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16. Abstract Recently, as part of Project 0-4174, Texas Transportation Institute (TTI) researchers developed maintenance traffic control plans (TCPs) for select mobile and short duration operations, as well as guidelines for choosing whether protection vehicles (i.e., trail and shadow vehicles) are needed based on roadway type, roadway volume, and posted speed limit. The objective of this implementation project was to facilitate the adoption of these procedures by the Texas Department of Transportation districts as a means of increasing the safety of mobile and short duration maintenance operations. To do this, researchers gathered input concerning these procedures from TxDOT personnel in five TxDOT districts. Based on the input received, researchers made revisions to the draft mobile and short duration maintenance TCPs and protection vehicle guidelines. In addition, researchers created and revised color-coded maps for each district that visually depict the protection vehicle guidelines.					
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FACILITATION OF THE IMPLEMENTATION OF MOBILE AND SHORT DURATION MAINTENANCE OPERATIONS GUIDELINES

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DISCLAIMER

This research was performed in cooperation with the Texas Department of Transportation (TxDOT) and the Federal Highway Administration (FHWA). The contents of this report reflect the views of the authors, who are responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official view or policies of the FHWA or TxDOT. This report does not constitute a standard, specification, or regulation, nor is it intended for construction, bidding, or permit purposes. The engineer in charge of the project was Melisa D. Finley, P.E. (TX-90937).

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INTRODUCTION

Maintenance work is often accomplished using mobile or short duration work zones. Mobile operations typically consist of one or more vehicles that move along the road continuously or intermittently at very slow speeds relative to the normal traffic stream. Short duration operations involve work that occupies a location for up to one hour.

Recently, as part of Project 0-4174, Texas Transportation Institute (TTI) researchers developed maintenance traffic control plans (TCPs) for select mobile and short duration operations, as well as guidelines for choosing whether protection vehicles (i.e., trail and shadow vehicles) are needed based on roadway type, roadway volume, and posted speed limit. [Table 1](#) contains a summary of the recommendations. These TCPs and guidelines are intended to aid TxDOT maintenance personnel (who are not engineers) in their decisions regarding which traffic control devices are needed for the various types of maintenance operations they conduct on a day-to-day basis.

Table 1. Summary of Project 0-4174 Guideline Recommendations.

Maintenance Operations	New TCPs	Protection Vehicle Guidelines
Striping, RPM installation/removal, & shoulder texture	1 mobile for undivided roadways 1 mobile for divided roadways	Trail vehicle
Spot pothole patching, spot edge repair, sweeping, herbicide, retroreflectivity measurements, core sampling, & temporary tab removal	1 mobile for undivided roadways 1 mobile for divided roadways	Shadow vehicle
Short-line striping & in-lane rumble strips	1 mobile for undivided roadways	NA
Sign, delineator, & lighting maintenance (work on or near shoulder)	1 short duration for undivided & divided roadways	NA

RPM – Raised Pavement Marker; NA – Not Applicable

The objective of Implementation Project 5-4174-01 was to facilitate the adoption of these procedures by TxDOT districts as a means of increasing the safety of mobile and short duration maintenance operations. To do this, researchers gathered input concerning these procedures from TxDOT personnel in five TxDOT districts. Based on the input received, researchers made revisions to the draft mobile and short duration maintenance TCPs and protection vehicle guidelines. In addition, researchers created and revised color-coded maps for each district that visually depict the protection vehicle guidelines.

IMPLEMENTATION PROCESS

In order to facilitate the adoption of the mobile and short duration maintenance TCPs and protection vehicle guidelines developed as part of Project 0-4174, researchers completed the following five tasks, which are described in more detail below:

- Task 1 – Identify Districts,
- Task 2 – Categorize State Roadways,
- Task 3 – Organize and Facilitate Meetings,
- Task 4 – Prepare Implementation Documents, and
- Task 5 – Prepare Technical Report.

TASK 1 – IDENTIFY DISTRICTS

Researchers worked with TxDOT to identify and verify that the following five districts were interested in participating in this implementation project: Abilene, Lufkin, San Angelo, Waco, and Wichita Falls. The TxDOT project director then identified one person within each of these districts to participate on the project advisory panel. Next, a project meeting was held to explain the implementation project to the panel members and receive their input regarding the work plan.

TASK 2 – CATEGORIZE STATE ROADWAYS

The draft guidelines for choosing whether protection vehicles (i.e., trail and shadow vehicles) are needed are based on roadway type (two-lane, multilane undivided, and multilane divided), roadway volume (average daily traffic), and posted speed limit. During this task researchers categorized the state roadways in each of the five districts by these three factors. This process was accomplished using the 2003 TxDOT Roadway Highway Inventory Network (RHINO) database.

Researchers then mapped the state roadway network for all five districts and color-coded each roadway based on the guidelines (i.e., whether or not a protection vehicle was needed). Two sets of maps were made for each district: one showed the trail vehicle guidelines and one showed the shadow vehicle guidelines. These visuals, as well as the draft maintenance TCPs for select mobile and short duration operations and protection vehicle guidelines, were sent to the

five districts for review. In addition, the districts used the color-coded maps in Task 3 to help determine how the recommended guidelines would be used in their areas.

TASK 3 – ORGANIZE AND FACILITATE MEETINGS

In April 2006, TTI researchers and the TxDOT project director traveled to the five districts to facilitate meetings with TxDOT personnel in order to receive input regarding the draft mobile and short duration maintenance TCPs and protection vehicle guidelines. More specifically, researchers wanted to discuss any desired changes, the potential effect on daily operations, and the best implementation methods. [Table 2](#) shows the number of attendees at each of these meetings.

Table 2. Summary of District Meeting Attendance.

District	Date	Number of Attendees
Waco	April 11, 2006	9
Lufkin	April 12, 2006	18
San Angelo	April 17, 2006	22
Abilene	April 18, 2006	9
Wichita Falls	April 19, 2006	10
Total		68

TTI researchers submitted a technical memorandum (5-4174-01-1) to the TxDOT project director and TxDOT project advisory panel that contained a summary of the comments received at the district meetings and included recommendations for revising the draft mobile and short duration maintenance TCPs and protection vehicle guidelines. The majority of the concerns revolved around having adequate personnel and equipment to accomplish the desired setups, the liability of implementing the protection vehicle guidelines, and the ability of district personnel to use additional site-specific factors for choosing whether a protection vehicle is needed (e.g., accident history, roadway alignment, presence of shoulders, shoulder width, etc.). The districts suggested the following means to implement the protection vehicle guidelines: internal memorandum, inclusion in the forthcoming work zone manual, development of a worksheet procedure which allows personnel to document decisions, and inclusion in traffic control training program. Overall, the districts preferred the worksheet procedure since it would allow for the documentation of other factors considered and the process followed to reach a decision (i.e., whether or not a protection vehicle was needed).

TASK 4 – PREPARE IMPLEMENTATION DOCUMENTS

Based on the input received in Task 3, researchers made revisions to the draft mobile and short duration maintenance TCPs and protection vehicle guidelines. In addition, researchers revised the color-coded maps generated in Task 2 using 2004 TxDOT RHiNo data. All of these implementation documents were submitted directly to the project director.

TASK 5 – PREPARE TECHNICAL REPORT

This report documents the implementation process.

SUMMARY

The objective of this implementation project was to assist TxDOT personnel with the adoption of the mobile and short duration maintenance TCPs and protection vehicle guidelines developed as part of Project 0-4174 as a means of increasing the safety of mobile and short duration maintenance operations. Researchers gathered input from TxDOT personnel in five TxDOT districts. Based on the input received, researchers made revisions to the draft mobile and short duration maintenance TCPs, draft protection vehicle guidelines, and color-coded maps that visually depict the protection vehicle guidelines.

