Montana Department of Transportation

# Context Sensitive Solutions Guide

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*Context sensitive solutions (CSS) is a collaborative, interdisciplinary approach that balances the interests of various stakeholders in providing a transportation facility that fits its setting. It is an approach that leads to preserving and enhancing scenic, aesthetic, historic, community, and environmental resources, while improving or maintaining safety, mobility, and infrastructure conditions.*

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# I. Introduction and Background

Context Sensitive Solutions (CSS) begins early; it is a process needing involvement from citizens and local elected officials; it balances community desires, needs, funding and the law; and it often results in innovative solutions derived from keeping an open mind and a collaborative approach both internally and externally.

A context sensitive solution is grounded in the Montana Department of Transportation mission and vision. Montana's long-range transportation plan – TranPlan21 – supports the CSS process and spotlights the importance of CSS outcomes.

## Purpose of the Context Sensitive Solutions Guide

This CSS Guide is designed to educate and assist both internal and external users to better understand the considerations given to our environment and in the use of CSS approaches to implementing the MDT environmental ethic. This CSS approach should permeate all aspects of transportation including policy development, systems planning and project development, and the design, construction, maintenance and operations of the transportation system.

*The term "environment" as used in this Context Sensitive Solutions Guide includes the natural environment, the built environment, the cultural and social fabric of our communities, and the quality of life of the people who live in and visit Montana.*

The CSS approach is more than just processing environmental clearances and ensuring regulatory compliance for transportation projects. It embodies "going beyond" legal requirements and being responsive to community desires with a balance of what needs to be done to meet the project's purpose and to enhance safety and operations within the budget. A CSS approach produces environmentally conscientious decisions, ensuring that the statewide transportation system is responsibly constructed, operated and maintained.

The MDT considers environmental and community factors to be an important part of every plan and decision in the same way that engineering, economic, social and other factors are considered. As the planning and decision-making process becomes more project-oriented, CSS is realized through the planning process, public involvement, environmentally responsible engineering, context sensitive design and implementation, and best management practices.

## Mission and Goals

The mission of the Montana Department of Transportation is:

*"…to serve the public by providing a transportation system and services that emphasize quality, safety, cost effectiveness, economic vitality and sensitivity to the environment."*

An integrated use of CSS in daily practice helps MDT fulfill this mission.

### TranPlan 21

TranPlan 21, Montana's long-range transportation plan, is part of an ongoing process that regularly identifies transportation issues, evaluates public and stakeholder needs and priorities, and establishes and implements policy goals and actions. This process guides MDT in the development and management of a multimodal transportation system that connects Montana residents and communities to each other and the world. Policy goals and actions specifically related to CSS, under the Roadway System Performance Policy area, include the following:

- Roadway System Performance, Policy Goal B – Preserve mobility for people and industry in Montana within available resources.
    - Action B.6-Develop a context sensitive design toolkit to support project development.
    - Action B.7-Continue to use the corridor planning process to consult with resource agencies in identification of environmental sensitivities, avoidance areas, or potential mitigation measures.

### CSS in Design

As a matter of practice, MDT considers context sensitive solutions throughout the project development process. In 2003, MDT issued the CSS Management Memo (ENG-03-01; 10/23/2003) with the intent to:

- Reinforce MDT's commitment to work with communities and local stakeholders to assure that MDT transportation facilities meet their needs as well as the needs of the traveling public
- Establish that pursuing context sensitive solutions is to be an integral part of all phases of all projects – it must become part of our organizational culture
- Provide conceptual guidance to staff regarding the context sensitive design solution decisions that they will make while nominating projects, evaluating needs, prioritizing, designing, constructing, and maintaining highway projects

### MDT's CSS Policy

***Start early***

Making context sensitive solutions part of our culture means beginning early in the project selection process and continuing on through design, construction and maintenance with consideration for community and customer values and needs.

***Involve local government and citizens***
To help the process get off to the best possible start, remember to include all affected parties (e.g. local government) and those with a partnership interest (e.g. Federal Highway Administration.) In fact, to make this concept work, local government and citizens must be a genuine part of the process and feel they have been heard…otherwise we are just offering lip service.

***Balance wants, needs, money and the law***
Since the availability of transportation funds will also continue to be a major factor affecting decision-making during the project development process, balancing the needs of the community with safety/mobility and the needs of multiple projects will certainly challenge the transportation designers of the future.

And, of course, any context sensitive solution must be accomplished within the parameters of existing laws, rules and regulations.

***Think "outside the box"– innovation is key***
No "cookie cutter" approach is available on exactly how to approach context sensitive solutions.

***Listen and keep an open mind***
Be willing to listen to our customers – some of our best solutions come from them. Individuals and communities will have different ideas on what constitutes the ideal context sensitive solution in any given situation. The fact that there are differences does not mean there is a "right" or "wrong" outcome.

***Support, teamwork and communication***
To make this policy work at MDT, all staff need to support context sensitive solutions, recognize the physical and financial limitations involved, and communicate as a team to make the best possible decision.

Each of these principles reflects and emphasizes an aspect of the Context Sensitive Solutions approach.

## CSS Vision

MDT's vision for CSS is to adopt a community-integrated approach that will successfully guide future planning, funding and decision-making for the local and statewide transportation system, while meeting MDT's mission to emphasize quality, safety, cost effectiveness, economic vitality, and sensitivity to the environment. Involving community partners will enable the exploration of new methods to coordinate transportation planning and multimodal corridor preservation activities. Together, Montanans can develop focus areas, strategies, and action plans to meet our transportation needs by considering economic, social, and environmental impacts; interacting with the business community and each other; and jointly searching for flexible funding alternatives.

The goals of this CSS vision can be presented as an integrated process:

**Figure 1: CSS Continuum**


## CSS Goals

The continuum shown in Figure 1 highlights the connecting goals that help make MDT's vision for CSS a success. These goals address the fundamental dimensions relating to safety, mobility, community benefit and stewardship of the system along with exploring new methods to coordinate transportation planning and multimodal corridor preservation through the corridor planning process.

### *Quality*

Balancing all of the goals is the key to successfully implementing CSS and producing a quality project. If any of the goals dominate the design so much that other goals are compromised, the project quality will diminish. For example, if cost effectiveness dominates so much that mobility needs are not met, then the project's mobility perspective is diminished. On the other hand, if mobility enhancements drive up project costs, then the cost effectiveness is diminished. The key is to balance all of the goals in the CSS continuum, Figure 1, and optimize the quality.

### *Enhance Safety*

A primary element of MDT's mission and policy goals is to ensure the safety of the transportation system users. The State of Montana adopted a vision for safety through the Comprehensive Highway Safety Plan of,

*"VisonZero: Zero Fatalities and Zero Serious Injuries"*

This goal is crucial to the context sensitive solution approach; it reminds us to balance a community's needs and desires with safety. Not all features are

practical to be included in a highway context, especially those that may reduce safety performance. MDT improves safety with every project we build.

***Be Cost Effective***
MDT's statewide cost effectiveness goals challenge us to balance the local community's needs and desires with current and future statewide mobility and transportation infrastructure needs. Objective comparison of relative costs and outcomes must be considered to determine which CSS features are practical while balancing community needs within the context of the statewide transportation plan. Future maintenance and operations are also considered, as some CSS elements may be appropriate for the community to maintain while others MDT will maintain.

***Improve Mobility***
Mobility in an effective transportation system means the ability to move goods and people. This addresses the issue of operation and effectiveness of the transportation system from a users' perspective.

***Be Sensitive to the Environment***
Montana's history is strongly associated with its natural resources. The theme of respect and value for our natural environment continues today and into the future. Using CSS provides us with a means to achieve transportation system goals while serving as stewards of our natural and historical treasures in Montana. Balancing transportation needs and environmental goals is a fundamental tenet of this approach.

***Preserve Community Assets***
Each community is responsible for defining itself and what constitutes success for its transportation system, as a part of the statewide system. Montana's existing transportation infrastructure is a unique asset requiring continued operation, maintenance, and reinvestment to serve future system needs. Reinvestment to address system needs must be done within the scale and context of the community to maintain or enhance the asset's value.

This goal and the corridor planning process directly reflect the CSS approach of utilizing a collaborative public involvement process. Collaborative public involvement engages citizens and affected agencies early and continuously in order to find the balance in safety, mobility, community and environmental goals, while being flexible and cost effective.

***Be Flexible and Responsive***
Constant and committed efforts must be taken toward Montana's vision of a fully balanced transportation system. The vision and the corridor plans must be open to options, opportunities, and community input.

## Environmental Responsibilities
There are numerous federal, state, and tribal environmental laws that affect and shape the MDT's decisions.

National and Montana Environmental Policy Acts (NEPA and MEPA, respectively) are procedural laws that provide a framework for addressing various applicable environmental statutes, regulation and policies. NEPA and MEPA set the tone for the MDT's environmental ethic by recognizing the need for systematic, interdisciplinary planning and decision-making that considers environmental factors for major federal and state actions that could significantly affect the quality of the human environment. NEPA and MEPA provide a process for sound decision-making based on thorough environmental analysis and public disclosure and review.

The Montana Department of Transportation is committed to embracing the spirit of NEPA and MEPA for all federal and state actions. The guiding principles of NEPA and MEPA have been incorporated into the Montana Department of Transportation's transportation planning and project development process, as well as maintenance and operations of the state transportation system. It is the responsibility of all MDT employees to recognize and consider these essential principles and to appropriately include them in the transportation decision-making process to assure accountability across the department.

## II. A Context Sensitive Solutions Approach

### What is CSS?

Context Sensitive Solutions (CSS) is a collaborative, interdisciplinary, holistic approach to the development of transportation projects. It is both process and product, characterized by a number of attributes. It involves all stakeholders, including community members, elected officials, interest groups, and affected local, state, tribal, and federal agencies. It puts project needs and both agency and community values on a level playing field and considers all trade-offs in decision making based on available funding. Often associated with design in transportation projects, CSS should actually be a part of all phases of program delivery including long range planning, programming, environmental studies, design, construction, operations, and maintenance.

*Context sensitive solutions (CSS) is a collaborative, interdisciplinary approach that balances the interests of various stakeholders in providing a transportation facility that fits its setting. It is an approach that leads to preserving and enhancing scenic, aesthetic, historic, community, and environmental resources, while improving or maintaining safety, mobility, and infrastructure conditions.*

CSS principles address both the transportation decision-making ***process*** and project ***outcomes***. A CSS process relies on "open, honest, early and continuous" communication, and draws from the knowledge that communities and other stakeholders bring to a transportation project. With a focus on collaboration, CSS meaningfully involves stakeholders in transportation planning, design, and implementation. CSS means taking a

flexible and fiscally responsible approach to designing a transportation project so that the infrastructure fits into the natural and human environment - its ***context.***

### CSS Process

Context Sensitive Solutions are created through the CSS continuum. A successful CSS process:

- Involves an interdisciplinary team with transportation related expertise that considers stakeholder interests early and often throughout project development.
- Seeks to understand the landscape, the community, valued resources, and the role of all appropriate modes of transportation in each unique context before developing engineering solutions.
- Tailors public involvement to the context and phase of the project.
- Early on, defines and communicates the decision-making process.
- Clearly defines the purpose and scope of projects and activities.
- Tailors the transportation development process to the circumstances based on transportation needs, funding, and stakeholder input.
- Encourages agency and stakeholder participants to jointly monitor how well the agreed-upon process is working, to improve it as needed, and when completed, to identify any lessons learned.
- Considers mutually supportive and coordinated multimodal transportation and land-use decisions.
- Uses a full range of communication and visualization tools to better inform stakeholders, encourage dialogue, and increase credibility of the process.

### Outcomes

A CSS approach to project planning and design leads to outcomes that:

- Balance the expectations of both designers and stakeholders, thereby adding lasting value to the community, the environment, and the transportation system.
- Are safe for all users.
- Demonstrate effective and efficient use of resources (people, time, and budget) among all parties.
- Accommodate, to the extent practicable and appropriate, the needs of all users, regardless of the mode of travel they choose.
- Are compatible with the community values and preserve the environmental, scenic, aesthetic, historic, and natural resource values of the area.
- Provide solutions that balance and consider the needs of a full range of stakeholders.

*Ask:*
*"What does the successful project look like?"*

## How is CSS applied?

### Through the Project/Corridor Vision

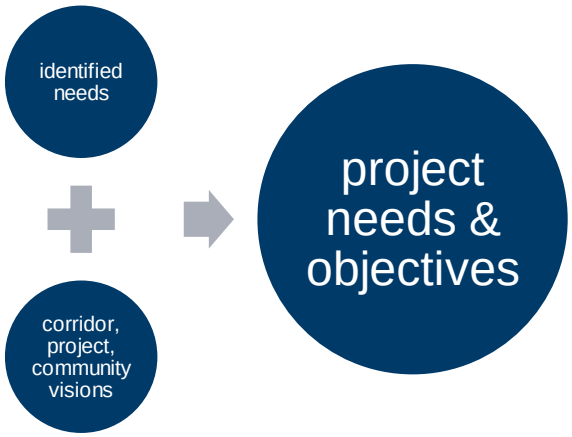
A project vision, including purpose and need, is developed and clearly documented with the involvement of project stakeholders early in the process. A

key component to this is capturing community values that represent the majority of the community members and the needs of the traveling public as a whole.

The project vision guides the project development decisions. Team members from planning, design, right-of-way, construction, maintenance, and operations must appreciate the importance of each function and commit early to achieve success.

The purpose and need statement required by the Montana and National Environmental Policy Acts for new transportation projects addresses the fundamental reason or justification for proposing a transportation improvement. The project need is often scoped by assessing the safety and/or mobility deficiencies of an existing transportation system. Identified deficiencies and opportunities should be described and quantified, to the extent possible. The purpose statement should explain how each of the deficiencies will be addressed or opportunities will be seized. The purpose and need statement becomes the cornerstone for project evaluations and decisions in the planning and development process.

Goals or objectives can be used to support the project purpose. The goals or objectives can include other secondary but important factors to the community and these, too, may influence the design, selected features, and overall success of the solutions. For example, the aesthetic appearance of safety improvements in the transportation system can affect the use and hence the intended benefits of features such as cross walks or bridges.




The potential solutions should consider alternative modes and approaches to the extent they support the transportation needs. For example, in some cases, non-structural solutions may be the most efficient and sustainable answer to capacity problems.

And finally, the solutions must be based upon sound financial and technical considerations. A transportation solution that lacks good engineering, design and

financial feasibility won't be sustainable or useful to the community, and will be difficult to maintain.

### Through Public Involvement

A cornerstone of successful CSS is public involvement. Effective public involvement encourages the exploration of issues from a variety of perspectives. Stakeholders that are representative of the community and users need to be identified early, during the planning, programming and development processes. Stakeholders need to be involved throughout these processes. All projects need some form of public outreach. On smaller projects, at the very least, the public should be notified of upcoming projects that will affect them.

Public involvement includes talking and listening, teaching and learning. While projects are not expected to be unanimously endorsed by every citizen, the Montana Department of Transportation is committed to providing users with projects that meet their basic needs and complement the project setting. Good communication throughout the project, using appropriate tools, helps achieve support.

For complex projects, a project schedule and budget should be developed during the process of initial stakeholder involvement, project vision, and conceptual design. Starting the risk management process during the planning stage will assist with identifying opportunities and conflicts that may impact project objectives.

Dialogue is a fundamental part of the decision-making process. From town hall to "store-front" meetings, to advisory groups and public hearings, the process encourages interaction. The need for safe and efficient transportation should consider the need to preserve or improve economic, social and environmental conditions. Effective public involvement creates a legitimate basis for making those trade-off decisions in light of the project goals and objectives.

### Through Designs Compatible with Environmental Context

CSS considers the natural and human environment. This includes the rural or urban setting, cultural, historic, recreational, biological, archaeological, and other resources important to the project needs. Therefore, CSS can affect all design elements and project costs.

Financial feasibility must still be addressed during project development, as is the case with all technical and environmental constraints. CSS adds value to the process by helping to identify and work with stakeholders to develop projects that are sensitive to their context. The CSS approach does not imply that there will always be unanimity among stakeholders, nor does it eliminate the Department's responsibility to exercise sound engineering judgment in balancing trade-offs.

## MDT Guidelines

CSS implementation is considered for MDT programs, and details of application vary depending on the community, the project scope, and the issues. MDT's CSS approach will generally follow these guidelines:

- Identification of, and agreement on, the transportation concerns while determining project needs and objectives
- Full commitment to the CSS process by the Department's employees
- Early establishment of interdisciplinary teams, beginning at the corridor planning stage and continuing through construction, operation and maintenance
- Development of responsive public involvement plans consistent with the Public Involvement Plan that consider the communities' needs
- Understanding of the landscape, the community and valued resources during scoping activities
- Use of a full range of tools as appropriate to communicate project information (visualizations, internet, etc.)
- Conducting continuous and effective communication with stakeholders in the community

### MDT Public Involvement

MDT provides early and continuing public involvement opportunities throughout the transportation planning and programming process using a variety of strategies. This public involvement process explores the issues surrounding proposed transportation improvements, identifies potential solutions and limitations, asks questions of the community about their values and concerns, estimates the scope of the Department's efforts and begins to understand the level of effort and time needed to design and implement effective solutions. Established community visions and plans that are endorsed by the majority of the community members greatly enhance this process.

Public involvement is an important component of every transportation project. MDT's Public Involvement Plan, Planning staff, the project design team members, and the project sponsor are resources for determining the appropriate level of stakeholder outreach.

### MDT Corridor Planning

MDT uses corridor planning studies to identify needs and determine cost-effective ways to address corridor transportation needs. Corridor planning studies emphasize early and continuous involvement of the public and environmental, regulatory, and resource agencies. The studies generally contain the following

elements: documentation of existing conditions, analysis of funding availability, environmental analysis, traffic forecasts, development of needs and objectives to help frame a purpose and need statement, and a list of improvements to meet long term corridor needs. The *Montana Business Process to Link Planning Studies and NEPA/MEPA Reviews* (see link in CSS Toolkit) provides guidance to MDT and its partners in a direction that strengthens the Corridor Planning Process by feeding "directly into the NEPA/MEPA process, help advance viable alternatives into NEPA/MEPA, and provide the opportunity for partner involvement at all stages."

### MDT Environmental Services

MDT Environmental activities are integral throughout planning, project development, construction and maintenance.

The Environmental Bureau is responsible for identifying cultural and environmental resources; estimating potential impacts; and recommending avoidance, minimization, and mitigation features associated with the location, design, construction, operation and maintenance of transportation projects within the state of Montana. Bureau staff members are an essential part of the project development team. Their work addresses a variety of applicable state, federal, and tribal laws that require consideration of social, economic, and environmental impacts and protection of important resources.

### MDT Preconstruction and Design Activities

Project design activities overlap with planning and environmental studies at MDT. The Preconstruction Program involves planning and developing the details of construction projects. This includes determining the location and design features, conducting public hearings and working with local officials, acquiring property for right-of-way and processing contracts up to the time they are awarded to private contractors. The most comprehensive CSS involvement is directly tied with the Preconstruction activities for a given project. Preconstruction disciplines include:

- Bridge
- Consultant Design
- Geotechnical
- Hydraulics
- Photogrammetry and Survey
- Road Design
- Right of Way
- Traffic Engineering, Operations, and Safety

### MDT Construction and Maintenance Activities

CSS principles are applicable to construction, operations, and maintenance in addition to project development activities. These functions are important because they employ the majority of the transportation work force, are the focus of some of the most substantial environmental impacts and opportunities, and are the most visible to the public. Moreover, the environmental commitments and mitigation measures identified and adopted in the planning and project

development processes are addressed in the contract bid documents and implemented and maintained by those responsible for construction, operation, and maintenance activities.

MDT has established best management practices (BMPs) to provide guidance to construction and maintenance personnel on practices and procedures designed to better care for the environment and ensure consistency and performance across the organization. Communication and involvement are critical to ensuring that good practices are understood and implemented. For example, inviting Environmental, Planning, Construction, and Maintenance representatives to attend critical project development meetings or plan reviews in order to provide early input into planning and project development decisions is essential. Early notification to and consultation with Maintenance regarding project mitigation commitments or design changes that create long term maintenance obligations is necessary to ensure those responsibilities are adequately funded and implemented as intended. Maintenance and operations priorities reflect the safety goals and level of service established by MDT and the Montana Transportation Commission.

## MDT Examples

MDT has several examples of projects that have incorporated CSS principles. The following are brief descriptions of some of these examples. Each of the examples highlights different CSS Goals. Recognizing that no project is perfect, positive and negative aspects are noted, along with some lessons we learned from the process.

### Rural Reconstruction Project

***Lewistown – Southeast (STPS 238-1(7)0; UPN 4892)***

*Project Description*: This project was nominated as a reconstruction of Secondary Highway 238. The roadway was identified for improvement by the local agency (Fergus County) with the goal of enhancing safety and mobility for both motorized and non-motorized users. The project begins on the outskirts of Lewistown and proceeds southeast along Big Spring Creek towards several recreational areas. The roadway tightly follows the surrounding terrain in a serpentine manner, with numerous large cliffs and rock outcroppings on the north/east side of the road and creeks and wetlands on the south/west side. Big Spring Creek is a Blue Ribbon trout stream. Additionally, there were a multitude of other design

considerations, including floodplains, fishing access sites, historic properties, narrow right-of-way, county road bridges immediately adjacent to the main highway, and unstable cut/fill slopes. In essence, the task at hand was to fit a 32' peg in a 26' opening while enhancing, not damaging, the integrity of the surrounding terrain. The original nominated limits were approximately 9 miles of highway. The construction project limits are from RP 0.39 to 7.18, for a total project length of 6.81 miles.

*Primary CSS Goals*:

- Flexibility and Responsiveness
- Preservation of Community Assets
- Cost effective

*Opportunities/Successes*:

- The project was broken down into segments and prioritized by the primary stakeholder (Fergus County). This allowed MDT to focus on and improve the segments that were of highest priority. By doing this, segments that were identified as a lower priority were able to be removed from the project design in exchange for enhancements on the high-priority segments (i.e. reinforced slopes, sheet pile walls, and MSE walls).
- Horizontal curvature was modified to match travelling speeds (actual and anticipated)
- Reinforced slopes, sheet pile walls, and MSE walls were included to reduce the limits of fill slopes
- Modified ditch sections (paved ditches, curb and gutter) were designed in order to reduce impacts that standard ditch sections would have caused
- Almost none of the large outcroppings were disturbed. This was a clear priority for the community and the primary stakeholder, as the aesthetics of this route is seen as an asset to the community.
- Big Spring Creek was not disturbed. Again, this was seen as an asset to the community and is of high value to Montana Department of Fish, Wildlife, and Parks.
- Floodplain impacts were eliminated, even where the floodplain abuts the adjacent highway fill slope. This was critical to timely project delivery.
- Painted box beam guardrail was used for safety and aesthetics
- Installed 4' shoulders (increase from existing shoulders of 0'-2') for safety of motorized vehicles as well as non-motorized users for nearly the entire project
- Rumble strips were not included in order to allow full shoulder use by non-motorized users

*Challenges*:

- Several elements do not meet full MDT design standards
- Unable to improve many county and private approaches substantively
- The entire 9 miles of highway that were nominated was not able to be included

*Lessons Learned*: The success of this project is a clear demonstration of the value of an iterative design process, involving project stakeholders, the design team, and the public. As each design challenge presented itself, the design team consulted these entities to determine their needs, desires, concerns, and absolute requirements. This information was then evaluated by asking the questions:

1. How can this need, desire, concern, or absolute requirement be met without adversely affecting the interests of the other entities or the project goals? What is the win-win?
2. What is the effect of this solution on project cost, scope, and quality, and how can this be properly balanced?

It was imperative to not blindly adopt design standards or to bow unnecessarily to the demands of the vocal minority. Rather, the approach used was to analyze the design standards and the vocalized desires and apply this analysis to an impartial decision that fit the *situation*. This process highlights the fact that CSS principals are integral to sound highway engineering, not an afterthought.

## Large-Scale Corridor Example:

***Shiloh Road Corridor, Billings***

*Project Description*: Shiloh Road was once a rural two-lane roadway located on the west end of Montana's most populated city, Billings. A quiet country road traveled mostly by farm machinery morphed into a heavily traveled north-south arterial and a main entry point as the city grew and subdivisions and commercial centers developed. Portions of the roadway were in very poor condition and intersections no longer functioned effectively. Traffic experienced congestion during peak times.


Reconstruction of approximately 4.5 miles of Shiloh Road has greatly improved traffic flow. It is now a four-lane divided facility providing a balance of safety and

mobility. In addition to including an unprecedented number of multilane roundabouts -- eight total -- in series, other major features of the project include:

- Continuous bicycle and pedestrian facilities, including a 10-foot wide multiuse path
- Large pedestrian underpass
- Mid-block, at-grade pedestrian crossing using Rectangular Rapid Flashing Beacons
- Extensive landscaping
- Noise barrier wall
- Design solutions to minimize Right-of-Way impacts to 135 properties
- Continuous lighting
- Stream crossings that provide fish passage
- Design solutions to avoid historic properties
- Strict access control
- Farm irrigation structures and crossings

*Primary CSS Goals*:

- Enhance safety
- Mobility

*Opportunities/Successes*:

- Extensive meetings were held between MDT, consultants, the city and county to effectively communicate design parameters, make decisions, and enable cooperative ownership of the project. This included 11 stakeholder meetings targeted at landowners, businesses, local task forces, media, and business organizations. These meetings were effective in conveying project features and status. Stakeholder buy-in was key for this controversial design.
- Traffic now flows efficiently and smoothly. Corridor travel time, congestion, and delays have all been significantly reduced. As designed, the new corridor also decreased peak travel time. Apprehension voiced by many towards roundabouts before construction has diminished significantly.
- Cost sharing and innovative right-of-way negotiations enabled the construction of some of the key features, including the pedestrian underpass. In addition, an access control plan was developed during the design process to enhance safety while allowing flexibility for future access.

*Challenges*:

- Controversial design (roundabouts)
- Addressing work zone safety and mobility
- Coordination between stakeholders
- Impacts to adjacent businesses, homes, and wetlands;
- Funding-related commitments by stakeholders; and
- Land acquisition

*Lessons Learned*: A key lesson learned from the Shiloh Road Project that helped to complete this project on time, was that early communication and involvement with landowners goes a long way to smooth negotiations for right-of-way and provide landowners the opportunity to meet with MDT to discuss specifics of the project, the right-of-way process, project schedule, and potential impacts and solutions. This has been successful in engaging the public, reducing landowner apprehension, and exchanging critical information prior to the right-of-way acquisition process.

MDT was able to gain additional buy-in from the adjacent landowners and businesses while saving money on right-of-way by encouraging a higher level of ownership earlier in the project development.

## Environmentally Sensitive Area

***Lincoln - East (NH-NHTSA-NHPB-HSIP 24-3(30)76; UPN 4322)***

*Project Description*: This project was nominated for major widening with improved geometrics on State Primary Route 24 (MT 200). This 7.4-mile project begins east of Lincoln and proceeds in a northeasterly direction through a timbered narrow valley and ending near the junction with Secondary Route 279. The existing roadway surface was in various stages of dilapidation and was originally designed to less rigorous standards. The aggregate of the following design elements created a safer section of roadway that enabled a longer maintenance cycle and mitigated for environmental impacts. The subject project provided a 36-foot roadway surface, more robust sub-surfacing strata, updated hydraulic features, and better domestic and wild-animal accommodations.

Environmental issues associated with this project included wildlife vehicle collisions, Threatened and Endangered (T&E) species and Critical Habitat, habitat connectivity for wildlife, wetlands, streams, and migratory birds. This project lies within a corridor between Lincoln and Roger's Pass which the US Forest Service (USFS) has designated as a key linkage area for wildlife movement between Glacier Park/Bob Marshall Wilderness Area and the National Forest lands to the south. The Federal Highway Administration (FHWA) requested that early coordination be completed with resource agencies to gain their comments on this issue. Resource agencies requested that MDT consider incorporating wildlife-crossing features along the project. T&E species are also

known to use this area including; Bull Trout (threatened), Canada Lynx (threatened), and Grizzly Bear (threatened). Wetlands are located along the project and measures were considered to avoid/minimize wetland losses in these areas for Clean Water Act (CWA), Section 404 compliance. Migratory birds are protected under the Migratory Bird Treaty Act (MBTA) of 1918 and due to the amount of potential nesting trees along the project corridor; options for compliance with the MBTA were considered.

*Primary CSS Goals*:

- Be Sensitive to the environment
- Be Flexible and responsive

*Opportunities/Successes*:

- Environmental issues were documented and coordination with resource agencies, local community members, and adjacent landowners occurred early in the project design process. This allowed MDT to focus on specific roadway segments to address environmental issues. By doing this, MDT was able to discuss opportunities, develop options based on design constraints, and come up with an acceptable solution to environmental issues that would be compatible with design.
- Two wildlife underpasses were installed in critical areas to accommodate habitat connectivity and public safety. Originally only one crossing was included in the preliminary design; but due to elk-vehicle collisions occurring late in the design process, an additional crossing was added in the vicinity of the collisions. Both underpass designs were of sufficient size to accommodate deer, elk, moose, and bears, as well as smaller animals. This met resource agency considerations for wildlife and T&E species. Exclusionary fencing (8-foot tall woven wire) was used to funnel animals to the crossings and under a bridge to promote crossing usage and keep wildlife off the roadway. This was seen as an asset to the community and to the resource agencies and this also enhanced safety.
- A review of various wildlife crossing designs and costs was undertaken. Based on this review it was decided that cast-in-place flat slab concrete bridges were the most cost effective design while still meeting the needs of wildlife. The bridge over Alice Creek was designed across the entire floodplain, maintaining fish passage (including bull trout), and the existing vertical clearance to allow some wildlife movement under the bridge. Measures were taken to enhance willow growth along the banks. These efforts are seen as an asset to the recreational community and resource agencies.
- Standard roadway slopes were adjusted to avoid and/or minimize impacts to wetlands, streams, and waterbodies.
- Due to the project letting schedule, a separate contract was awarded to remove trees within the construction limits outside of the nesting season to comply with the MBTA.

*Challenges*:

- Balancing preferred locations and dimensions of wildlife crossings while still meeting design criteria. The location of the wildlife crossing structure (underpass) near the eastern end of the project was recommended as a potential crossing location during early meetings with the resource agencies. This location serves both T&E species and general wildlife species such as elk and moose. A minimum opening height of 12 feet was recommended for elk and moose passage, and bridges were recommended instead of culverts. At this location the road grade was controlled on the east end by the junction with S-279, and on the west end by the proximity of the Blackfoot River.
- Constructability of crossings due to high groundwater/wetland issues.
- Maintaining height of the bridge to meet requirements for wildlife while meeting design parameters. The grade of the bridge at Alice Creek is controlled by the junction with S-279 located immediately to the east and therefore could not be raised to gain any more height than the original bridge height. To maintain this opening height for wildlife use, the Bridge Bureau designed the bridge with tri-deck beams, which also reduced the number of piers in the floodplain, going from an originally proposed 5-span bridge to a 3-span bridge. This also reduced the encroachment of the piers into the current active channel of Alice Creek, and will allow the creek to meander across the floodplain in a more natural manner.
- Land use and wildlife issues related to fence type. Along one section of the project the landowner grazes sheep on private land. The landowner requested sheep fence be used as the R/W fence so he could graze all of his property. MDT would normally provide a woven wire fence with 2 or 3 strands of barbed wire on top. The R/W Bureau, at the request of the District Biologist, negotiated with the landowner to use just the woven wire with no barbed wire above, reducing the height of the fence and allowing for better wildlife permeability across the roadway.

*Lessons Learned*: The success of this project in addressing environmental concerns demonstrates the benefits of early involvement and coordination between all project stakeholders. With the collaboration and flexibility of the open minded and talented design team this project will promote the reduction of animal-vehicle collisions, improve wildlife habitat connectivity, and address project stakeholders' needs while meeting the purpose and need of the project. Flexibility and responsiveness was shown with the addition of the second crossing due to elk-vehicle collisions occurring late in the design process. This process highlights the fact that CSS principles can be incorporated not only early, but also continually throughout project development which results in not only maintaining sound engineering standards, but also in a final project that benefits wildlife, T&E species, and additional safety to the traveling public.

## Urban Reconstruction Project

***Custer Interchange - Helena (IM-MT 15-4(107)193; UPN 5588)***

*Project Description:*

Custer Avenue is a main arterial roadway in Helena, Montana. In the early 1960s when Interstate 15 was built through the Helena Valley, the Custer Avenue overpass was constructed to give traffic access over the interstate between the city and the sparsely populated rural area to the east. This two-lane, 28-foot wide bridge with no suitable pedestrian sidewalks or direct access to the interstate, served travelers heading to and from the Helena Valley out to Canyon Ferry Lake, East Helena, and along York Road. Over the years, the Helena Valley population increased exponentially while the Custer overpass remained much as it was when it was built. As decades passed, the bridge became functionally obsolete and physically deteriorated, with traffic volumes increasing every year. Due to the lack of another point of access in the nearly 7-mile segment of I-15 between Cedar Street and Lincoln Road, MDT began exploring options for a new interchange and upgrades to the Custer Bridge.


The Custer Avenue Interchange project includes a new 236-foot, two-span, five-lane concrete structure over I-15; five interchange ramps; and 1.4 miles of interstate auxiliary lane construction on 1-15 between Custer Avenue and Cedar Street. Other features of this project included widening Custer Avenue between Montana Avenue and York Road, construction of the Helena Valley Canal bridge on Custer Avenue, construction of seven traffic signals, street lighting, reconstruction of the City of Helena's 30-inch trunk sewer and 20-inch water transmission mains, resurfacing Washington Street, ornamental railing, patterned concrete finishes, powder-coated light poles, and bridge end treatments which

produced an attractive yet highly functional bridge. Other aesthetic treatments included a tiered keystone retaining wall system along the roadway and under the bridge, patterned red brick median concrete, and restoration of preexisting private landscaping and irrigation features. Another major project component was the construction of a major storm drainage network including six intermediate detention ponds, a 32-acre regional detention pond, storm drain piping (up to 72-inch diameter RCP), and nine major outfall/flood management concrete structures.

*Primary CSS Goals:*

- Enhance Safety
- Improve mobility
- Preserve community assets

*Opportunity/Successes:*

- Partnering with the local government. City construction of Sanders Street through to Cedar Street ahead of interchange construction provided more access to adjacent businesses and detour alternatives during the road closure.

*Challenges:*

The existing Custer Avenue is located in a tight, developed corridor with limited right-of-way. The project required expedited construction with minimal disruption to the local businesses and traffic users. The project had very complex construction staging restrictions and tight construction windows without any traffic detours or lane closures. The fully developed location included potential involvement with several major utilities including a 2,200 psi 10-inch petroleum pipeline, 10-inch, 8-inch and 4-inch NorthWestern Energy natural gas pipelines, AT&T and CenturyLink fiber optic cables, buried copper communication lines, NorthWestern Energy overhead transmission lines, and city sewer and water facilities. Another challenge was access to adjacent businesses and balancing local desires with federal highways requirements.

The biggest challenge was for traffic operations during construction – what to do with the traffic and whether bridge closure was possible– was solved by using traffic modeling tools to collaborate with the local government officials and nearby business owners.

> *"On May 7, the Custer Avenue overpass will be closed to traffic and removed. The plan calls for replacing and reopening it to traffic by July 7 or earlier."*
>
> *Helena Independent Record*
> *February 12, 2012*

*Lessons Learned:*

- Engage the community and adjacent businesses early in the project design and development process. The Helena urban area is bisected by I-15. Closing one of those crossings for a significant amount of time for a construction project was an issue for community safety and economic concerns for adjacent commercial development. Through heightened outreach early on, providing modeling of construction traffic impacts, and working with the local government to identify, fund and improve viable alternate routes, MDT was able to completely close the crossing during construction and accelerate the project, rather than trying to keep the roadway open to traffic during construction.

- Begin project R/W and utility planning early. MDT and the City both considered right of way and utility move needs years before construction began. As development and other infrastructure improvement projects moved forward, MDT and the City worked together to ensure the improvements considered the future interchange designs, preserving needed right of way, allowing utilities to have to be moved only once, and collecting financial participation in development-related project attributes. Early engagement with the development community resulted in a better final project and provided more efficient use of public and private funding available.
- Sharing responsibilities can provide solutions to complicated problems. For example, MDT agreed to design the project to convey MDT's and the City's water through the interchange, and the city was responsible for accepting and detaining the water downstream of the project while some of the fill the city removed to create the pond was used on the project.

## III. Montana Department of Transportation Partners

MDT has many partners in planning, developing, and implementing the transportation system. These partners can assist in meeting the Department's mission. The primary federal partner for the Department is the Federal Highway Administration, which provides significant funding for transportation projects in Montana. The MDT and FHWA have a history of working with the resource, regulatory, and local agencies described below.

The following partners work with the Department implementing CSS at various stages in the transportation process from programming through construction and maintenance.

### Federal Highway Administration (U.S. Department of Transportation)

The Federal-aid Highway Program is administered by the Federal Highway Administration (FHWA), providing financial and technical assistance to the states and metropolitan planning organizations to plan, construct, and improve the National Highway System and other roads and bridges eligible for federal-aid. The program also addresses economic and social factors affected by transportation systems and infrastructure development. Federal-aid assistance is available for communities through state-administered, federally-assisted planning, development, safety and operational funding. The program fosters the development of a safe, efficient, and effective highway and intermodal system nationwide. The FHWA has primary responsibility for compliance with the National Environmental Policy Act and the Uniform Relocation Assistance Act, as examples, and other statutory and regulatory requirements.

### U.S. Fish and Wildlife Service (U.S. Department of the Interior)

The U.S. Fish and Wildlife Service works to protect threatened and endangered species, migratory birds, freshwater fish and wildlife habitats They administer provisions of the Endangered Species Act, Bald and Golden Eagle Protection Act, Migratory Bird Treaty Act, and other wildlife laws.

### U.S. Forest Service (U.S. Department of Agriculture)

The U.S. Department of Agriculture Forest Service's fundamental responsibility is focused on stewardship and sustainability of the National Forests and the associated resources.

### Bureau of Land Management (U.S. Department of Interior)

It is the mission of the Bureau of Land Management (BLM) to sustain the health, diversity and productivity of the public lands for the use and enjoyment of present and future generations. The BLM's task is to recognize the demands of public land users while addressing the needs of traditional user groups.

### U.S. Army Corps of Engineers (U.S. Department of Defense)

The United States Army Corps of Engineers is primarily responsible for regulating the placement of fill material into waters of the U.S. by authority of the Clean Water Act.

### U.S. Environmental Protection Agency

The mission of the Environmental Protection Agency (EPA) is to protect human health and the environment. In Montana, the EPA has delegated much of the regulatory authority to the State but maintains oversight responsibility for a variety of programs, such as the Clean Water Act and the Resource Conservation and Recovery Act (Superfund sites). The EPA has oversight for environmental regulation on sovereign Indian lands.

## Montana Department of Environmental Quality (DEQ)

The DEQ is responsible for ensuring clean air, water, and land in the state and for protecting Montana citizens' constitutional rights for a clean and healthful environment. As a regulatory agency, the DEQ is responsible for enforcing various state environmental regulations and administering a number of federal environmental protection laws, including the Clean Air Act, the Clean Water Act, and the Resource Conservation and Recovery Act. The Montana DEQ oversees MDT projects to ensure that they have the necessary environmental permits and clearances.

## Montana Department of Fish, Wildlife & Parks (FWP)

The Montana FWP's primary role is advising and providing technical information regarding wildlife and fish. FWP administers the Montana Stream Protection Act and oversees properties acquired or improved with funds from the land and water conservation fund (Section 6(f)). MDT has agreements in place with the FWP to provide consultation services, and the FWP is also a participant in interagency coordination for transportation projects under development.

## Montana Department of Natural Resources & Conservation (DNRC)

The Montana DNRC deals with water resource issues. Their programs include groundwater protection, floodplain management, stream channel protection, water allocations/water rights, and water planning.

## State Historic Preservation Office

The Montana State Historic Preservation Office (SHPO) is a division of the Montana Historical Society. The mission of the Montana State Historic Preservation Office is to preserve our significant historic, archaeological and cultural places.

The role of the State Historic Preservation Office in federal project review is to reflect the interests of the State and its citizens in the preservation of Montana's rich cultural heritage through the State Antiquities Act, Section 106 of the National Historic Preservation Act, and Section 4(f) of the Department of Transportation Act.

## Tribal and Local Government Agencies

The Montana Department of Transportation regularly works with seven tribal governments, as well as local governmental agencies. Implementing the CSS Guide will help to strengthen a well-developed coordination process already in place.

Community-developed visions and plans are an important piece in the successful implementation of the CSS approach. The communities that have collaborative visions or transportation plans in place and understand project constraints can provide valuable input into the project development and design process.

## IV. Implementation of Context Sensitive Solutions

Implementation of the CSS approach in all areas of MDT will take time, education, experimentation, commitment, awareness of changing values and attitudes, and a constant reassessment of the best ways to provide for the public benefit through the development and implementation of transportation systems. A successful approach will pay dividends in terms of cost savings, greater public acceptance, and expedited programs. Although explanations and examples have been provided, the application of CSS principles can be a creative process and will depend greatly on the project and its context.

### Tools & Strategies

MDT has many tools and strategies in place that help ensure a consistent implementation of CSS. These are linked in the MDT CSS Toolkit: http://www.mdt.mt.gov/business/consulting/context-sensitive-solutions.shtml
Some of the more essential tools and strategies are listed below. Keep in mind that the toolbox will continue to change as MDT's implementation and use of Context Sensitive Solutions expands.

- 3-D Models for design and visualization
- AASHTO Highway Safety Manual
- ADA/ADAAG/PROWAG
- Bicycle and pedestrian facility guidance and resources
- CSS Training
- FHWA Context Sensitive Solutions internet-based resources
- MDT Public Involvement process
- Montana Transportation and Land Use Resources for Growing Communities Toolkit
- MDT Design and Procedural Manuals
- MDT Research projects
- Montana Local Technical Assistance Program (LTAP)
- Multi-functional design team participation
- TRB/NCHRP Research reports
- Planning-Environmental Linkage document
- Project and corridor-specific webpages
- TranPlan 21 and local government transportation plans
- Value Analysis process


Alternative accessible formats of this document will be provided on request. Persons who need an alternative format should contact the Civil Rights Bureau, Department of Transportation, 2701 Prospect Avenue, PO Box 201001, Helena, MT 59620. Telephone 406-444-9229. Those using a TTY may call 1 (800) 335-7592 or through the Montana Relay Service at 711.

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