Context Sensitive Solutions: Paving the way for better transportation

Whether we are navigating rush hour traffic on our journey to work or picking up a carton of milk on our way home, transportation is a part of our everyday lives. Our highways and streets facilitate the delivery of goods and services we depend upon daily. Interstate freeways traverse our nation connecting centers of commerce and providing an efficient system for transporting wares from one location to another. In addition to their economic importance, transportation facilities allow us to actively participate in community life. From the charming downtown streetscape to the emergency evacuation route, transportation facilities serve a myriad of needs, each within their own unique context.

Context Sensitive Solutions (CSS), a relatively new approach to planning and designing transportation projects, emerged in the 1990s. The Federal Highway Administration (FHWA) defines CSS as a “collaborative, interdisciplinary approach that involves all stakeholders to develop a transportation facility that fits its physical setting and preserves scenic, aesthetic, historic, and environmental resources, while maintaining safety and mobility.” CSS is responsive to the values the public places on aesthetics, cultural resources, and natural landscapes. As populations have grown and the number of bigger and faster vehicles has increased, safety has also become an important public value. For those who do not drive, accessible public transportation is critical to maintaining quality of life. Clearly, CSS has an important role to play in meeting today’s complex transportation challenges!

A powder-coated guardrail along the M-119 Scenic Heritage Route blends with the natural landscape.

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CSS Principles

CONTEXT SENSITIVE SOLUTIONS:

• Incorporate early and continuous public involvement, consistent with project scope;
• Utilize effective decision making;
• Reflect community values;
• Achieve environmental sensitivity and stewardship;
• Ensure safe and feasible integrated solutions; and
• Protect scenic resources and achieve aesthetically pleasing solutions.

MDOT’s CSS initiative

Following the recommendations of the Michigan Land Use Leadership Council’s (MLULC) final report in December 2003, Governor Jennifer M. Granholm issued an Executive Directive requiring the Michigan Department of Transportation (MDOT) to incorporate CSS into its transportation projects whenever feasible. Soon after, MDOT established an internal interdisciplinary team to develop a strategy to institutionalize CSS. One of the team’s first tasks was to craft a CSS policy. To achieve this goal, the team actively solicited input from a broad range of more than 60 stakeholder groups. Stakeholders shared their ideas and opinions for MDOT’s new policy by participating in workshops and focus group sessions. The new policy was approved by the State Transportation Commission on May 26, 2005. A CSS manual is being developed and an implementation plan will soon follow. Training will be an important element of MDOT’s CSS initiative. In addition to training its own staff, MDOT plans to expand its educational program to include consultants and local agencies that perform contract services for the department.

Context Sensitive Solutions were familiar to MDOT prior to the governor’s Executive Directive. For example, larger-scale projects requiring Environmental Impact Statements or Environmental Assessments under the National Environmental Policy Act (NEPA) follow CSS principles to engage in sound decision making with efforts to blend projects into the environment. The Transportation Enhancement Program, a federally-funded initiative dedicated to improved roadside conditions, has helped MDOT address scenic, aesthetic, non-motorized, historic, and water quality project aspects. In 2000, the State Transportation Commission approved an aesthetics policy that has resulted in many examples of aesthetically-oriented bridge and highway treatments.

MDOT also maintains a decentralized organization with 26 Transportation Service Centers (TSCs) located throughout the state. These TSCs help MDOT gain a better understanding of local interests, foster more frequent interaction between staff and local governments, and have improved overall stakeholder interaction in project development. With the MDOT stage set for Context Sensitive Solutions, the governor’s Executive Directive lends impetus to further program improvements.

Defining context

The first step in the CSS process is to define the physical and social context of the project. Defining the context of a project is critical to focusing or targeting areas needing special attention. Is the project area urban or rural? Does the landscape have unique, natural, built, or potentially historic features? What purpose does the roadway serve? Different types of roads serve different purposes and may require different solutions. Local streets, for example, accommodate a mix of transportation modes including walking and cycling, while a limited access freeway caters only to high speed vehicular traffic. Accurately defining the context, including the setting and road type, help transportation agencies develop solutions that provide safe, functional solutions, while maintaining the unique character of a community or landscape.

The importance of stakeholders

The CSS process requires early and continuous dialogue with community members and other interested parties to identify common interests and build consensus. Partnering with communities, advocacy organizations, state agencies, and other interested parties early in the planning and design phase is essential to successful project development. Early stakeholder engagement allows individuals and groups to identify community needs and potential transportation problems and solutions, as well as the characteristics that contribute to the uniqueness of a built or natural landscape. It also provides MDOT with the opportunity to explain the purpose

Stakeholder ID

To help identify stakeholder groups impacted by a project, begin by developing a list of potential issues and concerns.

<table>
<thead>
<tr>
<th>Potential Concern</th>
<th>Stakeholder Group</th>
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<td>maintaining emergency access</td>
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<td>access, pedestrians</td>
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<td>preserving capacity</td>
<td>local/state department of transportation</td>
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<td>aesthetics</td>
<td>residents, city officials, neighborhood groups</td>
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<tr>
<td>compatible land use</td>
<td>resource agencies, city, township, county government</td>
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<tr>
<td>public transportation</td>
<td>public transit agencies and advocates</td>
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<td>non-motorized access</td>
<td>bike clubs, schools</td>
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and scope of a proposed project. In addition, stakeholder participation may lead to win-win partnerships that facilitate cost sharing for some aspects of the project or result in agreements to manage maintenance activities once the project is complete. Time spent engaging stakeholders at the beginning of the planning process can facilitate smoother project implementation and avoid costly redesign efforts. By gaining an understanding of community needs early in the process, CSS may actually save time and money!

Identifying stakeholders

Think of stakeholders as anyone with a possible interest, whether direct or indirect, in the outcome of the project. Some groups, such as city officials, local planning agencies, and county road commissions have an obvious vested interest in transportation projects and are relatively easy to identify. But, because city and local officials may not represent the full spectrum of public opinion, a genuine effort must be made to involve stakeholder groups who may be less apparent. Local business associations, non-profit organizations, historical societies, and religious groups may have concerns about the social and economic impact. Conservation organizations, watershed groups, and “Friends of” groups may be interested in the potential environmental impact. Some stakeholder groups, such as bicycle enthusiasts, may hold ardent positions on multiple issues such as non-motorized transportation, safety, and fitness.

One of the first steps to identifying stakeholders is to evaluate potential issues or concerns associated with the proposed project. Preparing a list of potential issues, along with a list of groups or individuals who may be affected by the project, can be helpful. Keep in mind both positive and negative project consequences, as well as the direct and indirect outcome that may occur. Once

M-69 Paint River bridge rehabilitation in Crystal Falls

Built in 1924, the Paint River bridge is the only non-redundant open spandrel concrete arch bridge in Michigan. Rehabilitation measures included deck replacement, replacement of the spandrel columns, substructure repair, approach work, and sidewalk replacement on both sides.

Public engagement was crucial to the success of the bridge rehabilitation. In addition to meetings with the city of Crystal Falls and the State Historic Preservation Office, a public meeting was held to obtain input for the project. MDOT staff addressed concerns related to aesthetics, safety, the detour route, and the historic nature of the bridge. The city preferred to keep traffic on the main street during construction by building a temporary bridge or by utilizing part-width construction. Although it was determined that keeping traffic on the main street was not feasible, MDOT invested about $350,000 on upgrades to the detour route on city streets.

The bridge was designed, with critical modifications, following the essence of the historical design, including the spandrel columns, superstructure, railing, lighting columns, and lamps. Staging construction on one span at a time minimized potential disruption to the structural equilibrium of the bridge and virtually eliminated any environmental impact. Drainage problems were addressed and new lighting, based on the original design, added to the safety and ambiance of the rehabilitated bridge. MDOT responded to the issue of some motorists feeling crowded when sharing the bridge with trucks carrying wide loads. Although the existing deck was essentially wide enough, MDOT widened the superstructure by six inches and each sidewalk was reduced by six inches without affecting non-motorized and snowmobile users and without increasing dead load. MDOT also addressed the community’s concerns about the impact of the detour on downtown businesses as well as controlling speed on the detour route, which went through a residential area. The department provided signs on the detour route to indicate that the downtown business district was open. MDOT also funded dedicated work zone law enforcement for the detour route, which was in effect for five months.

Returned to service in 2002, the bridge is both a gateway into Crystal Falls and a focal point for a non-motorized path along the Paint River. As viewed from the adjacent park, the bridge fits well with its surroundings, lending an element of charm to the landscape.

The project was completed in one construction season at a final cost of more than $1.1 million. A new, modern bridge would have cost approximately 25 percent more, would have had a greater environmental impact, and would not have been as visually respectful of history or as harmonious with its surroundings.
the stakeholder list has been established, the next step is to develop a plan for involvement and take the appropriate actions.

**Engaging stakeholders**

Stakeholder involvement methods vary from project to project, based on the available resources (staff and funds), schedules, and project complexity. Fortunately, there are a variety of involvement techniques available that range from personal interviews to stakeholder advisory groups. Public meetings, workshops, or charrettes provide an opportunity for open communication between the transportation agency and the public, as well as among stakeholder groups themselves. E-mail updates, interactive Web sites, and newsletters also may be used to maintain communication. Once engaged, stakeholders also have a responsibility to provide timely and reasonable input into MDOT’s project development process.

The public engagement process presents a learning experience for everyone involved. Public meetings provide opportunities for stakeholders to share their concerns and ideas with the transportation agency and with each other. It is not unusual for groups who are interested in a project to have competing objectives. For example, one group may support development while another favors preservation. Bringing together diverse groups with opposing viewpoints can provide opportunities to examine tradeoffs, gain an understanding of other perspectives, and encourage planners to develop solutions that address shared concerns while balancing community needs. From a transportation agency’s point of view, stakeholder meetings provide an opportunity for interested parties to ask questions and increase their understanding of potential design and construction constraints.

**Decision making—who decides?**

Increasing public concern about the impact of transportation projects on both the natural environment and built communities has resulted in the involvement of public and local officials in not only the basic design features of a transportation project, but also the purpose and need for the project itself.

The concept of CSS has emerged in response to this national trend, providing a process that will assist transportation agencies in developing facilities that help incorporate community and other non-transportation needs. The CSS process, by definition, involves a collaborative, interdisciplinary approach in which citizens are part of the design team.

**Decision points**

The decision-making authority for a project rests with the owner who manages and operates the transportation facility. Transportation officials, responsible for the highway system, must make decisions that support the overall public good, reflect the needs of highway users, and represent sound design judgment.

**Regulatory requirements**

There are many requirements associated with adherence to federal and state laws on environmental protection. By statute, resource, and regulatory agencies have varying levels of decision-making authority for environmental, socioeconomic, and historic outcome related to the alternatives presented. The transportation agency is also obligated to adhere to federal standards on the National Highway System (NHS) roadways. The NHS roadways are vital to the nation’s economy, mobility, security, and defense.

To result in sound investment decisions, local interests and values must be considered to accurately define the transportation problem, select the best alternative, and provide the most efficient use of resources. Decisions are not the result of a “vote,” especially in matters of highway safety. Good decisions result from an understanding of the purpose and need of a project along with clearly identified roles and responsibilities for the various stakeholder groups.

Competing interests and project constraints will often necessitate tradeoffs regarding an action that addresses the purpose and need of a project. The design professional has a responsibility to bring technical expertise and sound engineering data to the decision process. The assessment of different project alternatives involves understanding a range of quantitative and qualitative characteristics describing the impact and tradeoffs among competing interests. But first, the stakeholders should agree on what the problem is.

**Defining the transportation problem**

To reach a common understanding and public acceptance, defining the transportation problem requires a strong public engagement process. Under MDOT’s current Five Year Transportation Program, the majority of the department’s projects are generated by the need to reconstruct or rehabilitate aging or deteriorating infrastructure. Developing an initial project statement usually begins with identifying a list of problems or deficiencies to be addressed. These problems may include poor surface conditions and may be limited to resurfacing or repairing existing roads and bridges.
Where do stakeholders fit into the process?

Projects represent a series of tasks, each of which involves a series of decisions. Effective decision making requires an understanding of what decisions will be made and by whom. To consider effective decision making as it relates to the public engagement process, it is helpful to first understand the types of projects typically represented in MDOT’s Five Year Transportation Program.

There are four basic types of highway improvement projects at MDOT:

CAPACITY IMPROVEMENTS AND NEW CONSTRUCTION

This action involves the construction of additional lanes on an existing highway or the construction of a new transportation facility where one currently does not exist. With the department’s focus on preserving our current system, new construction is rare.

RECONSTRUCTION

This work typically involves reconstruction of an existing highway within the existing general alignment, usually to better accommodate current travel demands or to modify an aging highway’s alignment in order to eliminate safety concerns.

RESURFACING, RESTORATION, AND REHABILITATION (3R) PROJECTS

3R projects primarily focus on the preservation of existing facilities to extend their service life and provide safety enhancements. This work includes resurfacing, minor lane and shoulder improvements, minor alterations to alignment, and bridge repair.

CAPITAL PREVENTATIVE MAINTENANCE (CPM)

This work represents activities used to keep an existing facility in good

US-131 S-curve replacement in Grand Rapids

The S-curve is a 1.25 mile segment of US-131 located south of the I-196 interchange in downtown Grand Rapids. The project called for the replacement of the existing structure which had six 11-foot lanes without shoulders, short ramps, and five steel beam structures that required continuous maintenance.

The project presented challenges to the social environment including minimizing the impact to commuter, commercial, and tourist traffic, and related economic issues. Other challenges included recovering archaeological resources and avoiding harm to fish reproduction.

Early and frequent stakeholder involvement was critical to project success. Multiple local meetings were held to discuss design issues, detours, scheduling, and the impact to businesses and the new Grand Valley State University campus during construction. Through intense planning and coordination with the city of Grand Rapids, the Grand Rapids Chamber of Commerce, the Interurban Transit Partnership (the Rapid), and the Grand Valley Metropolitan Council, the project was planned, designed, and constructed in less than two years. During construction, it was important to direct motorists to alternate routes without discouraging them from visiting downtown businesses and entertainment venues. To keep visitors, residents, and businesses informed, MDOT developed a motorist information plan and adopted the motto, “Road Closed, City Open.” A project Web site also was launched.

A CSS approach addressed aesthetic opportunities and helped minimize the project impact. Several enhancements were included in the project to help this major highway structure fit and blend into the downtown area and complement this area of Grand Rapids. Aesthetic enhancements include formed/textured concrete, arches and lighting on the segment over the Grand River (matching the theme of other downtown bridges), landscaping along the interchanges, and working with the city to provide a marker recognizing Native American culture in the area. MDOT established two detours during construction instead of a partial closure. A total road closure allowed for faster project completion at less cost and less overall inconvenience to motorists. MDOT worked with the state archaeologist and the Grand River Bands of Ottawa Indians to expedite a dig that recovered 42,000 artifacts from Indian groups and early settlers.

The end result of the project, completed ahead of schedule in 2000, was a wider and more efficient highway that will serve the city and metropolitan area of Grand Rapids for generations. Permanent safety improvements include full shoulders for emergency use. After the project was completed, the city of Grand Rapids developed a park and non-motorized path adjacent to the S-curve and installed landscaping along the US-131 BR ramps. The non-motorized path was funded in part through the Transportation Enhancement Program.
condition. CPM activities include crack sealing, joint repairs, chip seals, and thin overlays. These treatments preserve the system, retard deterioration, and maintain or improve the functional condition without substantially increasing structural capacity.

In addition, the department performs routine maintenance activities such as reapplying pavement marking, patching pavement, repairing drainage features, replacing damaged guardrail, mowing, and removing snow.

Public involvement and flexibility issues for most day-to-day maintenance activities will be minimal. However, partnerships that promote an enhanced level of maintenance for roadside resources certainly provide a mutual benefit for the department and the community. Many municipalities and corporate stakeholders already partner with MDOT to address such issues as increased mowing cycles, vegetation management, and roadside landscaping. For example, more than 2,500 groups currently participate in MDOT’s Adopt-A-Highway program. Sponsoring groups participate in litter pickups along their “adopted” stretch of roadway three times per year. Since the program began in 1990, volunteers have removed nearly 1.4 million bags of trash from more than 6,000 miles of highways. Volunteers represent organizations from colleges and universities to Rotary groups and from Lions clubs to fast food restaurants.

Additionally, MDOT’s mission to provide “the highest quality integrated transportation services for economic benefit and improved quality of life” involves allocating limited resources among competing interests. To ensure the long-term success of these investments, local agencies or stakeholder groups need to partner with MDOT to provide and finance maintenance of unique or enhanced design features.

Since the scope of 3R projects does not include significant alteration to the existing transportation facility, these projects usually have a lower cost and less impact on the community. While stakeholder involvement may still be helpful to the designer, the likelihood of a small-scale project growing into a major investment is low. For example, a resurfacing project that includes minor drainage improvements may afford an opportunity for a community to pursue a Transportation Enhancement Grant for streetscapes that would coincide with the primary work. However, a road joint repair project may not offer enough compatible work types to allow for the installation of a streetscape. The staff at any MDOT Transportation Service Center can address community concerns about general maintenance practices and pavement condition.

The greatest opportunity for community involvement and project-level decision making occurs in capacity improvements, new construction, and reconstruction projects. These project categories tend to have high impact and high costs. The project development process is often lengthy and complex, involving many agencies and individuals. During the planning and development stage of these larger-scale investments, the greatest opportunities for a flexible transportation solution occur.

What is flexibility in design?

Transportation professionals are being challenged to deliver an integrated transportation system that meets the needs of citizens and communities in the 21st century. A foundation of good CSS practice is the concept of flexibility in design.

Flexibility in design fosters a more customized approach to project development. It involves a collaborative, interdisciplinary approach to equally address safety, mobility, and the preservation of scenic, aesthetic, historic, and environmental resources. Stakeholder engagement is at the heart of delivering CSS, and design flexibility enters into that discussion.

Flexibility is about balance

To develop safe, effective, and creative alternatives that address a transportation facility’s unique attributes, a designer must collaborate with stakeholders to create a project that best meets the interests, needs, and concerns of both the community and the transportation facility.

Balancing transportation and safety goals within a specific context requires design flexibility. Standard or conservative use of the national highway criteria, along with a lack of consideration of community values, has sometimes resulted in a misunderstanding of the flexibility that is inherent in the design process.

Flexibility in design is a key component of CSS and it requires an understanding of the guidelines and standards used to develop and maintain a safe, functional transportation system.

The Green Book

The American Association of State Highway and Transportation Officials (AASHTO) establishes national guidelines on highway design. The most referenced guide is A Policy on Geometric Design of Highways and Streets. Because of the color of its cover, it is commonly referred to as the “Green Book.” The Green Book is more than a cookbook for civil engineers. Its recommendations undergo research, testing, and a rigorous peer review.

Conservative application of the Green Book may limit creative design alternatives. However, some engineering criteria in the Green Book cover a recommended range of responses, depending upon the situation. Engineers use professional judgment to customize the design to the specific needs of
Partnerships

Partnerships can provide win-win results that would be unattainable if undertaken independently. For example, MDOT partnered with the city of Taylor and the Detroit Regional Gateway Advisory Group to improve the aesthetics of a project to reconstruct the I-94/US-24 interchange. The city and advisory group contributed $1.5 million to offset the additional costs of the tied arch bridge. The city of Taylor also shared the cost of landscaping and decorative lighting for the project.

MAINTAINING INVESTMENTS

MDOT is pleased to partner with various organizations and businesses to provide an enhanced level of maintenance to support such investments in roadside improvements such as landscaping and seasonal flower displays.

- **Bay Region**, in the thumb area of the state, has developed a strong partnership with local master gardener groups to plant and maintain annual and perennial flower gardens at numerous rest area facilities throughout the region. The arrangement gives master gardeners an opportunity to earn credits and to do some public education as they work.

- **Grand Region** is partnering with the Grand River Valley Gateways and Passages group and Kent County Road Commission (KCRC) on landscaping, planting enhancements, and structural surface treatments of the I-96 at 36th Street new interchange project and the KCRC 36th Street extension project, near the Gerald R. Ford International Airport. Generally, these enhancements are expected to require little or no maintenance.

- **Metro Region** has partnered with numerous community groups and local agencies throughout the region to provide trunkline aesthetic improvements and maintenance on a regular basis.

- The 8-Mile Boulevard Association has completed landscape projects through the Transportation Enhancement Program on 8 Mile Road (M-102) from I-94 to Grand River Avenue. This work also includes ongoing maintenance of the landscape material and additional litter pickup through the cities of Detroit, Farmington Hills, Redford Township, Southfield, Oak Park, Ferndale, Hazel Park, Warren, Eastpointe, and Harper Woods.

- Downtown Detroit Incorporated (DDI) also has completed landscape projects and installed irrigation systems on both Woodward Avenue (M-1) and Jefferson Avenue (M-10). DDI also provides additional mowing, litter pickup, and an enhanced level of plant care for the landscaped areas.

- Ford Motor Company provides additional mowing and has upgraded the right-of-way fence on M-39 between Ford Road and Oakwood Road in Dearborn. American Axle Corporation provides additional litter pickup along I-75 in Detroit.

the project. Factors such as roadway function, condition, terrain, type of traffic, amount of traffic, and safety data influence the design. A professional engineer combines the Green Book guidance with professional training and experience to produce a suitable and safe design.

Transportation engineers are advocates for safety. Designers follow guidelines and criteria aimed at providing the safest highway conditions. When deviating from the established design criteria (called design exceptions), an engineer must document that no substantive safety risk exists. The ideal solution is to work within the guidelines to achieve community goals. Yet, there are times when the engineer’s need to address safety concerns may clash with the wishes of a community. CSS provides the framework for reaching compromises that strive to meet community goals while providing a safe transportation system.

**What is a design exception?**

At times the engineer may need to apply for a design exception to deviate from the accepted guidelines. Examples might include using a narrower shoulder or lane width than the Green...
Book recommends. Before a design exception is approved, the engineer must do the following:

• Consider the alternatives and document the need for a design exception. This documentation must include safety data, costs, and a discussion of the consequences of meeting the current design standards. For example, meeting the standard may result in serious harm to a historic district, an endangered species, or neighborhood viability.

• Consider safety enhancements that can compensate for the possible effects of the design exception. What measures can help minimize risk of a safety problem occurring?

Stakeholders participating in the CSS process also have a responsibility to understand the full range of possible consequences various alternatives present. No one wants an unsafe situation for any transportation user, including motorists, pedestrians, and cyclists. Understanding the safety requirements of a project gives stakeholders one of the tools they need to support good decisions.

Solid decision making takes place when all participants understand their roles and responsibilities. Stakeholders have an obligation to help the process along by gaining an understanding of the issues affecting the project, asking questions, and staying engaged. The highway owner makes informed design decisions using stakeholder input. Design flexibility helps customize the project while maintaining safety, allowing the engineer to explore alternative answers to the problem at hand. If done well, CSS helps raise the quality of transportation projects and integrates them into the community.

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Lynn and Cynthia are members of MDOT’s interdisciplinary Context Sensitive Solutions (CSS) team. The team, established in 2003, has been actively involved with stakeholder engagement as well as the development of policy and implementation guidelines to guide MDOT’s CSS effort.

SmartGrowthTactics

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Conclusion

Three key ingredients of a successful CSS approach are stakeholder engagement, solid decision making practices, and design flexibility. Identifying stakeholders and keeping them engaged at the right times in the decision making process leads to better outcomes. Stakeholder engagement requires creative approaches to public outreach and good listening skills on the part of the transportation agency.

Resources


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