A Mn/DOT Forum: Integrating Context Sensitive Solutions in Construction, Operations, and Maintenance

Balancing Competing Objectives and Optimizing Return on Investment

Final Report:
June 29, 2010, Forum Proceedings and Summary
Participants, Advisory Group, and Planning Team
Post-Forum Evaluation
August 5, 2010, Forum Advisory Group Debriefing Summary
Context Sensitive Solutions Initiative Fact Sheet
Follow-up Forum Participant Survey for Prioritizing Actions

Minnesota Department of Transportation

Contents

Prepared by:
Center for Transportation Studies
University of Minnesota
200 Transportation and Safety Building
511 Washington Avenue S.E.
Minneapolis, MN 55455-0375
Writer: J. Trout Lowen, Trout Editorial Services
Designer: Cadie Wright Adhikary
Managing Editor: Pamela Snopl

Executive Summary

The Minnesota Department of Transportation (Mn/DOT) has been nationally recognized for demonstrating context sensitivity and excellence in project development and implementation over the years. In 1999, the Federal Highway Administration (FHWA) selected Mn/DOT as one of five pilot states to help advance and institutionalize a context sensitive design approach in transportation nationally. Since that time, the philosophy, strategies, and principles of this nationally advocated approach have been acknowledged as having broader applications and relevance, and the approach has become referred to as Context Sensitive Solutions (CSS). Mn/DOT has been recognized as a national leader in this area, and the department has earned national awards for projects and programs that demonstrate the benefits of applying CSS principles.

Currently, CSS is best-integrated within Mn/DOT's project development and design process, and the department is seeking many more agency and customer benefits that correlate with better integration of CSS principles in other functional activities, including construction, operations, and maintenance. A 2007 FHWA CSS Implementation Assessment of state DOTs rated Mn/DOT's efforts in the areas of commitment or policy as mature, its training as exemplary, and its integration into projects as mature. FHWA also cited some areas of CSS implementation weakness, including Mn/DOT's CSS policy commitment, action planning, and integrations in upper management; performance measurement; and in planning, construction, operations, and maintenance functions. Consistent with a new Mn/DOT Strategic Vision and Plan, in December of 2009 CSS was identified as one of 12 flagship initiatives that were seen as most critical, at the time, for moving Mn/DOT forward in realizing the strategic vision and plan.

The intent of this forum was to identify challenges and barriers to the integration of CSS in construction, operations, and maintenance areas and to identify needed action items and next steps. The forum was organized by the University of Minnesota's Center for Transportation Studies, within the oversight of a broad Mn/DOT Advisory Group, and attended by targeted Mn/DOT managers, staff, and functional representatives from around the state. Participants listened to case study panel presenters and participated in facilitated small- and large-group discussions where they were encouraged to share their observations and experiences and to seek input from others. As documented in this final report, the forum and its immediate follow-up activities with participants succeeded in meeting the intent and the following objectives: 1) assess participant perceptions of CSS in construction, operations, and maintenance, 2) overview CSS background and CSS initiative objectives, 3) present and discuss case studies related to CSS in construction, operations, and maintenance, 4) identify CSS challenges, opportunities and needs, and 5) prioritize needs, action items, and next steps.

Some common themes that emerged during the forum include:

- The need for improved communication and accountability across all functional areas.
- The need for greater flexibility in approaches and processes.
- The need to evaluate lifecycle costs as well as capital costs in decision making.
- The importance of communicating commitments that have been made during project development to construction, operations, and maintenance personnel.
- The need to involve construction, operations, and maintenance personnel in discussions earlier and more continuously in project planning and development processes.
- The importance of educating legislators, politicians, and stakeholders.
- The importance of additional training and alternative training approaches for integrating CSS principles into construction, operations, and maintenance activities.

Mn/DOT is committed to increasing the integration of CSS principles in all aspects of the way it does business — to maximize benefits and cost-effectiveness for the department and its customers. The information and outcomes from this forum will be used to inform and prioritize needs, action items, and next steps in integrating CSS into Mn/DOT construction, operations, and maintenance.

Summary of the Forum

About the Forum

Consistent with a new Strategic Vision and Strategic Plan, Mn/DOT's executive leadership has recognized that the philosophy and principles of Context Sensitive Solutions (CSS) can serve as an effective business model and has directed that CSS should be taken to a new level of integration across the department's decision-making, planning, programmatic, project development, construction, operations, and maintenance functions and activities to maximize benefits and cost-effectiveness for the agency and customers.

To assist the department in these efforts, Mn/DOT held this forum—*Integrating CSS in Construction, Operations, and Maintenance*—on June 29, 2010, in St. Paul. The University of Minnesota Center for Transportation Studies (CTS) provided support and expertise to develop and host the forum.

Welcome and Forum Objectives

Jim Grothaus

Jim Grothaus, Director of Training and Technical Assistance, University of Minnesota Center for Transportation Studies

Mn/DOT's top staff has identified Context Sensitive Solutions (CSS) as a flagship initiative. Today we want to have a discussion about CSS in construction, operations, and maintenance and how you can apply it to your work.

What are the challenges of CSS? What are the opportunities? It's important to hear from you regarding next steps for CSS in construction, operations, and maintenance. We want to identify opportunities for CSS in education and outreach and ways that employees can apply CSS in day-to-day operations.

This is a chance to apply CSS across the whole life of a project. I know that many DOTs are not doing that. It's seldom that designers and preliminary designers have a chance to talk with maintenance workers, or that maintenance is even discussed within the different departments. So this is a great opportunity to share knowledge across the agency.

Scott Bradley

Scott Bradley, Director of Context Sensitive Solutions, Mn/DOT

Context Sensitive Solutions is a philosophy and a body of principles. I think of it as principle-based and benefit-driven approach, and recent research now correlates more than 20 desirable agency and customer benefits with the effective application of CSS principles. CSS applies to much more than design. It applies to our program, service, planning, project development, construction, operations, and maintenance activities. Everything we do can benefit from applying CSS strategies.

For example: 1) it's striving toward a shared stakeholder vision as a basis for decision making; 2) it's demonstrating a comprehensive understanding of contexts in our work; 3) it's fostering continuing communication and collaboration to achieve consensus; and 4) it's exercising flexibility and creativity in our decision making and planning, in our design, and in our actions to create effective transportation solutions that cost-effectively preserve and enhance safety, mobility, and infrastructure along with community, natural environments, and our quality of life.

Mn/DOT is a leader in CSS and has won more awards than any other state DOT in the Federal Highway Administration (FHWA) Excellence in Highway Design and Environmental Excellence Award competitions to date. Research done in the mid-1990s on the stories behind this success found 10 attributes common to about 28 award-winning projects that were researched in a time period from the 1970s through the mid-1990s. Those attributes of success look an awful lot like the principles known today as CSS.

One stand-out attribute was the perseverance of champions within Mn/DOT and at all levels, including maintenance and construction engineers, project managers and inspectors, interdisciplinary experts, and upper leadership. In every case study, they persevered in trying to do the right thing in the best public interest. But we haven't been consistent over the years, and there are many more pieces we need to tie together to enhance and sustain our performance and success more consistently. That's where CSS comes in.

As a flagship initiative, Mn/DOT seeks to integrate CSS as a business model to improve our processes and outcomes in balancing competing objectives and optimizing return on investments within existing constraints while also seeking the many potential agency and customer benefits that are correlated with effective application of CSS strategies and principles.

It's a slightly different way of doing business. It's not new, but it requires some shifts and adjustments in our approaches. It requires new habits and overcoming resistance to change and common misperceptions. It requires combining and applying new knowledge, skills, and attitudes, with new habits then forming as a result.

[View Scott Bradley's PowerPoint presentation at www.cts.umn.edu/contextsensitive/workshops.]

Tom Sorel, Commissioner, Mn/DOT

Tom Sorel

Today's discussion is a culmination of many things we've been talking about for many years. It builds on some of those early ideas about CSS and really takes us into new areas that are going to benefit not only Mn/DOT but, as the country observes what we are doing, other areas as well. These discussions today are transformational for us as a department. Beyond that, it's going to be transformational for the entire CSS discussion in this country.

I've been advocating for this for some time. The day I became commissioner I talked a lot about the importance of public trust and confidence. And I sincerely believe that innovation needs to be a key part of that. From a strategic planning standpoint—right through our strategic directions and our flagship initiatives—we've got this pretty well embedded in our agency right now. It's a matter of taking the philosophy to a new level.

We're doing a lot of work on business impact mitigation. We're taking a strong leadership role with our Complete Streets philosophy, working with our local communities. And we worked a lot with the Legislature this past session to pass legislation to move that forward. We're working very hard with flexible design and performance-based design, innovative contracting, innovative financing, and sustainability.

We have been conducting some market research with the public, including a quality-of-life pilot study. This represents the next generation of performance measures in our country. We also have an online community. We've enlisted the help of 600 people across the state to respond to questions about issues we're interested in. We've already had a lot of success with this.

Here's what we've learned so far that might be helpful in the discussions here today.

People told us, without prompting, that transportation is an important element of their quality of life. This is what they meant: reasonable access and connections to parks, bike paths, walking trails, LRT, bus systems, medical services, shopping, work, entertainment, restaurants, airports, family and friends, etc. But they see transportation as both a contributor and a detractor to their quality of life, and they place transportation at number two on the list of detractors right behind the current state of our economy. So that's important for us to acknowledge and to recognize.

As I travel around and interact with my peers across the country, there is no doubt in my mind that we are a leader in CSS, and I think we have an opportunity here to take it to a new level. I'm excited about that.

[View Tom Sorel's PowerPoint presentation at www.cts.umn.edu/contextsensitive/workshops]

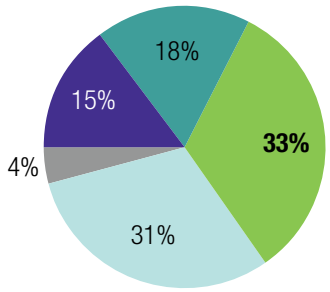
Assessment of Current Perceptions & Issues

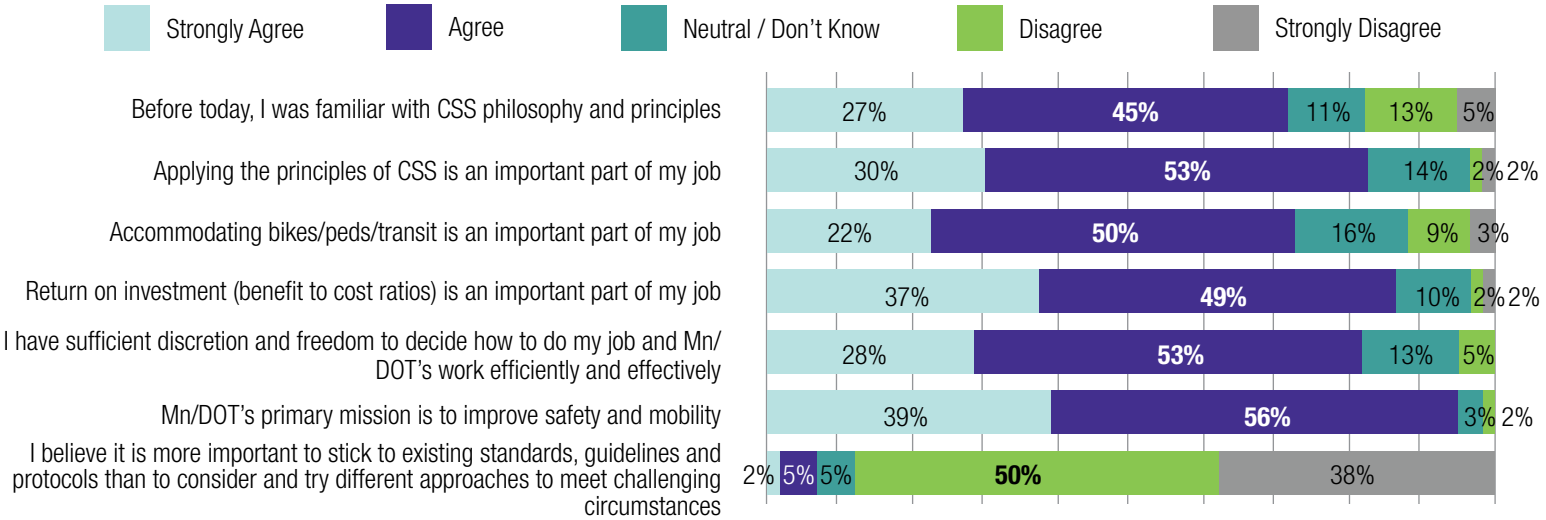
Group Polling Using iClicker Technology

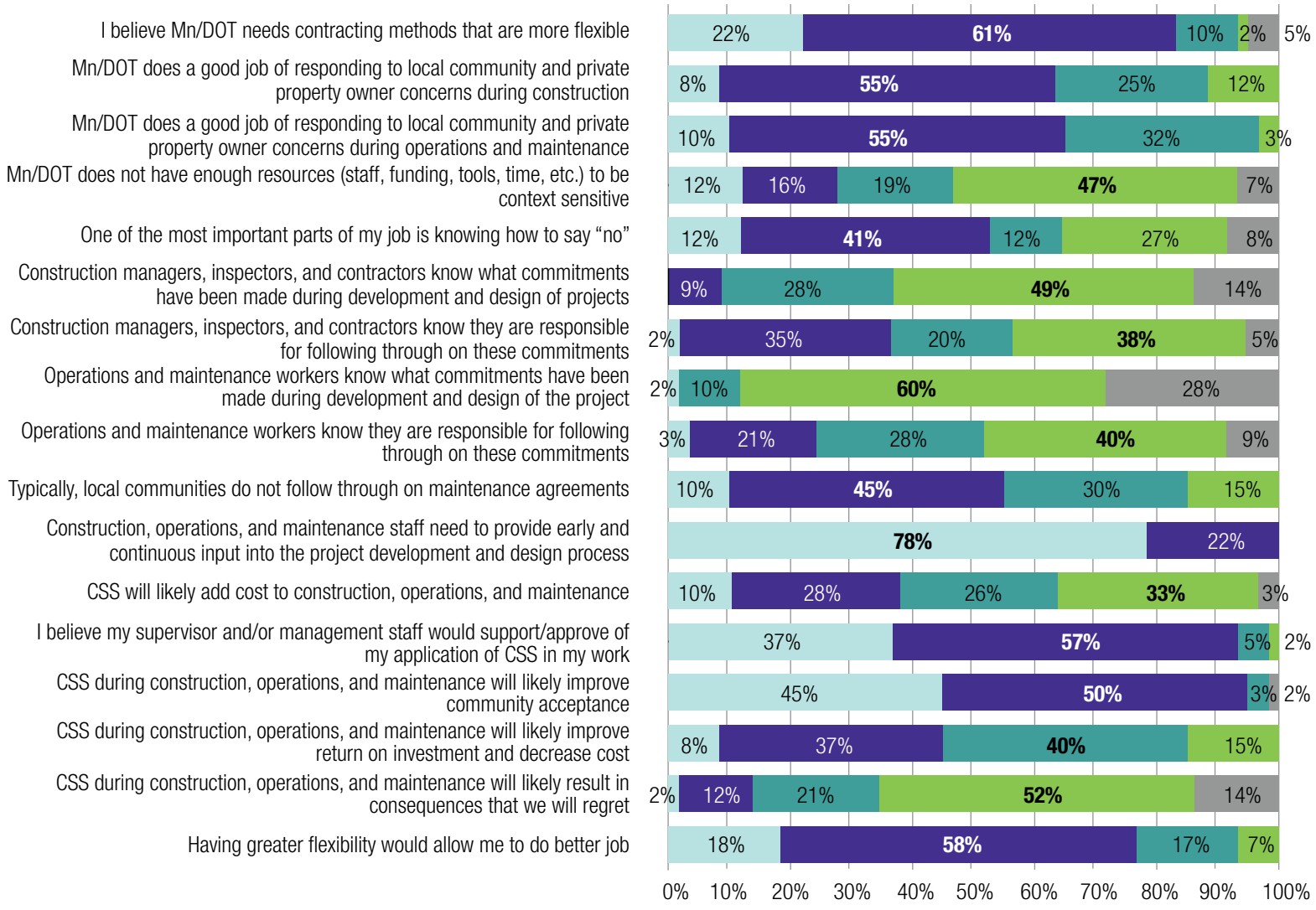
Forum participants were asked to respond to a series of 28 questions using iClicker technology (electronic polling). Electronic polling allowed the group to view their aggregate responses in real time. There were four practice questions designed to familiarize the participants with the technology. The remaining 24 questions were intended to gather information about participants' familiarity with context sensitive solutions and information about how the principles of CSS are or are not being applied in day-to-day work. Additional questions sought to identify attitudes about Mn/DOT policies and practices and the extent of information sharing across departments. Response rates per question varied from 56 to 60.

My day-to-day work is most related to:

System or corridor planning – 15%
Preliminary or final design – 18%
Construction – 33%
Maintenance – 31%
Day-to-day operations (e.g., traffic controls – 4%







What this told us about the most dominant (70%+) perceptions and issues:

- 72% agreed that they were previously familiar with CSS philosophy and principles
- 83% agreed that applying CSS principles is an important part of their job
- 72% agreed that bike/ped/transit accommodation is an important part of their job
- 86% agreed that return on investment is an important part of their job
- 81% agreed they have sufficient discretion and freedom to do their job efficiently and effectively
- 76% agreed that having greater flexibility would allow them to do a better job
- 95% agreed that Mn/DOT's primary mission is to improve safety and mobility
- 83% agreed that Mn/DOT needs contracting methods that are more flexible
- 100% agreed that construction, operations, and maintenance staff need to provide early and continuous input into the project development and design process
- 93% agreed that they believed their supervisor and/or management staff would support or approve of their application of CSS in their work
- 95% agreed that CSS in construction, operations, and maintenance will improve community acceptance
- 88% disagreed that it is more important to stick to existing standards, guidelines, and protocols than to consider different approaches to meet changing circumstances
- 88% disagreed that operations and maintenance workers know what commitments have been made during development and design of projects (66% disagreed that construction managers, inspectors, and contractors know what commitments have been made)

Innovations in Construction, Operations, and Maintenance

Case study examples that focus on innovative actions, processes, and materials used in construction, operations, and maintenance

Panelists: Charleen Zimmer, Zan Associates, moderator and panelist; Terry Zoller, Metro District Construction Engineer, Mn/DOT; Dave Hall, Bridge Office Architectural Specialist, Mn/DOT; Dan Gullickson, Roadside Vegetation Management Unit Forester, Mn/DOT

Charleen Zimmer, Zan Associates

Charleen Zimmer

When I talk about and think about context sensitive solutions, I always like to remind people that it is not about a specific product or outcome—it is more about problem solving and a way of thinking about how we do the business of transportation. We all have to work within constraints. We're used to constraints, whether it's budget, time, the environment, community and public needs, or physical constraints.

Context sensitive solutions just brings a way of thinking, a way of problem solving, and a set of tools to the table that help us to be more flexible and creative. It helps us to be more successful in solving the problems we have to face. We decided to start the discussion today by having three people share some examples of problem solving.

Terry Zoller, Metro District Construction Engineer, Mn/DOT

Terry Zoller

The two jobs I'm going to talk about are Highway 36 in North St. Paul and the Highway 610 job in Maple Grove.

Highway 36, North St. Paul
This was a $28 million job with a lot of innovative techniques to it. In order to keep under the budget cap, we needed to find ways to get this job done at a lower price. One of the things that came up in the discussion: What happens if we close this highway down completely? Could we save time and money? The estimate was that we could save between $3 and $6 million if we shut it down completely.

This was the first time, at least in Metro, that we had ever proposed a full closure to a major project. The decision was made to go ahead and do it. Prior to that decision, we did a market research study asking the travelers through the corridor, businesses along the corridor, and the residents in the city of North St. Paul what option they would prefer. The market research study was about 50-50. We did a constructability review—probably one of the first times we've done a major constructability review—during which we brought in the contractors one at a time and asked them, could you do this in one year and what would it take for this to happen?

We brought in five contractors. We laid out the process. All of them agreed it could be done in one year. So we decided to move ahead. We did what is called A+B bidding. Basically, it's the cost of the project plus the time to get the project done. The bid came in at $28 million; the B part of the bid, which is the time, came in at 147 days and $25,000 per day, for $3.6 million savings.

The other thing that we did—it was the first time that we've done it in Metro, and maybe the first time we've done it in the state—was to use no-excuse locked incentives. We said if you could get this done

in 125 days we would give you an additional $300,000, and if you could get this done sooner we would add on even more. So the contractor took us up on that. In fact, he finished in 125 days and got the extra money.

We included lane rental. We required at least one lane to be open in each direction during that 125 days. After 125 days, we said you can shut part of it down, but there is a cost for every day you shut that one lane down. That worked out well, too. We also tried intelligent compaction machine controls, which worked really well. So we had a lot of innovation happening on the Highway 36 job.

Highway 610, Maple Grove
The estimate for the 610 design-build job in Maple Grove was about $70 or $80 million. When it was let in 2009, one bidder came in at $47 million and the second at $54 million.

There were three major innovations resulting from acceptance of the design-build contractor's proposed ATCs (Alternative Technical Concepts).

The original design required excavating and hauling a lot of material off of the job site. The contractor wanted to raise the grade instead, and they were allowed to raise it by about 8 feet, which eliminated a lot of material removal from the job. That was obviously a big savings in time and cost, and one of their major innovative processes. Another thing they did was an alternative design at Zachary Lane where it crosses over the 610 corridor. They went with a roundabout rather than a traditional intersection approach, resulting in a big savings because they could do construction on that bridge anytime in the process, which helped them on the timing and the sequencing of that particular job.

The third alternative they came up with was to build a small berm and put the noise wall on top of the berm. They chose this approach rather than constructing a taller noise wall, as proposed in the contract, because there was excess excavation material available for the berm construction. This resulted in another big cost savings.

Dave Hall, Bridge Office Architectural Specialist, Mn/DOT


Dave Hall

I want to talk about the materials used in three different projects that are a bit different than the materials Mn/DOT has used in the past.

Valley Creek Road Bridge over I-494, St. Paul
Woodbury is a community that has a very strong planning department. They are very particular about what gets built in their city. They have a strong theme throughout their planning process for commercial business properties, which carried through to this particular project. One of the strong elements within the community is the use of brick.

Masonry construction can be fairly expensive. So in this case, we were looking for a way to incorporate brick into the project without spending the kind of money we would if we hired a masonry contractor to do the work.

There is a brick product that's been on the market a number of years, used primarily in flatbed casting for big-box stores. It is the standard size of a brick face but is only 9/16 of an inch thick. We came up with a system that's kind of a gasket liner with the thin brick pushed into the frame. This is the first transportation project in the United States to use a product like this.

It's a very sturdy system, but we had to sell the state bridge engineer on the use of this product. He was very skeptical of this, especially in areas over traffic, so we placed this product away from traffic. There's always the thought that perhaps these bricks would just start popping off as the bridge was opened to traffic. I would defy anybody to say that you could pop that brick off of there. You would have to get up there with a jackhammer to get that brick out of the concrete once it is cast into place.

Highway 36, North St. Paul
North St. Paul did not have the same theme throughout their community that Woodbury did, but it uses historical material throughout the downtown area. So this product seemed like a great addition to that highway project as well.

The main detail that we changed concerned the corner pilasters, or rail posts. We added just a smooth veil of concrete so that all of the brick went in as a flatwork design. It made it much easier once we got the system down.

I-35W Bridge over Minnehaha Parkway, Minneapolis
This is part of the I-35W Crosstown project. It's the most contentious little piece in the whole project. The local folks and the historic preservation people didn't want the view from the freeway blocked down to Minnehaha Parkway. Also, there was a need for a noise barrier on this particular bridge.

Earlier designs called for either solid wood or concrete barriers. But these created a big blockage of the view and a lot more shadowing onto the Parkway at different times of the day. So we looked into having a transparent noise barrier. This was one of those areas where you give up a little bit because it costs considerably more than our typical noise barrier, about four times as much.

Maintenance was very skeptical of this. We met with them before we ever introduced this into the project and got their buy-in after a number of discussions. We actually built a test panel that was put in place at the north end of the Minnehaha Creek Bridge for one season just to see how it would perform. Eventually, we ended up putting it on the project.

Dan Gullickson, Roadside Vegetation Management Unit Forester, Mn/DOT


Dan Gullickson

Emerald ash borer
Why are we concerned about the emerald ash borer in Minnesota? If you look across the country, Minnesota has probably one of the highest populations of ash trees—an estimated one billion of them. So we have a lot of food for this insect to eat.

Last year in Minnesota the emerald ash borer was found not too far from the University of Minnesota campus near Highway 280 and I-94 in a residential area of St. Paul. A quarantine was put in place. In Ramsey County or Hennepin County you cannot transport ash materials outside of the county without a permit for fear of spreading this insect.

Three counties in the state are quarantined. Obviously that affects the movement of ash materials in the state, as well as our operations for clearing and grubbing to maintain safety on the highways and visibility at stop signs, and our construction program.

Mn/DOT Metro has entered into a compliance agreement with the Department of Agriculture so that

when we're doing tree removal activities for maintenance operations, we're keeping the stuff within the quarantine area. We're stockpiling it at our Maple Grove truck station where it gets ground up. If we're doing tree work near St. Paul, we haul it to District Energy where it's burned to produce electricity.

One of the containment strategies for the emerald ash borer is to buy your firewood locally when camping. The same principle applies here in construction. We are using this wood chip mulch on these construction jobs. This is a resource that can be used for erosion control purposes. It can also be put on driving paths so you're not tracking as much onto the highways.

Passive blowing snow control
Living snow fences are one of my passions. These fences use native plant materials, even structural snow fencing, to control blowing snow to improve driver visibility and road service conditions.

One of the things we've done is gone out with global positioning systems (GPS) and located problematic blowing and drifting snow areas, and then looked at where crashes happened in relation to those areas to identify where we should focus our efforts. As a result of that survey we have roughly 1,200 miles of crowned roadway and roughly 4,000 sites across the state that would benefit from some type of snow fence treatment.

We have in place partnerships with the U.S. Department of Agriculture, the USDA farm program, and with our partners from Soil and Water Conservation Districts, and we are working with private landowners to plant these snow fences or leave standing cornrows. That's really context sensitive. You are actually going out there and talking to people who are making their living on the land and asking them to help improve public safety. You've really got to talk and listen to these folks, because you're not just going to get on their land without working with them.

In Mn/DOT District 7, the Montgomery truck station talked with landowners about leaving standing cornrows at an intersection so crews didn't have to apply as much salt in that intersection to keep it safe. That's one of the environmental benefits of a living snow fence—reducing salt usage.

Other benefits tied to living snow fences include creating habitat for pheasants and other grassland nesting birds, reducing soil erosion, and reducing the amount of topsoil blowing into the road ditches.

Whether it is the emerald ash borer or living snow fences, working in partnership with regulatory agencies and the people interested in these issues is key.

Question-and-Answer Session

Q: In the 610 design-build project, what is the contractor's role as far as context sensitive design during construction? Do they have an ongoing outreach to the community?

Terry Zoller: I don't think we have an outreach program built into that particular project. We've done it on some other projects. Part of it is because it's on a brand new corridor that's been dedicated to the 610 project for years.

Q: On the Highway 36 project preconstruction survey, did you do anything else with the businesses in the community regarding the proposals to close the highway? What was their reaction? And how did you build support for that?

Zoller: I know there was real concern about the effect on businesses. So we did some extra signing in that particular area. We also worked with the businesses in putting together some brochures on how to shop and get around in the city of North St. Paul. And it was ongoing during the construction process. Our public affairs folks stepped up to the plate and did some really outstanding work in that particular area.

Q: On the I-35W noise walls, are there any special maintenance requirements? How do you clean them and how often do you have to?

Dave Hall: That was one of maintenance's big concerns. This particular product is cleaned pretty much by the weather. We agreed as we went into it, the only time there would be a real need for doing any cleaning would probably be first thing in the spring. The dirt and grime that comes from the roadway could just be power-washed off. I think the maintenance agreement calls for Mn/DOT to maintain the traffic side on I-35 and the city of Minneapolis to maintain the community side.

Q: Have you had any feedback from the community or trail users or anyone on the noise walls?

Hall: I haven't had any directly. I know just having been out there, there is very little difference now between the new structure and the old in as far as how the sun comes down to the Parkway. I think it's a benefit.

Q: How do you make trade-off decisions? Is everything costed out? For example, the cost of a railing versus the nice effects of having additional sunlight down below on the path.

Hall: There's actually guidance in the design manual for costs that are allowable over and above the cost for what we would call a normal bridge, for example. Basically we go through and do a cost analysis before the project ever goes to final design.

Dan Gullickson: I would like to add on to that with the value of partnering. With the snow fence program, when we're working with the farmer, if we partner with the USDA and the planting goes in under the conservation reserve, we can basically get that paperwork done in a matter of weeks. Whereas if we are going to buy an easement from the farmer to put something in on private land, that can be a two-year process of acquiring the right-of-way.

Oftentimes, farmers aren't all that interested in selling a strip of land in the middle of their field. That can be problematic. So partnering can help with a quicker delivery, and it can also help with costs. Partnering with the USDA means there are some federal dollars, so the costs of plantings were roughly $1.50-$2 per plant, whereas if we were to go out there and hire a contractor to do the planting, they might be upwards of $20-$30 a plant. So there's definitely value.

Q: The costs you talked about, are those capital cost or do they include operations and maintenance?

Hall: They would just be capital costs.

Q: Was there much discussion of additional operations and maintenance cost, and how to fund that extra work?

Hall: That is one of the things that, as a designer, is taken into consideration. We may not always bring in people from maintenance, but as I mentioned in the case of the transparent noise barrier, for example, we

brought in several members from the maintenance group and talked it all through. They were very skeptical in the beginning. We gave them all of the facts as much as we could. We put up a test panel.

The brick veneer, for example, was a way to address the community's desires in a way that was a better solution than using a traditional brick product and approach. That's something that maintenance is probably never going to have to touch, and if they do, it's probably going to be at the time that they're going to replace that bridge.

You're right. We don't always bring in the maintenance folks. I can tell you, just from my own personal experience, it's a battle, always. That's one of the reasons I'm here today. There was a question asked before, and the answer is always "no." That kind of keeps you from going to reach out to maintenance folks, for example, because the answer is always no. There's got to be some kind of a line of communication developed there. There's got to be give-and-take.

Commissioner Sorel: This is a critical discussion. One of the things we've tried to do at Mn/DOT this past year is to develop trust at the legislature and have some outreach activities with the legislature before the session. We called key members of the transportation committees over to the central office and outlined highlights to them. CSS is one of the things we highlighted.

This discussion we're having here came up several times. The discussion went pretty well, and I think most people embrace this movement or are trying to move forward with it. State Representative and House Transportation Finance and Policy Division Chair Bernie Lieder was in one of the sessions and he said, "We can't do this stuff, it's going to cost too much money."

We went on to talk about many of the things we have talked about here, how this is important from a partnering perspective, from a collaboration perspective, and from a context sensitive perspective.

It does point out that this discussion is something we need to address—it's critical. For those people who support us, they need to understand it. And we need to be able to communicate, to be transparent, not only with the people we work with every day, but with the people who support us at the legislature. We need to make the case that this is the right thing to do.

CSS in Construction

Case study examples of barriers and innovations that relate to context sensitive solutions in construction.

Panelists: Jack Broz, HR Green & Associates, moderator and panelist; Jeff Perkins, District 4 Area Operations Manager, Mn/DOT; Matt Rottermond, TH169 St. Peter Design-Build Manager, Mn/DOT

Jack Broz, HR Green & Associates

Jack Broz

When I went into design almost 20 years ago, I went to a meeting in which construction and maintenance people were talking with designers. One phrase from maintenance sticks in my head to this day: "How am I going to mow in there?"

In design-build, there was kind of a mantra: they wanted to get construction input early. We would say: "What do you want to build? How do you want to construct it?" And then we would go design that. And then you add the maintenance perspective: "How am I going to mow in there?"

As we went through the design process for the Highway 10 project through Detroit Lakes, there were some exciting decisions to be made. The project involved shifting a railroad and a local street; stage one of construction was to build a railroad bridge in a field. In the later stages, we shifted the railroad so that we could then shift Highway 10. An integral part of the concept was how it was staged. As a designer, I think that was an important aspect for the community all the way through.

We had to construct a big box culvert to realign the Pelican River while maintaining flow, which required a lot of coordination with the Department of Natural Resources, and we actually exceeded their expectations by improving fish spawning habitat. There were also a lot of historic components to the downtown area, and we had a lot of communication and coordination with the White Earth Band of Ojibwe. And there was a big issue with the railroad spraying weeds along the tracks. We designed a 25-foot buffer area of rock ballast on a liner that would preclude weeds from growing and hopefully eliminate the need for spraying in the downtown area.

Jeff Perkins, District 4 Area Operations Manager, Mn/DOT

Jeff Perkins

One of the unique things on this Highway 10 job was the communication and coordination between the design and construction staff in District 4. At the time of this project I was the resident engineer. Our construction staff and the designers worked together for about four years before the job was let, meeting with the public, businesses, community groups, environmental groups, and the lake association, all the different groups that had input as stakeholders on this project. That helped ensure we knew about the commitments made during the planning and design phases, because we were right there working with them as a team.

As we staged this project, we incorporated all of the concerns that the community brought to us. In turn, we were extremely transparent in that we clearly identified to the community the major problems we were going to face during the project.

For example, there's a frontage road and Highway 10 pinched between Detroit Lake and the Burlington Northern Railroad. Burlington Northern has about 70 trains a day that run through that stretch. It's an extremely tight section that used to have a four-lane highway and now it's got the four lanes plus a two-

lane frontage road. Some of the issues we had to deal with were how do you stage it, how do you maintain it, and who's going to be responsible after the fact.

We worked with our maintenance staff and with the city public works director and figured out during construction how we were going to do snowplowing through there. We worked with them to determine who was going to be responsible for what during construction, who was going to be responsible for what after the project was complete, and who was going to be responsible for what costs. We went out of our way to make sure there was transparency, and that the public clearly understood what problems we were going to face.

We dealt with the construction of a full-box culvert several hundred feet in length and an active river where we had to maintain flow. We actually wrote specs on how we were going to handle that with the Department of Natural Resources and with the watershed managers to make sure that we would have buy-in from them, which in turn got us buy-ins from other environmental groups. Things like that are so valuable as you go forward.

We put together a business liaison for this project, a contractor's employee. It was not a communication position, but someone who reported directly to the project manager. It turned out to be the project manager on this job. That person's responsibility was to go out and explain to every single business what work would be done, when it would start, and how access to their business would be maintained. Businesses received the project engineer's phone number and a hotline number with 24-hour message service. Countless people told us how much they appreciated that responsiveness.

Detroit Lakes is a resort community that basically makes its money during three months of the summer. Originally, this was going to be a three- to four-year construction project. After hearing all of the concerns and identifying the ones that we had, we chose to let a couple separate projects. We used Primavera B3 Critical Path software to develop the schedule for the job and communicated the timeline to the public.

We did a pre-letting conference with every contractor bidding the job. We had these extremely restrictive specs explaining what was required, what was expected, and why it was being done that way. The problem with doing something like that is that while it sounds easy, you're really tying the contractor's hands. When you tie a job down that tight on the specs, it can cost money because it requires the contractor to do things a certain way and it precludes them from using some of the innovative methods that they bring to the table.

So we also put in a performance spec that said the contractor was allowed at any point in the project to come up with a proposal if they thought they could do it better and cheaper. If they did, we required them to do a revised CPM schedule showing how it was going to impact the entire project, not just that small portion of the work. We made them go in front of whatever group was impacted, the city council, watershed, DNR, or a business group, and explain how it would impact that portion of the project. From there we made our decision on whether or not we were going to approve that change. Through that process we probably made about 20 or 30 different changes to the schedule.

We identified key areas that were going to be critical points to the schedule. We used tools such as a locked incentive date, awarding the contractor a $300,000 bonus to get the work done by a certain date. We used lane rental: every day that portions of the job were closed down, they paid a certain flat fee. We had A+B bidding, which allowed us to take that project down from four years to two.

There are times when we can't do certain things because of the environmental requirements, because it's

cost-prohibitive, or for other reasons. But there are so many other things that we can do. We can build trust with the community by saying what we're going to do to meet their concerns and needs, and we can show them we're doing everything we can to try to help them out.

A lot of times, these things don't even cost money. It's more or less a communication and coordination issue. When we build trust like that, if there is a big ticket item that we can't do, whether because of cost or environmental factors, it helps people understand why we can't do it. And they trust that when we are able to do things, we do make those modifications and adjustments in the plans.

Matt Rottermond

Matt Rottermond, Highway 169 St. Peter Design-Build Manager

The Highway 169 St. Peter project is on the Minnesota River, about 10 miles north of Mankato. There's pretty heavy truck traffic, and it's also right on Main Street where there's a six-block historic area with a lot of businesses. We had to take into account the conflicting uses, pedestrians wanting to get from shop to shop downtown and across the road, and cars and trucks wanting to get through town.

The two big goals we had for the project were to increase pedestrian safety and to increase mobility through town. Those two things don't often go together well, but we worked with what we had and I think we came up with some pretty good solutions.

Some CSS topics came up during the project. First, the impact of vibrations and the potential for damage to the historic buildings downtown. We required the contractor to perform a preconstruction, precondition survey of the buildings, taking cameras into basements to make a record of the foundations, noting cracks in the plaster and that kind of thing. That actually came in very helpful. If someone raised a concern about their foundation, we were able to compare it to the precondition images. Sometimes it was new and sometimes it wasn't.

Another CSS issue that came up was the sometimes competing requirements of the State Historic Preservation Office and the Americans with Disabilities Act. A lot of the businesses in town had a step or a couple of steps into their business. The question was, do you keep the steps because that's what's been there, or do you fix the situation and put in a ramp?

Going into the project, not many people knew who trumped who in that situation. We actually walked through town with someone from the Federal Highway Administration and went door-by-door and asked what we should do at each one.

There were also a couple of things in terms of the business impacts. The city was replacing all of its water mains through town, so one of the first things the contractor did was set up a temporary water main and put all their connections onto that temporary water main, and then they installed the new water main and switched them back over.

A couple businesses that are key in terms of water shutoff were hair salons and coffee shops. You don't want to be in the middle of getting your hair done and all of a sudden your water is shut off for 5 or 15 minutes, or however long it takes. For coffee shops, from what I understand, if they are in the process of using the machine and you shut off their water, it basically wrecks the machine. So communication with business owners when shutoffs are happening is key, especially on a project like this.

Pedestrian access was a bit of a challenge. We struggled early on defining where the contractor would need to keep a crossing open across the highway. We wanted to give the contractor as much access to the road to get good production. At the same time we wanted people to be able to get across, especially residents. What we decided was that allowing four blocks of closure was a good compromise. It would give the contractor a little bit of room to work, but it wouldn't be too far for people to get across the highway.

We didn't think about the fact that if you're standing in the middle of the four block section and you want to get a coffee shop on the other side in the middle of that four block section, it's now a four block hike, instead of simply crossing the road. That's not to say that people are lazy and can't walk four blocks. When they are on the way to work in the morning, people don't have time to walk four blocks. Fortunately, the contractor was able to open up temporary pedestrian crossings to try to help some of those businesses.

Business signing was also a key issue. Basically, every store along the highway had its name on a sign with an arrow pointing to the cross street that provided access to that store from the detour. The fact that the businesses got to see their names on a sign really helped, whether or not it was beneficial to customers. It was more of a morale thing for businesses themselves.

Since we have operations and construction here, I'll talk about one other issue: pedestrian safety. In terms of pedestrian safety, we put in bump-outs at all of the intersections for the sidewalks, basically to get the pedestrians trying to cross the street closer to the travel lane and still be protected, so they could see around the cars parallel parked along the roadway. We knew from the very beginning that snowplow and snow removal operations did not like bump-outs. We had discussions with them. The decision was not made lightly, I need to emphasize that. We felt that because pedestrian safety was one of the goals of the project we needed to put those bump-outs in. I will say that even after one year some of those curbs out there have taken a beating.

One last topic I'll talk about is how we dealt with storm water. Highway 169 is one block off the Minnesota River and right in town. There was really no room at all for any kind of storm water treatment ponding or anything like that. What the designers came up with is called the downstream defender. It's a huge underground water treatment device under the city streets between 169 and the river. We have a maintenance agreement with the city.

Question-and-Answer Session

Q. Have you encountered any problems after the fact on maintenance on any of these things?

Matt Rottermond: St. Peter is holding up its end in terms of cleaning the water treatment device. I also touched on the fact that the curbs did take a little bit of a beating out there this winter. Mn/DOT plows the mainline through town and left-turn lanes. The city is responsible for the pickup and the parking lanes. That's really where a lot of the damage came from. We did have a discussion with their Public Works Department and basically told them, "We got this project done. It's your town. It's up to you on how you want it to look from this point forward." From this point forward they are going to be taking a little bit better care of their curbs and their snowplow removal operations.

Jeff Perkins: I'm not aware of any issues that have come up that we hadn't really anticipated. There were a couple of issues during construction. One of the contractor's modifications was to build the four-lane portion of Highway 10 while we carried two-way traffic on the new frontage road. One thing we didn't anticipate was that we had to carry traffic on that into the winter. There's a grade separation there. There's a

retaining wall on one side of the frontage road and Detroit Lake on the other. There was about 25 feet or so from the edge of the retaining wall to the drop-off into the lake, which we had to maintain in the winter-time.

We put in changeable message boards with radar detectors flagging anyone in excess of the speed limit we set. We also put remote sensors in all of our plow trucks. Anytime one of our plows came into that area, a message flashed on both sides alerting people that snowplows were operating, please slow down. It really helped the comfort level of our plow operators.

Q: Are you aware of any maintenance agreements with the city of St. Peter with regard to the bump-outs?

Rottermond: The businesses shovel sidewalks to the curb. Mn/DOT plows the snow into the parking areas. Then the city comes through and removes snow from there. From what I know from last winter, they also did the bump-outs.

Q: I got a call from a private property owner and the fire marshal about a tank that was out on private property where Mn/DOT had removed a house. Nobody thought to ask if that tank should be removed during construction. Now, five years later, the contractor keeps changing the day when they plan to remove the tank.

Perkins: Accountability and communication are key. That was a big part of why we put that business liaison in there, to make the contractor directly accountable for all communication with the city and with those businesses. Mn/DOT was still accountable, but it was the contractor's responsibility to go out and to talk about those changes in schedule. It really helped ensure they did a better job of holding to their timelines.

Q: How do you decide in your particular district how much an incentive should be? How do you justify that based on the fact that the incentive money comes out of your road construction funds?

Perkins: Before the project started, we went through and looked at how we could do that without actually spending much money. The area where we used a locked incentive date happened to be a bridge that went over the top of two railroads, the Burlington Northern, which carries about 70 trains per day, and the CP Rail, which carries about 7 or 8 trains a day.

The entire time we were working on that thing, we were paying for two railroad flaggers, and everything after eight hours was overtime. So we calculated the cost of flagging if we did the job in 180 days and if it took longer. The difference came out to about $240,000. Then we went through and calculated the cost of doing the project if the contractor used two crews working heavy overtime. We figured that roughly to be about $300,000. So actually, the cost of that $300,000 locked-in incentive was only $60,000, because we would have spent the $240,000 anyway. And the payback in the community was invaluable.

Q: Do you have any maintenance agreement with the city other than the standard cooperative agreement language?

Perkins: On Highway 10 in Detroit Lakes we did a cooperative agreement and our design engineer put together a map that clearly showed in different colors what the cost participation was, and we went to different groups and talked about who was paying for what portion of the project. We ended up doing the same thing with a maintenance agreement afterwards, so it actually shows who is responsible for different parts of the maintenance and who is responsible for all of the different cost breakdowns.

Small-Group Discussion: CSS in Construction

Questions: What do you think are the roadblocks and challenges to applying the principles of CSS during construction? What do you think the department should do to improve how CSS principles are applied during construction?

Group One

Challenges and Roadblocks

- Installation of guardrail (construction costs versus M/O), look at long-term costs to maintain the guardrail system.
- Lack of time and resources to bring staff and public input into the project. Hard to find time for construction to have input. At peak times, it is hard be involved on the front end.
- Construction functions are understaffed to deal with non-traditional items (lack of inspectors, etc. with non-traditional expertise).
- Construction functions are understaffed to deal with traditional items (lack of experienced staff).
- Lump sum construction payments versus other approaches.
- How to estimate the cost of the unknown.
- How to estimate unknown environmental costs.
- How to establish standards/specifications for the unknown.
- How to establish construction details for the unknown.
- Lack of as-built data.
- Need for as-built data for management/maintenance of infrastructure.
- Lack of as-built information that records commitments.
- Lack of discussion at the beginning of the design as opposed to discussing at the end of the design.
- Need for improved communication between planning-design-construction-maintenance or between central office and districts.
- Poor handoffs during the project's life.
- Decisions made based on low cost. When you have different options, how do you make the decision to best solve the problem and recognize impacts on operation and maintenance?
- Lifecycle costs should be a determining factor, not just capital costs.
- Construction training needs (erosion control, etc.).
- Lack of training or expertise to maintain new safety or infrastructure systems (safety technology or bridge technology).

Solutions

- Training needs
  - ADA (balance of historic requirements).
  - Environmental constructability techniques (EAW/EIS commitments).
  - Site plan process.
  - Better quality guidelines.
  - Quality-based contracting (bid advantage for quality).
  - Better estimating and pricing techniques (e.g. environmental items).
  - Understanding operations/maintenance of safety systems or infrastructure systems (e.g. cable barrier guardrail, bridge inspection).
  - Specialize expertise for inspectors for better inspection of safety systems.
  - Leadership training.
  - Conflict management training.
  - Emotional intelligence.
- Reduce or streamline paperwork (federal process).

- Include lifecycle costs (not only capital costs) when making decisions.
- Realistic view of timelines and schedules instead of backing into letting dates.
- Defined synopsis for commitments for construction and maintenance (Operators Manual for the completed project).
- Final walk through for turning over project from construction to maintenance.
- Deeper understanding of the application and use of GIS data (why to use it, how to use it, when to use it).
- Better understanding of new technologies.
- Official handoff from construction to maintenance.
- Annual meeting (with documentations) with regulatory agencies (Bowser, SHPO, DNR, MPCA) to look ahead 10 years.

Group Two

Challenges and Roadblocks

- Difficult to isolate.
- Communication. Bid/build jobs are more critical because more "silos" separate different groups. Knowledge transfer is key. Management from cradle to grave is helpful.
- CSS is difficult in the traditional construction box because the process is already defined. CSS has to be established prior to construction.
- CSS things take time. During construction, time equals money. Decisions need to be quick.
- Internal buy-in, getting inspectors to buy-in. Keeping them informed is key, as they are the primary contact for some stakeholders. Within the Bridge Office, introduce initiatives to the inspectors so they can bring it back to their daily work in the summer.
- Business Liaison performance spec was intriguing, as there is direct interest in working with the business and takes Mn/DOT out of direct contact.
- In D/B/B, attitude of contractor is key. Some contractors make it a battle from day one. Some contractors are inflexible (relating to their right to demand more money) when changes occur in the project.
- More of a challenge in bid-build. Project manager's time is spread too thin and they depend on inspectors. Design-build affords more flexibility for minor changes, but in bid-build it is more rigid. Bid-build emphasizes low price, which reduces flexibility.
- Around the horn:
  - Looking for contracting industry to be our partner, so maybe look into AGC.
  - Landscape contracts: low cost and difficult. But if you can get a good contractor, it's much easier.
  - Design-build: buying ROW without certainty and paying a premium. On D/B/B, when making changes in field, find out what was done first.
  - Mn/DOT can do best value with D/B/B. When contractor is flexible, process is much smoother.
  - Make sure staff has time to focus on working with contractors.
  - Sometimes it boils down to resources.
  - Other agencies doing things such as changing storm sewers. How does coordination with permitting work? Hard to make change for this reason during construction.
  - D/B/B has a lack of flexibility, i.e. lump sum on interim pavement markings has worked well.
  - Would like to be able to be more selective on which contractors.
  - Think it through from start to finish in terms of how it will impact maintenance.
  - Identifying true cost of decisions we make. We don't calculate that now. Rarely do we account for cost of maintaining what we build.
  - If D/B/B contractor takes ownership of solutions it should be done right.

- Decision making: document what led to choices made. Particularly with the very independent districts in MN. FHWA: more centralized.
- Design review meetings would be beneficial.
- Lacking a contractor rating system.
- How to set up early in the process so that projects are set up for success during construction? We don't provide on-the-ground tools for this. Bring construction, maintenance early.
- Bring all personalities in early to understand abilities of all players.

Solutions

- Have short list of "best" contractors for key projects. Weed out the difficult contractors and those that don't buy into CSS (or hide behind the fact that Mn/DOT, not they, will be remembered).
- Having everyone at every level exposed to CSS and solutions, all the way down to the technician.
- In bid-build, we have not used "best value." We can do that. Once we start scoring them on how they work with us, they'll work better in the future.
- Communicate with legislature to make sure we have resources/tools.
- Communication, communication, communication…on all things.
- Tying in with maintenance and design, long-term cost. Early on has a lot of influence on cost.
- Allowing people to responsibly take risks and make decisions.
- Communication regarding ability to maintain when done. Take advantage of existing resources that help this by communicating with maintenance, for example.
- Flexibility, using the tools we have.
- Scoping is where impact on maintenance can be made.
- Communication: listen and ask "why" if they say no.
- After project completion, have communication between construction and maintenance.
- Cities don't always understand agreements they are entering. Future commitment needs to be understood from the beginning so enforcement and follow-through can occur.
- Determine how to incorporate value into D/B/B. Prequalify bidders or have a list of who's eligible or a short list. Bridge Office has a pre-qualified list for consultants (not contractors).
- Document decisions (lessons learned).
- Project management culture will help document decisions and understand risks.
- Business liaison required on certain projects. Looks positive thus far.
- Communication and timing. We have a lot of communication tools but no effective/efficient method.
- Many offices involved in design quality management. From designer to designer there is not consistency in process, which leads to less-than-optimum communication.
- "Uncomplicate" things; it will help when turnover occurs.

Group 3

Challenges and Roadblocks

- When projects change hands, communication doesn't get transmitted to the next person (with engineers, etc.) or with work areas/departments.
- Following through on commitments is key.
- When communications do not happen early, it affects the project.
- ADA issues that are in flux.
- Pedestrians and bikes
  - During construction.
  - Goal with completion of project.
  - Constructability during design phase.
  - Long-term and short-term environmental commitments (i.e. erosion).

  - Movement.
- Are the commitments appropriate? If there are problems, what is the process to reverse the commitment if need be? How are commitments communicated?
- Example: Screening for neighborhood with wetland issues.
- Project newsletters help communicate project to local residents and businesses.
- Project detours (St. Peter) that were continually changing.
- Signage for businesses during detours – what signage is best for drivers, pedestrians, etc., versus businesses?
- Begin early to determine signage needs for the community as a whole.
- Commitments that are made that do not work out
  - Policies establish consistency, but it can be tricky when there are exceptions to the policy/consistency.
  - The same applies to traffic and permit rules. Need more flexibility according to the situation.
- Money, establishing incentives
  - Jeff had a good example.
  - Depends on project and district.
  - Difficult to anticipate where you might have problems on a project. Allocate money ahead of time to problem if possible.
  - A+B contracts example.
  - Every district has their own policy on incentives. Various availabilities of funds.
- Not enough time to involve everybody throughout whole process. Ditto for residents and businesses that voice concerns once the project is on the ground. Public participation issues.
- Outsourcing projects to consultants – how does this affect projects?
  - Is creativity stifled with one point person?
  - Arguably, there are more problems.
  - Contractor understanding that commitments are an issue.
  - Design and construction issues here.
  - Can result in a poorer design standard.
  - When contractors make executive decisions, this is an issue. Liability issues around this.
- In design process, it should be noted where the accessible route/zones are.

Solutions

- Use pre-bid meetings. Required for all jobs with substantial amounts of "work."
- Establish zones and map them on the plan sets for construction manager to see (i.e. zones included, etc.).
- Consider CM – Not At Risk to provide construction reviews, let sub-packages of full plan set and manager project schedule through construction.
- Become involved in pre-bid meetings. Defining expectations.
- Be more engaged in pre-construction meetings. Understand commitments.
- Gain trust of elected officials.
- Gain trust of the public.
- Using incentives to expedite projects.
- How and when do you use incentives? This can be very project-specific, so a policy may not work.
- Contracting methods to incentivize contracts.
- Construction Manager At Risk.
- Business liaison through Mn/DOT or contractor?
- Mapping out zones for utilities, accessibility, storage, etc., would be helpful.

CSS in Operations and Maintenance

Case study examples of barriers, challenges, and innovations that relate to context sensitive solutions in operations and maintenance

Panelists: Scott Bradley, Director of Context Sensitive Solutions, Mn/DOT, moderator and panelist; Steve Lund, Office of Maintenance, Mn/DOT; Bev Farraher, Metro District, Mn/DOT

Steve Lund, Director of the Office of Maintenance, Mn/DOT

Steve Lund

I don't think there's anybody out there who is an expert when it comes to context sensitive solutions, at least in maintenance. We're still trying to make that link. I'm going to focus on two of our efforts, the environment and market research.

Environment
Chemical usage in snow and ice management and usage of salt are areas where we feel we have our biggest return. Our efforts are focused in three areas.

Training: I don't know if there's another state that invests in training in the maintenance areas the way we do. Any new Mn/DOT employees with plowing in their PDs are required to attend a snowplow operator training (SPOT) boot camp. That's a top management-endorsed and -reinforced best practice. We have annual refresher training for all snowplow operators. We are dabbling with simulator training. We're going into the second full year of driving a simulator around the state and we have added two more consoles at the Arden Hills training facility.

New technologies: They're not all new but they're proven and very successful. In the pre-wetting area we're actually introducing additional salt brine with our chemicals to make them stick to the road more. The goal is to reduce our consumption without compromising service.

MDSS, our maintenance decision support system, uses in-cab technology to help the snow fighter from a forecasting perspective and in making decisions on application rates.

Alternative chemicals continue to be on our radar screen. But we struggle to find a chemical that doesn't have an environmental impact.

Customer satisfaction: We have a model that looks like a three-legged stool. One leg is our technical expertise. Another leg represents our strategic direction. And one leg represents customer input. The model has been around for quite some time—long before we made the connection to CSS—but it very much fits with where we need to be in making decisions out in the field.

For any given project, the support of those legs might vary. If you're building a bridge you might not rely too much on strategic direction; you might rely more on technical expertise. If you are in a rural roadway setting, you might not rely on customer input as much. But if you're in a town situation, you might rely on customer input more because of the direct effects the project has on the locality. It's a balancing act.

Market Research
In maintenance, we have a long history of doing market research. We take the pulse of the customer. We can't make decisions necessarily based on that. It's really a snapshot, kind of a pulse reading of how the customer is feeling.

Then, once we understand areas where we need to drill down further, we do specialized market research. Our Bare Lanes Study and our business planning are both examples of drilling down. We are making decisions and setting targets based on what we are hearing from the customer.

We have used our online community to do some data gathering on our snow and ice efforts. The one report that sticks in my mind concerns expectations for weekend snowplowing. About half of our customers have an equal expectation of snow and ice service on the weekends. We didn't have a very clear understanding of how weekend services should be provided.

Bev Farraher, Metro Maintenance Engineer, Mn/DOT

Bev Farraher

I want to highlight three things that were developed and put into play not in the framework of context sensitive solutions but as a business benefit.

Road sand screener
In Metro, we go out in the spring and we sweep up several thousand tons of sand. We used to just take this to a landfill and it was very expensive to dispose of. Since we purchased the screener, we stockpile all of the sweepings in specific areas, and then we drive the screener around and screen all of the material. We recycle the recyclables, we landfill the stuff that is extra, and we test the stockpiles to see what's in them. When they're cleared by our Environmental Services Office we use them as fill. The screener offers huge environmental benefits and huge cost benefits. It paid for itself in its first year of operation.

Emerald ash borer
Dan Gullickson already introduced you to the problem and challenges we face with emerald ash borer, and there is nobody, to our knowledge, collecting all of the information across the state about where the problem is and what has been done in a particular location. This is going to be significant as far as tracking what has happened and in pursuing larger goals. We are talking with IT to see if we can create a database to aggregate all of the data from around the state and make it available to our staff and others to help in our efforts to manage the emerald ash borer.

Graffiti control
Jeff Streeter from Metro Golden Valley Traffic Services has spent a lot of time over the last few years addressing graffiti in the metro area. This is not just a safety issue with obscuring signs; this is also a community issue for neighborhoods with regard to gang control. Mn/DOT spent $160,000 on graffiti removal last year. We do not want to spend that again next year. We would like to prevent it altogether.

Our goal is to deter the act of graffiti using Q-Star cameras equipped with motion detectors, lights, and recorded warnings. Someone attempting to create graffiti will trigger the motion detector, and after about five seconds, a recorded message will issue a warning. A light will come on and a camera will take a photograph so the individual can be prosecuted. We are partnering in this effort with the cities of Minneapolis and St. Paul and the Minneapolis Park Board. We will be placing cameras at 12 sites of interest to Mn/DOT and some sites that are of interest to the cities. Minneapolis and St. Paul have agreed to work to prosecute the vandals.

Scott Bradley, Director of Context Sensitive Solutions, Mn/DOT

Scott Bradley

I'm going to quickly discuss a number of Mn/DOT projects that stand out for their attention to context sensitive solutions to provoke your thinking about how we can tie things together better.

Highway 38 Reconstruction Project, Grand Rapids to Effie
Back in 2005, Highway 38 between Grand Rapids and Effie in northern Minnesota won an award from AASHTO for best CSS project in the country. It was selected from among 75 applicants for illustrating all the principles of CSS and applying flexibility in design to balance competing objectives. But really it was more than that. This was a great example of collaborative visioning, involvement, and partnering to develop and implement a corridor management plan that guides both development and management of Highway 38 and the land adjacent to it. It resulted in dramatic cost avoidance and savings while improving mobility and safety and creating environmental and community enhancements. The initial track record shows post-reconstruction reduction in crashes by more than 55 percent annually.

Highway 8 Pedestrian Underpass and St. Croix River Scenic Overlook, Taylors Falls
This was an FHWA Excellence in Design award-winning project, and another poster child in terms of the benefits of collaboration and visioning and of Mn/DOT partnering with a community in their strategic planning, and vice versa to improve safety and the community, transportation, and natural environments. And it is an example of the power of relationships and alliance building among agencies, including the National Park Service, DNR, Mn/DOT, and the city of Taylors Falls. I also want to point out that this idea and project, as a potential opportunity, was advocated by Metro District design, construction, and maintenance representatives.

17th Street Partnership Project along I-94, Stevens Square Neighborhood of Minneapolis
This was the era when Mn/DOT had formalized the Community Roadside Landscape Partnership Program. The Stevens Square neighborhood sits across from the Minneapolis Convention Center along the south side of I-94. The issues here were crime, neighborhood revitalization, visual concerns, and the interface and pedestrian connectivity and safety along and across the freeway. The hardscape and softscape elements were designed by Mn/DOT landscape architects, funded by the city and Mn/DOT, installed under city contract and by community volunteers with inspections and oversight by Mn/DOT and ongoing maintenance assigned to volunteers, the city, and Mn/DOT as appropriate. This project was cited in Metro District discussions with nontraditional stakeholders as a great way for Mn/DOT to work with communities.

Collaborative and Innovative Solutions, Beaver Creek Travel Information Center Snow Drifting Problem
During one of those epic late '90s winters, the truck parking lot blew shut with about 6 feet of snow cover more than 25 times. The cost of snow removal was more than $35,000 that year. District operations folks were looking for a cost-effective solution. A Mn/DOT landscape architect and forester tag-teamed with District maintenance folks to design an innovative landform pattern and catchment area that could immediately control the blowing and drifting snow problem without the need, or the maintenance required, for a conventional structural or living snow fence. They created berming and two catchment ditches to store the snow. Since that time, in virtually all winter conditions, snow has been blowing clear through the parking area.

A Model Mn/DOT and Fond du Lac Reservation Roadside Vegetation Management MOU
In May 2009, Commissioner Sorel and the Fond du Lac Band of Lake Superior Chippewa entered into a memorandum of understanding concerning roadside vegetation management and the use of herbicides on

Mn/DOT roadways within reservation boundaries. The memorandum sets goals, objectives, and agreements for both Mn/DOT and the Fond du Lac Band in terms of their commitments to work cooperatively together in managing vegetation with mechanical methods, where feasible, to address the Band's concerns about herbicide use and the loss of culturally significant plants and plant habitat.

Collaborative and Innovative Solutions, Highway 61 at Silver Creek Cliff Rock Fall Problem and Opportunity
A rock slide filled a Silver Creek Cliff tunnel catchment area adjacent to the Gitchi-Gami State Trail construction area and the North Shore Highway. Mn/DOT needed to quickly and cost-effectively do something with all the fallen rock to be cleared from the catchment area. Collaboration by a Mn/DOT construction engineer, maintenance superintendent, and landscape architect yielded an innovative solution: reuse of the rock to create a retaining wall and to expand the size of a visitor parking lot. The collaborative solution eliminated the need for a separate contract for catchment cleanout. The changes were made under the existing contract without additional cost, and the work was completed more quickly and within the existing work limits.

Collaborative and Innovative Solutions, Mn/DOT's Online PlantSelector
Volunteer collaborators from other agencies and organizations around the state, upper Midwest, and Canada helped Mn/DOT landscape architects, foresters, plant specialists, and maintenance representatives to fulfill a vision of developing a comprehensive and roadside-specific expert system for more successful roadside plant selection, highway landscaping, and training outcomes. The expert system was initially developed and distributed as a CD-ROM that was widely acclaimed and used throughout Minnesota, and it was a recipient of numerous awards including the FHWA Environmental Excellence Award for Research. Mn/DOT staff then expanded, updated, and migrated the tool to an online expert system which serves as a highly utilized and cost-effective tool for the department and our stakeholders. Past surveys indicated that more than 90% of the expert system's transportation-user respondents indicated use of the tool improved their knowledge, proficiency, and success, and it saved them time and money in doing their work.

Collaborative Camp Ripley Dry Stack Stone Wall Restoration Workshop
One of our most recent collaborative efforts, the Camp Ripley Dry Stack Stone Wall Restoration Workshop, took place in August 2009. The workshop was developed by a Mn/DOT landscape architect in collaboration with other Mn/DOT functional area representatives, the Camp Ripley National Guard, and the Dry Stone Conservancy (out of Kentucky) to further support restoration and preservation of unique historic roadside properties along the Great River Road. The workshop was designed to provide property managers and stone masons with a basic and hands-on understanding of the age-old craft and the requirements necessary to appropriately maintain, repair, and restore dry stack structures. Participants also got a broader exposure to the history and value of these kinds of historic properties and structures, and more information on construction documents, utility permitting issues, and maintenance requirements.

Aesthetic Initiative Measurement System (AIMS) Phase 1&2 Research Efforts
AIMS was designed as research and a tool to enable us to: 1) analyze public perceptions of existing and proposed visual environments, 2) aid in decision-making specific to highway corridor design and management decisions, and 3) monitor travelers' visual experiences and perceptions in a practical and systematic manner. In Phase 1, focus groups in vans toured corridors in the Twin Cities, Duluth, and Rochester pointing out what they liked and disliked, and their comments were documented. Phase 2 was a larger population survey where respondents looked at 50 roadside images in urban and rural contexts with a variety of mowing patterns and vegetation treatments inclusive of retaining wall and noise barrier types in urban areas.

What we learned from AIMS Phase 1 focus groups in a nutshell: 1) to achieve attractiveness and avoid unattractiveness, invest in maintenance, 2) views of landscape context create the most attractive use views, 3) highway location and design should intentionally open or screen views, 4) urban highways should include a comprehensive planting design strategy, and 5) all structures in the right-of-way should meet a minimum level of aesthetic quality.

In closing, increasingly we are being judged by the sustainability of our decisions and our ability to preserve our investments. As Commissioner Sorel mentioned, we're looking at sustainability from a triple bottom-line perspective: social, economic, and environmental.

Question-and-Answer Session

Q: How are we balancing the Dr. Jekyll/Mr. Hyde attitude of Mn/DOT towards beautifully landscaped rights-of-way and the mentality that says sell everything that isn't nailed down to generate some dollars?

Steve Lund: Money should be used as a common denominator in all of these decisions. There is value and cost to everything that we do. If you deal with things on a cost basis, at least we'd be using a common denominator. The dilemma here is how do we put an appropriate cost on some of these attributes that are valued by some and not as valued by others?

Q: In a lot of rural areas we have exceedingly wide rights-of-way for aesthetic reasons or to preserve the natural corridor. In those areas we don't have any maintenance costs because we aren't mowing, but we are still getting this drumbeat to get rid of it.

Bev Farraher: In the Metro area we need every bit of right-of-way that we've got. What we have are a lot of remnant parcels and parcels for projects that are coming up, such as the new St. Croix River crossing. We've got hundreds and hundreds of parcels out there that we're trying to maintain, and we're just making all the locals angry because we're not maintaining them. So we are trying to get rid of those as best as we possibly can.

Q: What will be the impact of CapX2020 transmission lines that are running along our interstates?

Farraher: In the metro area, with tight rights-of-way and the size and the power of those lines, it's a real concern. How do we fit everything in and have people working safely in the right-of-way? I do not see an easy resolution to that.

Lund: I don't know if we have much control in this situation. It appears that it will be done to us. It seems like it's a cost issue. The utility is bringing a service to citizens and they want the cost to be the cheapest it can be. I think we raised a lot of our concerns: What if we need to get out and work on the bridge ends? What if there's overhang and we need to get crews in that area? I don't know if that kind of argument sells well with the decision makers. We don't have real tangible risks that we can put forward.

Q: Could context sensitive solutions be used to save green space?

Scott Bradley: Yes, and increasingly you're seeing approaches in flexibility and design, from improving mobility and safety to reallocating space in a variety of ways.

Small-Group Discussion: CSS in Operations and Maintenance

Questions: What do you think are the roadblocks and challenges to applying the principles of CSS during operations and maintenance? What do you think the department should do to improve how CSS principles are applied during operations and maintenance?

Group One

Challenges and Roadblocks

- When you buy the rights of way for large/future projects, you still have to maintain it.
- Maintenance of remnant properties after the project has been constructed.
- Legislature requests that resources are taken away from priorities.
- Too many systems (materials/maintenance/operations/construction) are working independently. They should be tied together.
- Maintenance operations are not funded additionally when a new design adds new operations.
- Not enough resources to pay for new or existing commitments (corridors).
- Just like Mn/DOT, locals/community groups/agencies are experiencing a resource shortage and they are not able to live up to their agreements. Is Mn/DOT liable when agreements are not lived up to? How does Mn/DOT maintain this along with existing responsibilities?
- Does Mn/DOT consider walking away from projects? Should they? If the community can't assist with M/O should Mn/DOT consider walking away?
- Not enough budget for special requests from other state agencies. Should other state agencies (e.g. SHPO, ADA) have a maintenance/operations budget to help with their requests? Do you really have to use a special rivet or tuck point technique?
- Other state agencies.
- What is the definition of low/medium/high maintenance? What do they mean?

Solutions

- Maintenance plans that include people hours and equipment needs.
- Propose set-aside budget for maintenance (repair/replacement, e.g. cable barriers).
- Formula for required maintenance FTE if you add new lanes, miles, infrastructure.
- Message to public about maintenance/operations costs outside of snow and ice control (sound wall maintenance, cable barriers, guardrails).
- Commitment by top staff to make one change. Change at least one way of doing business to address these challenges.
- Revisit the different pots of money (construction versus maintenance). A dollar is not a dollar. Need flexibility to address all the needs.
- Evaluate how effluent discharge requirement (MS4) will impact maintenance and operations.
- Revisit bald eagle monitoring.
- Revisit SHPO clearance.
- Take a new look at materials management requirements since the dollar amount levels are set at low levels and it costs Mn/DOT resources that could be used elsewhere to comply.
- Required walk-throughs with maintenance and construction. (Clean project with as-built information shared)
- Change monetary amounts on emergency orders and negotiate caps on agreements/contracts.
- Public communication
  - Market Mn/DOT with what we have accomplished.
  - Truth about how much it costs.

Group Two

Challenges and Roadblocks

- Some changes from standard procedure (e.g. CSS idea) are not usually funded mandates. Unforeseen issues are not budgeted but have to be addressed.
- Tracking commitments are needed, as the commitments can be needed indefinitely.
- Mn/DOT is risk averse.
- How do you get those that control the money to understand that maintenance is a big deal? When ignored, then replacing is the only option. Legislators prefer to get credit for building something new than maintaining. "No ribbon-cutting ceremonies for seal coat." Real costs of deferred maintenance are not known/understood.
- Resource issues require maintenance to struggle, particularly outstate where the people are spread out. They are, therefore, unable to do some of the things that would have an impact.
- Proper soils management on construction can have maintenance impacts. Poor soils management can allow weeds to lead to issues like erosion, etc.
- Funding issues are difficult; it's difficult for Mn/DOT to "get rid" of a road to the locals. Should partner with the locals to get it up to date and pass it down.
- Maintenance agreements, as things need to be added to the project. Do locals understand future costs of some adjustments? Educating the locals.
- Lack of performance goals in cooperative agreements for local maintenance. Additionally, there are no ramifications if locals don't maintain.
- Budgets: unintended consequences in construction versus maintenance. When the project appears to be done, there is still further work and construction gets the burden of paying for it. Need to educate people on how we do things; it's not just "the contractor's problem."
- Getting input from maintenance up front can be a challenge.
- Key to get maintenance to communicate their needs early.
- Maintenance is not always receptive to information early in the process. Everything falls back on maintenance, e.g. silt fence. We don't have the resources to do this – things not in construction plan.
- Lost communication because district management seems to be on the right page for getting the project correctly done. No clear-cut handoff for communication.
- Cradle to grave: grave does not really exist until reconstruction (as opposed to when construction is done). Maintenance wants construction to do things so as not to impact its budget, but it's a Mn/DOT project.
- Some burden should go to maintenance when they don't go to meetings and identify early the least maintenance impact.
- Need more focus on preventative maintenance. We get behind and focus on the surface and ignore trees and culverts until an emergency occurs.
- During construction there is a lack of consistency in some things that will impact maintenance, such as differing fence poles, etc., that cause confusion in the future. Problem: have to allow multiple types of fences because not allowed to have single provider.
- Roundabouts not well maintained and sight problems occur.

Solutions

- Commit more money to maintenance. As Mn/DOT looks at innovative financing, maybe some maintenance dollars can be made available.
- Need a better job of costing out alternatives, including the non-monetary value.
- Promote within Mn/DOT. Construction, maintenance: either way, it's all Mn/DOT.
- Need for alternatives and ideas for maintenance early into the scoping process.
- Work with realistic politicians that understand the process.

- Method for tracking commitments, particularly when staff turns over. Carry commitments from generation to generation.
- Require contractor to develop a punch list of things to approve and have staff walk through to confirm that responsibilities are met.
- Incorporate maintenance into the planning process (at 60 %).
- Bring maintenance into the environmental process.
- No matter what part of Mn/DOT we are from, we're all being asked to do more with less. There are so few inspectors to go around that some things never get looked at.
- Warranties. Shift some responsibility over to the contractor. Enforce the warranties. D/B/B: look into withholding funds from the contractor. Consistency in enforcement is key because those that are enforced result in contractors saying "is the rest of the state enforcing this way?" Warranty serves as incentive to do good work. Though be careful, as you cannot count on the warranty to protect you on all things.
- Need an "M" manual with as-builts. For example, spell out what it means to have to maintain the drainage structures.
- Should be a thread of all of this taken through standard training. Mn/DOT has a lot of training opportunities.

Group Three

Challenges and Roadblocks

- Maintenance staff used to have more flexibility, especially when there were more funds available in the past.
- Cities are watching their contracts closer now. What they once did before they are not doing anymore without a contract and payment.
- Cities are having funding issues.
- Mn/DOT gets calls from the public first before any city does.
- Example: 35E Parkway with many weeds. It is difficult to maintain either during day or night due to public complaints about time of day, noise, etc.
- Cities want median plantings, but cities need to figure out a maintenance plan.
- Would be good to set up maintenance through a community group or volunteer organization. But would it be difficult to have volunteers in the middle of a road?
- Rochester has accepted responsibility for maintaining median plantings and following through.
- Maintenance agreements: Mn/DOT is responsible for major work, but city has routine maintenance responsibility. If it is more than routine, Mn/DOT covers.
- In Rochester, agreements are set, but a change of staff could affect the agreement.
- Everyone is doing less with fewer resources.
- Are metro public transit organizations maintaining? Yes, for the most part.
- Trails are similar.
- Bridges and sidewalks: who clears sidewalks on bridges? The more sidewalks we build, the bigger the issue. Often, more work is required to maintain and this increases the operating budgets.
- Sidewalk button crossing signals without a sidewalk is an issue. This affects more than ADA people. The crossing may have a future sidewalk.
- Who is maintaining the signal? Every signal has an agreement around the infrastructure around the signal.
- When are pedestrian signals warranted? What are the design alternatives that can affect the budget?
- Other native plantings, rain gardens, noxious weeds, etc., can affect maintenance work. Good to use methods with little or no maintenance.
- Communication with the public is generally good but internal communication within Mn/DOT

has suffered. Some districts are intentional about internal communications twice per year about projects. Other districts would like to have continual updates on projects throughout process to promote internal communication.
- Maintenance is the face of Mn/DOT to community. This is especially true in smaller communities. People also assume contractors are Mn/DOT staff or that Mn/DOT is the county, etc.
- Currently there is not good or formalized information on training in these areas.
- Much of the information is online and not too accessible by maintenance staff.
- Communication via e-mail is not effective in getting to maintenance staff in a timely manner.
- Equipment is aging.
- Labor.
- Technology in cab creates efficiencies.
- Maintenance-free create efficiency (type of grass, etc.).

Solutions
- Good for maintenance staff to have one-on-one, face-to-face communications with other Mn/DOT staff to know organizational direction. Newsletters and e-newsletters are helpful too.
- GIS mapping of specialty systems along highways, including systems such as infiltration systems, drain tiles, etc. Have computer access from in cab.
- Need certification and/or ongoing training in hydraulic systems. "Train the trainer."
- Maintenance has been involved in scoping, but need to involve these staff in public meetings.
- Some district staff meet with their maintenance supervisor to go over a final punch list to ensure contractor has done work. This helps communication.
- Good to involve maintenance staff in pre-design work. Some districts are doing this as part of the scoping phase.
- Good for Mn/DOT to talk to residents who lives on the roads Mn/DOT works on. They know the land and how the elements have affected the road, etc., because many have lived there a long time, some over generations.
- Could we get technicians to do GPS mapping, hydraulics, permitting issues, etc.? Their time is limited and they could easily work overtime doing all this work.
- Would be beneficial for construction staff to give weekly updates to maintenance staff on projects.
- Communication goes both ways with construction and maintenance.
- Some districts have cross training between construction and maintenance, sometimes seasonal.

Forum Wrap-up

Mike Barnes, Director of Engineering Services, Mn/DOT

Mike Barnes

This is one of our flagship initiatives. I'm hoping that every one of you can leave here and feel that there is something that you could do differently, maybe lead by example, because we do want CSS more integrated in construction, operations, and maintenance.

As we said this morning, we're doing it in the pre-design, design side of things. That's usually where we cover the *what*. Construction, operations, and maintenance is a lot of the *how*. There's a lot of impact there, too. The public sees and experiences that part. For us to really be successful we need to integrate CSS more fully in construction, operations, and maintenance.

There will be next steps. This is one of those efforts, however, where we're on a journey. It is changing the way we do business so some of this will take some time. I really need all of you to be ambassadors as we move forward.

Post-Forum Evaluation

Participants completed a post-forum evaluation, including a list of their top CSS priorities. Results are in Appendix C.

Appendices

Appendix A: Forum Participants

Matthew Banks
Mn/DOT District 7

Joe Barbeau
Center for Transportation Studies
University of Minnesota

Mike Barnes
Mn/DOT Engineering Services Administration

Richard Beckes
Mn/DOT District 3

Scott Bradley
Mn/DOT Engineering Services Administration

Jack Broz
HR Green & Associates

Kelly Brunkhoust
Mn/DOT District 8

Jeffrey Brunner
Mn/DOT Technical Support

Todd Campbell
Mn/DOT District 1

Tiana Carretta
Mn/DOT

Jon Chiglo
Mn/DOT Technical Support

Craig Collison
Mn/DOT District 2

Bev Farraher
Mn/DOT Metro

Chase Fester
Mn/DOT District 7

Jim Grothaus
Center for Transportation Studies
University of Minnesota

Dan Gullickson
Mn/DOT Roadside Vegetation Management Unit

Kevin Hagness
Mn/DOT Metro

David Hall
Mn/DOT Bridges

Craig Hansen
Mn/DOT District 6

Michael Hedlund
Mn/DOT District 1

Neil Hjelmeland
Mn/DOT District 6

Brian Hogge
Federal Highway Administration

Anthony Hughes
Mn/DOT District 3

Pat Huston
Mn/DOT District 1

Amr Jabr
Mn/DOT Metro

Sheila McArthur Johnson
Mn/DOT Metro

Dewayne Jones
Mn/DOT Metro

Adam Josephson
Mn/DOT Metro

Keith Kearney
Mn/DOT District 6

David Keranen
Mn/DOT District 4

Kaydee Kirk
Center for Transportation Studies
University of Minnesota

Trudy Kordosky
Mn/DOT District 4

Diane Langenbach
Mn/DOT Metro

Craig Lenz
Mn/DOT District 6

Sue Lodahl
Mn/DOT Maintenance

Steve Lund
Mn/DOT Maintenance

Stephanie Malinoff
Center for Transportation Studies
University of Minnesota

Allen Milbradt
Mn/DOT District 4

Timothy Murphy
Mn/DOT Metro

Greg Ous
Mn/DOT Operations Division Administration

Mark Panek
Mn/DOT District 6

Jeff Perkins
Mn/DOT District 4

Norm Plasch
Mn/DOT Engineering Services Administration

Mark Pribula
Mn/DOT Metro

Cal Puttbrese
Mn/DOT District 3

Paul Rasmussen
Mn/DOT District 8

Tom Ravn
Mn/DOT Construction and Innovative Contracting

David Redig
Mn/DOT District 6

Gordy Regenscheid
Mn/DOT District 7

Matt Rottermond
Mn/DOT TH 169 St. Peter Design-Build Manager

Gust Scharffbillig
Mn/DOT Metro

Bruce Schlueter
Mn/DOT District 8

Mark Schoenfelder
Mn/DOT District 6

Tom Sorel
Mn/DOT Commissioner

Dwayne Stenlund
Mn/DOT Environmental Services

Patti Strohmayer
Mn/DOT Technical Support

Mike Tardy
Mn/DOT District 1

Brett Troyer
Mn/DOT Office of Environmental Services

Jeffrey Vlaminck
Mn/DOT District 6

Todd Vonasek
Mn/DOT District 2

Mark Waisanen
Mn/DOT District 4

Jean Wallace
Mn/DOT Project Scope and Cost Management

Teresa Washington
Continuing Professional Education
University of Minnesota

Robert Williams
Mn/DOT District 7

Seth Yliniemi
Mn/DOT District 4

Charleen Zimmer
Zan Associates

Tom Zimmerman
Mn/DOT Maintenance

Terry Zoller
Mn/DOT Metro

Appendix B: Advisory Group and Planning Team Members

Advisory Group

Mike Barnes	Mn/DOT Engineering Services Division Director
Scott Bradley	Mn/DOT Director of Context Sensitive Solutions
Bev Farraher	Mn/DOT Metro District Maintenance Engineer
Brian Hogge	FHWA MN Division Programs Team Leader
Steve Lund	Mn/DOT Office of Maintenance Director
Greg Ous	Mn/DOT Operations Division Asst. Director
Jeff Perkins	Mn/DOT District 4 Operations Manager
Cal Puttbrese	Mn/DOT District 3 Asst. District Engineer for Construction
Tom Ravn	Mn/DOT Office of Construction & Innovative Contracting Director
Gordy Regenscheid	Mn/DOT District 7 Asst. District Engineer for Maintenance
Dave Solsrud	Mn/DOT District 8 Asst. District Engineer for Field Operations
Mike Tardy	Mn/DOT District 1 Asst. District Engineer for Program Delivery
Terry Zoller	Mn/DOT Metro District Construction Engineer

Support Team

Norm Plasch	Mn/DOT Engineering Services Division Training Coordinator
Jim Grothaus	Contractor, U of M Center for Transportation Studies
Kaydee Kirk	Contractor, U of M Center for Transportation Studies
Stephanie Malinoff	Contractor, U of M Center for Transportation Studies
Lori Graven	Contractor, U of M Continuing Education
Jack Broz	Subcontractor, H.R. Green Co. Transportation Group Leader
Charleen Zimmer	Subcontractor, ZAN Associates President

Appendix C: Post-Forum Evaluation

Participants completed a post-forum evaluation, including a list of their top CSS priorities.

Number of responses: 18

1. What did you like about today's forum?

- The cross-section of different departments
- The dynamics of group make-up, discussion topics, and opportunities, commissioner support
- Some good discussions on CSS including some good success stories
- Good facility, good program
- Stop it earlier – some have to drive home
- Case studies – examples of CSS techniques used on construction projects
- The group sessions
- It was interesting to learn about CSS at Mn/DOT – as a student, I have learned about these practices and hope that changes will be made over the next couple of years because it is so important
- Hearing from all Minnesota of Mn/DOT, and the ability to complain and be heard
- Open conversation/discussion – break out groups
- Informative, different look – if we could implement just a few
- Sharing information in breakouts
- Panel case studies and breakout sessions
- Good presentations or representation projects. Lunch was good too!
- Good discussion
- Breakout group input – balance between case studies an breakout groups was great
- Breakout sessions. Feedback and shared information
- Opening

2. What were the most valuable aspects of the forum?

- Breakouts
- Panel discussions
- Hearing what others are doing
- Discussion about techniques used and maintenance communication concerns
- To get the overall program goals from the commissioner
- Discussion sessions – able to learn more about how construction and maintenance work together
- Discussion with the group
- Weakness: did not show challenges and barriers in prepared presentation
- The opener for construction communicating with maintenance
- Small group discussions
- Sharing of info in break-outs
- Panel case studies and breakout sessions
- Discussion and information exchange between small groups
- New ideas for CSS
- Variety of backgrounds of attendees led to a balanced discussion
- Networking with Mn/DOT staff to understand issues to make my job easier and develop better solutions
- Networking

3. What would you like to see as your top three CSS priorities for Construction, Operations, and Maintenance?

- Involve maintenance (input) in projects at an earlier stage and throughout the project
- Management complete and report back on at least one issue
- The reality of projects (i.e. use rivets to match hypothetical bridge)
- Improved internal communication
- Emphasis on what we can do to consider CSS principles in construction
- Communication, communication, communication
- Better communication within the department
- Consistent external communication plans
- More involvement with contractors
- A manual for a completed project
- More communication
- Public concern on projects
- Enough money
- Real maintenance plan which people have described
- Creation of solutions = details, narrative and environmental constructability
- Documentation
- & M manual – with expectation of partners
- Recognize the costs of CSS to maintenance and operating budgets
- More communication/coordination with maintenance
- Sustainable approach to CSS must be emphasized
- Flexibility in design standards
- Better communication with handoff from construction to maintenance
- Holding contractors responsible before a project is closed out for the punch list
- Incorporating CSS principles into all applicable Mn/DOT training
- Early communication between construction and design
- How to convert the three priorities to everyday operation
- Constructability in design – temp issues
- Walk there with maintenance in construction projects before contractor is off the project. Punch list
- Maintenance plows in permanent features

4. Are you interested in participating in future CSS training?

- Neil Hjelmeland
- Keith Kearney
- Dave Redig
- Tiana C. Carretta
- Dwayne Stenlund – Barriers & Benefits
- Patti Strohmayer
- Brett Troyer

5. Do you have any additional comments, thoughts, or feedback?

- Yes, will e-mail Scott
- Clearly more discussions are needed
- Guest to have all parts of the organization work together
- Maybe for training for CSS implementation, the speaker from Detroit Lakes (who spoke about Business Liaison) may be a great CSS trainer because he has had so much prior experience
- Define reality of low, medium, and high maintenance as-built infrastructure

- Need environmental guidance manual
- ASAP implement something from this day! Makes it not seem like a waste
- Project examples in the morning not very effective
- Had lots of input at breakout sessions

Appendix D: Advisory Group Follow-Up

Advisory Group members met on August 5, 2010, at the Mn/DOT Training and Conference Center to review the forum and discuss next steps. Scott Bradley, Mn/DOT Director of Context Sensitive Solutions, chaired the meeting.

Reflections on the forum

Advisory group members each shared their perceptions of the June 29 event.

Key perceptions:

- Use this forum to *do something*.
- Implement CSS through the planning/design/build process
- CSS is difficult to implement. There's a sense that people feel it's being rammed down their throats.
- There is still some confusion about what CSS is and what it entails. Mn/DOT still needs to do a better job explaining the benefits of it.
- Breakout sessions were a real eye opener, especially the number of participants who didn't really understand the purpose of CSS.
- There were lots of people who weren't on board with CSS. Some of them in key decision-making roles.
- Construction folks are really struggling with CSS. Some of the bridge participants stood out.
- Mn/DOT has done a good job integrating CSS into design.
- A lot of participants voiced concerned about the cost of implementing CSS.
- The results of the electronic polling were surprising. Some participants seemed to respond in a way that was politically correct. [Jim suggested that having participants sign out their clickers at the beginning made people feels as if their responses would be identified.]
- Mn/DOT is moving in the right direction with CSS. Don't want to see it dropped but maintenance has to be taken into consideration.
- When decisions are made, everyone who needs to be at the table should be there.
- CSS activities could be more coordinated.
- The term CSS is new and it will take more time and experience for everyone to get up to speed.
- Nationally, sustainability is the term being used. There needs to be more explanation of how those two terms are used and what they mean.
- People appreciated the opportunity to talk.
- There was a lot of frustration and many comments about how, with the resources currently available, people could barely accomplish the basics.
- Participants said they felt a lot of time constraints. Everything was "push, push, push." It made it difficult to address things that were talked about in the construction process.
- Case studies were a good way to illustrate CSS.
- People think this is so much extra work, but if they understood it better, if we worked on it prior to construction, it would actually save time.
- If CSS were incorporated into daily practice it would have the opposite effect of what people fear.
- CSS can produce a lot of efficiencies
- How do you change the frame of mind, especially in construction?
- It's one thing to hear about it, but there's a piece of it that comes from experience.
- Part of the challenge is to get folks more comfortable with CSS through experience and building some successes.

- There's a problem with silos, not only by group but by district. How can we communicate better across districts?
- One of the things that is limiting is everybody is up to their eyeballs in work.
- Communication is one of the last things you do.
- How does communication get out? It starts with project managers. Ultimately it has to flow down to all the people working on a project.
- Need to find a way to reach out to contractors and contractors' staff. They are the people in the field.
- Don't see much opposition to the concept (in clicker data). That's a positive sign.
- Difficult for different parts of the process to understand each other's roles and responsibilities.
- Clicker questions 17& 18. I knew it was true, but I didn't know it was that true.
- Clicker questions 17& 18 struck me over the head the most. That's a significant problem and we have to deal with it. If we are making commitments and people in CO&M are unaware of it, it's important for us to address.

Additional discussion

The advisory group briefly discussed the draft report. There were no specific changes, although there was some discussion that members should review the executive statement to make sure it included all the points they wanted raised.

- The committee discussed the clicker data and what other questions and responses were notable.
  - No. 28 Flexibility in design
  - No. 12 Flexibility in contracting
- The group discussed the role of project managers.
- The group discussed how the three Mn/DOT management groups should meet to discuss CSS regularly.

Next steps

Finalize the survey and distribute.
Include survey results in final forum report.
Committee should meet again to decide how to proceed next. This might involve a different committee with some different participants.

Appendix E: Context Sensitive Solutions Fact Sheet

Context Sensitive Solutions

Context Sensitive Solutions (CSS) is a principle-based and benefit-driven way of doing business that supports Mn/DOT's Vision and Strategic Plan as a "Flagship Initiative".

CSS is about accountability and responsiveness in building relationships and trust with stakeholders and the public to improve processes, outcomes and cost-effectiveness. CSS also creates opportunities to accomplish more with less through collaborative alliances and partnerships. A CSS approach uses early and ongoing public and stakeholder involvement to help identify and resolve problems and value conflicts before they cause costly process and project conflicts, delays and rework cycles. Avoidance of delays and rework cycles contributes to process streamlining and overall time savings and improvements in agency cost-effectiveness. A CSS approach relies upon broadly informed innovation and flexibility in planning, design, construction, operations and maintenance decision-making to balance competing objectives with right-sized solutions that optimize benefit to cost ratios and return upon investments.

CSS Initiative Background

In 1999, the Federal Highway Administration designated Mn/DOT as one of five pilot states to help advance institutionalization of a context sensitive design approach in transportation ... the nationally advocated philosophy and body of principles is now referred to as Context Sensitive Solutions or CSS. Mn/DOT is a widely recognized leader in CSS and has been a partner to many nationally known and award-winning projects and efforts that have demonstrated the benefits of applying CSS philosophy and principles. Mn/DOT further recognizes that the philosophy and principles of CSS serve as a business model and should be taken to a higher level of integration in agency decision-making, planning, programmatic, project development, design, construction, operations and maintenance activities to further maximize value-added benefits and cost effectiveness for the agency and its customers.

The Business Case for Further Integration of CSS

- Improved customer and stakeholder relationships (building confidence and trust)
- Improved efficiency and performance (reducing costly delays and rework cycles)
- Improved ability to balance competing objectives within constrained budgets (optimizing benefit to cost ratios with broadly informed flexibility and innovation)
- Reduced costs of doing business (finding collaborative and right-sized solutions)
- More than 20 desired agency and user benefits (correlated by research)

June 2010

Definition:

CSS is a collaborative, interdisciplinary approach that involves all stakeholders in providing a transportation facility that fits its setting and leads to preserving and enhancing scenic, aesthetic, historic, community and environmental resources while also improving or maintaining safety, mobility and infrastructure conditions.

For More Information Contact:

Scott Bradley
Director of Context Sensitive Solutions
651-366-3302
651-334-8045
scott.bradley@state.mn.us

CSS Core Strategies (4 from 2007 FHWA / AASHTO CSS action planning)

- Strive towards a shared stakeholder vision to provide a basis for decisions
- Demonstrate a comprehensive understanding of contexts
- Foster continuing communication and collaboration to achieve consensus
- Exercise flexibility and creativity to shape effective transportation solutions while preserving and enhancing community and natural environments

CSS Principles (15 paraphrased 1998 principles referenced in SAFETEA-LU)

- Use interdisciplinary teams
- Involve your stakeholders
- Seek broad-based public involvement
- Use a full range of communication strategies
- Achieve consensus on purpose and need
- Address alternatives and all transportation modes
- Seek safe facilities for communities and all users
- Maintain environmental harmony
- Address community and social issues
- Address aesthetic concerns and integrations
- Use a full range of design choices and flexibility
- Document project decisions
- Track and meet all commitments
- Use agency resources effectively
- Create lasting value for communities and the public

CSS Benefits (22 from NCHRP Report 642 - Quantifying the Benefits of CSS)

- Improved predictability of project delivery
- Improved project scoping and budgeting
- Improved long-term decisions and investments
- Improved environmental stewardship
- Optimized maintenance and operations
- Increased risk management and liability protection
- Improved stakeholder and public feedback
- Increased stakeholder and public participation, ownership and trust
- Decreased costs for overall project delivery
- Decreased time for overall project delivery
- Increased partnering opportunities
- Minimized impact to human and natural environment
- Improved mobility for users
- Improved walk-ability and bike-ability
- Improved safety (vehicular, pedestrian, bicyclist)
- Improved multi-modal options (including transit)
- Improved community satisfaction
- Improved quality of life for communities
- Improved speed management
- Design features appropriate to context
- Minimized construction related disruption
- Improved opportunities for economic development

Appendix F: Participant Survey Results

Summary of Survey Results

This is a summary of a survey of participants who attended a Mn/DOT forum on Context Sensitive Solutions (CSS) in Construction, Operations, and Maintenance on June 29, 2010. Participants were asked during the forum to propose actions that might improve CSS in construction, operations, and maintenance. The purpose of this survey was to assist in establishing priorities among the many actions that were suggested. The full survey results begin on page F-16.

Thirty-six people completed the survey, nearly two-thirds (64%) of them working in maintenance and construction, and 61% of them located in districts outside the Twin Cities.

1. The top five ranked priorities for improving internal communications were:

- Involve construction and maintenance staff in pre-construction meetings so they understand commitments. (One respondent commented that construction and maintenance staff need to help determine which commitments are made, to avoid committing to projects that are unrealistic in the field.)
- Integrate construction staff in systematic design review meetings.
- Manage effective knowledge transfer from cradle to grave through the project development process.
- Document all commitments and everything that leads to choices considered and decisions made. (One comment was that the agreements need to be understandable to maintenance personnel.)
- Institutionalize post-construction communications between construction and maintenance representatives and other internal stakeholders to determine lessons learned.

2. The top two ranked priorities for improving external communications were:

- Clearly communicate all expectations and requirements before entering into construction and maintenance agreements with cities and counties.
- Fully communicate the requirements, trade-offs, costs, and Mn/DOT's capabilities regarding facilities that we are involved in planning, designing, constructing, operating, and maintaining.

3. The top five ranked priority actions for improving construction contracting practices were:

- Build a best value approach into Mn/DOT design/bid/build projects.
- Establish guidelines for how and when to use incentives.
- Use more warranties as further reinforcement and incentive for better quality materials and work.
- Use a pre-qualification process for contract bidders.
- Use innovative contracting, A+B, to balance project issues and available resources.

4. The top five ranked priorities for improving the use of staff and financial resources were:

- Represent and consider full lifecycle costs (not only capital costs) and liabilities when evaluating alternatives and making decisions.
- Take long-term maintenance cost into account as well as existing design guidance when making design decisions.
- Use realistic timelines and schedules instead of backing into letting dates.
- Reduce or streamline paperwork, particularly for federal processes.
- Make commitments for construction and maintenance as part of the design and budgeting process.

5. Other actions participants thought Mn/DOT should consider to improve context sensitive solutions during construction included:

- "Construction staff needs to have earlier involvement in the design process. They need to understand the impacts the project will have on individuals and businesses and then they need to take proactive steps to minimize those impacts. When problems are encountered in the field that impact the public, construction staffs need to have the authority to deal with those issues decisively, with the costs to mitigate included in the project as part of the cost of doing business."
- "Open the dialogue and welcome opinions between construction and maintenance before, during, and after projects."
- "Have locals governments share in cost, either as construction costs or long-term maintenance. It requires them to understand and accept trade-offs."

6. The top three ranked priorities for improving internal communications related to CSS during operations and maintenance were:

- Hold operations and maintenance staff accountable for participating in earlier project development processes and meetings to identify and communicate issues and needs – integrate operations and maintenance staff into the planning and environmental review processes.
- Have construction managers meet with their maintenance supervisor to go over a final punch list to ensure contract is complete.
- Require walk-through between construction and maintenance.

One respondent commented that the biggest problem is not maintenance/construction; it is maintenance/design.

7. The top three ranked priorities for improving external communications related to CSS during operations and maintenance were:

Identify and communicate true maintenance and construction costs.

- Work strategically with political officials and communicate more effectively with political officials to refute misperceptions and build better understanding.
- Provide more information, guidance, and education related to maintenance for our local partners.

8. The top three ranked priorities for more effectively using staff resources during operations and maintenance were:

- Direct more focus, commitment, and resources at preventative maintenance and reducing deferred maintenance backlogs.
- Use and enforce more warranties to shift some responsibility over to the contractor while providing an incentive for better quality materials and performance.
- Require cities to have a maintenance plan when median plantings are provided.

Comments on this question:

- Ensuring a punch list review between construction and maintenance supervisors toward the conclusion of projects will help reduce the long-term maintenance costs.
- Who is going to referee the warranty game? It comes with a cost.

9. The top five ranked priorities for improving financial resources for operations and maintenance were:

- Develop a better approach for identifying and quantifying full lifecycle liabilities and costs (monetary and non-monetary) for evaluating alternatives and making decisions and investments.
- Establish a formula for required maintenance inputs (FTEs) if new lanes, miles, or infrastructure are added to the system.

- Establish a set-aside budget for maintenance and repair when projects are developed.
- Include people hours and equipment needs in maintenance plans.
- Require other state agencies to have a construction/maintenance/operations budget that covers their special requirements (for example, special rivets or special tuck point technique).

10. The top five ranked priorities for improving the delivery of maintenance and operations services were:

- Provide clear guidance on the definition of low, medium, and high maintenance.
- Develop and update maintenance or management guides or manuals with current "as-built" information to better guide preservation of assets and investments.
- Use maintenance-free or low-maintenance plantings to create efficiency (type of grass, etc.)
- Use GIS mapping of specialty systems along highways, including systems such as infiltration systems, drain tiles, etc., and provide computer access from truck cabs.
- Provide improved technology in truck cabs.

Comments on this question:

- None appear real useful.
- For medium- and high-maintenance items, require local maintenance.

11. Other actions participants thought Mn/DOT should consider to improve CSS in operations and maintenance were:

- "Who is going to do this development and implementing of this?"
- "Understand that any additional cost is difficult. While there are low-cost options, we need to change our cooperative agreement process so that local governments do not hold Mn/DOT hostage over context sensitive solutions and municipal agreement. Urban right of way and construction is extremely expensive and maintenance is difficult."

12. The top ranked potential CSS training topics were:

- CSS cross-training events between construction and maintenance
- Application and use of GPS data
- Quality-based contracting
- GIS training
- Estimating and pricing techniques
- ADA (balance of historic requirements)
- Enhancing public engagement

Additional comments on this question:

- Training to help design, construction, and maintenance staff learn to appreciate the unique skillset each area brings to the table and then help them to utilize those skills to serve the public in the development, construction, and maintenance of projects.
- Make the contractor solely responsible for meeting permit requirements — get Mn/DOT out of being a referee. This is currently out for review for the year starting 2013 — this is a huge deal.

13. Other training that participants thought was needed to improve CSS in construction, operations, and/or maintenance included:

- Project manager training
- General CSS awareness outreach for all employees

Survey on Context Sensitive Solutions (CSS) in Construction, Operation,

1. Introduction

On June 29, you were part of a Mn/DOT forum on Context Sensitive Solutions (CSS) in Construction, Operations and Maintenance. Participants were asked during the forum to propose actions that might improve CSS in construction, operations and maintenance. The purpose of this survey is to assist in establishing priorities among the many actions that were suggested. It is important that everyone who participated in the forum complete this survey. Please take the time to answer all of the following questions. There are four parts to the survey. The first part provides some basic information that will allow some cross-tab analysis of the survey results. The second part is about actions related to context sensitive solutions during construction. The third part is about actions related context sensitive solutions during operation and maintenance. The fourth part is about training needs.

Thank you for your participation in the forum and the survey. The results of the survey will be included in a report about the forum, which will be completed in the next several weeks. If you have any questions about the forum or the survey, please contact Scott Bradley at scott.bradley@dot.state.mn.us or 651-284-3758.

Survey on Context Sensitive Solutions (CSS) in Construction, Operation, and Maintenance

Which of the following best describes your day-to-day work?

	Response Percent	Response Count
System or corridor planning	2.8%	1
Preliminary or final design	11.1%	4
Construction	27.8%	10
Maintenance	**36.1%**	**13**
Day-to-day operations (e.g., traffic controls)	0.0%	0
Other	22.2%	8
answered question		**36**
skipped question		**0**

Survey on Context Sensitive Solutions (CSS) in Construction, Operation, and Maintenance

Where do you work in Mn/DOT?

	Response Percent	Response Count
Central Office	16.7%	6
Metro District	22.2%	8
Other Districts	**61.1%**	**22**
answered question		**36**
skipped question		**0**

Rank your top five (5) priorities for improving internal communications; #1 indicates your top priority. You may write in additional actions and include them in your priorities.

	1	2	3	4	5	Rating Average	Response Count
Institutionalize post-construction communications between construction and maintenance representatives and other internal stakeholders to determine lessons learned.	15.8% (3)	15.8% (3)	**31.6% (6)**	10.5% (2)	26.3% (5)	3.16	19
Manage effective knowledge transfer from cradle to grave through the project development process.	25.0% (5)	**35.0% (7)**	30.0% (6)	0.0% (0)	10.0% (2)	2.35	20
Involve construction and maintenance staff in pre-construction meetings so they understand commitments.	**29.2% (7)**	20.8% (5)	16.7% (4)	20.8% (5)	12.5% (3)	2.67	24
Integrate construction staff in systematic design review meetings.	**33.3% (6)**	27.8% (5)	22.2% (4)	5.6% (1)	11.1% (2)	2.33	18
Prepare as-built data for construction, management, maintenance of the system.	0.0% (0)	25.0% (3)	**33.3% (4)**	**33.3% (4)**	8.3% (1)	3.25	12
Prepare an operator's manual for the completed project.	12.5% (1)	0.0% (0)	12.5% (1)	**37.5% (3)**	**37.5% (3)**	3.88	8
Document all commitments and everything that leads to choices considered and decisions made.	15.8% (3)	**31.6% (6)**	10.5% (2)	26.3% (5)	15.8% (3)	2.95	19
Follow-up with post-construction evaluations and document benefits, problems and lessons learned.	7.7% (1)	0.0% (0)	15.4% (2)	**38.5% (5)**	**38.5% (5)**	4.00	13
Add additional information to plan sheets (accessible routes, pedestrian zones, utility zones, storage areas, etc.)	14.3% (1)	14.3% (1)	0.0% (0)	14.3% (1)	**57.1% (4)**	3.86	7

Require contractors to develop a punch list and have operations and maintenance staff involved in walk-through to confirm that all responsibilities are met before the close-out of construction contracts.	22.2% (4)	11.1% (2)	16.7% (3)	**33.3% (6)**	16.7% (3)	3.11	18
Other action(s) (describe below)	**50.0% (1)**	0.0% (0)	0.0% (0)	0.0% (0)	**50.0% (1)**	3.00	2
						Please describe other action(s) to rank as priorities:	2
						answered question	**32**
						skipped question	**4**

Please describe other action(s) to rank as priorities:		
1	document external agreements in understandable form so maintenance understands responsibilities	Aug 27, 2010 6:24 PM
2	Involve construction and maintenance staff in pre-construction meetings, not so they can understand commitments, but rather so they can be involved in the development process and help determine what commitments should be made and which ones cannot be made. Being sure construction and maintenance staff "understand" commitments is not sufficient. Often times having them involved in the decision making process early on in the project development will help prevent commitments from being made that may sound like a good idea to a designer, but may not be realistic in the field.	Aug 30, 2010 11:07 PM

Survey on Context Sensitive Solutions (CSS) in Construction, Operation, and Maintenance

Rank your top two (2) priorities for improving external communications; #1 indicates your top priority. You may write in additional actions and include them in your priorities.

	1	2	Rating Average	Response Count
Hold an annual meeting (with documentation) with regulatory agencies (Bowser, SHPO, DNR, MPCA) to look ahead ten years.	18.2% (2)	**81.8% (9)**	1.82	11
Fully communicate the requirements, trade-offs, costs and Mn/DOT's capabilities regarding facilities that we are involved in planning, designing, constructing, operating and maintaining.	**59.1% (13)**	40.9% (9)	1.41	22
Clearly communicate all expectations and requirements before entering into construction and maintenance agreements with cities and counties.	**58.6% (17)**	41.4% (12)	1.41	29
Other action(s) (describe below)	**100.0% (1)**	0.0% (0)	1.00	1
			Please describe other action(s) to rank as priorities:	3
			answered question	**33**
			skipped question	**3**

Please describe other action(s) to rank as priorities:		
1	not sure if much would be gained by an annual meeting, but it would be interseting to see if the agencies think it would be helpful to look ahead	Aug 27, 2010 3:30 PM
2	Need a very proactive communication plan that covers several months before letting and continues thru construction.	Aug 27, 2010 6:35 PM
3	Include construction staff in project development meetings with the public and other agencies. Doing so will help ensure that the "how it will be built" will be discussed, rather than just the "what will be built". This is a critical element to ensure all parties understand what will happen between letting and final construction. It will also help poeple understand why some things have to be done a certain way in the field.	Aug 30, 2010 11:07 PM

Identify your top five (5) priority actions for improving construction contracting practices; #1 indicates your top priority. You may write in additional actions and include them in your priorities.

	1	2	3	4	5	Rating Average	Response Count
Establish a partner relationship between Mn/DOT and the contracting industry.	14.3% (2)	14.3% (2)	14.3% (2)	**28.6% (4)**	**28.6% (4)**	3.43	14
Build a best value approach into Mn/DOT design/bid/build projects.	**37.0% (10)**	11.1% (3)	18.5% (5)	14.8% (4)	18.5% (5)	2.67	27
Use a pre-qualification process for contract bidders.	27.8% (5)	**33.3% (6)**	11.1% (2)	27.8% (5)	0.0% (0)	2.39	18
Use “Construction Manager – Not At Risk” to provide construction reviews, let sub-packages of full plan set, and manage project schedule through construction.	7.7% (1)	15.4% (2)	30.8% (4)	7.7% (1)	**38.5% (5)**	3.54	13
Use incentives to expedite projects.	11.1% (1)	22.2% (2)	22.2% (2)	11.1% (1)	**33.3% (3)**	3.33	9
Establish guidelines for how and when to use incentives.	15.8% (3)	21.1% (4)	**26.3% (5)**	**26.3% (5)**	10.5% (2)	2.95	19
Use pre-bid meetings for all jobs with substantial amounts of work.	6.7% (1)	26.7% (4)	**33.3% (5)**	13.3% (2)	20.0% (3)	3.13	15
Use innovative contracting, A+B, to balance project issues and available resources.	16.7% (3)	16.7% (3)	**27.8% (5)**	**27.8% (5)**	11.1% (2)	3.00	18
Use more warranties as further reinforcement and incentive for better quality materials and work.	**28.6% (4)**	21.4% (3)	0.0% (0)	21.4% (3)	**28.6% (4)**	3.00	14
Other action(s) (describe below)	**100.0% (1)**	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	1.00	1
					Please describe other action(s) to rank as priorities:		1
					answered question		**31**
					skipped question		**5**

Please describe other action(s) to rank as priorities:		
1	Institute system where Mn/DOT's Construction Project Manager is involved earlier in the project design/development process. Construction Manager should then write project specifications to ensure project commitments are followed through and that realities of how to build the specific project are included in the specs.	Aug 30, 2010 11:07 PM

Identify your top five (5) priorities for improving the use of staff and financial resources; #1 indicates your top priority. You may write in additional actions and include them in your priorities.

	1	2	3	4	5	Rating Average	Response Count
Use realistic timelines and schedules instead of backing into letting dates.	24.0% (6)	28.0% (7)	4.0% (1)	12.0% (3)	**32.0% (8)**	3.00	25
Reduce or streamline paperwork, particularly for federal processes.	18.2% (4)	**22.7% (5)**	**22.7% (5)**	13.6% (3)	**22.7% (5)**	3.00	22
Allocate money ahead of time to address issue resolution during construction.	0.0% (0)	10.0% (1)	20.0% (2)	**50.0% (5)**	20.0% (2)	3.80	10
Make commitments for construction and maintenance as part of the design and budgeting process.	22.7% (5)	22.7% (5)	22.7% (5)	**27.3% (6)**	4.5% (1)	2.68	22
Represent and consider full lifecycle costs (not only capital costs) and liabilities when evaluating alternatives and making decisions.	**26.9% (7)**	**26.9% (7)**	**26.9% (7)**	15.4% (4)	3.8% (1)	2.42	26
Allow and encourage staff to responsibly assess, take and manage risks for improving processes, outcomes and success.	15.0% (3)	20.0% (4)	15.0% (3)	**25.0% (5)**	**25.0% (5)**	3.25	20
Take long-term maintenance cost into account as well as existing design guidance when making design decisions.	**30.8% (8)**	15.4% (4)	26.9% (7)	7.7% (2)	19.2% (5)	2.69	26
Other action(s) (describe below)	0.0% (0)	0.0% (0)	**100.0% (1)**	0.0% (0)	0.0% (0)	3.00	1
					Please describe other action(s) to rank as priorities:		1
					answered question		**33**
					skipped question		**3**

Please describe other action(s) to rank as priorities:		
1	make tack and temp. paint incidental to bituminous	Aug 30, 2010 8:00 PM

Survey on Context Sensitive Solutions (CSS) in Construction, Operation, and Maintenance

What other actions, if any, do you think Mn/DOT should consider to improve context sensitive solutions during construction?

	Response Count
	3
answered question	3
skipped question	33

	Response Text	
1	have locals governments share in cost, either as construction cost or long term maintenance. If requires them to undertand and accept trade offs.	Aug 27, 2010 6:24 PM
2	Open the dialogue and welcome opinions between Const. and Maint. before, during and after projects.	Aug 30, 2010 12:34 PM
3	Construction staff needs to have earlier involvement in the design process. They need to understand the impacts the project will have on individuals and businesses and then they need to take proactive steps to minimize those impacts. When problems are encountered in the field that impact the public, construction staffs need to have the authority to deal with those issues decisively with the costs to mitigate included in the project as part of the cost of doing business.	Aug 30, 2010 11:07 PM

Survey on Context Sensitive Solutions (CSS) in Construction, Operation, and Maintenance

Rank your top three (3) priorities for improving internal communications related to context sensitive solutions during operations and maintenance; #1 indicates your top priority. You may write in additional actions and include them in your priorities.

	1	2	3	Rating Average	Response Count
Hold operations and maintenance staff accountable for participating in earlier project development processes and meetings to identify and communicate issues and needs – integrate operations and maintenance staff into the planning and environmental review processes.	**44.0% (11)**	40.0% (10)	16.0% (4)	1.72	25
Have construction managers meet with their maintenance supervisor to go over a final punch list to ensure contract is complete.	**40.0% (10)**	32.0% (8)	28.0% (7)	1.88	25
Have construction staff give weekly updates to maintenance staff on projects.	16.7% (1)	16.7% (1)	**66.7% (4)**	2.50	6
Require walk-through between construction and maintenance.	28.0% (7)	**40.0% (10)**	32.0% (8)	2.04	25
Use internal newsletters and e-newsletters.	0.0% (0)	0.0% (0)	**100.0% (5)**	3.00	5
Other action(s) (describe below)	0.0% (0)	0.0% (0)	0.0% (0)	0.00	0
			Please describe other action(s) to rank as priorities:		1
				answered question	**30**
				skipped question	**6**

Please describe other action(s) to rank as priorities:		
1	the biggest proiblem is not maint. /const. it is maint./design	Aug 30, 2010 8:15 PM

Survey on Context Sensitive Solutions (CSS) in Construction, Operation, and Maintenance

Identify your top three (3) priorities for improving external communications related to context sensitive solutions during operations and maintenance; #1 indicates your top priority. You may write in additional actions and include them in your priorities.

	1	2	3	Rating Average	Response Count
Involve maintenance staff in public meetings.	40.0% (4)	10.0% (1)	**50.0% (5)**	2.10	10
Provide a message to the public about maintenance/operations costs outside of snow and ice control (including maintenance for sound walls, guardrail, cable barriers, etc.)	25.0% (4)	**37.5% (6)**	**37.5% (6)**	2.13	16
Identify and communicate true maintenance and construction costs.	**45.8% (11)**	25.0% (6)	29.2% (7)	1.83	24
Work strategically with political officials and communicate more effectively with political officials to refute misperceptions and build better understanding.	28.6% (6)	**52.4% (11)**	19.0% (4)	1.90	21
Provide more information, guidance and education related to maintenance for our local partners.	29.4% (5)	29.4% (5)	**41.2% (7)**	2.12	17
Other action(s) (describe below)	0.0% (0)	0.0% (0)	0.0% (0)	0.00	0
			Please describe other action(s) to rank as priorities:		0
			answered question		**30**
			skipped question		**6**

Survey on Context Sensitive Solutions (CSS) in Construction, Operation, and Maintenance

Identify your top three (3) priorities for more effectively using staff resources during operations and maintenance; #1 indicates your top priority. You may write in additional actions and include them in your priorities.

	1	2	3	Rating Average	Response Count
Use technicians to do GPS mapping, hydraulics, permitting issues, etc.	**36.4% (4)**	**36.4% (4)**	27.3% (3)	1.91	11
Use and enforce more warranties to shift some responsibility over to the contractor while providing an incentive for better quality materials and performance.	**42.1% (8)**	31.6% (6)	26.3% (5)	1.84	19
Direct more focus, commitment and resources at preventative maintenance and reducing deferred maintenance backlogs.	**52.0% (13)**	28.0% (7)	20.0% (5)	1.68	25
Require cities to have a maintenance plan when median plantings are provided.	21.1% (4)	**42.1% (8)**	36.8% (7)	2.16	19
Use community groups or volunteer organizations for maintenance (but be aware of potential risks).	12.5% (1)	37.5% (3)	**50.0% (4)**	2.38	8
Other action(s) (describe below)	0.0% (0)	**100.0% (1)**	0.0% (0)	2.00	1
			Please describe other action(s) to rank as priorities:		2
				answered question	**30**
				skipped question	**6**

Identify your top five (5) priorities for improving financial resources for operations and maintenance; #1 indicates your top priority. You may write in additional actions and include them in your priorities.

	1	2	3	4	5	Rating Average	Response Count
Develop a better approach for identifying and quantifying full life cycle liabilities and costs (monetary and non-monetary) for evaluating alternatives and making decisions and investments.	**62.5% (15)**	25.0% (6)	4.2% (1)	4.2% (1)	4.2% (1)	1.63	24
Require other state agencies to have a construction/maintenance/operations budget that covers their special requirements (for example, special rivets or special tuck point technique).	5.6% (1)	**27.8% (5)**	16.7% (3)	22.2% (4)	**27.8% (5)**	3.39	18
Include people hours and equipment needs in maintenance plans.	5.3% (1)	5.3% (1)	**42.1% (8)**	36.8% (7)	10.5% (2)	3.42	19
Establish a set-aside budget for maintenance and repair when projects are developed.	15.8% (3)	5.3% (1)	**42.1% (8)**	21.1% (4)	15.8% (3)	3.16	19
Establish a formula for required maintenance inputs (FTEs) if new lanes, miles or infrastructure are added to the system.	26.3% (5)	**31.6% (6)**	10.5% (2)	15.8% (3)	15.8% (3)	2.63	19
Revisit the different pots of money (construction versus maintenance) – need flexibility to address all needs.	5.9% (1)	**35.3% (6)**	11.8% (2)	17.6% (3)	29.4% (5)	3.29	17
Negotiate caps on agreements/contracts.	8.3% (1)	16.7% (2)	16.7% (2)	25.0% (3)	**33.3% (4)**	3.58	12
Other action(s) (describe below)	**50.0% (1)**	0.0% (0)	0.0% (0)	0.0% (0)	**50.0% (1)**	3.00	2
					Please describe other action(s) to rank as priorities:		2
						answered question	**29**
						skipped question	**7**

Please describe other action(s) to rank as priorities:		
1	Again, we need to get partners to have some responsibility for the costs associated with the options.	Aug 27, 2010 6:30 PM
2	Improving the communication between constructin and maintenance staff is the single most effective way to reduce maintenance costs on specific projects.	Aug 30, 2010 11:21 PM

Survey on Context Sensitive Solutions (CSS) in Construction, Operation, and Maintenance

Identify your top five (5) priorities for improving the delivery of maintenance and operations services; #1 indicates your top priority. You may write in additional actions and include them in your priorities.

	1	2	3	4	5	Rating Average	Response Count
Provide clear guidance on the definition of low, medium and high maintenance.	**45.0% (9)**	10.0% (2)	15.0% (3)	10.0% (2)	20.0% (4)	2.50	20
Revisit SHPO clearance requirements.	**25.0% (2)**	**25.0% (2)**	0.0% (0)	**25.0% (2)**	**25.0% (2)**	3.00	8
Develop and update maintenance or management guides or manuals with current "as-built" information to better guide preservation of assets and investments.	23.8% (5)	**42.9% (9)**	23.8% (5)	4.8% (1)	4.8% (1)	2.24	21
Use maintenance-free or low-maintenance plantings to create efficiency (type of grass, etc.)	11.5% (3)	11.5% (3)	23.1% (6)	**42.3% (11)**	11.5% (3)	3.31	26
Provide improved technology in truck cabs.	25.0% (4)	12.5% (2)	25.0% (4)	6.3% (1)	**31.3% (5)**	3.06	16
Use GIS mapping of specialty systems along highways, including systems such as infiltration systems, drain tiles, etc. and provide computer access from truck cabs.	12.5% (3)	**29.2% (7)**	25.0% (6)	**29.2% (7)**	4.2% (1)	2.83	24
Establish better warrants for pedestrian signals and connecting crosswalks/sidewalks.	14.3% (1)	14.3% (1)	14.3% (1)	0.0% (0)	**57.1% (4)**	3.71	7
Other action(s) (describe below)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	**100.0% (1)**	5.00	1
						Please describe other action(s) to rank as priorities:	2
						answered question	**28**
						skipped question	**8**

Please describe other action(s) to rank as priorities:		
1	for medium and high mainteance items require local maintenance	Aug 27, 2010 6:30 PM
2	None appear real useful.	Aug 30, 2010 11:21 PM

Survey on Context Sensitive Solutions (CSS) in Construction, Operation, and Maintenance

What other actions, if any, do you think Mn/DOT should consider to improve context sensitive solutions in operations and maintenance?

	Response Count
	2
answered question	**2**
skipped question	**34**

	Response Text	
1	Understand that any additional cost is difficult. While there are low cost options we need to change our cooperative agreement process so that local governments do not hold MnDOT hostage over Context sensative solutions and municipal agreement. Urban right of way and construction is extremely expensive and maintenance is difficult.	Aug 27, 2010 6:30 PM
2	who is going to do this development and implementing of this?	Aug 30, 2010 8:15 PM

Survey on Context Sensitive Solutions (CSS) in Construction, Operation, and Maintenance

Please review the following potential CSS training topics and identify the top five (5) topics that would be most important to your individual training needs, with #1 being the most important. You may write in additional topics and including them in your priority ranking.

	1	2	3	4	5	Rating Average	Response Count
ADA (balance of historic requirements)	22.2% (2)	**33.3% (3)**	0.0% (0)	22.2% (2)	22.2% (2)	2.89	9
Application and use of GPS data	**30.0% (3)**	20.0% (2)	10.0% (1)	**30.0% (3)**	10.0% (1)	2.70	10
Conflict management training	12.5% (1)	**37.5% (3)**	0.0% (0)	12.5% (1)	**37.5% (3)**	3.25	8
CSS cross training events between construction and maintenance	30.0% (3)	**50.0% (5)**	0.0% (0)	20.0% (2)	0.0% (0)	2.10	10
Emotional intelligence	0.0% (0)	**50.0% (1)**	**50.0% (1)**	0.0% (0)	0.0% (0)	2.50	2
Enhancing public engagement	**50.0% (4)**	0.0% (0)	0.0% (0)	**50.0% (4)**	0.0% (0)	2.50	8
Environmental constructability techniques	0.0% (0)	**37.5% (3)**	25.0% (2)	12.5% (1)	25.0% (2)	3.25	8
Erosion control	0.0% (0)	16.7% (1)	**50.0% (3)**	0.0% (0)	33.3% (2)	3.50	6
Estimating and pricing techniques	0.0% (0)	10.0% (1)	20.0% (2)	30.0% (3)	**40.0% (4)**	4.00	10
GIS training	0.0% (0)	20.0% (2)	**30.0% (3)**	20.0% (2)	**30.0% (3)**	3.60	10
Hydraulics systems (including train the trainer)	**100.0% (2)**	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	1.00	2
Leadership training	**42.9% (3)**	14.3% (1)	14.3% (1)	28.6% (2)	0.0% (0)	2.29	7
New technologies	**50.0% (4)**	25.0% (2)	0.0% (0)	12.5% (1)	12.5% (1)	2.13	8
Operations and maintenance of safety systems	0.0% (0)	0.0% (0)	**62.5% (5)**	12.5% (1)	25.0% (2)	3.63	8
Pedestrians and bikes	0.0% (0)	25.0% (1)	**50.0% (2)**	25.0% (1)	0.0% (0)	3.00	4
Quality guidelines	0.0% (0)	20.0% (1)	20.0% (1)	**60.0% (3)**	0.0% (0)	3.40	5
Quality-based contracting	**40.0% (4)**	10.0% (1)	0.0% (0)	10.0% (1)	**40.0% (4)**	3.00	10

Site plan process	0.0% (0)	0.0% (0)	**100.0% (4)**	0.0% (0)	0.0% (0)	3.00	4
Specialized training for inspectors of safety systems	**25.0% (1)**	**25.0% (1)**	0.0% (0)	**25.0% (1)**	**25.0% (1)**	3.00	4
					Other (please specify)		2
					answered question		**28**
					skipped question		**8**

Other (please specify)		
1	make the contractor soley responsibal for meeting permit requirements - get mn/dot out of being a referee -this is currently out for review for the year starting 2013 = this is a huge deal	Aug 30, 2010 8:21 PM
2	Training to help design, construction and maintenance staff learn to appreciate the unique skillset each area brings to the table and then help them to utilize those skills to serve the public in the development, construction and maintenance of projects.	Aug 30, 2010 11:23 PM

Survey on Context Sensitive Solutions (CSS) in Construction, Operation, and Maintenance

What other training, if any, do you think is needed to improve CSS in construction, operations and/or maintenance?

	Response Count
	2
answered question	**2**
skipped question	**34**

	Response Text	
1	Offer general CSS awareness outreach to all employees...	Aug 27, 2010 4:59 PM
2	Project Manager Training	Aug 30, 2010 11:23 PM