

## Methods to Reduce Construction-Induced Traffic Delay

### Introduction

In recent years, Oregon highway construction has moved towards resurfacing, restoration, and rehabilitation (3R) projects and away from building completely new transportation facilities. Typically, 3R work results in more traffic disruption than construction of new facilities. Construction of new transportation facilities does not usually interfere with traffic to a great extent, because much of the work is done outside regular traffic flow. At the same time, Oregon's vehicle-miles-of-travel have significantly increased. Vehicle-miles-of-travel increased 39% between 1980 and 1990 and an additional

20% since 1990. Together, these changes have resulted in more construction-induced delay, representing a significant cost to system users. This kind of disruption can create adverse impacts on local economies, major inconveniences to the traveling public, and increased risk to highway workers.

Good traffic management reduces motorist and highway worker exposure to construction work zones. A number of methods have the potential to reduce worker exposure and traffic delay associated with construction. Familiar methods include using detours around construction areas and doing road construction at night. There are other methods used by agencies to reduce construction work zone delay, including:

- Innovative contracts – aimed at reducing the length of construction contracts,

- Public information activities – providing the public the opportunity to avoid work zones, and
- Intelligent Transportation System solutions – providing real-time traffic flow information.

Both urban and rural areas are impacted by construction delay - urban areas because of heavy traffic and rural areas because few alternatives exist for routing traffic around construction zones. While some delay associated with construction work zones is expected and accepted by the public, there is a growing intolerance of avoidable delay.

### Methods Available

The objective of traffic management is the development and implementation of an overall strategy, allowing construction and maintenance operations to be completed safely with minimum impacts on motorists, highway workers and the community. It involves a comprehensive series of actions designed to minimize motorist delay while enhancing the safety of the motorist and highway worker.

#### Innovative Contracts

Three specific contracting practices have been shown to generally shorten contract times.

Cost-plus-time bidding requires a contractor to include an estimated project length as part of the bid in addition to the standard project cost information. Cost-plus-time bidding permits the agency to award contracts based both on cost and project duration, placing

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the burden of estimating the contract time on the contractor.

Incentive/disincentive clauses are used to provide an incentive to contractors to complete contract work on time. A fee is *paid to* the contractor if the work is completed early and a fee is *charged to* the contractor if the work is completed late. The dollar amount must be high enough to motivate the contractor to finish in a timely manner, but not so high that the contractor ends up realizing a loss on the project because of a short delay. Oregon's experience using this method has found it to be more manageable and productive when the incentive/disincentive clause is used for specific portions of a project. By using this on focused portions of a project, we can better insure that the incentive is targeted to the portion that most affects the traveling public.

Lane rental fees encourage contractors to minimize the effect construction has on road users during construction by charging the contractor a fee to close a lane to traffic. The rental fee is based on the estimated cost of delay or "inconvenience" to road users during the rental period and depends on the number and type of lanes closed. The fee may vary by time of day and be set higher during peak hours and lower (usually zero) during the night. Lane-by-lane rental assesses a charge only when the contractor closes a portion of the roadway. By putting a price on decreasing a road's vehicle capacity and transforming it into a cost borne by the contractor, an incentive to effectively manage lane closure is established.

Oregon uses these techniques as well as others. Cost-plus-time bidding has reduced contract duration in Oregon. Oregon uses incentive clauses, but not disincentive clauses, which are not allowed under Oregon law. Instead, Oregon uses lane rental fees as the incentive to minimize traffic exposure to construction work zones. Oregon also uses another technique worth mentioning here, called "limit of on-site time." This clause lists a generous completion date for the project, but strictly limits the actual time allowed on the construction site. This method balances the contractors' need for flexibility with the road users need to limit exposure to construction work zones. It has worked well in Oregon.

### Public Information Activity

Public information activity informs people of expected delay and construction duration in advance, giving system users the opportunity to change their usual travel patterns and avoid the construction area. The means used to spread the word about construction depend on the nature of the project and relative cost of disseminating information, relative to the user cost of delay. Methods available include:

- published material like fliers and direct mailings;
- radio, newspaper, and television announcements;
- construction zone signs;
- use of short-range radio transmission;

- contact with private service organizations like AAA and Oregon Trucking Associations;
- an internet web site with up-to-date information and/or real-time video of construction site;
- a telephone hotline;
- direct community outreach; and
- coordination with State Police.

The I-5 Bridge-Lift Repair Project in Oregon is an example of the successful use of public information, as travel on the bridge was reduced by 47% during the construction period.

### Intelligent Transportation Systems

Intelligent Transportation Systems (ITS) are often associated with safety, but there are applications that can keep traffic flowing in construction zones. Real-time traffic control and incident management systems can significantly reduce traffic delay. Technologies available for this use include:

- traffic queue detectors;
- computer programs maximizing traffic flow;
- a radio communication system that transmits data to a traffic control center;
- variable message signs – permanent overhead-mounted signs;
- portable trailer-mounted signs;
- brick modular message signs;
- temporary ramp metering; and
- pagers for key construction staff.

This kind of traffic management is useful for projects of relatively long duration or having the potential to impose large delays.

## **Conclusion**

Effective construction project management and work-zone traffic management are a continuous series of acts aimed at balancing project cost, quality of work, safety, motorist delay, and time to complete a project. There are a number of techniques available for agencies to use. No method is particularly more successful than others. Each technique has characteristics that fit specific types of projects or certain stages of projects. Using these methods together at the appropriate stage of projects successfully reduces traffic delay associated with construction work zones.

The information presented in this article was taken from "Working Paper: Methods to Reduce Construction Induced Delay, April 2000." Copies of this paper can be obtained by request from the author.

