3) consider alternative performance measures to LOS, like VMT.

Relax LOS standards and focus on community goals

DOTs should reconsider their priorities around LOS, and provide guidance on how to balance tradeoffs as well as set expectation on what level of improvement is trying to be accomplished. Some key questions that should be asked, but are not often considered, include:

- What are acceptable levels of delay and design guidelines for the many types of modal users, density of land uses, roadway type?
- What problems warrant a multimillion-dollar investment?
- At what point in the process are alternative modes of travel considered?

While a project may have several goals, certain goals take higher priority by default. For example, to achieve LOS C, all other priorities may become secondary to the flow of traffic as a result. If DOTs want to address community concerns, project goals should reflect the community's input and priorities, not a one-size-fits-all LOS goal. For example, if the community wants a safe, walkable corridor, the goals set for a project may not include decrease in delay for vehicles.

This is especially challenging when projects are developed to address lower LOS at peak periods. DOTs should reconsider designing improvements and investing limited resources to address the most congested 15 minutes of the AM and PM peaks.

In addition, especially with state-of-repair projects, project teams may not have information about what that community wants, what questions to ask to anticipate conflicts in needs, or how to resolve those conflicts. DOTs should have procedures in place to ensure that project teams collect this information consistently—otherwise LOS will continue to drive design decisions by default.

Relaxing expectations around LOS can remove one of the biggest barriers to making lower-cost investments while still addressing much of the identified need. USDOT has developed case studies outlining several alternative metrics to LOS to consider.[16]

WSDOT: Accepting lower performance

The Washington State Department of Transportation, which has pioneered a statewide practical solutions approach, includes "accepting lower performance" as one of six strategies staff should consider to address performance gaps. As WSDOT notes, the benefits of addressing the performance gap do not always outweigh the cost of investing in a solution.

Give other measures greater weight

DOTs should supplement LOS by giving other measures, like accessibility and safety, the same weight to address the state's priorities more accurately. Work and non-work accessibility measures better capture the goal of getting people and goods where they need to go in a reasonable amount of time. The measures used in project development should also reflect the community's input and priorities, not a one-size-fits-all LOS goal.

For many of the same reasons mentioned above, giving LOS less weight in relation to other goals can lead to more successful, cost-effective projects. Additionally, there is a steep increase of marginal costs for improvements made to keep LOS above "F" at all times. This is especially problematic when achieving a certain level-of-service stands in direct conflict with other goals for the project, such as pedestrian safety.

WSDOT: Emphasizing other performance measures

[16] U.S. Department of Transportation. Level of Service Case Studies. December 2017. https://www.transportation.gov/office-policy/transportation-policy/level-service-case-studies

WSDOT is currently working to change which performance measures it uses in day-to-day decisions to place greater emphasis on the broader outcomes the state has identified that its transportation network should help advance. These performance measures will feed into a new Practical Solutions Performance Framework WSDOT is developing to bring the state's six transportation policy goals (mobility, environment, economic vitality, preservation, safety, and stewardship) directly into its decision making at every level, from statewide planning down to roadway design. The new framework will help WSDOT make a more intentional determination about which transportation problems are most critical and which potential investments will move the state toward its vision for the future, rather than defaulting to traditional measures focused on vehicle throughput.

Consider replacing LOS in development review with alternative measures like vehicle miles traveled

Focusing on preserving LOS can lead to roadway expansions that induce more vehicle trips, ultimately degrading LOS again. This is an expensive cycle. DOTs should consider replacing the use of LOS in land development approval with a measure like vehicle miles traveled (VMT). There is precedent for this already in California, discussed below.A more productive approach seeks to minimize traffic from development before resorting to just building expensive, bigger and wider roads. This approach is discussed in greater detail in the Practical Solutions Memo in this series titled "How to address land use and context."

A new report, Modernizing Mitigation, from the State Smart Transportation Initiative provides more information about how to implement VMT measures for decision-making in place of LOS, as well as examples of how this new practice is working in California regions.[17] USDOT also provides an analysis of LOS alternatives used by both state and local agencies.[18]

California: Measuring VMT

Many states such as California have accepted that the LOS in highly urbanized areas will be "F" for single-occupancy vehicle movement during the peak hour(s). In other words, they have decided on a number of hours during peak period for which LOS F is acceptable, based on technical, political, and financial constraints. In states where LOS F during peak hours is assumed, the conversation shifts to predictability of traffic flow performance metrics and capacity within alternate corridors and transit.

As a result of California state legislation (SB 743),[19] the DOT and localities are shifting to using vehicle miles traveled instead of LOS in development review and approval.[20] This

[17] State Smart Transportation Initiative. Modernizing Mitigation: A Demand-Centered Approach. September 2018. https://smartgrowthamerica.org/resources/modernizing-mitigation-a-demand-centered-approach/
[18] U.S. Department of Transportation. Level of Service Case Studies. December 2017. https://www.transportation.gov/office-policy/transportation-policy/level-service-case-studies
[19] State of California. Senate Bill No. 743. Retrieved December 2018. http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201320140SB743.

change is the result of recognition that using LOS measures to assess the need for additional roadway capacity during development review increases the cost of infill development and incentivizes suburban sprawl. The state will better achieve its Greenhouse Gas emission reduction goals and improve the affordability of its communities by using performance measures that incentivize alternative modes of transport and density and mix of land uses.

[20] State Smart Transportation Initiative. California moves to reform traffic mitigation process. November 2014. https://www.ssti.us/2014/11/pasadena-development-review-moves-away-from-auto-delay-and-toward-auto-miles-traveled/

Addressing assumptions and expanding flexibility

Why?

For close to a century, transportation agencies have followed fairly strict guidelines and formulas to maximize the utility of the networks they manage, to meet driver expectations, and to manage risk (as perceived in the past).

Typical engineering standards are built around the objective of moving vehicles quickly through an area, and engineers generally default to using the maximum ends of the ranges in their design standards. This results in the application of the same basic roadway design approach to all of their projects—one-size fits all solutions—whether the project is in a rural area, a small town main street, a transitioning or suburban area, or an urban downtown. This comes from embedded assumptions that faster is better, and wider lanes allow vehicles to travel safely at higher speeds. These standards were developed for a specific purpose when we were building the interstate and national highway system, but many states continue to apply them to all projects regardless of the context.

Assumptions and rigidity built into every aspect of this work have produced overbuilt, costly projects that have huge impacts on accessibility, health, and affordability in communities. Further, they have had negative impacts on the local and regional economy by prioritizing traffic moving through a community rather than bringing economic activity to a corridor.

State DOTs should consider the aspects of the transportation planning process that have become obstacles to cost-effective, common sense designs and solutions. They include predictions around transportation needs for 20-plus years into the future, how models are used and what data they rely on, and rigid design guidelines.

Reconsider design year assumptions

To anticipate future needs, DOTs typically attempt to forecast the future and anticipate what might be necessary over 20 years. Part of the goal of this practice is to avoid having to revisit the same corridor a few years later. The intent behind a 20-year projection is noble—it would be irresponsible to build something we know will be obsolete halfway through its lifecycle. However, overbuilding is wasteful of taxpayer money and harmful to the environment and the adjacent communities. Besides, predicting traffic in 20 years is impossible. We simply do not and cannot know what the transportation needs that far into the future will be, especially with the arrival of new technology and modes that no one predicted even a couple years ago. In 1999, no one thought we would be carrying around small, touch screen computers in our pockets, let alone that each would carry the technology to summon a driver for us. Though we had no way to predict it, ride sharing has had a major impact on transportation. Transportation Network Companies brought 2.6

new vehicle miles on the road for each mile of personal driving removed, and that number was 2.8 before the sharing and carpooling features were introduced.[21]

Relying on 20-year models will often prescribe large, expensive projects that are not yet necessary—and may never be. Such large projects may also induce demand that would not otherwise have occurred, requiring still further investments in the future. Traditional models predict steady growth of vehicle miles traveled (VMT), yet VMT decreased during the 2008 recession, and has largely flattened in recent years. The transportation industry did not anticipate ridesharing, nor can it be sure how autonomous vehicles will impact demand. Rather, planning for what is needed now and addressing today's issues will allow DOTs to do more projects, through smaller improvements, and conserve resources to add enhancements later should it become necessary.

Evaluate how the 4-step model is used

The 4-step travel demand model is a blunt tool and can only measure trips between larger zones. In smaller communities, especially those with an active main street or small downtown, the model would ignore trips within those areas.

State DOTs should reevaluate how they use the 4-step model for future decision-making, especially in more urban areas and small town centers where trips are likely to be shorter. There are alternatives, including more advanced, activity-based models. These are powerful tools and can be extremely effective, but can also be a big undertaking. Another option is to change the way current demand models are used—including the information fed into those models—and how they influence decisions.

It is important to consider the assumptions made within the traditional model. Too often, models include consistent, high levels of growth, as well as assumptions around where people will be living and what their activities will be. Reevaluating these assumptions can allow transportation agencies to think about the interaction between land use and transportation, and run models with different growth and development scenarios. Comparing different scenarios will provide a better understanding of which transportation investments are beneficial regardless of future growth, and which should be reconsidered.

A few options for how to reconsider the 4-step model are below:

1. Run the travel demand model using alternative land use assumptions, i.e. scenario planning, particularly with parcel-level land use scenarios.

   Examples:

   - CommunityViz: Software from City Explained, Inc. for a parcel-based scenario planning analysis.[22]

[21] Schaller Consulting. The New Automobility: Lyft, Uber and the Future of American Cities. July 2018. http://www.schallerconsult.com/rideservices/automobility.pdf

[22] Kimley-Horn and Associates. Scenario Planning and Travel Demand Modeling. 2015 http://ncampo.org/documents/Toolkits_20130515-1515_Padgett.pdf

- DelDOT and SSTI's Land Use and Transportation Scenario Analysis and Microsimulation (LUTSAM) Tool enables model walking and biking trips and speed scenario analyses. LUTSAM can be used to improve the current 4-step and advanced travel demand models to work at the parcel and building level within the study area.[23]

2. Use an integrated transportation and land use model.

   Examples:

   - Oregon DOT built its Statewide Integrated Model (SWIM) as a cost effective decision making tool, and to evaluate the economic impacts of bottlenecks and inadequate pavement and it could be invaluable in understanding the effects of new technologies like autonomous vehicles and transportation networking companies.[24]
   - NCHRP Synthesis 520: Integrated Transportation and Land Use Models presents information on how select agencies are using sketch planning models and advanced behavioral models to support decision-making. The synthesis describes the performance of these models and the basic principles of land use/transport integration.[25]

3. Consider using an activity-based model, which are generally as useful anywhere the 4-step model would apply. They would also account for shorter trips and would recognize how those trips were made (i.e. walking trips), making them much more effective in a town context.

   Examples:

   - Sacramento Activity-Based Travel Simulation Model[26]
     - Individualized modeling—better accounts for demographic factors (e.g. age, income)
     - Models full-day activity and travel
     - All travel, not just travel to/from home is traceable—models "tours" = chain of trips beginning or ending at home.
     - Used for:
       - Region-wide and subarea estimates of travel: VMT, congestion, and travel by different modes

[23] State Smart Transportation Initiative and Delaware Department of Transportation. Land Use and Transportation Scenario Analysis and Microsimulation (LUTSAM) Tool. June 2012. https://www.ssti.us/2012/06/lutsam/

[24] State Smart Transportation Initiative. Mainstreaming transportation and land use modeling within Oregon DOT. February 2018. https://www.ssti.us/2018/02/mainstreaming-transportation-and-land-use-modeling-within-oregon-dot/

[25] National Cooperative Highway Research Program. Integrated Transportation and Land Use Models. 2018. https://www.nap.edu/catalog/25194/integrated-transportation-and-land-use-models

[26] SACOG's Regional Travel Demand Model Program. March 2014. http://www.sacog.org/sites/main/files/file-attachments/plnrscmte_sacog_travel_model_wkshp_27mar2014.pdf

        - Equity/environmental justice analysis
        - Air quality analysis
        - SB375 GHG analysis
    - Data inputs:
        - Population
        - Land use
        - Transportation network
- DRCOG Focus Travel Model[27][28]
    - Activity-based model; based on Sacramento's activity based model
    - Forecasts individual travel based on personal and travel-related characteristics
    - Compared to 4-step model, includes more:
        - Individual characteristics,
        - Household composition detail
        - More realistic travel purposes (work, school, shop, escort children, etc.)
    - Does not model vehicle type, non-motorized assignment
    - Data inputs:
        - Job location
        - Household location
        - Demographics
        - Road network and traffic counts
        - Transit network and frequencies
- Review of MPOs using activity-based travel models from the Metropolitan Washington Council of Governments/National Capital Region Transportation Planning Board. [29]

Address design assumptions and rigidity

State DOTs should (1) encourage greater use of design flexibility by making it easier to do design exceptions or incorporating commonly used exceptions into the standards and (2) creating design guidelines that vary by context.

Design guidance and the AASHTO Green Book are critical resources for transportation engineers. However, the options presented in these resources are often 'preferred' or, 'acceptable.' Within those labels is an implication that 'acceptable' is not as safe, or is in

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[27] Denver Retional Council of Governments. Focus Travel Model. Retrieved December 2018. https://drcog.org/services-and-resources/data-maps-and-modeling/travel-modeling/focus-travel-model

[28] Denver Retional Council of Governments. Land Use and Travel Demand Models Presentation to the Institute of Transportation Engineers Colorado/Wyoming Section. December 2014. http://www.cowyite.org/presentations/DRCOG_Models.pdf

[29] Metropolitan Washington Council of Governments/National Capital Region Transportation Planning Board. Status of Activity-Based Models and Dynamic Traffic Assignment at Peer MPOs. October 2015. https://www.mwcog.org/file.aspx?D=4I4c3V5tz1NX%2FJ1mRm8ngNOP2IR2IlINP0s86mxTxP4%3D&A=bwpDgpuaidJbqzIA61InNBxuu%2BQ9vpwRkOWn4SIhySU%3D

some way an inadequate solution. Rather than imposing these assumptions, DOTs have an opportunity to promote a different way of thinking. AASHTO's Roadside Design Guide also states, "if including the highest level of roadside design criteria is routinely required in each highway design project—regardless of cost or safety effectiveness—it is likely that system-wide safety may stay static or even may be degraded."

These assumptions, as well as the utilization of LOS standards in the Practical Solution Memo in this series titled *Reevaluating level-of-service*, make it extremely difficult to consider the other needs of the community. Further, design engineers are hesitant to apply for formal exceptions because the process is difficult and punitive—it can impact the time and cost to deliver a project, currently two of the most important metrics for success at many state DOTs.

Even when a practical solutions approach is utilized, a well-defined need and scope during planning may expand into a larger-scale capacity project because staff are hesitant to deviate from roadway design standards. DOTs should encourage designers and engineers to make design decisions based on proven concepts and expand flexibility.

FHWA, AASHTO, and TRB have been working to clarify the flexibility that is available in existing guidelines and regulations between the Green Book, the Roadway Design Guidelines, FHWA rules, and the Highway Safety Manual.

The foreword of AASHTO's Green Book[30] states:

- "This policy is therefore not intended to be a detailed design manual that could supersede the need for application of sound principles by the knowledgeable design professional. Sufficient flexibility is permitted to encourage independent designs tailored to particular situations."
- "Cost-effective design is also emphasized. The goal of cost- effective design is not merely to give priority to the most beneficial individual projects but to provide the most benefits to the highway system of which each project is part."

AASHTO has plans for major revisions to the Green Book over the coming years in a a paradigm shift toward context-sensitive, multimodal, and performance-based design. The newly released 7th Edition includes an introduction that promotes this design approach explicitly. The 8th Edition, which will be developed over the coming years, will include substantial revision to the rest of the chapters in the Green Book to align with performance-based, multimodal, practical design principles.

A more flexible approach must promote predictable vehicular flow and not allow delay or speed performance metrics to be the only measures of success. Rather, people-moving capacity, safety of all modes, and aesthetics are important outcomes in the urban context. With less additional right-of-way needed for an urban project, costs will be lower and the project will move forward faster to provide on the ground results.

To design a project solution that meets multiple, vague, and conflicting goals, the design guidance will need to be flexible on how to maximize safety, health, and utility to all users

[30] American Association of State Highway and Transportation Officials. A Policy on Geometric Design of Highways and Streets, 7th Edition. 2018. https://store.transportation.org/item/collectiondetail/180

based on flexible design speed guidance as well as requirements related to lane, median, sidewalk widths, etc.; distance between signals and mid-block crossings; and, roundabouts and other traffic calming designs and measures.

While this sounds like a reasonable recommendation, this creates tension between a spoken desire for innovative solutions and a reluctance to relax or deviate from the standards in practice. In addition, the processes for submitting design exceptions and design waivers can be onerous. This creates a deterrent to deviating from the standards, particularly for localities with lower capacity.

Strategies to improve the design waiver and design exception processes:

- Integrate common design exceptions into DOT's standards: If certain categories of designs have been proposed and accepted repeatedly, DOTs should integrate them into what is allowable within the standards. This will allow staff to avoid the exception or waiver process every time. This strategy could include collecting data or documentation to provide more confidence that the approaches are "proven" without additional justification moving forward. There may be good design concepts that are not being utilized because the exceptions process is too onerous.
- Change the terminology around the exception process: Terms like "exceptions" and "waivers" come with connotations that may be discouraging staff from using them. They imply that designs that diverge from the standards are suboptimal or problematic, rather than innovative. Simply changing the words used in the process might help change the culture around it.
- Provide guidance on which circumstances likely warrant a waiver/exception: DOTs can help make the waiver/exception processes easier for lower-capacity regions by providing more straightforward guidance or a 'cheat sheet' that breaks down what types of circumstances are likely to require a waiver and what justification will be necessary. This could help make the exception process less intimidating and onerous.

Oregon DOT: Least cost planning

Oregon's least cost planning may provide some guidance and a starting framework.[31] The project called Mosaic provided a planning framework and technical guidance to be able to weigh trade-offs in a qualitative and quantitative manner.[32,33]

States that have changed their design guidance to promote flexibility include: Pennsylvania, Florida, and Kentucky.

TDOT: Multimodal Project Scoping Manual addresses risk and design flexibility

[31] HDR. Least Cost Planning Methodology for ODOT. Retrived December 2018. https://www.hdrinc.com/portfolio/least-cost-planning-methodology-for-odot

[32] Oregon Department of Transportation. Oregon Mosaic: Value and Cost Informed Planning. Retrived December 2018. https://www.oregon.gov/ODOT/Planning/Pages/mosaic.aspx

[33] State Smart Transportation Initiative. Mosaic Value and Cost Informed Planning: Oregon's new tool for least cost planning (webinar). September 2014. https://www.ssti.us/Events/mosaic-value-and-cost-informed-planning-oregons-new-tool-for-least-cost-planning/

The Tennessee Department of Transportation developed a new Multimodal Project Scoping Manual in spring 2018 to support the state's Multimodal Access Policy.[34] The new manual includes a section that explicitly addresses design flexibility, professional judgment, and risk. The manual notes:

> "Designers sometimes express concern about risk when applying design flexibility. Due to these concerns, some designers adhere strictly to their interpretation of established design criteria, sometimes at the expense of providing adequate bicycle and pedestrian facilities. However, strictly adhering to the most conservative design values without considering other relevant factors may not constitute reasonable care on behalf of the designer. Likewise, a designer who deviates from established design guidance is not necessarily negligent, particularly if the designer follows and documents a clear process, using engineering judgment, when dealing with design exceptions, and experimentation.
>
> "A flexible design approach has three key elements: (1) Engineering Judgment, (2) Documentation and (3) Experimentation."

TDOT's manual also provides guidance on each of the three key elements listed, including how to exercise judgment and when and how to consider experimenting with new and emerging design treatments. Risk is a common and intense concern among roadway designer engineers. However, as Tennessee's guidance points out, strict adherence to conservative designs may create the same or more risk than deviating from design standards using appropriate judgment and documentation—a point many state DOT legal divisions echo when consulted directly. TDOT's guidance around risk and flexibility—especially the note about documentation, which greatly reduces risk and helps bring design "exceptions" into mainstream usage—is a great step towards utilizing flexibility to produce the best designs possible. TDOT has also introduced a multimodal Design Deviation Request Form to make the documentation process clearer for staff.

[34] Tennessee Department of Transportation. Multimodal Project Scoping Manual. April 2018. https://www.tn.gov/content/dam/tn/tdot/multimodaltransportation/TDOT%20Multimodal%20Project%20Scoping%20Manual.pdf

How to address land use and context

Why?

Transportation agencies do not and should not play the leading role in land use decisions, but they cannot ignore local land use and development decisions either or dismiss them completely as someone else's responsibility. Land use and development has significant ramifications for the costs to deliver and maintain the state's transportation system. If local land development is not managed carefully along a corridor, it can lead to increased congestion due to more driveways and access points for local businesses, auto-oriented land uses that require driving even for short trips, and a poorly-connected network of parallel local streets to reduce demand on the state-owned arterial. This results in a "need" to expand state highways to accommodate additional traffic that could have been prevented. These types of transportation solutions for land use mistakes are both expensive and ineffective.

At the same time, state DOT investments have significant impacts on local land development. For example, it is generally cheaper for DOTs to purchase extra right-of-way now if they think they may need to expand the facility someday in the future. Yet doing so leads to a loss in development potential within the right-of-way. It also likely leads to a change in the development potential of the adjacent land because different land uses will make sense next to wide highway right-of-way compared to a narrower road. Buildings will need to be set back further from the road, development will be more car-oriented, and this will likely induce more vehicle trips over time.

A narrow main street in Bisbee, AZ on the left and a slightly wider road in Golden, CO in the center match their context and support businesses. On the right, a much wider road—NH State Route 28—serves almost exclusively cars and buildings are set back form the road. (All images from Flickr, left to right: Mr.TinDC; MomentsForZen; Doug Kerr)

The ways state departments of transportation design roads should evolve to meet today's economic and funding realities. In many cases, the objective of moving vehicles through an area as quickly as possible is set as the primary goal but should not be and may even directly conflict with primary community goals like supporting local economic activity. Young workers are choosing to live in cities with vibrant neighborhoods that provide

access to a variety of transportation options, including transit.[35] Businesses across the country are responding by changing how they choose where to locate to attract and retain a talented workforce.[36] Building unique, walkable places with transportation choices has become paramount to remaining economically competitive. DOTs should be an active part of responding to this demand, but currently, they are often an obstacle.

The goal of the agencies and entities involved should be to openly address all of the goals of a transportation investment along with the role that land use decisions play in the performance of the transportation network and vice versa, foster an environment where state, regional, and local agency partners are discussing the tradeoffs between different objectives, and create accountability between land use and transportation decisions. This first requires acknowledging that land use and transportation decisions impact each other. It also requires acknowledging the importance of context; the traditional, oversimplified characterization of roads as either "urban" or "rural" is insufficient. Priorities will be different for a state-maintained roadway where it serves as a town main street compared to five miles away in a transitional commercial area outside of town; the design and operation of the road should reflect those differences.

Tie state transportation funding to local land use decisions that mitigate vehicle demand

DOTs should encourage local land use decisions that do not undermine the state's ability to invest limited transportation dollars effectively. They need to bring the relationship between land use and transportation into the open during decision-making. Local land use decisions that are likely to increase auto demand or slow traffic should be made in direct collaboration so that the state DOT can either ameliorate the impacts or make a decision with the locality to accept a lower level of service and promote other regional priorities.

Tying state funding to land use decisions can help create a positive feedback loop to ensure that state transportation investments and local land use decisions are all aiming toward the same goals. DOTs can reward those localities that harmonize their land use with the state's transportation work by prioritizing those projects for funding while moving the projects of areas that do not to the bottom of the list. Including these priorities in a scoring process or giving a higher match to those that do this can also encourage coordination.

States can also use funding to reward localities that are using strategies to mitigate future travel demand rather than requiring the state to expand roads to accommodate it. Mitigation strategies can include a range of transportation demand management (TDM) approaches like improving the infrastructure for walking, biking, or transit; providing

[35] Rockefeller Foundation. Access to Public Transportation a Top Criterion for Millennials When Deciding Where to Live, New Survey Shows. April 2014. www.rockefellerfoundation.org/about-us/news-media/access-public-transportation-top/

[36] Smart Growth America. Core Values: Why American Companies Are Moving Downtown. June 2015. https://smartgrowthamerica.org/resources/core-values-why-american-companies-are-moving-downtown/

complementary land uses that minimize the need for new trips; subsidizing other forms of mobility like bike sharing or car sharing; and providing first-and last-mile connections to high-capacity transit like a regular shuttle. These strategies are often significantly less expensive over the long term than expanding roadways to increase capacity.

DOTs can reward those that participate in breaking down barriers between state agencies and local governments and ensure decision making across all public entities is working toward a common goal—providing a safe, efficient transportation system, inclusive of surrounding land uses. Prioritizing projects that already coordinate across levels of government and consider land use is the best way to accomplish this. Simply directing partners to do this is ineffective, especially since changing land use patterns and rules can be politically challenging for local leaders.

Building relationships with stakeholders and other actors such as school districts, developers, universities and other institutions that are making major land use decisions outside of a DOT's processes can help make this happen.

Example: Mitigating future demand through TDM strategies in California:

A number of cities in California are leading the country in shifting toward an approach to land use decisions that actively mitigate future vehicle travel demand. Prompted by California state law SB 743, these cities are making changes to the review process for new development proposals to incentivize traffic reduction rather than requiring developers to expand the transportation network to accommodate the traffic their development would otherwise generate. The new approaches these cities are taking reward developers for using strategies from a menu of TDM approaches. This makes developers partners in an effort to produce people-friendly neighborhoods.[37]

Develop guidance on what localities should ask of developers

States can also develop simple guidance or checklists to help lower-capacity localities make the right requests of developers and determine when they should and should not grant waivers. Some localities simply may not be aware of the impacts their land development decisions have on transportation demand over the long term, let alone the implications for the cost necessary to address the demand. States can make it easier for them by drawing a clear connection between poor development decisions and the state's inability to fund transportation projects to address them.

This could be framed as a checklist of key considerations or asks for developers to help ensure that the localities' future transportation projects can be successful in receiving support and investment from the state.

[37] State Smart Transportation Initiative. Modernizing Mitigation: A Demand-Centered Approach. September 2018. https://smartgrowthamerica.org/resources/modernizing-mitigation-a-demand-centered-approach/

It could include guidance encouraging localities to put better zoning in place or stay firm on existing zoning requirements when negotiating with developers in areas such as:[38]

- Orienting buildings toward the street
- Keeping parking requirements low
- Creating a well-connected local street network
- Clustering development and including a mix of land uses
- Relaxing or replacing LOS standards in development approval
- Not building roads/lanes that are wider than necessary

Create land use context classifications

Customizing transportation projects to the context of the surrounding community is a key component of Practical Solutions. State transportation agencies traditionally apply the same basic roadway design approach to all of their projects, whether the project is in a rural area, a small town main street, a transitioning or suburban area, or an urban downtown. Typical engineering standards are built around the objective of moving vehicles quickly through an area, and engineers generally default to using the maximum ends of the ranges in their design standards. This comes from embedded assumptions that faster is better, and wider lanes allow vehicles to travel safely at higher speeds. These standards were developed for a specific purpose when we were building the interstate and national highway system, but many states continue to apply them to all projects regardless of the context.

Some states have issued policies or directives requiring that staff should consider land use context during project development, but this rarely produces consistent changes to how projects are designed without further changes to the project development process and standards.

A growing number of states are addressing this by developing context classification systems that clearly define land use categories for staff to consider—such as rural, small town, suburban, urban, and urban core—and what types of design considerations and approaches are appropriate for each. This guidance is usually accompanied by pictures or visual depictions of each land use context category, as well as lists of characteristics to look for in the surrounding area. This might include specific features like block lengths, building density, building height and distance from the street, and whether the development is residential, commercial, industrial, or a mix.

Staff can then use the context classification guidance to make decisions about which strategies are a best fit for the identified need for investment and which specific design features are appropriate. For example, some states have included guidance saying that pedestrians and transit should be the highest priority modes of transportation in urban areas, and that narrower road and lane widths, pedestrian refuge islands, more frequent crossings, and other features should be considered.

[38] Smart Growth America. Complete Streets In Central Florida. February 2017. https://smartgrowthamerica.org/resources/complete-streets-central-florida/

Example: FDOT's context classifications

As part of its Complete Streets Implementation initiative, FDOT has adopted eight context classifications to guide road design decisions. Under this new system, planners and engineers consider existing and future characteristics such as land uses, building configuration, and street connectivity to ensure that roads are designed for the right vehicle speeds, road users, and trip types. The classification system includes the following categories: natural, rural, rural town, suburban residential, suburban commercial, urban general, urban center, and urban core. FDOT's guidance also offers performance measures and indicators for FDOT decision-makers to use in determining the context classification for a road and identifying travel demand for different modes.[39]

Example: WSDOT context and modal accommodations

WSDOT has developed a "Context and Modal Accommodation Report" to help project development teams think through which modes should be accommodated at what level on non-freeway state projects.[40] The report provides a structure for having conversations about and documenting discussions around tradeoffs during early project development. The worksheet establishes a suggested baseline for which modes should be prioritized based on the roadway type and land use context, and then provides a series of factors and questions to consider that could raise or lower the priority of each mode. WSDOT has also integrated this framework into the Practical Design section of the statewide design manual.[41]

Example: MnDOT Context Guidance

While "context sensitive solutions" has been MnDOT's overarching design philosophy in policy since adopted by technical memorandum in 2000, MnDOT recognized that the land use contexts in its existing guidance (rural, urban, and sometimes suburban and small town) fell short of the breadth of real-life development settings around the state. To address this, MnDOT recently developed a thorough technical memorandum defining specific land use types staff should use in considering context.[42]

The new technical memorandum includes nine context types: natural, rural, rural crossroad, industrial/warehouse/port, suburban residential, suburban commercial, urban residential, urban commercial, and urban core. MnDOT's memorandum also provides a framework to identify each context type by evaluating surrounding land uses, buildings and

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[39] Florida Department of Transportation. FDOT Context Classification. August 2017. https://fdotwww.blob.core.windows.net/sitefinity/docs/default-source/roadway/completestreets/files/fdot-context-classification.pdf

[40] Washington State Department of Transportation. Context and Modal Accommodation Report; Context and Modal Accommodation Report Learner's Guide. https://www.wsdot.wa.gov/planning/default.htm

[41] Washington State Department of Transportation. Design Manual. https://www.wsdot.wa.gov/Publications/Manuals/M22-01.htm

[42] Minnesota Department of Transportation. Technical Memorandum: MnDOT Land Use Contexts: Types, Identification, and Use. June 2018. http://dotapp7.dot.state.mn.us/edms/download?docId=2056227

structures, parking, and traffic, as well as a matrix with more detailed characteristics for each land use context.

Develop context-based design standards

While defining context types or classifications is a great first step, it will have limited influence over how staff develop and design projects if they are still using a design manual or guidance that reflects a more traditional emphasis on expanding roads to reduce congestion and moving vehicles through an area as quickly as possible. States need a framework in place to encourage or require the consistent use of context in project decision-making with localities.

One key solution is to update roadway design standards to incorporate context types and provide different standards for different contexts. In more urban and town main street contexts, this should generally include lower acceptable levels of service, lower design speeds to improve the safety of other roadway users and create a more walkable environment, and narrower lane width and turn radii ranges. This is especially beneficial in places where design exceptions would be needed constantly and the design standard would seriously impede the community's goals and quality of of life.

States can also work with localities to explicitly define development contexts in which the state will change its design standards as an area transitions. This can mean defining thresholds that will trigger changes in design standards and policies, particularly for urbanizing corridors. For example, a state could determine that if a suburban corridor surpasses a certain number of access points per mile, the DOT will design to a lower level of service for the road. The state would then need to clearly communicate these thresholds to localities. The goal should be to openly address the role that land use decisions play in the performance of the transportation network, foster an environment where state, regional, and local agency partners are discussing the tradeoffs between different objectives, and create accountability between land use and transportation decisions.

Example: Florida Design Manual

In 2017, FDOT revised the FDOT Design Manual (previously referred to as the Plans Preparation Manual) to help transportation engineers and planners better consider community context when planning and designing state roads. For example, the updated FDOT Design Manual allows state engineers to design for lower speeds in more urban areas. The manual guides FDOT staff in picking the best road design for each of FDOT's eight context classifications and to make sure FDOT puts "the right road in the right place." It increases design flexibility and considerations for people walking, bicycling, using transit, and driving, as well as freight. To institutionalize context classification, FDOT now requires its chief transportation planners in each district to approve the context classification of each project.

TDOT: Multimodal design guidance

The Tennessee Department of Transportation developed a new Multimodal Project Scoping Manual[43] and added a Multimodal Design Chapter[44] to the state's Roadway Design Manual in spring 2018 to support the state's Multimodal Access Policy, which calls for encouraging safe access for users of all ages and abilities through the planning, design, construction, operation, and maintenance of the transportation network. These new resources provide detailed TDOT specific guidance on designing to make roads safe and comfortable for all modes of transportation including how to inform engineering judgment. For example, the Scoping Manual includes a matrix of roadway functional classifications and context classifications (Rural, Rural Town, Suburban, Urban, and Urban Core), and provides guidance on which modes of transportation should be given the greatest priority for each roadway type and context. It also provides visual examples of how to accommodate people walking and biking in various contexts, such as paved shoulders on rural highways.

Staff within TDOT's multimodal division provide feedback on project scopes at key stages in the project development process, and having these new resources has enabled staff to point to clear written guidance about which multimodal treatments are recommended in which contexts when they offer their input. This has already had an impact on the project scopes the multimodal division receives for review. Project teams have been able to use the additional clarity provided by the guidance to bring the right considerations into their projects upfront.

Evaluate the costs and benefits of acquiring right-of-way more comprehensively

States need ways to bring considerations around purchasing right-of-way more directly into an assessments of costs and benefits. This means creating a process to directly evaluate the tradeoff between the costs of right-of-way now versus in the future, compared to the loss of developable land and the trips that will be generated when the road is expanded. States should seek to incorporate these factors into the analyses they conduct for highway expansion projects, particularly in suburban and urbanizing areas.

Provide technical assistance to localities

As states set expectations for the kinds of projects they will fund, they should also consider the limitations that smaller communities will face when trying to meet these requirements. Communities with small municipal staff and fewer resources could benefit from tools and support. States should provide education or technical assistance to localities on updating comprehensive plans or zoning codes, understanding the state's

[43] Tennessee Department of Transportation. Multimodal Project Scoping Manual. April 2018. https://www.tn.gov/content/dam/tn/tdot/multimodaltransportation/TDOT%20Multimodal%20Project%20Scoping%20Manual.pdf

[44] Tennessee Department of Transportation. Roadway Design Guidelines. Retrieved December 2018. https://www.tn.gov/tdot/roadway-design/design-standards/design-guidelines.html

context classifications, transportation design standards and thresholds, and addressing relationship between development and transportation decisions.

Prioritizing projects based on outcomes

Why?

States should organize their transportation programs around priority outcomes. What are the most important goals the state's transportation network should address? Which investments will do the best and most cost-effective job moving the state toward those goals?

A growing number of states are creating performance-driven transportation programs as funding has become scarcer. No transportation agency will ever have the resources to complete every project on their list so they need a way to choose projects that generate the greatest benefits within statewide transportation priority areas. These states also recognize that their stakeholders and the public are not as trusting as they once were—they want to see that taxpayer dollars are producing results.

Successful states are 1) articulating their goals, 2) evaluating proposed transportation projects to ensure they are well-connected to those goals, 3) tracking how those projects perform after they are built, and 4) communicating each of these steps to their stakeholders.

Profiles of several states that have implemented new programs to evaluate, score, and rank projects for funding based on their statewide goals are included at the end of this white paper.

Strategies

Create a prioritization process that applies across project types and modes of travel.

Currently, most states segregate transportation programs by mode, with separate funding programs for highways, transit, and walking and biking infrastructure. This limits the investment approaches available to meet any given transportation need, making it harder to find the most effective solution. For example, reducing congestion on a corridor could be addressed by widening the road, providing better transit service, promoting teleworking to reduce trips, directing travel to parallel routes, or any number of other strategies. Focusing on the desired outcome allows the state and the community to consider all possible approaches and pick the most cost-effective option.

Use the priorities in long-range plans to drive project selection.

States expend substantial effort working with stakeholders to develop the statewide long range visions and plans. The criteria used to evaluate projects should flow directly from the priorities in those plans—everything from moving people and goods safely, to supporting the economy, to minimizing harmful environmental impacts.

However, it is rarely clear how project selection connects to those goals. This is a major missed opportunity. Drawing a clear connection between statewide goals and the projects that receive funding shows stakeholders that the decisions they help make during planning actually carry weight, and are more than empty intellectual exercises. It also helps determine whether investments are producing the outcomes the state has said it wants to achieve.

States should 1) establish or update the criteria used to prioritize investments to align more directly with its goals; 2) publicize how the scoring criteria connect rather than assuming people can see the connection; and 3) create a feedback loop by evaluating whether investments actually achieved the intended outcomes to update the plan and project selection criteria over time.

Develop a numerical scoring system to evaluate projects based on goals:

States on the forefront of performance-based project selection have developed numeric scoring systems to rank all potential projects based on how well they are likely to perform in advancing the state's identified objectives. They develop performance measures to evaluate all projects consistently and give them a score based on the sum of how well they perform in each policy category.

Developing a numeric project scoring system based on goals is the most important step states can take to prioritize investments based on outcomes. The following considerations are crucial to establishing a successful scoring process.

Identify a small number of measures to use in scoring projects

Project scoring systems work best when states develop a short list of measures (ideally 1-3 for each policy goal) to use in project prioritization.

As states figure out how to meet federal performance management requirements and integrate performance measures into their planning processes, many are finding themselves with long laundry lists of measures and indicators to consider pursuing based on a combination of the required federal measures, relatively easily measurable outputs (ex. "miles of sidewalk added"), currently available data, and priorities raised by their partner agencies and stakeholders. However, tracking a long list of performance indicators like this can require significant legwork and capacity and ultimately do little to advance the region's goals. As the saying goes, "if everything matters, nothing does."

Further, with a long list of measures, it can be difficult to avoid double counting some of the benefits across policy categories. For example, some regional agencies evaluating and scoring projects have measured congestion reduction several times throughout the scoring framework: as a benefit in its own right, as a "freight" benefit, and as an economic benefit. This approach places more weight than these regions intend on congestion reduction in relation to other policy goals by counting the same benefit in two places.

States must identify the most important things to measure that best reflect the highest priorities in order to identify criteria to use in project prioritization. Rather than try to be

comprehensive in capturing every significant priority, states should strive to select a few measures that capture most of the top priorities under each goal.

Make sure the measures used are directly relevant to policy goals

The scoring criteria should be based as directly as possible on the specific priorities identified in the states' long range plans. For example, if a region has a goal of "Increasing Mobility for All Users," looking at a variety of indicators such as miles of sidewalks and bike lanes added, transit service headways, multimodal level of service, and others could all help address aspects of the goal. However, choosing a single targeted measure such as access to necessities can more directly capture what the region is trying to achieve in a way that is simpler to measure, easier to convey to policy-makers and the public, and directly focused on desired outcomes rather than outputs.

Use measures with data that is available or could be made available

One the one hand, the measures used to prioritize projects should not be based exclusively on what data is currently easiest to access since there will likely be a mismatch between what the region already measures and its top policy goals. However, all of the measures will need to have enough information behind them to support consistent evaluation of benefits across projects throughout the region. This will likely mean that states will need to do some analysis or outreach upfront to collect the necessary data. Looking to other state agencies often results in additional data sources that can be adapted for transportation purposes and/or data that can measure health or economic outcomes.

Make sure the measures used actually help differentiate between proposed projects

For the purposes of project prioritization, some measures that are well aligned with planning goals may not make sense to include in a scoring framework because they will not help states differentiate between the relative merits of proposed investments (though they can still be used in planning and general tracking). For example, measures of housing and transportation affordability are useful on a system-wide scale but hard to use in isolating the impacts of individual projects. Likewise, measures will not be useful for this purpose if most or all projects would receive the same score, or designs would not be impacted by application of the measures.

Select measures that are easy for the public to understand

States will need to be able to explain the new criteria used to score projects in a relatively straightforward way to a variety of stakeholders with different levels of technical transportation knowledge. Even if the methodologies behind the scoring criteria are complex, the concepts should be easy to convey and not overly technical or vague—for example, "access to jobs" is a more straightforward concept than "level-of-service."

Work toward measuring outcomes in the scoring process.

Some states have established project scoring frameworks that primarily measure outputs. For example, the Minnesota DOT recently established a new project scoring system in response to state legislation, but most of the proposed scoring criteria reflect current

conditions rather than outcomes. They prioritize projects based on the magnitude of the problem (number of crashes, current pavement condition, current traffic volume, etc.) rather than how well the proposed project will actually address the need. This practice makes sense—current conditions and outputs are simpler to measure in a defensible way than expected outcomes—but it does not consider whether the proposed investment is the best and most cost-effective solution for the need.

States should look for opportunities to replace the current measures with outcome-focused measures with every iteration of the project scoring process. New data and tools are making it easier every year to evaluate the likely impacts of investments across a range of goals. For example, several states DOTs have pioneered the practice of measuring accessibility to jobs, including the Virginia Department of Transportation's work to prioritize investments based on how they will improve accessibility to jobs and other destinations for several years through Smart Scale (profiled in greater detail below).[45]

Consider costs as well as benefits.

States should consider the cost of projects within their project selection framework. Without consideration of costs, the process will naturally bias larger-scale projects that provide a greater number of benefits, regardless of whether they are a cost-effective use of limited funds.

There are two primary ways states can incorporate cost into how they evaluate and score projects: as a component of the overall project score, or by adding up all of the points each project receives and dividing them by the cost after the benefits have been tallied. The latter approach is the best way to consider costs consistently across project types. Because the process provides a numerical score for each project, states can consider cost-effectiveness without a full monetary benefit/cost analysis for each project.

Do a pilot project scoring round even if the approach is not perfect.

Developing a prioritization process based on statewide goals is not a science. All transportation agencies with an established project scoring framework started with something they knew was not perfect and continued to refine the approach with each round of scoring. In some cases, states have revised their scoring approaches because measures did not work as anticipated or better data or methodologies have become available.

For example, VDOT has made several changes to the measures used in its Smart Scale project scoring process since the first round of scoring. In the initial round of scoring, VDOT gave projects points in its environment category if they did not negatively impact wetlands. However, VDOT discovered that this approach rewarded projects simply for avoiding something negative on the same magnitude that it rewarded positive benefits. As a result, some projects that had relatively few merits otherwise scored competitively simply for being relatively low-cost and not negatively impacting wetlands. VDOT opted to

[45] Virginia Department of Transportation in partnership with the State Smart Transportation Initiative. Accessibility in Practice. July 2017. https://www.ssti.us/2017/07/accessiblity-in-practice/

address the issue in later rounds by weighting the environmental score based on the overall benefit score for a project. Now, if a project receives a low total benefit score, VDOT reduces the weight of the environmental impact score so that it does not skew the results.

The key is to start somewhere, set clear expectations that the process will evolve with each round (and provide details about how this evolution will occur as noted below), and begin to build buy-in.

Conduct extensive outreach around the new scoring framework round.

Building buy-in around a new project prioritization approach—before, during and after an initial round—will require significant outreach and education, but the results will be worth the effort. States should consider doing targeted one-on-one outreach to local partners and key stakeholder groups individually in addition to larger group sessions for stakeholders and board. States should also make the scoring criteria and process that will be used readily available online. Strategies to support effective engagement include:

- Develop a standard "road show" to educate localities whenever new elected officials take office: States should present in each of the regions after major elections to provide basic information and framing. Establishing a standard process and orientation will help address the loss of understanding and buy-in when local decision-makers turn over.
- Create intergovernmental affairs positions: State DOT should consider increasing its capacity to do stakeholder education by creating positions, or modifying existing positions, that have time dedicated to doing regular education around the state.
- Create and train a team of career staff to do this outreach on an ongoing basis: States will not be able to educate elected officials and other stakeholders if there is a high level of turnover in its own staff tasked with conducting that education. States should build a team of staff who can do this type of outreach on an ongoing basis over time and provide them with regular training as it expands its library of examples and tools that can be used for education.
- Use existing tools more consistently: States can also use existing tools and guidance more routinely to help educate local decision-makers and reduce the loss of awareness as elected officials turn over.

Update project selection criteria regularly

States should update their project scoring criteria with each round of scoring based on future long range plans. States will also likely determine that other revisions to the scoring criteria are needed based on the results of each round of scoring, either because the measures did not work as anticipated or better data or methodologies have become available. This will mean setting the expectation from the beginning that the approach will evolve with each round of scoring, which can help reduce concerns from skeptics.

Examples

Virginia DOT's Smart Scale

In 2014 and in response to new legislation, VDOT established a new performance-based project scoring framework called Smart Scale to ensure that the state picks the right transportation projects for funding and makes the best use of limited tax dollars.

The legislation explicitly established six factors to be used in the scoring process, but tasked VDOT with developing the methodologies for measuring each. The factors are congestion mitigation, economic development, "accessibility," safety, environmental quality, and (in areas with a population over 200,000) coordination with land use.

The new scoring approach applies to all new capacity projects that receive state funding across transportation modes, which represent about half of VDOT's overall program (a different scoring process applies to state of repair projects).

VDOT first screens projects for eligibility based on whether they meet an identified need in the state's long-range plan. All projects that pass the eligibility screening are scored by VDOT to determine their cumulative benefits in the six factor areas based on a combination of state and locally submitted data. VDOT assigns up to 100 points to each project under each of the six scoring factors.

VDOT then divides the total benefit score by the cost requested from the state to determine the final Smart Scale score and rank compared other projects. This approach provides a number of benefits, including encouraging localities to make their projects more competitive, either by identifying innovative ways to accomplish their objectives through smaller improvements or by identifying local matching funds to offset the funding needed from the state.

VDOT has conducted three rounds of project scoring so far using the new approach, and has made minor adjustments to the scoring methodology with each round of prioritization. VDOT also continues to conduct meetings with stakeholders to build buy-in and address concerns, including VDOT staff across the Commonwealth, metropolitan planning organizations, planning district commissions, and counties, cities, and towns.

The Smart Scale project prioritization process has largely been received positively for taking politics out of the process and has made clear to the taxpayers why projects are funded and how projects not chosen for funding can be improved in order to receive funding in the future. It has allowed the state to put priorities like multimodal accessibility to jobs on par with other, more typical transportation measures, like congestion mitigation and safety.

Hawaii DOT SmarTRAC

The Hawaii DOT plans to implement a new project selection framework based partially on Virginia's Smart Scale framework but with greater emphasis placed on system preservation and safety. Smart Growth America has developed a proposed approach for the new prioritization framework as a starting point, which HDOT is currently considering.

Under the recommended approach, each capital project is rated on the extent to which it:

- Improves safety;
- Preserves the current system;
- Provide access to jobs and services;
- Reduce traffic congestion;
- Protect the environment and cultural assets; and
- How the total benefits compare to the cost of the project to the state.

The majority of points will go to safety and state of repair, as these are the top state priorities currently, with some additional points for improving vehicle movements, increasing jobs access and protecting cultural and sensitive lands. Projects were rated for inclusion in the State Transportation Improvement Program during the fall of 2018.

TDOT's Multimodal Sustainability Index for ranking projects

As part of a broader initiative to improve safety for all roadway users, TDOT has developed a Multimodal Suitability Index to help the department evaluate projects based on need for better accommodate all modes of travel—an area that many states have struggled to measure comprehensively in project evaluation. The new index offers a tool and methodology for scoring, ranking, and prioritizing projects for funding based on four factors.

- Safety: Presence of crashes involving bicyclists and pedestrians on the segment.
- Equity: Location of the project in relation to populations that may have more difficulty accessing resources, including low-income and non-white populations, people under age 18 and over 64, and zero car households.
- Demand: Whether the project is located in an area with the potential for high pedestrian activity based on population density and proximity to trip generators like schools, retail, jobs, and transit stops.
- Supply: An evaluation of the roadway's existing characteristics, including posted speed limits, number and width of travel lanes, presence or lack of sidewalks and bike facilities, and traffic volume.

The new tool was developed in-house by TDOT's Data Visualization section and has the potential to be used to help prioritize projects across a variety of funding programs, including the Multimodal Access Grants TDOT provides to localities. It can also be customized to the goals of specific programs by modifying the weighting of the four factors within the overall score, which all have a weighting of 25 percent by default. For example, TDOT could choose to place a greater emphasis on equity for a given prioritization process.

The Governors' Institute on Community Design worked throughout 2017-2018 helping a small group of state departments of transportation question and assess the underlying assumptions that result in giant highway solutions for every transportation problem. This memo is part of a series about the states that are finding success through what's known as practical solutions, a way for transportation departments to meet changing demands

and plan, design, construct, operate, and maintain context-sensitive transportation networks that work for all modes of travel.

The Governors' Institute on Community Design, a program of Smart Growth America, helps state leaders address economic development, housing, transportation, and other pressing issues that relate to how communities grow and develop.

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