

Traffic-Handling Procedures During Maintenance and Reconstruction to Promote Safety and Minimize Delays

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In urban expressway maintenance projects, planning traffic control procedures requires as much time as making repairs. Therefore, these techniques must be constantly improved to minimize traffic delays and to accomplish the necessary improvements safely. This paper presents the Illinois Department of Transportation's urban Interstate maintenance project experience and uses the 1971 Kennedy-Dan Ryan Expressway rehabilitation project as a case study. Procedures for the planning of this project were based on experience gained from the 1966 Edens Expressway resurfacing project and involved a series of steps. Some essential components of this procedure include the formation of a task force to prepare the project contracts and the arrangement of meetings with various highway agencies and interested public and private transportation organizations. Proper timing of the elements of the planning effort ensures success of full news dissemination concerning the project. These efforts are designed to avoid congestion at the project's inception and to ensure that the motorist makes advance plans about alternate routes or modes of travel. The public information program is closely correlated with the success of the planned control measures.

The Illinois Department of Transportation has operational responsibility for the 135-mile (217-km) Chicago Metropolitan Expressway System, which carries more than 15 million vehicle-miles of travel daily and 25 percent of all of the vehicle-miles traveled within Chicago. Approximately 20 miles (32 km) of this system accommodates two-way daily traffic demands in excess of 200,000 vehicles (Fig. 1).

Drivers on urban Interstate facilities daily encounter peak-period delays caused by accidents, vehicle disablement, or lane closures for pavement repair. Figure 2 shows the peaking characteristics of an eight-lane urban expressway. Growth in urban Interstate travel demand has lengthened the peak periods, and public criticism of even off-peak lane closures for any type of maintenance is increasing. This public attitude plus the fact that the Interstate facilities are getting older and require more major preventive maintenance has emphasized the need for proper project planning. The public is more tolerant of congestion caused by accidents and disabled vehicles than it is of planned maintenance activities that require lane closures.

Figure 1. Maximum observed daily traffic volumes (in thousands of vehicles) in spring 1972.

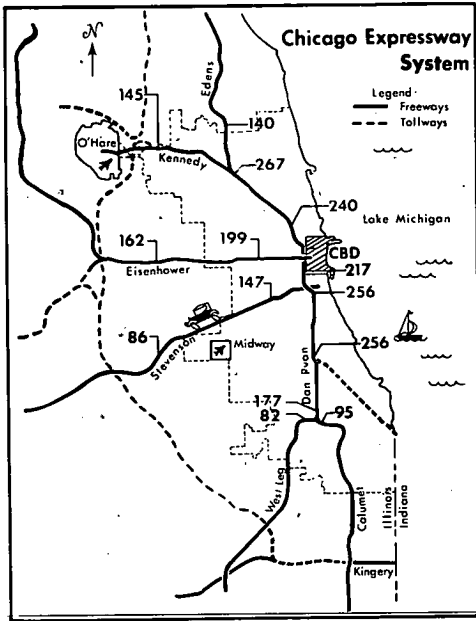
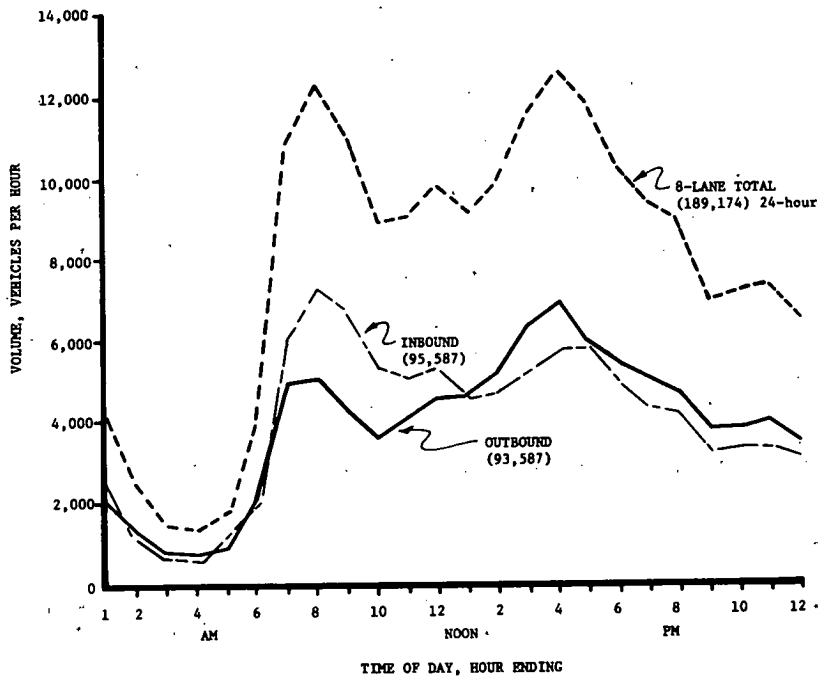


Figure 2. Hourly traffic volumes on Eisenhower Expressway at Sacramento Boulevard.



URBAN INTERSTATE EXPERIENCE

The Illinois DOT's urban Interstate maintenance experience began in 1966 when the Edens Expressway (I-94) was resurfaced. Because of the major traffic impact of this 90-day project for which two lanes of the six-lane facility were closed, we attempted to develop traffic procedures that would provide an acceptable level of traffic service and allow adequate working areas to expedite work completion. Use of critical path techniques for project evaluation allowed a review of the benefits of various means of work accomplishment from one lane to full roadway closures.

Since the Edens Expressway (I-94) project, we resurfaced the Eisenhower Expressway (I-90) in 1968, the Calumet Expressway (I-94) in 1969, and the Kennedy Expressway (I-94) in 1971. On these projects the work was phased within two lane closures. As funding allowed, we used the lane closures to accomplish all types of necessary maintenance and traffic work. Signing, guardrail modernization, bridge painting, sewer cleaning, bridge handrail construction, bridge waterproofing, pavement marking, and other improvements were performed during the resurfacing work.

Since the 1966 project, the motoring public has accepted the need for expressway maintenance. Project planning that emphasized traffic control techniques and public information efforts contributed greatly to this acceptance. Because we fully explained our intended actions before they were implemented and we provided informational assistance including control sketches and maps, we obtained cooperation from the news media. In fact, media representatives were disappointed when the expected chaotic congestion did not occur.

KENNEDY-DAN RYAN PROJECT

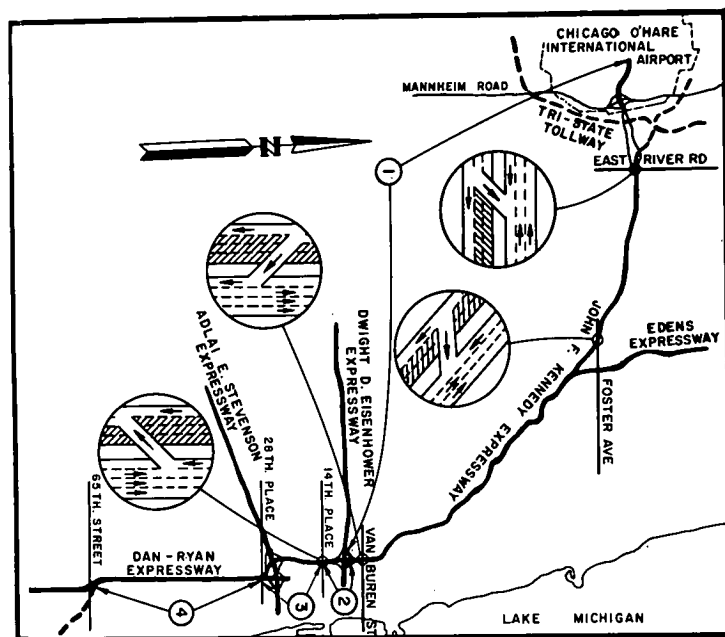
In 1971 the \$16 million rehabilitation of the Kennedy Expressway (I-94) and Dan Ryan Expressway (I-90/I-94) was undertaken. To complete the project within the 15-week schedule, we planned two 10-hour shifts per day. The specific improvements (Fig. 3) are listed below.

1. Between Mannheim Road and the Eisenhower Expressway, the existing 10-in. (254-mm) portland cement concrete (PCC) pavement was structurally restored and resurfaced with 3 in. (76 mm) of bituminous concrete wearing surface. All main-line expressway bridges were repaired, and metal handrails were removed and replaced with PCC parapet walls. All cross-street bridges over the expressway were painted, and thermoplastic pavement marking was installed throughout the section.
2. Between the Eisenhower Expressway and 14th Place, the existing 8-in. (203-mm) continuously reinforced pavement was removed and replaced with 10 in. (254 mm) of continuously reinforced pavement on a 4-in. (102-mm) stabilized subbase; geometric modifications at the Chicago Circle interchange were included.
3. On the Dan Ryan bridge between 14th Place and 28th Place, the existing median guardrail was removed and replaced with a concrete barrier wall. Pavement surface and joint repairs were made.
4. From 28th Place to 65th Street, the existing 8-in. (203-mm) reinforced pavement in the local lanes was removed and replaced with a 10-in. (254-mm) continuously reinforced PCC pavement on a 4-in. (102-mm) stabilized subbase. No work was done on the express lanes in this area.

Project Procedures

Planning this 1971 project involved the following steps. A task force composed of design, construction, maintenance, and traffic personnel was formed to prepare the project contracts, to fully evaluate the necessary repairs, and to determine the traffic phasing and controls. A project traffic engineer was assigned for the duration of the project. A meeting was held with other highway agencies and interested public and

Figure 3. Crossover locations on Kennedy-Dan Ryan Expressway project.



private transportation organizations to discuss the impact of the proposed work and to identify possible conflicting work areas affecting alternate routes. Potential traffic control problems were reviewed with enforcement personnel.

Before contract bidding, a meeting was held with contractors to discuss the project work, phasing, and the importance of maintaining the required traffic controls. Briefings were held with regional communications center dispatchers, expressway emergency patrol supervisory staff, expressway surveillance personnel, and Kennedy-Dan Ryan Expressway maintenance yard supervisors to discuss the traffic control plans. In addition, individual radio traffic reporters were briefed on the details of traffic phasing, recommended alternate routes, and other modes of travel available.

The secretary of the Illinois DOT held a formal press conference to discuss justification for the Dan Ryan Expressway pavement replacement because of expected public interest. Film clips showing the specific problem areas of the roadway were distributed. Another press conference was held to announce the project approximately 1 week before work started. A department public information officer was designated to serve as liaison between news media and project personnel. Field trips were arranged after the conference to accommodate the individual media filming needs. On the day of the press conference, cross-street bridge-mounted signs read, **KENNEDY-RYAN REPAIRS BEGIN JULY 5TH—ONLY 2 LANES OPEN**. Advisory signs were also erected on approaching Interstate routes, including portions of the Illinois Tollway, to publicize alternate routes.

Private companies responsible for large changeable-message advertising signs adjacent to the Kennedy and Dan Ryan Expressways were requested to publicize the starting date of the project.

On the day the project began traffic engineers accompanied commercial radio helicopter traffic reporters to explain traffic control procedures. Up-to-date traffic reports were provided through the state regional communications center. The office

staff was augmented to handle citizen inquiries about alternate routes, closed ramps, and access to high traffic generators.

Weekly work status reports were issued throughout the project, and any special project work features were highlighted. Field trips were arranged for the news media throughout the project to discuss project features with traffic engineers, construction engineers, and contractors.

Signs thanking the motorists for their cooperation were erected at the finish of the project. Press releases announced the project completion ahead of schedule, and the contractors earned bonuses for the early completion.

Project Communications Planning

The timing of some of the elements in the foregoing procedure was very important to ensure the success of full news dissemination regarding the project. We normally plan a press conference within a week of the start of a project and attempt to hold all project information so that maximum attention is ensured at the time of the formal announcement. If the press conference precedes the work start by too long a period, the press is not interested in republicizing the beginning of the work and highlighting the control details.

Because our efforts are oriented to avoid congestion at the project start and to ensure that the motorist makes advance plans about alternate routes or modes of travel, we give maximum publicity to the project immediately before the work start. Traffic control details such as which lanes and ramps will be closed, where the median cross-overs are located, and what special traffic provisions are made for high traffic generators must be publicized extensively for motorist safety.

For a safe and congestion-free start on these large projects, we give great consideration to which day lane closures are initiated. There is a tendency to begin projects on a Monday. This detracts from the effectiveness of the informational program because the motorist has all weekend to forget the control information disseminated. He is more likely to remember radio messages regarding the project start if he hears them the previous day. Also, the heavy Monday and Friday traffic conflicts are avoided when the first barricades are placed.

There is a close correlation between the public information program and the success of the planned traffic control measures. A closed expressway lane is not a unique experience to the motorist. However, when an express lane is created by reversing traffic, ramps are closed, and median crossovers are operated over a 3-month period to facilitate traffic movement, good communications to the motorist are essential.

Lane Closure Staging and Control

The Kennedy-Ryan Expressway project required special staging of lane closures. The work was planned in two stages, each having two phases. We worked in one direction at a time, each direction representing one stage. Normally each work phase represented the number of major lane control shifts necessary to complete the work on one directional roadway. The staging shown in Figure 4 was complicated by the differing roadway geometrics, which varied from four lanes (area A near O'Hare field) to 10 lanes (area D where the median reversible lanes exist between two four-lane roadways).

It has been our practice to reverse traffic within a directional roadway (Fig. 5). A physical delineation created by tire-covered traffic cones establishes an express lane so that two traffic lanes are provided in each direction in a six-lane cross section having a two-lane work area. Signing legends for the typical median crossover are shown in Figure 5. Trucks were normally restricted from express lanes.

After the motorists gain experience in traversing the work area, traffic control problems do not develop until there are major project phasing changes. Traffic shifts to newly resurfaced lanes, changes in barricade placement, and redesignation of ex-

Figure 4. Traffic patterns for stage 1, phase 1 of rehabilitation project.

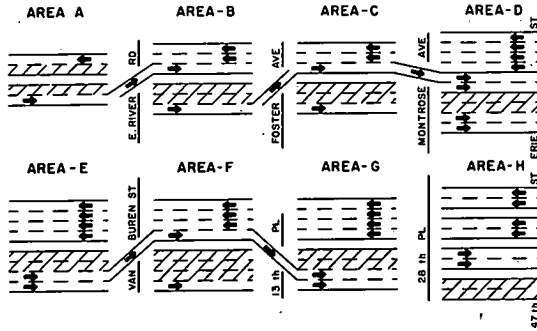


Figure 5. Crossover advance signing.

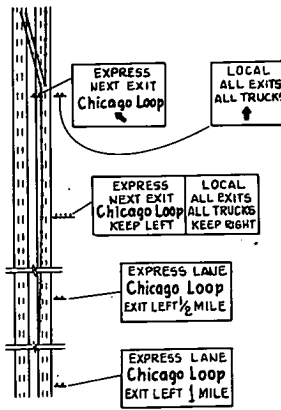


Table 1. Percentage change in weekday traffic counts.

Expressway Location	Normal ADT	Stage 1	Stage 2
Kennedy at Cumberland Peak ^a	130,000	-40	-25
Kennedy at Cicero Peak ^a	125,000	-50/-50	-40/-40
Kennedy at Ohio Peak ^a	210,000	-35	-25
Dan Ryan at 55th	115,000	-35/-45	-25/-45
Edens at Wilson	230,000	-40/-30	-35/-50
Edens at Church	105,000	-5	-5
Eisenhower at Sacramento	190,000	0	+5
Eisenhower at East	125,000	0	+5

^aPercentage change for a.m./p.m.

press reverse lanes create new control situations that require motorist understanding.

Speed limit reductions to 45 mph (72 km/h) within the construction area have been utilized on these resurfacing projects. Normally this limit is unnecessary during peak periods and too low in off-peak times. The enforcement agencies cooperate fully in providing the necessary control surveillance.

Expressway Volumes

The percentage changes in weekday traffic counts (both directions) were recorded during the 1971 Kennedy-Ryan resurfacing project (Table 1). Normally from midnight to 6 a.m. the volume change was slight. As indicated in Table 1, the biggest impact was during the peak periods. Traffic observations on the Edens Expressway reflected the effects of the adjacent Kennedy Expressway lane closure. Traffic increases on the Eisenhower Expressway resulted from traffic diversions to avoid the project congestion.

Special Traffic Activities

The Department of Transportation maintains a 41-vehicle fleet of emergency traffic patrol vehicles. Patrolling the expressway system on a 24-hour basis serves a valuable function during major reconstruction projects. Prompt removal of accident or disabled vehicles ensures minimum congestion on the already heavily used lanes. Patrolmen report work area traffic problems and any barricade or signing conditions that require remedial action by the contractor.

The Expressway Surveillance Project with its traffic detection and ramp-metering system provides continuous traffic flow information. This is utilized to evaluate work-site control effects and to report traffic conditions to the media.

The traffic control procedures developed during these urban expressway reconditioning projects require as much planning as the physical repairs. The techniques used must be constantly improved to minimize traffic delays and safely accomplish the necessary improvements.