



SCAN TEAM REPORT

NCHRP Project 20 68A, Scan 11-01

Leading Practices in Large-Scale Outsourcing and Privatization of Maintenance Functions

Supported by the

National Cooperative Highway Research Program

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Executive Summary

Overview

The National Cooperative Highway Research Program (NCHRP) Project No. 20-68A, U.S. Domestic Scan Program, is a broad initiative intended to identify innovative practices used by some transportation agencies that potentially could be adopted by other agencies to help advance their own state-of-the-practice. The purpose of the scan program is to facilitate sharing of information and technology among the state departments of transportation (DOTs) and other transportation agencies and identify actionable items related to the dissemination of the scan's findings and implementation of the improved practices identified in the scan.

The purpose of this scan was to review leading DOT practices for outsourcing of maintenance activities. Outsourcing in this context refers to the use of resources not under the DOT's direct ownership or management to maintain transportation system facilities or equipment. These resources may be engaged under leases, labor contracts, or other business arrangements.

Maintenance outsourcing is practiced to a limited extent by many agencies, but typically on a small scale (e.g., through rental of specialized equipment and hiring of temporary labor). When outsourcing becomes large-scale (e.g., engaging contractors to perform selected maintenance activities within a particular district or highway corridor), complex management problems can arise.

Large-scale outsourcing is sometimes implemented by spinning off or otherwise eliminating an organizational unit within an agency, then engaging private enterprise to perform the maintenance functions previously performed by in-house forces. Such instances of outsourcing may be termed privatization. An agency's maintenance division may be asked to submit a bid to continue providing maintenance services, in what is sometimes termed managed competition with outside vendors.

Scan 11-01, *Leading Practices in Large-Scale Outsourcing and Privatization of Maintenance Functions*, was initially undertaken to consider privatization only. However, the practitioners comprising the scan team judged that limited experience with privatization of transportation system maintenance and the difficulty of distinguishing privatization from many other large-scale outsourcing instances would severely limit the scan's value. The team therefore expanded its scope of inquiry to consider all maintenance outsourcing. However, the primary focus of the team's work and of this report is large-scale outsourcing, including privatization. Unless important distinctions need to be made, this report refers to all such practices as outsourcing.

The scan team undertook a review of recent experience with large-scale maintenance outsourcing to identify leading practices that might offer lessons for other agencies. The team focused particularly on:

- Maintenance functions and specific practices outsourced
- Factors contributing to the decision to outsource maintenance
- Contractual arrangements, procurement practices, and performance management
- Experience with implementation of outsourcing, including obstacles encountered
- Agency self-assessment of the advantages and disadvantages of maintenance outsourcing

The scan team first conducted a review of published literature and anecdotal knowledge of agencies’ outsourcing experience. Based on this review, the team invited representatives from 11 states to participate in a workshop where they could present their agencies’ maintenance outsourcing experience; eight of the nine states represented on the scan team made presentations as well. All together, 19 agencies shared their outsourcing experiences and discussed their assessments of these experiences. In addition, representatives of the Association for the Management and Operations of Transportation Infrastructure Assets (AMOTIA) gave a presentation at the workshop, representing contractors’ perspectives. Table ES.1 lists the presenters’ names and affiliations. The scan format is described in Chapter 1.

Table ES.1 Workshop presenters

Invited presenters	Affiliation
Eric Pitts, State Maintenance Engineer	Georgia DOT
Brian Burne, Highway Maintenance Engineer	Maine DOT
Russ Yurek, Director, Office of Maintenance	Maryland DOT
Steven Cook, Operations/Maintenance Field Services Engineer	Michigan DOT
Elizabeth Wright, State Maintenance Engineer	Missouri DOT
Anita Bush, Chief Maintenance & Asset Management Engineer	Nevada DOT
Charles Goodhart; Director, Bureau of Maintenance & Operations	Pennsylvania DOT
Joseph Baker, Acting Administrator, Division of Highway/Bridge Maintenance	Rhode Island DOT
Kevin Griffin, Engineer for Maintenance	Utah DOT
Robert Prezioso, State Infrastructure Manager, Maintenance Division	Virginia DOT
Todd Matheson, State Maintenance Engineer	Wisconsin DOT
Peter Loughlin and David Rader	AMOTIA
Scan team	Affiliation
Agustin Rosales; Chief, Roadway Maintenance, Division of Maintenance	California DOT
Tim Lattner, Director, Office of Maintenance	Florida DOTD
Leslie Mix, Maintenance Management Administrator	Louisiana DOTD
Caleb Dobbins, State Maintenance Engineer	New Hampshire DOT
Jennifer Brandenburg, State Road Maintenance Engineer	North Carolina DOT
Greg Duncan, Team Chair and Director of Maintenance	Tennessee DOT
Carolyn Dill, Director of Maintenance Management	Texas DOTD
Robert “Chris” Christopher; Director, Maintenance & Operations	Washington State DOT

Principal Findings

In the workshop and subsequent discussion, the scan team identified and drew its conclusions about leading practices in maintenance outsourcing. Chapters 4 and 5 present the scan findings and plans for implementation. Following are the scan team’s key findings.

Maintenance Functions Suited to Outsourcing

A variety of economic and political factors will determine whether outsourcing of some or all maintenance activities is likely to yield benefits for a particular agency. The great variety in how agencies define particular maintenance activities makes it virtually impossible to catalog all of those activities that one agency or another has outsourced.

Some agencies effectively outsource their entire maintenance operation; in all of these instances, the scan-team found that such outsourcing engages another government entity. Some agencies have outsourced all maintenance within a specific highway corridor or geographic area to private vendors. The following are examples of maintenance activities that at least one transportation agency has chosen to outsource on a significant scale:

- Vehicle fleet outfitting and upkeep
- Highway guardrail and crash attenuator repair
- Roadway striping and marking
- Winter pavement treatment and snow plowing
- Right-of-way mowing and litter removal
- Drain cleaning and culvert repair and replacement
- Bridge inspection, washing, and painting

The outsourcing itself may be accomplished in a number of ways. Most typically, the agency responsible for operation and maintenance of a particular class of assets (e.g., a portion of a highway network, a vehicle fleet, or a set of traffic signals) will contract with another agency (e.g., a county or city) or a private-sector firm to provide specific services. The agreement may be limited to a specific length of time (e.g., five years) and establish specific compensation to be paid, or it may be open-ended and compensate for costs incurred. Developing and administering such contract agreements represents one of the more significant challenges in outsourcing.

In many cases, government regulations mandate bidding and open competition before the outsourcing contract can be negotiated and executed. Specifications and performance measures must be carefully crafted. Such requirements may pose a significant management burden for the agency, slow the outsourcing process, and add to its costs.

Other arrangements that qualify fundamentally as outsourcing include use of volunteer labor (e.g., adopt-a-highway programs and reliance on abutting property owners for grading of low-volume rural roads); use of prison labor; and even engagement of part-time workers, who do not receive the same salary or benefits as full-time staff. Such arrangements play a small part in maintenance outsourcing in U.S. practice.

Factors Likely to Influence the Decision to Outsource

The following factors have been most significant in persuading agencies to make substantial use of maintenance outsourcing:

- Inadequate staffing (e.g., because of authorized staffing levels insufficient to handle recurring peak workloads, mandates to limit or reduce staffing, or regulatory or contractual limitations on staff assignments)

- Need for specialized expertise or equipment (e.g., for vehicle or signal-system upkeep)
- Constitutional assignment of road-maintenance responsibilities among government entities
- Mandated use of private-sector providers (e.g., to seek efficiencies or reduce agency expenditures)

Determining whether outsourcing an activity will be financially advantageous to an agency or the larger government entity of which it is a part requires accurate information on costs. However, public-agency accounting practices are poorly suited to identifying either the full costs of specific maintenance activities performed by the agency or the agency's costs associated with outsourcing those activities. The scan team found that, in general, outsourcing decisions have not been based on thorough financial analyses.

Motivations for Large-Scale Outsourcing

Outsourcing is a way that agencies can increase their capacity to provide services in response to peak demands (e.g., by renting equipment or engaging consultant services). When practiced on a larger scale, maintenance outsourcing may be seen as a way to reduce agency staffing and the long-term liabilities associated with direct employment and asset ownership. It may also be seen as a means of taking advantage of the perceived efficiencies or excess capacity of other organizations.

The scan team encountered several reasons why particular agencies have undertaken maintenance outsourcing:

- To address seasonal or other significant variations in maintenance workloads (e.g., snow-plowing following a major storm)
- To avoid excessive investment in equipment or stockpiled materials that may be under-utilized (e.g., for line-painting)
- To take advantage of opportunities to shift maintenance efforts to lower-cost providers
- To seek opportunities for economies of scale by combining operations with other entities
- To reduce agency civil-service personnel rosters
- To reduce maintenance costs

While reducing maintenance costs often is an impetus for considering outsourcing, information presented to the scan team showed no clear evidence that significant cost reductions have been demonstrated. Some agencies suggest that savings may be achievable; however, none of them were able to present documentation of actual savings. Outsourcing industry representatives participating in the scan reported that their repeated meetings with agency financial staff have failed to yield evidence of cost savings.

Obstacles to establishing clear evidence of savings include the fundamental complexity of accounting for the full costs of particular services delivered in a corporate context and the typically different scope of the operations for contractor- and agency-provided services. In addition, some agencies using outsourcing required higher levels of service from the contractor than previously required from their in-house crews, which adds additional complexity when trying to compare costs. For example, guardrail repair and crack sealing entail use of distinct materials and methods; however, each properly bear a share of an agency's administrative costs, pension liabilities, and other indirect costs that the agency does not routinely calculate. In addition, agency maintenance crews may flexibly perform multiple functions during their normal operations without reporting precisely what they have done. Contractors tasked with providing

specific services are being paid amounts adequate to recover the full costs of those services

Essential Precursors to Large-Scale Outsourcing

Experience indicates that an agency should have a number of items in place before undertaking any large-scale maintenance outsourcing:

- **A comprehensive inventory of the assets to be maintained**
The contractor must be able to know with accuracy what is to be maintained and the working conditions within which the maintenance is to be accomplished. This asset inventory must encompass all assets that the agency wishes to include in a maintenance contract (e.g., all guardrail or drainage structures within a particular geographic area or corridor).
- **An analysis of the assets' current condition**
This analysis is the baseline against which maintenance performance is to be measured. Level-of-service or condition standards may be set at any level desired; however, experience indicates that outsourcing contracts should initially be written with standards no higher than current levels. The condition analysis may be performed on a statistically relevant subset of the inventory to be maintained (e.g., a random 10 percent sampling of the system to be covered).
- **Documentation of the agency's current standard maintenance operating procedures and performance**
This documentation will typically include such characteristics as frequency of inspections, time to repair, and relevant traffic control and environmental protection requirements. As in the case of condition and level-of-service standards, the agency may require any practices desired; however, experience indicates initially emulating those that the agency is currently providing will avoid conflicts caused by sharp differences in practice from one part of the system to another.
- **An effective system for qualifying and evaluating prospective contractors**
Agencies are likely to have in place such a system for construction projects, but experience indicates that maintenance outsourcing involves special requirements. For example, agencies should have the ability to very quickly deal with unexpected events or to correct errors.

These precursors are needed to support the development of technical specifications to be included in the maintenance contract. Experience indicates that agency personnel responsible for developing such specifications should engage the contracting industry to ensure that the contract requirements are technically feasible, entail acceptable levels of business risk, and are likely to elicit bids within the agency's budget. Developing specifications and making other preparations for soliciting bids represent a significant effort for an agency undertaking large-scale outsourcing.

Making the Decision to Outsource Maintenance

The scan team found that few decisions to undertake large-scale maintenance outsourcing or privatization have been based on careful analysis of likely costs and consequences. More typically, the decision has been necessitated by inadequate staffing to perform necessary work or by pressure from outside the agency to engage the private sector, to reduce agency staffing, or to address perceived public-sector shortcomings. Intergovernmental outsourcing arrangements have typically been the product of the unique constitutional arrangements of the particular state and sub-state governments.

Experience with large-scale outsourcing suggests several guidelines that can enhance the likelihood that a particular outsourcing arrangement will prove to be satisfactory:

- Be clear about the reasons for outsourcing.
- Take a disciplined approach and research what other states are doing.
- Try to define precisely the extent of services to be outsourced and use a contract mechanism suited to those services.
- Ensure that the agency has a firm understanding of the condition and maintenance requirements of assets to be maintained.
- Try to understand the contractor's business risks.
- Ensure that agency staff has adequate training.
- Use well-defined, measurable performance standards applied uniformly to all relevant maintenance activities.
- Allow adequate time for development and implementation of operating experience, for agency and contractor personnel as well as for other stakeholders.

Outsourcing Contract Practices

Regardless of the activities outsourced, experience indicates that an important element of success is having a clearly defined, measurable basis for judging that the services provided meet expectations (i.e., performance measures and criteria) and payment is due (i.e., work completion or service delivery). Refining the specifications that include these two items is best accomplished as a collaborative exercise that engages the outsource contractor and the agency.

Safety should be given high priority in contract development, in administration, and in performance of the maintenance functions. How interactions with the public are to be handled should be carefully defined.

Contracting between government entities for maintenance does not typically entail the effort of competitive bidding; however, it will otherwise be similar to private-sector arrangements. Measurable and mutually agreed upon criteria for judging performance and making payments are essential. If such outsourcing is to be a product of managed competition, having accurate cost accounting is essential to ensure both that the agency knows what the costs are and that public and private bids are comparable.

Several forms of outsourcing contracts have been successfully used:

- **Contract rental agreements** are used to engage equipment (with or without operators) on an at-will basis for designated time periods at a predetermined pay rate. The contractor generally operates at the direction of agency personnel; these personnel are responsible for the outcome of the maintenance activities.
- **Cost-reimbursable contracts** are those in which the provider provides the services required and invoices for the cost of doing so. Under this arrangement, which is most typically used when the provider is another government entity (e.g., a county maintaining state-owned roads), the agency may specify a level of service to be expected and monitors compliance. Unless the contract is carefully constructed to establish how costs are to be calculated, the agency may face the risk of unforeseen cost escalation.
- **Job-order contracts** are long-term indefinite-quantity and -delivery umbrella agreements that provide for on-call services, typically at fixed, predefined unit prices. The agency specifies job items that represent the likely range of activities to be required during the contract term. For example, in

the case of guardrail repair, the items might be 0-25' repair, 25-100' repair, 100-500' repair, and > 500' repair. Negotiated contract prices would be expected to include mobilization costs and time and materials; they might also include multipliers or other variations for after-hours and weekend or holiday work. Such agreements are well suited to use for emergency repairs and demand peaks.

- **Activity- or item-based contracts** are those in which a particular maintenance activity (e.g., pavement joint and crack filling in a highway corridor or transmission overhauls for a specific vehicle fleet) are to be provided within a definite time frame. Bids are often based on unit prices, in much the same way as construction contracts typically are handled. The contractor has scheduling control, although intermediate completion targets may be included in the contract. Such agreements typically are used to supplement an agency's current maintenance activities within a district or corridor, with a focus on repairing or upgrading a specific section of the system, versus long-term engagement or quick-response activities (under a job-order contract).
- **Asset- or performance-based contracts** provide for the contractor to take full responsibility for ensuring that a particular asset meets agreed-upon performance standards; they are also referred to as fence-to-fence, corridor, or performance-based contracts. These usually are long-term agreements where minimum performance levels are established and the contractor is given complete control of the work to ensure that these levels are delivered. Such contracts can be written for a single maintenance activity (e.g., covering only pavement marking or guardrail upkeep) or for all maintenance activities for an entire section of roadway, encompassing all assets from fence line to fence line.

Agencies may initially encounter difficulties with developing maintenance outsourcing contracts because staff members have developed contracting expertise on new construction only, while maintenance personnel have little such experience. The ways in which work and pay elements are defined and the types of performance measures used for maintenance generally are different from those encountered in construction. Additionally, an agency may not have specifications for maintenance activities. Performance-based maintenance contracts should typically focus on desired outcomes, without regard for methods used in the maintenance functions.

Agencies also may encounter difficulties associated with government contracting regulations that do not influence in-house operations. For example, required engagement of disadvantaged business enterprises or direct involvement of a prime contractor in the maintenance performance may influence competition and pricing; such influence may be particularly strong in a managed competition situation.

Maintenance Outsourcing Success Factors

Once an outsourcing agreement has been executed, each party to the agreement is fully responsible for its role. The contractor will typically provide the equipment, materials, labor, and management required to complete the outsourced maintenance activity. The government agency will usually determine that specifications and other contractual requirements have been met and make timely payments for the work with any appropriate incentives or deductions, if necessary. Experience indicates that several characteristics of the outsourcing arrangement can have an important influence on whether the agency will view the effort as a success:

- **Outsourcing scope**
The location and extent of the maintenance outsourced must be attractive to the contracting community. While the value of the contract will influence bidders, the contractors' ability to mobilize and flexibly manage their resources can be important. Experience suggests that

maintenance outsourcing is more likely to be attractive for longer roadway sections, not located in remote or inaccessible areas, and close to centers of labor supply. A longer contract duration—experience suggests at least five years—also will be more attractive to contractors. For the agency, the size of the contract must be large enough to offset inspection and contract administration efforts, but still be manageable.

■ **Contractor availability**

A robust community of contractors experienced in the types of maintenance tasks to be outsourced will help ensure both that there is effective competition and that the outsourcing agency has recovery options available if problems develop after a contract has been awarded.

■ **Risk allocation**

Agencies should understand the business risks inherent in the contracting situation and how these risks are likely to influence contractors' bids or their willingness to bid. For example, contractors may be unwilling or unable to obtain multiyear bonding at acceptable costs. Additionally, a long-term contract might not be attractive to a contractor if the price of materials is dynamic. The manner in which the contract specifications are written may also influence the contractor's management for contingencies. Finally, the contractors' expectations about labor markets may be influenced by uncertainties regarding the agency's capital plans.

Once a contract has been awarded, experience shows that the agency must be prepared to provide adequate management and oversight for the outsourcing to proceed smoothly. Particularly with large-scale performance-based outsourcing, agency employees must understand their role and avoid trying to direct the contractor or pressing for levels of service exceeding those specified in the agreement. Agency inspectors responsible for monitoring contractor performance should be specifically knowledgeable in maintenance and in the contract requirements. Training is a productive means for ensuring that inspectors are appropriately qualified.

Experience suggests that agencies should be reluctant to outsource the entirety of their maintenance capability. If a contractor fails for whatever reason to provide critical maintenance services, public expectations are likely to require that the agency be able to take remedial action, particularly if the maintenance activities affect public safety (e.g., snow and ice removal).

Maintenance Outsourcing Benefits and Concerns

The scan team concluded that outsourcing to fulfill at least a portion of an agency's total maintenance responsibilities is very widespread, but that few DOTs have used the practice on a large scale (e.g., agency- or corridor-wide). Noteworthy cases of large-scale maintenance outsourcing offer lessons for agencies considering adoption; the scan team sought to understand these lessons. The cases the scan team explored indicate that under the appropriate circumstances, large-scale outsourcing may offer potential benefits, such as the following:

- Labor cost reductions may be realized because of the greater flexibility a private contractor may have to adjust and manage the workforce assigned to the outsourced maintenance activities.
- The condition of the assets may improve.
- Equipment and inventory costs may decline if the outsourcing allows a contractor to improve utilization rates and reduce net investment levels.
- Standard specifications for maintenance activities may improve with time.

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- Accountability for performance is enhanced through enforcement of contractual standards.
 - Specialized expertise is made available on demand.

Other benefits may accrue to any particular maintenance outsourcing decision; however, the nature of the benefits and whether all stakeholders in the outsourcing decision agree on their scope and scale are not assured. Experience suggests that participation of all stakeholders in the outsourcing decision can help ensure that anticipated benefits are realized.

However, circumstances may not always favor large-scale outsourcing. Agencies considering the option may encounter a variety of concerns that must be resolved:

- Reduced staffing and loss of direct management control of the maintenance workforce will reduce operational flexibility.
- Outsourcing may reduce total employment for maintenance personnel.
- Adequate resources may not be available due to other activities in the region. For instance, energy development in Texas has created serious shortages in available personnel in much of the state.
- Outsourced maintenance services may be more costly for the outsourcing agency in initial contracts and may affect public perceptions of agency performance.
- Outsourcing may threaten agency morale and pride in performance and the agency's link to its system-using customer base.
- Contractual requirements associated with outsourcing may reduce agency management flexibility.
- Use of federally reimbursed funds to pay for outsourced maintenance may increase the complexity of agency accounting and reporting requirements and conformity with federal regulations.

Experience indicates that such concerns are meaningful, but may be resolved with adequate planning and involvement of all stakeholders in the outsourcing decision. The details of each specific situation where outsourcing is being considered should determine the agency's decision.

Next Steps

Given the likely continued interest in large-scale maintenance outsourcing, the scan-team members agreed on a number of activities that would help to disseminate the lessons learned from previous experience. These activities are listed below and described further in Chapter 5.

- The scan team members will collaborate with the American Association of State Highway and Transportation Officials (AASHTO) Subcommittee on Maintenance (SCOM) to develop a plan for the implementation of the scan findings that considers the recommendations included in the scan report.
- Scan team members will make presentations of their findings as part of several professional forums, including meetings of AASHTO and regional associations of DOTs, local-government associations, and the Transportation Research Board (TRB).
- To support DOT efforts to develop appropriate performance measures and service standards needed for large-scale maintenance contracting, the scan team members plan to work with

AASHTO's Highway Subcommittee on Maintenance to establish a Maintenance Performance Measures and Contracts Technical Services Program¹.

- To provide useful examples for agencies undertaking maintenance outsourcing, the scan team proposes to assemble a selection of specifications various agencies use to implement maintenance contracts and make these documents available in a web-accessible on-line library.
- To provide additional support for agencies, the scan team proposes that available training on the administration of performance-based maintenance contracts be promoted among states.
- In an effort to support additional opportunities for peer-to-peer exchanges, the scan team members will collaborate with the Federal Highway Administration (FHWA) and AASHTO to sponsor additional workshops that focus on issues relevant to maintenance personnel, including maintenance outsourcing.

¹ AASHTO Pooled-Fund Technical Service Programs, American Association of State Highway Transportation Officials, <http://www.transportation.org/Pages/Programs.aspx>