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Mass Evacuation: Using Multiple Contraflow Loading Points

SUMMARY

Single loading points for contraflow lanes may create traffic bottlenecks, particularly when jurisdictions use complex traffic-control schemes. Transportation engineers and law enforcement personnel should consider establishing multiple contraflow loading points to relieve traffic congestion and to facilitate the full use of contraflow lanes.

DESCRIPTION

Hurricane Ivan prompted nearly half of New Orleans' population to evacuate in September 2004. Evacuating motorists drove nearly 80,000 vehicles along Interstate 10 (I-10) West to destinations in Louisiana and Texas. The Louisiana State Police (LSP) and the Louisiana Department of Transportation and Development (LA DOTD) implemented contraflow in I-10's eastbound lanes to maximize westbound traffic flow. These agencies loaded the contraflow lanes via a single two-lane crossover near the Loyola Drive interchange in Kenner.

Median Crossovers and Contraflow

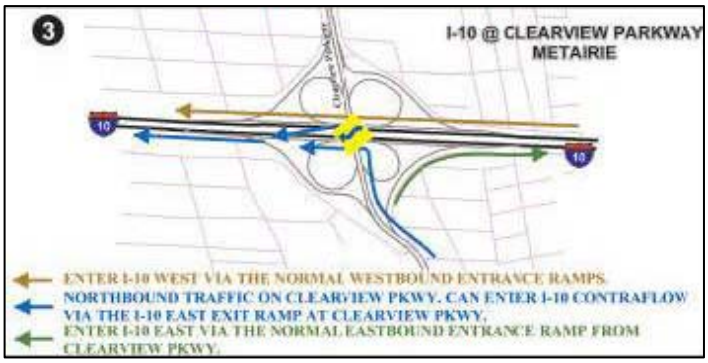
Contraflow sections of roadways are frequently loaded via median crossovers. Crossovers can be used to divert lanes of traffic from the non-contraflow to the contraflow side of the roadway directly across the median.

The Loyola Drive crossover created a traffic bottleneck that led to heavy congestion on the westbound lanes. The bottleneck stemmed from a number of causes:

- The use of a single loading point concentrated all the demand to enter contraflow lanes on one point. This is similar to trying to evacuate a crowded room through a single narrow doorway.
- Some motorists had to change lanes to access (or to avoid) the entrance to the contraflow lanes. This behavior contributed to traffic congestion before the median crossover.
- Vehicles had to slow down to safely drive through the median crossover, which was not designed for high-speed use.
- The temporary traffic-control measures on the interstate caused motorists to naturally reduce speed. In some cases, drivers stopped to ask questions of the law enforcement officers staffing the traffic-control point.

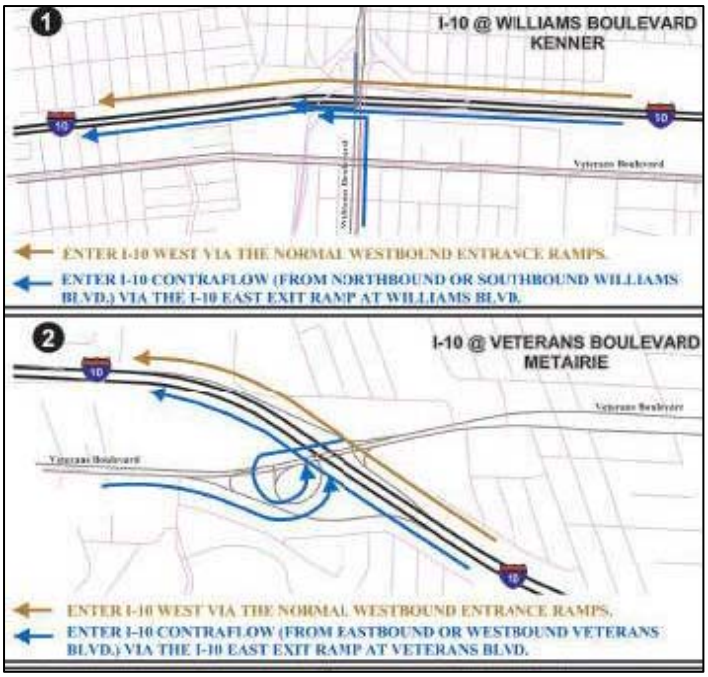
The capacity of the contraflow lanes was therefore limited by the capacity of that single loading point, and the bottleneck decreased the rate at which cars could enter those lanes. As a result, the contraflow lanes were not used at their full capacity. The bottleneck also created delays for the traffic that intended to continue in I-10's non-contraflow lanes. Some motorists reportedly experienced 12-hour delays en route to Baton Rouge during the Hurricane Ivan evacuation. The drive to Baton Rouge typically takes only 1 to 2 hours under normal conditions.

LSP and LA DOTD established a task force to review the Hurricane Ivan evacuation. The task force reached two key conclusions regarding how to improve loading for the I-10 contraflow operation. First, the task force concluded that the use of multiple loading points would spread the demand to enter contraflow lanes among several parts of the interstate. As a result, the demand at each loading point would become more manageable, and traffic flow would improve.



I-10 West's Initial Contraflow-Loading Point (Crossover and Intersection Loading)

Second, the task force recommended using interchange loading points to load vehicles onto the contraflow lanes directly from the secondary routes via the normal exit ramps at those interchanges (see inserts). These loading points would move all traffic-control devices and their associated bottlenecks off the freeways and onto the secondary routes. This would allow traffic on the interstate to travel freely. The interchange loading points, which resemble ordinary entrance ramps, would also appear more familiar to motorists and thus reduce motorists' tendency to slow down.



I-10 West's Two Additional Contraflow-Loading Points (Intersection Loading)

Source: [Metropolitan New Orleans Contraflow Route Map]

The joint task force revised the New Orleans evacuation plan to include multiple loading points for I-10's contraflow lanes. LSP and LA DOTD chose the loading points based on factors such as interchange configuration, construction requirements, emergency access, and population distribution. The agencies finally decided on one median crossover and three interchange loading points in Metairie and Kenner. Traffic-flow modeling predicted the revised plan would increase outbound traffic volume by about 25,000 vehicles over a 12-hour period.

LSP and LA DOTD used this revised contraflow plan to evacuate New Orleans when Hurricane Katrina threatened the city in August 2005. The use of these multiple contraflow loading points prevented major bottlenecks and increased the use of the contraflow lanes. Partly due to this improved loading process, Katrina evacuees experienced only 2- to 3-hour delays en route to Baton Rouge.

Single loading points for contraflow lanes may create traffic bottlenecks, particularly when jurisdictions use complex traffic-control schemes. Transportation engineers and law enforcement personnel should consider establishing multiple contraflow loading points to relieve traffic congestion and to facilitate the full use of contraflow lanes.

CITATION

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