SPR RESEARCH PROGRAM
SECOND-STAGE PROBLEM STATEMENT
FY 2009-10

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I. PROBLEM NUMBER – RDDS-10-09

II. PROBLEM TITLE – Access Management in the Vicinity of Interchanges

III. RESEARCH PROBLEM STATEMENT

The evolution of access management has generally focused on the built urban environment where driveway density and the interactions of vehicles using the driveways can pose potential risk to the safety of drivers and other users; however, little attention has been given to the higher-speed conditions in the vicinity of interchanges where crash severity is potentially greater. In 1996, the Oregon Department of Transportation commissioned a series of access management background papers including one titled "Interchange Access Management (Background Paper #2)." This paper presented a comprehensive summary of the information available at that time regarding access management near interchanges and suggested that spacing standards be developed that are dependent on a variety of factors including decision sight distance, vehicle weaving, and expected traffic volume and queue length. In 2004, NCHRP Synthesis 332 titled "Access Management on Crossroads in the Vicinity of Interchanges" further summarized nationwide practices and recommendations for future research as the authors concluded that much is known about the influence of individual variables that affect access management, yet little is known regarding the combined effects of basic spacing criteria. They further suggested that nationally, the use of design speed is common for developing access management standards, but that alternative speed-based factors may be more appropriate and should be examined. For interchange locations specifically, the treatment of driveway and intersection spacing in the proximity of on-ramps and off-ramps should be evaluated to determine their influence. For example, the potentially higher-speed vehicles using an off-ramp and entering the crossroad traffic may have a greater variability in speed that is not consistent with the facility design speed. Similarly, vehicles targeting an on-ramp may have a different set of controlling variables (lane changes, braking, and deceleration) that should be considered when determining the placement of intersections (signalized and unsignalized) and driveways in the proximity of the interchange ramp termini.

IV. RESEARCH OBJECTIVES

This proposed research effort will specifically examine candidate methods for determining appropriate access management spacing standards in the vicinity of interchanges. Since the operational nature of the highway and the cross-road directly affects the interchange functionality, the research will compare interchanges with similar characteristics. For example, a freeway interchange with a high-speed cross-road will function very differently than a scenic parkway interchange with a low-speed road. A cross-section comparison of similar interchange characteristics will be the focus of the evaluation; however, in the event a collection of interchanges with lower-speed conditions can be identified, the research will also seek to determine how these lower speed locations should be treated differently.

The research will evaluate various speed options (design speed, operating speed, etc.), assess alternative sight distances (stopping sight distance, decision sight distance, intersection sight distance), and evaluate crash history at sample locations. These candidate measures of effectiveness will help the research team identify boundary conditions for safe placement of access points in the proximity of interchanges. In addition, potential fluctuations in traffic volume or horizontal and vertical geometry can also influence safe conditions, so the research will also include an assessment using microscopic computer simulation (CORSIM, VISSIM, or similar) to test various spacing criteria assumptions and their expected influence due to combined effects on traffic operations (speed, delay, queue length, etc.). The goal of this project is to determine enhanced spacing guidelines for Oregon that will minimize conflicts in the vicinity of interchanges and thereby improve safety at these locations. The spacing criteria assessment will include distance from on-ramps and off-ramps to signalized intersections, unsignalized intersections and commercial driveways.

V. WORK TASKS AND DURATION

ID	Task	Month(s)
1.	**Literature Review:** The literature review will identify literature that focuses on access management in the proximity of interchanges. It will specifically seek to identify regional studies in addition to those published in national journals. An interim report will be prepared.	3

ID	Task	Month(s)
2.	**Data Collection and Assessment:** The research team will identify a variety of Oregon interchanges, acquire geometric and operational data as available, and analyze this data to determine access point density and location with respect to interchanges. For a sub-set of the sites, the research team will sample the operating speeds to determine their relationship to the design and posted speed limit. This information can then be incorporated with task 3 and 4 items to assist the research team in developing recommendations that will enhance safety and traffic operations in the vicinity of Oregon interchanges.	6
3.	**Evaluation of Crash Data at Study Locations:** The research team will use historic crash data for corridors in the vicinity of interchanges to determine recent crash conditions (within the most recent five years) and how this information corresponds to access point placement, road characteristics, and operations.	2
4.	**Microscopic Simulation:** To evaluate car behavior patterns and interactions between facility users, the research team will develop microscopic simulations in VISSIM, CORSIM, or similar and evaluate how changing certain road features (such as access density) will directly influence road operations. This information will complement the crash data to help the research team determine the boundaries of various access management strategies and their performance in the proximity of interchanges.	3
5.	**Recommendations:** The research team will compile the results of tasks 2, 3, and 4 to use as a basis for recommendations for ways to enhance safety and traffic operations on facilities in close proximity to interchanges.	2
6.	**Reports:** The research team will prepare draft and final reports compiling the results presented in the interim report as well as the final recommendations.	2

The estimated cost of this research project is **$148,000** with an **18-month** schedule.

VI. IMPLEMENTATION

It is expected that the results of this research effort will be recommendations that can be used as a tool for ODOT to further refine existing spacing standards at interchange locations. The research team will make presentations to the appropriate officials as deemed necessary by ODOT and the TAC in order to disseminate this information to the appropriate representatives of ODOT or other agencies.

VII. POTENTIAL BENEFITS

The ultimate benefit of this research effort would be to enhance safety and traffic operations on roads in the vicinity of Oregon interchanges. It will also provide supplemental information regarding how vehicles exiting the higher speed off-ramps may operate differently than those vehicles that are simply traveling past the location or driving towards the on-ramps. One result of this research could be to identify location types where design exceptions may be appropriate using current crossroad spacing standards. The study results could also be used as a tool for ODOT to further refine existing spacing standards at interchange locations.

VIII. SUBMITTED BY

Stage 1 Submitter	*Stage 2 Submitter*	*ODOT champion*
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