Nighttime Construction

Developing a Specification for Road Work at Night

GERARD E. KENNEDY

More and more states are scheduling construction work at night because of high traffic volumes during the day. Nighttime work, however, has its own hazards. A comprehensive specification can help in adapting to the special circumstances of working at night.

Problem
In 2002, the Nova Scotia Department of Transportation and Public Works (NSTPW) had to repave about 8 kilometers of Highway 125—a two-way, two-lane highway that serves as the main arterial route connecting several communities. In summer, the average daily traffic regularly exceeds 25,000 vehicles, with hourly peaks of more than 2,300 vehicles. The highway is close to reaching its capacity.

Detours were not practical, because the alternative routes also were almost at capacity during the day. The repaving therefore had to be carried out during nighttime hours when traffic volumes were low, to avoid traffic delays and queues that would be unacceptable to highway users.

NSTPW occasionally had performed highway construction work at night but had developed few specific safety requirements. Because Highway 125 would be the first major paving project requiring all work to be done at night, NSTPW decided to develop a specification to address the special concerns of working at night. The measure also would respond to the requirement for due diligence under Nova Scotia’s Occupational Health and Safety Act.

Solution
To develop the specification, NSTPW staff relied on published findings from two recently completed National Cooperative Highway Research Program (NCHRP) projects:

◆ NCHRP Report 476, Guidelines for Design and Operation of Nighttime Traffic Control for Highway Maintenance and Construction, which was a source of practical advice on traffic control devices, safety features, and the operation of a nighttime traffic control system;1 and

◆ NCHRP Report 498, Illumination Guidelines for Nighttime Highway Work, which described the three levels of illumination recommended for nighttime construction.2

NSTPW also obtained comments and specifications from many state and provincial departments of transportation (DOTs) in the United States and Canada that had experience with nighttime construction.

In the past 2½ years, NSTPW has continued to update the specification from experience and onsite observations. For example, a minimum level of point illumination recently was added to the lighting requirements to reduce the variability of illumination in the work area.

The specification addresses several areas of primary concern in working at night. First, NSTPW analyzes predictions of work zone capacity and traffic flow to establish the hours of work.

The specification defines the following three levels of illumination:

2 http://trb.org/publications/nchrp/nchrp_rpt_498.pdf; or contact TRB Online Bookstore, www.TRB.org/bookstore/; click on NCHRP and Reports.
1. Level 1, 60 lux—general site lighting for workers on foot;
2. Level 2, 110 lux—for working near certain types of equipment—for example, behind the paver, so that quality control personnel can monitor the pavement mat closely; and
3. Level 3, 220 lux—required at stations for traffic control persons (TCPs).

The contractor must assemble a trial setup of the traffic control and light systems for NSTPW review before work can begin. The specification also establishes requirements for traffic control devices that will be used at night, such as signage, flashing light units, and channelization—that is, redirecting the traffic flow with temporary markers.

The construction contractor must submit a detailed night work plan, which includes night-related traffic control plans, site safety rules, and training materials. The plan also must include detailed lighting plans designed by a professional engineer with expertise in lighting.

TCPs and other workers must receive special training in carrying out their duties at night and must wear high-visibility apparel. TCPs also must have radio communication with other TCPs and staff on the work site.

Haul trucks must have reflective signs mounted on the tailgates, directing motorists not to follow into closed traffic lanes. Trucks and heavy equipment also must add reflective material to produce an outline of the vehicle. All vehicles on the site must have rotating incandescent lights.

**Application**

The specification was employed during the 10-week construction period for the Highway 125 night paving project. No worker safety incidents occurred, and no complaints were received from motorists who passed through the work site.

The amount of illumination provided was adequate for a safe work environment and for high-quality work—the contractor earned a bonus for the asphalt work. Design of the lighting plan by a professional ensured that the light tower setup and the lamp-aiming geometry would minimize the glare.

Detailed observations of all aspects of the specification enabled improvements to be made for subsequent projects. The specification was used on five projects in 2003, including a full deck replacement and a structural upgrade of a major bridge. Much of the bridge rehabilitation had to be carried out at night.

Several nighttime construction projects have applied the night work specification in 2004, and others are scheduled for the 2005 construction season.

The specification continues to undergo updates and improvements each year.

Notable changes in the latest revision include using only drums to channelize roads with higher traffic volumes; tightening the spacing between channelization devices; setting minimum values for point illumination; and requiring an internal traffic control plan for each work zone, setting out a strategy for the safe operation of construction vehicles on the site.

**Benefits**

By implementing the NCHRP research findings and by learning from the experiences of other DOTs, Nova Scotia now has a state-of-the-art specification for night work. The specification has proved effective and practical, and improvements continue in response to on-site observations and further study.

Contractors have found the nighttime work productive—haul vehicles do not have to wait in the long queues that develop during daytime traffic. The motorist delays that were common during daytime construction and maintenance operations were minimized on project sites.

In addition, several jurisdictions in North America have used the NSTPW specification as a model for the development or improvement of their own night work specifications.

For more information contact Gerard E. Kennedy, Project Engineer, Nova Scotia Department of Transportation and Public Works, P.O. Box 1180, Sydney, Nova Scotia B1P 6J9, Canada (telephone 902-563-2518, fax 902-563-2517, e-mail kennedge@gov.ns.ca).

**Editor’s Note:** Appreciation is expressed to Amir Hanna, Transportation Research Board, for his efforts in developing this article.

Suggestions for “Research Pays Off” topics are welcome. Contact G. P. Jayaprakash, Transportation Research Board, 500 Fifth Street, NW, Washington, DC 20001 (telephone 202-334-2952, e-mail gjayaprakash@nas.edu).