

MULTIMODAL TRANSPORTATION ALTERNATIVES ANALYSIS



OVERVIEW

To this point in the Long Range Transportation Plan document, the update focused on two primary areas: establishing plan direction and evaluating how the current and future multimodal system works. The direction was set by garnering feedback from the public and stakeholders and through establishing study goals and objectives. The alternatives analysis involved developing potential solutions to the issues/deficiencies that were raised, while tailoring the evaluation perspectives to reflect the direction provided by public input, such that the recommendations reflected in the community's values.

The alternatives analysis process incorporated both quantitative and qualitative approaches to reviewing the range of concepts for potential inclusion in the LRTP. As the priorities of the community are quite diverse in terms of what individuals/groups want done (build new roadway corridors, improve the trail system, enhance transit, etc.), and there is no truly mathematical way of balancing conflicting priorities, so qualitative assessment based on broad community input must be brought into the process.

Through the alternatives analysis the range of improvements in each of the modal systems (roadway, transit and non-motorized) included:

- **Travel demand management (TDM)** alternatives, those intended to alter the level or timing of vehicle or person travel. Examples of TDM measures are carpooling/ vanpooling, staggered work hours (flex-time) to reduce peak hour travel, telecommuting, etc. Formalized TDM approaches would be relatively new to the Bismarck-Mandan region, and these alternatives are described in more detail later in this chapter.
- **Transportation system management** alternatives are minor improvements to the existing system, including adding turn lanes to intersections, improving the efficiency of signal system operation to increase the hourly throughput capacity of an intersection or corridor, conversion of two-way streets into one-way flow, modification of transit routes or arrival/departure times at specific locations to better serve the travel needs of the population, add electronic fare collection to improve the efficiency of moving people onto transit vehicles,



adding user amenities to a trail corridor, investing into efficient building technologies, etc.

- **Expanding current facilities/programs or developing new facilities/programs**, which provide additional through capacity in existing corridors, or entail construction of new roadway or pedestrian/bicyclist routes, adding service hours along a current transit route, extending multi-use trails, increasing the frequency of buses in a corridor, etc.

As with each of the key elements of the plan, the transportation goals and objectives were incorporated into the multimodal alternatives analysis, through utilizing the measures of effectiveness in the alternatives screening. The measures of effectiveness were developed as part of the transportation goals and objectives preparation and represent the benchmark criteria against which each of potential improvement was compared. As illustrated previously in Table 1, the measures of effectiveness are benchmarks, based on the goals and objectives, used to evaluate how well each of the alternatives reflect the community's vision for the transportation system.

ALTERNATIVES SCREENING PROCESS

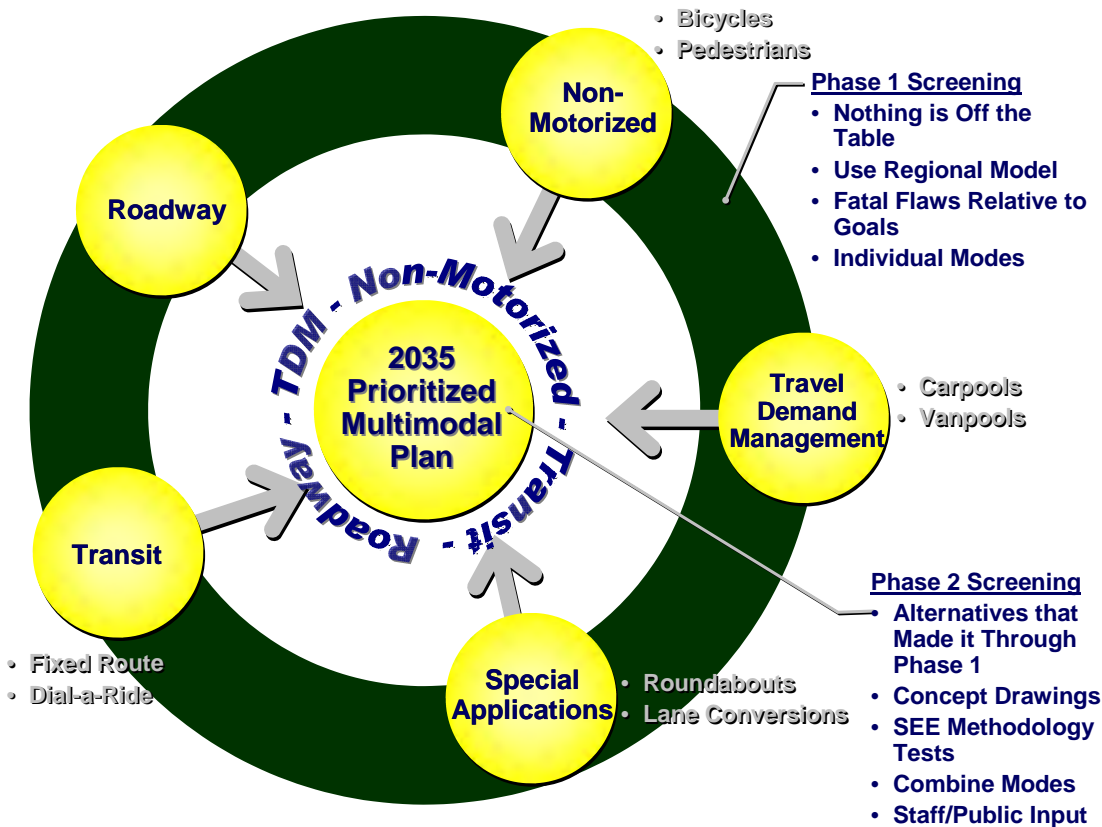
To efficiently sort through the relatively numerous and wide-ranging set of potential system improvements, a two-level alternatives analysis process was used:

- The **Phase 1 Screening** narrowed the list of potential alternatives by removing those concepts that did not reasonably reflect the transportation goals or did not have local support. The first phase allowed the study team to review a broad range of alternatives, while still completing the assessment in a reasonable time frame, by reviewing the alternatives in more broadly-described measures and removing those with fatal flaws.
- The **Phase 2 Screening** included more detailed assessments for those alternatives that were maintained through the Phase 1 screening, evaluating the positive and negative aspects of the improvement concepts relative to the evaluation criteria. A prioritized listing of the remaining projects was the product of this phase, and was used as a tool in determining the final list of projects/concepts to be included in the transportation plan. The prioritized list was based on how well individual or combinations of alternatives performed compared to other alternatives when considering the criteria.

The two-phase alternatives analysis process is illustrated in Figure 24.



Figure 24. Illustration of the Multimodal Alternatives Analysis



The alternatives analysis for the roadway, transit and non-motorized systems followed similar screening processes in evaluating the alternatives. The steps for the non-motorized and transit systems were streamlined from the process employed for the roadway system because there was not the same level of selection between multiple improvement options for a particular issue. Thus, for the non-motorized system the process jumped forward to the second level screening (documented below) and for the transit system only the first level of screening was conducted. The generalized screening process was completed through the following steps:

- Define current and future multimodal transportation needs in region. Current and future needs were defined through information gathered during the public involvement process and through technical analysis of the system safety, traffic operations, and economic development
- Work with the TAC and Community Committee to identify a range of improvements that could address the transportation issue/deficiency. Document the range of improvements and solicit input.
- Conduct an initial screening of the range of alternatives. For those locations where multiple concepts were identified to address a specified need or issue, an initial screening was conducted in order to reduce the range of potential alternatives to a preferred concept. Analyses that covered the



traffic impacts of the alternatives and a general assessment of the physical impacts to the adjacent area were conducted for individual areas of need rather than grouping them into packages of improvements. Through this individual idea analysis, the positives and negatives of the specific concept could be documented.

- The results of the initial screening were documented in a matrix format and presented to the TAC and Community Committee prior to a screening workshop held in March 2009. Documentation of the initial screening assessment was presented at a public meeting held in April 2009. The initial screening is summarized in Appendix D.
- A second level screening was conducted, where each of the alternatives maintained through the initial screening were reviewed in greater detail and cost estimates were developed for each alternative program/project. The alternatives were reviewed relative to the following perspectives:
 - Social effects
 - Engineering feasibility
 - Environmental impacts.

A second level alternatives workshop was held in May 2009. The second level screening is summarized in Appendix D.

- The second level screening included a project scoring system that was used to score, in relative terms, how each alternative would meet the Plan goals and objectives, and the community vision. Using the scoring system each improvement concept was evaluated using a scale from 0 to 6 in a broad range of criteria categories. The criteria addressed the impacts/benefits of a project from the social, engineering and environmental perspectives. The approach and results of the prioritization are documented in Appendix D.
- A series of preliminary project/program “packages” were developed that addressed the various transportation needs and were within the anticipated funding availability through 2035. Packages that focused on a range of themes were presented to the TAC to gather input. Packages were revised and modified a number of times, and a combined version that included elements of the various packages was presented to the community at the August and September 2009 public meeting. The packages that were considered are documented in Appendix D.

Not all of the higher-scored projects were included in the recommended plan, because the recommended plan is required to be cost constrained and the cumulative cost of the projects maintained through the second level of assessment far exceeded the likely available transportation funding. Thus, one more step was required in selection of the plan projects. The combined final package reflected a concept that:

- Incorporated elements for each of the systems; roadway, transit and non-motorized.



- Directly addressed many of the key transportation needs in the region.
- Was consistent with the plan Goals and Objectives.

The recommended multi-modal projects and programs are documented in the “Recommended Transportation Plan” chapter.

TRAVEL DEMAND MANAGEMENT ALTERNATIVES

As noted earlier in this chapter, formalized travel demand management programs would be a relatively new concept to the Bismarck-Mandan region, and warrant some additional discussion in regards to alternatives. Evaluation of TDM alternatives falls somewhat outside of the alternatives screening process, as the program elements are really intended as a complement to the existing and future multimodal system. Thus, the process of identifying recommendations for TDM activities in the Bismarck-Mandan region involves reviewing the toolbox of TDM options that might be available, and determining which of those TDM alternatives are both feasible to implement and would provide the most benefit given limited resources.

TDM programs have traditionally been viewed as viable options only in corridors and urban areas where travel comes at a higher cost. Cost is broadly defined as the time lost due to congestion, parking shortages and/or additional transportation costs such as tolls and parking fees. Communities such as Bismarck-Mandan, with limited congestion and relatively high parking accessibility, have traditionally had little incentive to actively implement TDM programs. Through the 2010-2035 LRTP update process, the MPO has placed more emphasis on the demand side of the solution when addressing transportation issues.

TDM programs for the Bismarck-Mandan region are specifically supported by two LRTP objectives related to Goal #5, *Address the transportation system’s impact on the built, social and natural environment*:

- Promote transportation projects, plans and/or programs that encourage reducing energy consumption.
- Reduce the pressure to expand the current system and improve the performance of the existing roadway system by implementing programs that increase average vehicle occupancy rates

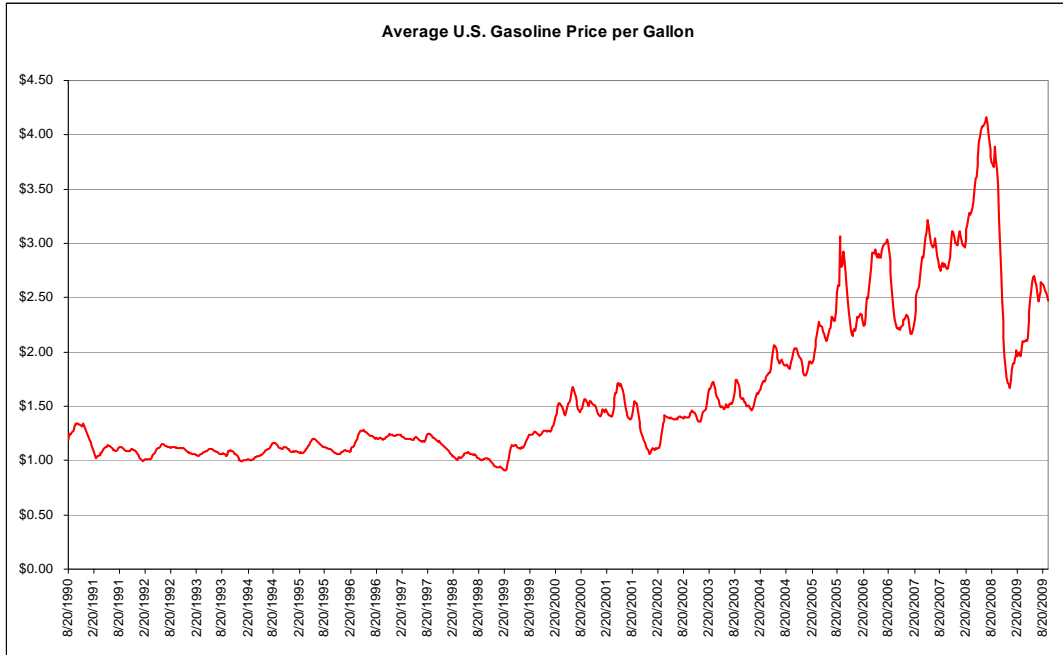
In addition to being supported by the community vision for the regional transportation system, two emerging factors make providing an active TDM program in the Bismarck-Mandan region potentially more viable for the 2035 LRTP:

- The first is the volatility and anticipated future increases in the cost of gasoline. Gas price increases last year made the cost of automobile trips increase substantially. The hardship that fuel price increases can create is demonstrated by the nationwide VMT decline of 3.6% between 2007 and 2008. Historic gasoline prices are shown in Figure 25, which shows that the price for gasoline nearly quadrupled between December 2001 and July 2008. While prices have decreased due to the global recession, Department



of Energy short-term forecasts anticipate a 9% increase in gasoline prices through 2010. An active, effective TDM program can provide more affordable travel options to a portion of the traveling public in Bismarck-Mandan, and would help soften the economic effects of future energy price spikes.

Figure 25. Average US Gasoline Price per Gallon, August 1990 – September 2009



Source: US Department of Energy, Energy Information Administration, October 2009

- The second factor is roadway construction costs. These costs are measured in both the monetary costs associated with system construction and the potential impacts to the built and natural environment that can be associated with transportation system expansion and reconstruction. Roadway construction costs increased approximately 20 percent per year between 2005 and 2008. An active TDM program can reduce the demand on the current roadway system, which in some instances may delay and even eliminate the need for some roadway expansion projects.

There are several different regionally-based TDM strategies to consider, each with varying mechanisms to affect travel behavior. The various TDM strategies can also be administered by different entities, whether state, regional or local governments, quasi-public agencies and/or individual or groups of employers. The TDM strategies include expansion of travel choices, through implementation of:

- **Rideshare programs**, including both carpooling and vanpooling. When formalized, both types of programs can be implemented and administered by employers, transportation management associations or a governmental



entity. Carpools typically use private vehicles, while vanpools typically use leased vehicles or vehicles owned by the governing entity, not the vanpool users. There are various elements that can be incorporated into rideshare programs, including:

- Guaranteed ride home: This element of the program provides regular users of the rideshare program a ride home if an emergency happens during the day (via taxi, rental car or transit).
- Web-based matching databases/bulletin boards: Employers and governments can provide web-based applications for ride matching based on commute origin and destination.
- **Alternative work arrangements**, are employer-based approaches including:
 - Flexible working hours: Employees are allowed some flexibility in their work schedules, which allows employees to commute to work during an off-peak travel times, reducing congestion.
 - Compressed work week: The number of work days is reduced, typically by increasing the length of the remaining work days.
 - Telecommuting: Employees work from home or at a “closer-to-home” satellite/neighborhood office to reduce daily work travel.
- **Financial Incentives**, which provide commuters money for considering alternative modes of travel. These program elements can include:
 - Parking cash-out programs: Employees can choose the cash value of their parking spot instead of the spot itself, allowing commuters to shift the money spent on parking on alternative commuting.
 - Employer incentives: Employers can provide up to \$115 per month in “Qualified Transportation Fringe Benefit” tax-free, including payments for employees’ rideshare and transit usage.

A key factor in implementing an effective TDM program is having a viable multimodal system in place so travelers have a true alternative to single-occupant automobile travel. Many of the recommendations in this LRTP include enhancements to the non-motorized system (through on-street bicycle lanes/routes and new and/or improved trails) and to the transit system (through route extensions into new development areas), which support the viability of non-automobile travel in Bismarck-Mandan. In addition to having an effective non-roadway transportation network, land use planning and development guidelines affect travel behavior immensely, and can be formed to provide an environment more conducive to successful TDM strategies. TDM programs are more effective in environments with relatively dense development with clusters of trip origins and destinations. In addition to critical densities, the site-development policies can also make TDM programs more effective, such as site parking policies and building orientations that make pedestrian, bicycle and transit access more convenient.



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