

MPC-520

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Project Title

Financial Benefits of Proposed Access Management Treatments

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Research Needs

Transportation access management is defined as systematic control of the design, spacing, operation, and locations of street connections, interchanges, driveways, and median openings on the roadway with the purpose of providing vehicle access while preserving the efficiency and safety of the entire transportation system. Access management is a proven method for maintaining and improving roadway capacity; traffic flow; and the safety of traffic, pedestrians, and bicyclists on rural and urban highways and streets (1). Improvements to operational efficiency and safety reduces transportation costs. Reductions in delay and improvements to

traffic flow also reduces vehicle emissions, reducing the environmental impacts of transportation. Research has shown that access management related improvements to traffic operations and safety have a positive impact on the local economy (2).

Access management methods include, but are not limited to, increasing the spacing between signals and intersections, managing access to/egress from driveways, median treatments (including the use of medians, indirect left-turns, etc.), use of frontage roads, providing turn lanes for heavy traffic movements, and land use policies. Each of these methods has safety and operational impacts (leading to financial and other benefits) as well as associated financial costs for implementing the changes and compensation to landowners for lost property or access. The decision of whether to implement a change often depends on the overall cost as well as the comparison of the cost relative to the expected benefits of the change. These benefits include the current and future benefits to both the public and the agency making the changes. Also, the project must fit within the overall budget of the agency making the changes.

Currently, no locally calibrated tool for South Dakota exists that captures the complexity of the current and future public benefits of proposed access management for estimating the financial and other benefits and comparing them with the associated financial costs. The benefits may be related to many local conditions including land use and zoning, roadway type and functional classification, traffic volumes, pedestrian and bicyclist volumes and characteristics, and the locations and other characteristics of access points. Given that many outcomes (i.e., safety and traffic operations) are related to human factors that are often unaccounted for in research, estimates of safety effects and operational changes associated with general access management methods provided in the *Highway Safety Manual* (3) and the *Access Management Manual* (4) may not be applicable in South Dakota. Also, more specific, complete estimates of the effects of access management methods on public benefits that are locally calibrated are desired when making decisions related to the value of the investment.

Research Objectives

This study seeks to accomplish the following research objectives:

- 1) Develop and validate a methodology for estimating the benefits to safety, operational efficiency, environment, and economic vitality resulting from proposed access management treatments.
- 2) Compile and derive data needed to support the benefit estimation methodology.
- 3) Build, demonstrate, and document a software tool to estimate the benefit of proposed access management improvements.

Research Methods

The research objectives will be met through the execution of the work plan. This includes a safety analysis of access management in South Dakota, use of traffic simulation, and accounting for potential financial benefits related to safety, traffic operations (e.g., delay), environmental factors, and the local economy. The results of this project will be used as a software tool that engineers and planners can use to evaluate the potential benefits of proposed access management treatments in the state of South Dakota.

Expected Outcomes

This research will develop a software tool for analyzing the financial benefits of proposed access management treatments. This tool will be useful in guiding decision making and for communicating potential benefits with the public.

Relevance to Strategic Goals

The expected outcomes of this project are directly related to the following goals: Safety and Livable Communities

Educational Benefits

This project will provide funding for two graduate students to work on a research project. It will also provide them with the mentoring of faculty members from both South Dakota State University and Penn State University.

Work Plan

The research objectives will be accomplished by completing the following tasks.

- Task 1: Meet with the project's technical panel to review the project scope and work plan.
- Task 2: Review literature pertaining to estimation of financial benefits of access management treatments, including those currently used by the City of Sioux Falls and SDDOT.
- Task 3: Interview key staff in SDDOT, the City of Sioux Falls, and the City of Rapid City to identify current and needed functionality for estimating financial benefits of proposed access management treatments and the data needed to provide that functionality.
- Task 4: Based on the literature review and interviews, suggest feasible methods for quantifying the benefits of access management treatments both in direct, non-economic terms and in monetized value. Describe their potential applications, outline their capabilities and limitations, and describe the physical and data resources needed to support them.
- Task 5: Submit a technical memorandum and meet with the project's technical panel to review the results of Tasks 2-4 and identify a preferred method for quantifying financial benefits of proposed access management treatments.
- Task 6: Fully develop the preferred benefit estimation method and assess its validity through an analysis of statistical reliability and demonstration in rural and urban case studies.
- Task 7: Submit a technical memorandum and meet with the project's technical panel to present the results of Task 6 and propose concepts for a software tool embodying the preferred benefit estimation method.
- Task 8: Develop crash modification factors and crash prediction models for commonly used local access management treatments.
- Task 9: Build a software tool that embodies the preferred access management estimation method.
- Task 10: Submit a technical memorandum and meet with the project's technical panel to demonstrate the software tool and obtain direction for needed modifications.
- Task 11: Based upon feedback from the project's technical panel, modify the software tool.

- Task 12: Prepare comprehensive documentation that provides guidance for using the tool, explains the methodology and underlying assumptions, identifies the supporting data requirements, and defines procedures for software configuration and maintenance.
- Task 13: Submit a technical memorandum and meet with the project's technical panel to review
- Task 14: In conformance with Guidelines for Performing Research for the South Dakota Department of Transportation, prepare a final report summarizing the research methodology, findings, conclusions, and recommendations.
- Task 15: Make an executive presentation to the SDDOT Research Review Board at the conclusion of the project.

Project Cost

Total Project Costs:	\$110,000
MPC Funds Requested:	\$ 35,786
Matching Funds:	\$ 74,214
Source of Matching Funds:	SDDOT

TRB Keywords

Access Management, Safety, Cost/Benefit, Traffic Operations

References

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