



# Project Summary

Texas Department of Transportation

## 0-5238: Improved Temporary Traffic Control Guidelines For Urban Freeway Interchanges

### *Background*

Navigating through work zones in the vicinity of complex urban freeway interchanges can be particularly challenging to motorists. Numerous existing and temporary guide signs, presence of short auxiliary lane segments, multiple lane exits, high merging traffic volumes, and other conditions in the work zones present complex driving situations and place considerable work load on drivers. A driver's work load and driving complexity increase even more when the travel path is temporarily altered in approach of, and through, the interchange. Traffic control designers often find it difficult to adequately convey lane closure, lane assignments, travel paths, and other warning information using traditional temporary traffic control signs and temporary pavement markings.

Similarly, a need exists for an objective assessment of how best to make pavement marking selection decisions for work zones. Lane shifts, crossovers, and other temporary changes in alignment often require the roadway into and through a work zone to be temporarily re-stripped. The traffic control designer has the choice of using paint, thermoplastic, ceramic buttons, or other types of material for this purpose. On one hand, it is desirable that the material selected be durable enough to last for the duration of the temporary change in alignment for that particular project or project phase. On the other hand, since the application is temporary and will eventually be removed or covered, it is desirable to use as inexpensive a material as possible with an anticipated service life for that particular application that simply exceeds the temporary duration.

### *What the Researchers Did*

Researchers conducted surveys and field investigations at several freeway interchange work zones to identify issues and challenges to temporary traffic control in and around urban freeway interchanges. Several laboratory studies were then conducted to identify and evaluate improvements to address these issues and challenges.

Researchers also investigated and developed an objective methodology for selecting the most appropriate pavement marking material for work zone situations, based on the duration of the project or project phase for which the marking is needed, type of pavement surface the marking will be placed on, and durability of the various marking materials available for use in work zone situations.

### *Research Performed by:*

Texas Transportation Institute (TTI),  
The Texas A&M University System

### **Research Supervisor:**

Gerald L. Ullman, TTI

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### **Project Completed:**

8-31-07

Researchers used monthly project progress estimates, National Transportation Product Evaluation Program (NTPEP) and other pavement marking material durability data, pavement marking cost data, and Monte Carlo simulation methods to develop the methodology.

## *What They Found*

Researchers found that driver lane choice decisions for both through and exiting maneuvers at freeway interchanges are significantly degraded if lane assignment arrows on advance guide signs have to be removed or covered because the signs no longer align over shifted travel lanes. In these situations, providing temporary guidance using orange-on-black diagrammatic signs and/or pavement symbols designating route and direction assignments on the travel lanes themselves significantly improves driver comprehension and lane choice. If used, pavement symbols need be installed only in the exiting lanes. However, traffic control designers may wish to include pavement symbols in all lanes if traffic volumes are very high and likely to obscure the exit lane pavement symbols from drivers in other lanes.

Results of the Monte Carlo simulation analyses indicate that, as would be expected, paint is the lowest total cost marking material to use on both asphalt and concrete pavements for project phases lasting less than six months and with traffic volumes less than 20,000 vehicles per day. Furthermore, paint continues to be the lowest cost alternative at longer project phase durations for lower traffic volume conditions on both types of pavements. However, thermoplastics and raised pavement markers (RPMs) are the lowest total cost alternatives for longer project phase durations and higher traffic volumes on asphalt pavements, and RPMs are the lowest cost alternative for these conditions on concrete pavements. These recommendations will change slightly if the traffic control designer assumes a more risk-averse (i.e., conditions anticipated to be worse than typical) or a risk-tolerant (i.e., conditions anticipated to be better than typical) position with regard to pavement marking material selection.

## *What This Means*

The technical report includes guidelines to aid traffic control plan designers in two important areas:

- specific temporary traffic control items to be checked and considered for work zones in and near freeway interchanges, and
- selection of the pavement marking material to specify for a particular project or project phase on a particular roadway.

### *For More Information:*

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