



Project Summary Report O-4747-S

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Project O-4747: Assessing the Impacts of Active Nighttime Work Zones upon Motorist and Worker Safety

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Motorist Safety at Active Nighttime Work Zones in Texas

Across Texas, more and more road work is being done at night (Figure 1). However, very few data have been collected to quantify whether traffic safety is improved or worsened by shifting work activities to night hours.

Crash rates on roadways are normally higher at night because visibility is reduced and a greater proportion of drivers are impaired or drowsy. On the other hand, traffic volumes are much lower at night, which reduces the overall level of traffic exposure to work activities. Working at night also reduces the frequency and extent of traffic queues that are created, a condition that correlates with increased crash risk. In this project, researchers quantified and



Figure 1. Across Texas, More and More Night Work Is Being Performed.

characterized the level of traffic safety risks associated with night work activities in Texas and evaluated the likely effectiveness of several countermeasures that have been proposed to further improve night work zone safety.

What We Did...

Researchers first traveled to several Texas Department

of Transportation (TxDOT) districts to identify, characterize, and quantify the amounts and types of nighttime work activity currently being done in Texas. In addition, researchers identified several highway projects being performed at night and conducted a before-during crash comparison using the Department of Public



Safety (DPS) crash database. Researchers also conducted a series of observational studies to quantify the amount and types of safety problems currently being experienced in nighttime work zones.

Once these data had been collected and analyzed, researchers developed a simplified procedure to estimate and compare the additional crashes that would be expected to occur by doing a particular roadway project at night versus doing the same project during the day. Finally, researchers identified and evaluated the potential cost-effectiveness of several countermeasures that others have recommended for implementation at night work zones.

What We Found...

Researchers found that the amount of active night work occurring in the districts correlates well with the overall traffic demands in the district (expressed as total vehicle-miles-traveled per lane-mile of responsibility). However, researchers did not find a significantly greater propensity for night work zone crashes or for more severe nighttime

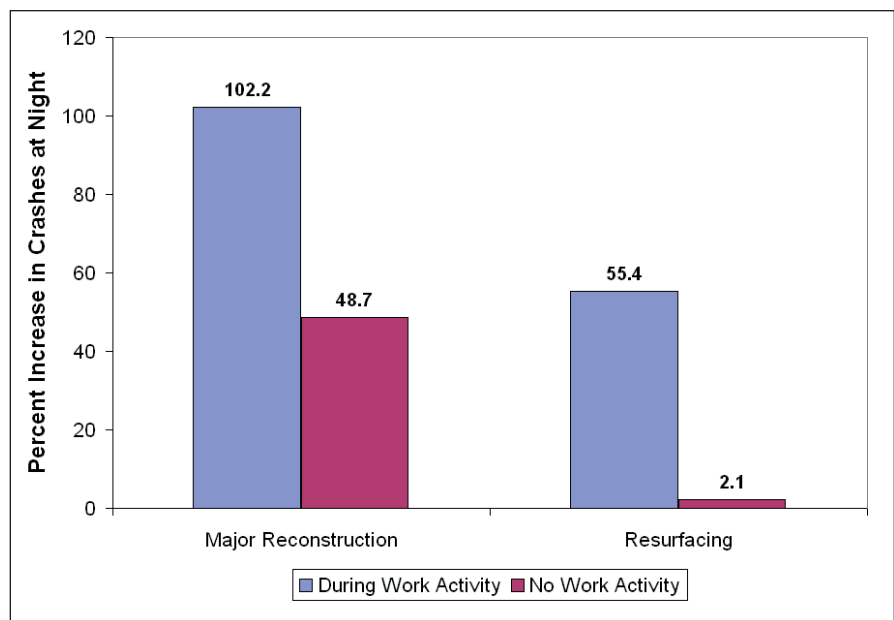


Figure 2. Increases in Crashes at Night at Major Reconstruction Projects and Resurfacing Projects.

crashes overall in those districts with significant amounts of night work.

When individual work zone projects were examined, researchers did find that crashes increased rather substantially on nights with work activity as compared to nights when work was not occurring. As shown in Figure 2, major reconstruction projects that involved temporary geometric restrictions through the work zone had more frequent crashes at night both when work was occurring and when it was not. However, the amount of the increase was much higher during nights of work activity.

At resurfacing projects that did not require long-

term geometric restrictions through the work zone, crashes increased only on nights when work activity was occurring. Interestingly, the differences between nights of work activity and nights with no activity were approximately the same in both cases, slightly more than 50 percent.

Although the magnitude of these percentage increases was significant, the more critical question was whether these increases meant that more crashes would occur by doing the work at night rather than during the day at the same location. To estimate these types of consequences, researchers developed daytime and nighttime



crash rate estimates for several ranges of average annual daily traffic (AADT) volumes per lane and highway type, and assumed that crashes during work activity done in the daytime would increase by a percentage smaller than that for crashes during nighttime work activity. Even with such conservative assumptions, the number of crashes that would be expected during an equivalent amount of time needed to complete a particular work activity was found to be much less at night than during the day on interstate highways, as illustrated in Figure 3.

The results were less conclusive when night work activities on U.S. highways were considered. Rather than suggest that night work is inappropriate for these types of roadways, however, researchers concluded that the evaluation methodology is rather sensitive to the normal crash rate assumed to exist on the particular roadway section being compared. Therefore, researchers developed a simple evaluation procedure to compare the expected crash differences between doing work at night and doing the same work during the day.

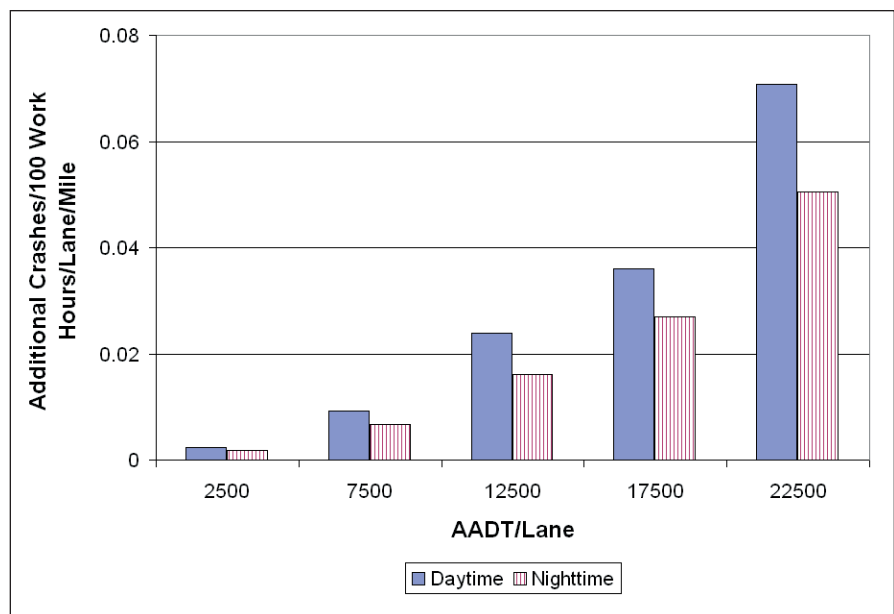


Figure 3. Additional Crashes Expected during Work Done at Night versus during the Day at a Given Location.

In this way, practitioners who have unique roadway or crash characteristics could evaluate their particular situations more accurately if they so choose. This procedure also allows for different assumptions to be used with respect to increases in crashes expected during night work or day work, should better data regarding these increases become available.

The Researchers Recommend...

Based on the results of the crash evaluation, researchers recommend that TxDOT continue to perform road work at night when justified on the

basis of high traffic volumes and other factors, as switching to nights in most cases will result in safer conditions for the traveling public. With regard to the potential countermeasures that have been suggested for use when performing night work, researchers could not justify adoption of any of them as statewide policy based on an economic comparison of costs to expected benefits. However, these countermeasures should still be considered by traffic control designers on a case-by-case basis if unusual conditions warrant.



For More Details...

The research results, recommendations, and evaluation guide are included in reports 0-4747-1, *Assessing the Safety Impacts of Active Night Work Zones in Texas*, and 0-4747-2, *Evaluating the Safety Risk of Active Night Work Zones*.

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