

Identifying Number MPC-349

Project Title:

Modeling, Analysis and Evaluation of Urban Arterial Work Zone

University:

North Dakota State University

Principal Investigator:

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Description of Research Problem:

Increased VMT, increased need for maintenance and rehabilitation, short construction period, resulting impact on network operation and congestion, and safety-sensitive nature of work zone, has made work zone mobility and safety in urban areas in the Mountain Plains region an important and continuing emphasis. North Dakota Department of Transportation (NDDOT) has developed policies to deal with work zone safety and mobility. Much research work has been done to understand the impact of freeway work zones. Some research has been done for issues related to closure of a bridge. The work for understanding the urban arterial work zones is lacking. The geometry, number of alternative routes, and controls for urban arterials are different from those of freeways, which make decision-making more challenging. Moreover, there is a need to develop, implement, and maintain work zone assessment and management procedures for any project in urban area which exceeds an estimated \$3,000,000 in cost and is on the urban regional system that either goes through a Metropolitan Planning Organization (MPO) boundary or city over 25,000 in population. This project will extend the capabilities of the state DOT and city traffic engineering departments in dealing with urban arterial work zones and in developing, implementing and maintaining work zone assessment and management procedures for the same.

Research Objectives:

The immediate research objectives are to: (1) survey the practices related to urban arterial work zone in the Mountain Plains region; (2)

analyze a current urban arterial work zone operation and examine the decision-making involved; (3) develop a framework for considering urban arterial work zones; (4) apply the developed framework for a future urban arterial work zone. This last objective is important because it provides the DOT and cities in small urban area with a more systematic way of designing and operating urban arterial work zone. The long-term objective for the federal, state, and local agencies is to ensure safe, efficient, and cost-effective urban arterial work zones.

Research Approach/Methods:

The first task includes the completion of a literature review and survey of urban communities to understand various practices related to decision-making, design, and operation of urban arterial work zones. The second task includes collection of field data from an existing urban arterial work zone with regard to volume, traffic control plans, signal plans, traffic diversion, delay, travel time, and other related data. This data collection will provide a basis for an assessment of urban arterial work zone issues. The data collection will be done before construction starts, soon after construction starts, after couple of weeks of the start of the construction, and finally after construction has been concluded. Third task will be analysis of data and development of appropriate models. Fourth task will be simulating urban arterial work for different scenarios under which urban arterial performs before construction, soon after construction, and during construction. Fifth task will be development of a framework for design, operation, and decision-making related to urban arterial work zone. Sixth task will be the application of the developed framework to an upcoming urban arterial work zone. Seventh and final task will be development of a project report documenting the reviews, analyses, models, findings, and case application.

MPC Critical Issues Addressed by the Research:

6. Work Zone Safety

11. Traffic Operations and Management

Contributions/Potential Applications of Research:

The outcome of this proposed project is (1) a comprehensive examination of issues related to urban arterial work zones in small

urban areas in the mountain-plains region, (2) guidelines for analysis of urban arterial work zone, and (3) development of a framework and its application to urban arterial work zones. The analysis and modeling will highlight the importance of issues such as traffic diversion, traffic controls, and impacts, which also needs to be looked into besides devising a traffic control plan based on MUTCD. The decision-making support can be provided by the lessons learned from such research. The work of cities and state DOTs in dealing with urban arterial work zone can be facilitated by such framework, findings, and analysis.

Potential Technology Transfer Benefits:

A workshop for city and state DOT traffic engineers in how to effectively adapt and use tools for analysis of urban arterial work zones will be conducted. In addition, the project will develop a lessons learned workshop, which may be useful to small urban areas in states in the region and beyond. The results will be disseminated via the Transportation Learning Network and LTAP Centers in the region.

Time Duration:

July 1, 2010 – June 30, 2011

Total Project Cost:

\$54,700

MPC Funds Requested:

\$ 25,964

Source of Matching Funds:

Dr. Amiy Varma will be devoting 14% of time to this project during the academic year (9 months) –funds from General Fund -- \$ 14,742

Indirect cost on MPC Request fund = $0.435 * 24,620 = \$10,709.70$

Total Match = \$ 14,847 + \$10,709.70 = \$28,736

TRB Keywords:

Urban arterial, work zone,