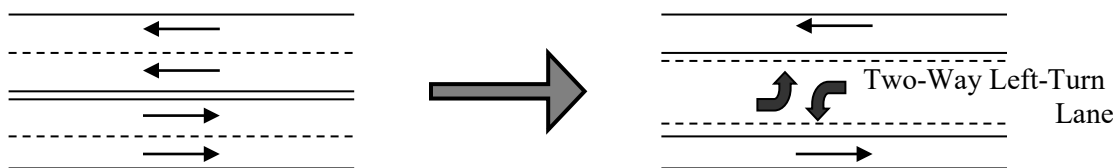


## TRAFFIC AND SAFETY INFORMATIONAL SERIES FREQUENTLY ASKED QUESTION #21

### WHY CONVERTING A FOUR-LANE STREET TO A THREE-LANE STREET MAY IMPROVE SAFETY AND NOT INCREASE CONGESTION

Operational and safety problems along a roadway can develop as traffic increases. The original design of the roadway may not be adequate or match current traffic patterns, and conflicts between turning and through vehicles may become significant. Recently, it has been found that some four-lane undivided roadways can be improved if converted to a three-lane cross section (see Figure 1). If feasible, this type of conversion can improve safety and have minimal impacts on congestion or traffic operations.



**FIGURE 1** Four-lane undivided roadway conversion to a three-lane roadway.

#### HOW IS SAFETY IMPROVED?

The National Cooperative Highway Research Program (NCHRP) has released several reports that address the safety benefits of adding two-way-left-turn lanes (TWLTLs) or raised medians to previously undivided roadways. Model results show that that addition of a TWLTL results in a lower crash rate than those along an undivided roadway (see Table 1).

**TABLE 1** Average Annual Crashes per Mile per Year Predicted by Various Models

Average Daily Traffic (ADT)	Predicted Crashes on an Undivided Roadway	Predicted Crashes on a Roadway with TWLTL
10,000	48	39
20,000	126	60
30,000	190	92
40,000	253	112

Source: *Converting Four-Lane Undivided Roadways to a Three-Lane Cross Section: Factors to Consider*. Center for Transportation Research and Education, Iowa State University, 1999.

Based on past research and several case study results (see the following section), it was expected that in certain instances a roadway with a three-lane cross section may have a lower crash rate than the existing four-lane undivided roadway. In addition, data from Minnesota indicate that three-lane roadways have a crash rate 27 percent lower than four-lane undivided roadways. Safety improvements from this type of conversion are typically a result of a reduction in speed variability, a decrease in the number of conflict points, and improved sight distance for drivers turning left.

The three-lane cross section removes left-turn vehicles from the through lanes, and this reduces the number of conflicts between them and the through traffic (in comparison to a four-lane undivided roadway). The number of lanes that need to be crossed by left-turn and minor street vehicles also decreases. These improvements usually decrease the probability of rear-end, sideswipe, and/or angle crashes along a roadway. The overall decrease in decision complexity helps all drivers but is especially preferable for areas with large populations of older drivers.

The conversion of urban four-lane undivided roadways to three lanes may also improve pedestrian and bicycle safety. Four-lane undivided urban roadways do not usually serve pedestrians and bicyclists very well. Converting a four-lane undivided roadway to a three-lane cross section can allow the provision of a bicycle lane, and surveys from past conversions show that pedestrians, bicyclists, and adjacent landowners typically prefer the three-lane cross-section environment. The somewhat slower and more consistent speeds of the three-lane roadway are more desirable.

### CASE STUDY ANALYSIS RESULTS

Several cities in Iowa have completed or are considering the conversion of urban four-lane undivided roadways to a three-lane cross section. This type of conversion has also been completed throughout the United States. Two cities in Iowa, Storm Lake and Muscatine, have had a positive experience with a four-lane undivided a three-lane cross section cross section. There has generally been a positive public response, and city officials are pleased with the resulting traffic flow and increased safety. When safety is an issue, the Iowa Department of Transportation believes that the feasibility of this type of conversion should be evaluated.

Table 2 summarizes the results and anecdotal conclusions from several Iowa case study conversions. There is a general indication that the conversion of a four-lane undivided roadway to a three-lane cross section can improve the safety of a roadway without dramatically decreasing the level of service provided. These types of results, however, are only produced when the conversion is feasible and applied at the appropriate locations.

**TABLE 2 Iowa Case Study Analysis Results**

<b>Location</b>	<b>Approx. Average Daily Traffic</b>	<b>Safety</b>	<b>Operations</b>
Storm Lake— Flindt Drive	8,500	Improved	No notable decrease
Muscatine— Clay Street	8,400	Improved	Not available
Sioux Center—US 75	14,500 (changed?)	Not available	Expected average arterial speed decrease of 2.6 mph
Iowa Falls—US 65	8,700	Not available	Expected intersection delay per vehicle increase of 0.5 seconds

Source: *Converting Four-Lane Undivided Roadways to a Three-Lane Cross Section: Factors to Consider*. Center for Transportation Research and Education, Iowa State University, 1999.

### For more information

For more information, please contact \_\_\_\_\_