

additional burden on the maintenance activities. In particular, there is an entire network of system detectors in addition to the loop detectors at each intersection. This was complicated by another city program to resurface the streets, destroying some of the newly installed detectors.

- All of these problems associated with the new system have forced the department to reexamine its maintenance program from a top-down view. They are attempting to reorganize their maintenance structure by looking at two things: the fundamental maintenance requirements of each piece of hardware, and the skills needed to perform that maintenance. The intention is to compare those needs with the existing maintenance organization, and restructure the organization accordingly. This will also reveal any holes in the future maintenance program that need to be filled.
- They are also addressing the problems associated with the need for special groups of technicians for the new systems. There has been an effort to establish a new class of maintenance personnel, with a pay bonus to compensate for the additional skills that are necessary.
- Because of the serious budget problems in the city, a lot of maintenance work is being contracted out. All of the advanced, technical maintenance is still done by the city personnel, but contracts are being let for other work. One potential solution to the financing problem is the federal funds that may soon be available for operations and maintenance activities.

Mr. Nordby concluded by noting that many automated systems around the country will be facing these same maintenance issues in the coming years. Although the current emphasis seems to be on system implementation, after a short period it will shift to the day-to-day concerns of operations and maintenance.

## **INFORM Operations and Maintenance**

*David C. Powell*

*New York State*

*Department of Transportation*

The New York State Department of Transportation has implemented an integrated traffic management system on Long Island called INFORM. In his presentation, Mr. Powell discussed five important elements needed to keep a system like INFORM operational. His comments about each of those items are summarized below.

- Funding for operations and maintenance is the most important issue. Most transportation agencies are not accustomed to projects that have annual cost for operations and maintenance that equal approximately 10 percent of the constructed cost, particularly in the period immediately after implementation. Funding for capital costs is relatively easy to obtain. On the other hand, operations and maintenance funding is unpredictable and difficult for most agencies to secure.
- Upper-level management support within the agency is another important issue. When the INFORM project was about to go on-line, the department officials were unfamiliar with many of the system components and became concerned about some of the promises being made. They were reassured once they had the opportunity to meet with people involved in other successful systems.
- The state has used a different approach for meeting the staffing needs of the INFORM system. The private sector has been relied upon for a significant amount of the work. This approach is expected to continue. The project involved a collection of entirely new technologies, and the state did not possess the necessary skills to maintain them. Thus, it was always assumed that the maintenance work would be done by a contractor. There is also a consultant for the operation of INFORM. The initial plan was to phase-out

the use of an operating consultant, but that has changed because the current arrangement seems to work well.

- The people who work with INFORM are always looking for opportunities to expand, enlarge, and enhance the system. Money has been made available for an IVHS project on Long Island that could be integrated with the INFORM system. There are also plans to expand the system in several directions, add new hardware components, and possibly relocate the control center. The state has also developed a unique relationship with a consulting firm for designing INFORM features into other corridor projects.

The final point that Mr. Powell made was that operations and maintenance efforts should be decentralized to the lowest possible level in the organization. It is very difficult to keep a system like INFORM in operation with a top-down approach from a central office.

### **ITMS Operations in Seattle**

*Peter M. Briglia  
Washington State  
Department of Transportation*

Mr. Briglia provided a description of the efforts being made to integrate traffic management systems in the Seattle area. Currently, their systems are primarily freeway-based, but they are moving toward integration in several areas. His comments about those efforts and the operations and maintenance issues are summarized below.

- The existing traffic management system consists of 1,200 loop detectors, 23 metered ramps, 55 closed-circuit television cameras, 22 variable message signs, and 6 highway advisory radio stations. It covers about 30 miles of freeway, and about 7 of those have ramp metering. There are plans to expand the system to about 60 miles of freeway. The system crosses numerous jurisdictions, and the expansion will involve several more.
- A major effort is underway to convince those municipalities of the benefits of ramp metering, which can be a challenge.
- The department is also working on plans for traffic management systems in the cities of Tacoma and Vancouver, Washington. Typically, there is a lot of discussion about interagency coordination for traffic management, but it is also necessary to think about the integration of different districts within the department. Sometimes that can be as difficult as integrating separate agencies.
- One example of a successful integration effort is a traffic information telephone hot line, 622-CARS. The objective of this program is to provide a single source of regional traffic information for motorists. In addition to traffic conditions, it provides construction information and road conditions that have been downloaded from city and county agencies.
- There is also a computer-generated graphic of freeway congestion information that is distributed to other agencies. The system is not used very effectively yet, but it does have significant potential in an integrated system for sharing real-time information among agencies.
- The Seattle area has many miles of both freeway and arterial HOV lanes in place or being planned. Like freeways, the HOV lanes cross many jurisdictions as well, and the operation of these facilities needs to be integrated in future systems.
- Currently there are two traffic management teams that meet regularly. One of the teams is working to implement a multi-jurisdictional traffic signal coordination system south of Seattle. A problem with these teams is that they are perceived as DOT controlled, and it has been difficult to get other agencies to participate actively.
- There are some specific problems with respect to the operation and maintenance of