

# Evolution of Contract Maintenance

---

Marshall L. Stivers

Contract maintenance has become a significant tool in recent decades that is used to some degree by most state agencies in the United States. Until the early 1970s, highway maintenance was mostly planned and executed by public highway agencies. Then, some highway agencies started contracting maintenance activities to private-sector resources. For the next 25 years many maintenance activities were outsourced in this manner. Some of the significant trends and projects that have occurred within the highway maintenance community are documented. It is hoped that documenting a composite of some of the various strategies tried by governmental agencies will help readers determine which methods may be applicable for their agencies.

Over the past several decades contract maintenance has become a significant tool that is used to some degree by most state agencies in the United States. Until the early 1970s, highway maintenance was largely planned and executed by public highway agencies. Then, a handful of highway agencies began to pilot the contracting of maintenance activities using private instead of public sector resources. During the next 25 years a significant amount of maintenance activities began to be outsourced in this manner.

The purpose of this paper is to document some of the more significant trends and projects that have occurred during the evolution of outsourcing within the highway maintenance community. It is hoped that documenting a

composite of some of the various strategies tried by governmental agencies will help readers determine which of the methods may be applicable for the circumstances within their agencies.

## THE TREND

During the 20 years from 1973 to 1993 the trend of several highway indicators very clearly explains the situation in which most highway agencies currently find themselves. This trend is demonstrated by the change in the following items that were measured during the period:

- Road and street mileage increased 2.6 percent,
  - Population increased 22.0 percent,
  - Licensed drivers increased 42.5 percent,
  - Motor vehicle registrations increased 56.4 percent,
- and
- Vehicle miles traveled increased 74.9 percent.

In recent years this trend has intensified the problems of the highway maintenance community because of the “blessings” of a booming economy, increased transportation funding, the trend toward downsizing, and more and heavier trucks. As a result of these trends many highway agencies are not able to provide their customers with an adequate level of service. Although funding levels for routine maintenance are generally at an all-time high, in most agencies staffing levels have not kept pace with increasing workloads. Many agencies are not allowed to replace maintenance employees who have left, and instead they

are encouraged to change the way the remaining employees think and act. Although some benefits were achieved in this self-improvement process, workloads continue to increase too fast for employee productivity improvements to keep pace.

Recognizing the need for assistance for conducting routine maintenance within highway agencies, private industry developed the capability to accept some of the highway maintenance workloads. This capability enables a highway agency to contract with a private firm to perform activities necessary for routine maintenance of a specified group of highways. Usually this service is performed in the same manner provided by the agency, for the same or an even smaller total cost. As the trend toward increasing workload and a diminishing workforce continues, more agencies are now considering outsourcing as a tool for providing services to the motoring public.

Currently outsourcing is generally being accomplished by one of two methods. The first method can be called activity based, which involves obtaining unit prices for each activity to be contracted. The second method usually involves a specific area or region being set aside for total routine maintenance to be accomplished by a contractor. The second method can be further subdivided into area-wide bundled bids and comprehensive asset management contracting.

An additional feature of outsourcing is also being offered, which is generally known as at-risk projects. In this scenario, contractors guarantee the agency a fixed price for the life of the contract (typically 5 to 7 years), and the contractor assumes all risks associated with the project at no additional cost. These risks may be the result of damages to the highway infrastructure caused by fire, flood, wind, snow, vehicle crashes and accidents, and so forth.

For any of these methods to function, it is necessary for the agency to be assured that the roads being outsourced are maintained in a safe and passable condition to protect the investment in the highways. Similarly, the level of service provided by the contractor must be equal to or greater than the level provided by the agency.

Maintenance activities that are typically accomplished by contracting include all routine periodic maintenance activities involved in repairing highways and bridges, including pavement surfaces, shoulders, roadsides, drainage facilities, bridges, tunnels, signs, markings, lighting fixtures, traffic services, mowing, litter and debris pickup, and snow and ice control. The operation of roadside rest areas, movable span bridges, and various minor construction activities are also typically handled through maintenance contracting.

### ACTIVITY-BASED UNIT-PRICE CONTRACTING

During the 1970s and 1980s, most maintenance contracts were activity-based or unit-priced contracts. These

unit-priced contracts stipulate that a contractor will be paid "x dollars" to perform one unit of "y activity." Activities that are typically accomplished by unit-price maintenance contracting include repairing highway surfaces, shoulders, drainage facilities, signage, markings, lighting, and signal operations as well as roadside maintenance such as mowing and litter pickup.

Awarded as single contracts to perform one activity, unit-price contracts are a common and useful tool for departments of transportation across the country. Although they allow an agency to respond to specific manpower and equipment shortages, the administration of this type of contract requires significant inspection costs to ensure that full value is received. Issues involving poor quality of work, lateness of the contractor performing the activity, defaulting and subsequent reassignment of agency resources, and contract readvertisement are some of the difficulties that may be encountered with this type of contracting. Unit-price contracts still have a proven value for some agencies who need assistance on a limited basis.

### AREAWIDE BUNDLED-BID CONTRACTING

The next step in the evolution of contract maintenance occurred in the late 1980s with the advent of area-wide maintenance contracting. Areawide contracting has evolved in basically two stages. The first stage involved single-service unit-priced contracts. The next stage occurred when areawide contracts bundled essentially all the routine maintenance functions commonly required. A few examples of the types of contracts that have been tried by some state agencies are described in the following sections.

#### Massachusetts

The Massachusetts Highway Department (MHD) piloted an areawide contract in 1992 that bundled essentially all routine highway maintenance and drawbridge operation in Essex County. MHD chose this region because it offered an ideal mix of highways, city streets, and drawbridges for testing private maintenance services. The \$4.08 million contract, which encompassed 611.5 road kilometers (380 road miles), was for all the functions of the District 5 maintenance office except snow and ice removal. The specific services provided in the contract include the following:

- Highway maintenance: cleaning, maintaining, and repairing roads, sidewalks, curbs and berms, ditches, slopes, guardrails, and drainage systems.
- Bridge maintenance: repairing and maintaining bridge decks, cleaning bridge seats and drainage systems, and doing other minor concrete repairs.

- Roadside maintenance: tree trimming and removal, sight distance clearing, and mowing.
- Traffic maintenance: maintaining and repairing traffic control equipment and lighting systems; painting stop lines, crosswalks, and road legends; and installing regulatory and warning signs.
- Drawbridge operations: operation and routine maintenance of drawbridges.

The request for proposal (RFP) issued by the MIID specified a method to price unforeseen services not itemized in the contract and also included detailed descriptions of repair methods, material specifications, and quality standards. The individual services were specified in existing state highway maintenance documents and a set of supplemental provisions and specifications for Essex County. These standards were quite detailed, defining everything from the required consistency of various forms of concrete to the composition of bridge paint. MHD personnel would continue to be responsible for ensuring the contractor adhered to the standards.

Available information on the MHD experience with the Essex County contract has been derived from a document prepared by the John F. Kennedy School of Government. In it is a statement about an assessment of the details contained in the contract: "The desired ends for the contracted services are fairly easy to define: satisfactory performance of routine maintenance, timely repairs, and proper operation of the drawbridges. There are a limited number of ways to accomplish these ends successfully, and as the above discussion of the contract indicates, the MHD has in many cases specified the preferred means. If anything, the contract errs on the side of being too specific about the means and could perhaps stifle innovation. An improved asphalt for patching potholes, for instance, could conceivably be unusable under the terms of the contract. The department has properly left many of the operational details, such as work crew size and equipment requirements, to the contractor's discretion."

The John F. Kennedy School of Government documented the success of the pilot program, concluding that privatized highway maintenance services were over 20 percent more cost-effective than their public counterparts. To compete, three unions formed a coalition, developing proposals to be competitive with private industry. Through the additional training and efficiencies among agency staff, overtime decreased 70 percent and sick leave decreased 50 percent in the first year. Currently the workload is being split about 50/50 between public and private contractors.

## Florida

In 1994 the Florida Department of Transportation (FDOT) used extensive contract maintenance successfully,

by combining several small activity contracts into one large contract. This change evolved from activity contracting to regionwide maintenance contracting when a pilot contract on I-95 in Jacksonville was awarded. The changes continued when all [about 177 km (110 mi)] the state highways within Nassau County were awarded in 1997 for a 3-year contract using activity-based prices. In essence this combined many smaller contracts into a single contract with FDOT issuing work orders on a daily basis. The documented benefits from this program included the following:

- Cost savings of about 10 percent,
- Reduced FDOT administrative costs of 70 to 90 percent, and
- Improved quality assessment rating of 30 percent.

The advantages to awarding contracts of this type include having one contractor perform multiple activities throughout the limits of a specific project. The agency inspector issues a work order when needed and the contractor responds as required. Agency costs for administration are lower because of a reduced number of contracts to advertise and inspect. Because this type of contract is much larger in scope than single activity-based contracts, the overall price compared with multiple contracts is usually lower because of the economies of scale achieved by the contractor. In this environment, the contractor can anticipate the multitasking of employees and equipment to perform several activities and pass the savings on to the agency.

The disadvantages of this type of contracting are that the contractor has no incentive to perform less work. These contracts usually specify that payment is by work accomplishment, not innovation, and once the contract is awarded any savings for doing work more efficiently remain with the contractor. Innovation may also suffer if work orders are issued for traditional methods (pavement striping with paint instead of longer-wearing materials) that may accomplish the same effect at a cheaper cost. Although this method of contracting has proven more advantageous than activity-based unit-price contracting, FDOT is now trying to improve even further. In the next section, the evolution of maintenance contracting that is being tried by FDOT is discussed.

## COMPREHENSIVE ASSET MANAGEMENT CONTRACTING

### Virginia

The Virginia Department of Transportation drastically changed the paradigm in July 1997 when it contracted for 402 km (250 mi) to be the total responsibility of a contractor. The impetus for the \$132 million contract was

the state's public-private transportation act, which encouraged creative approaches involving the private sector. The contractor performs all the ordinary maintenance activities to a predetermined level of service. Planning, scheduling, overseeing, and execution are the responsibility of the contractor under this program. This contract, which is for a 5.5-year pilot project with an optional 5-year renewal, includes all routine maintenance activities, incident management, snow and ice control, and major pavement and bridge rehabilitation.

The contract, which is a lump sum guaranteed maximum price, limited risk acceptance, fence-to-fence responsibility, has afforded a multitude of benefits to the department such as the following:

- Guaranteed cost savings of about 17 percent versus in-house,
  - Reduced capital cost outlays,
  - Ensured outcomes and consistency,
  - Guaranteed maximum price,
  - Flattening out of peak workloads,
  - Obtaining specialized skills or equipment,
  - Increased levels of service,
  - Limiting the agency staff and administrative requirements, and
  - Providing a single point of contact for the agency.

Although the project received some initial opposition from industry, it is now in its third year and is beginning to become more accepted. Some lessons have been learned from this experience, however, including the following:

- Year 1
  - Difficulty in monitoring time performance,
  - Statistical issues regarding sampling of rating sites,
  - Missed targets,
  - Recovery plan not articulated, and
  - Improvement in incident response was necessary;
- Year 2
  - Startup was smoother,
  - Acceptance of concept by the field,
  - Snow and ice control began, and
  - Recurring issues on I-95 (incident response, traffic control).

The lessons learned from this type of process better explain how to monitor timeliness requirements, establish better cost accountability, establish a more positive sampling technique, establish competitive bidding on the next contract, and provide a longer commitment for the contract to establish better prices.

## Texas

In fall 1999 the Texas Department of Transportation (TxDOT) awarded \$32 million for the complete maintenance

and operation of 246 km (153 mi) of Interstate highways, including existing appurtenances and future additions. The 5-year contract, with two extensions if both parties agree, includes mainline roadways, frontage roads, shoulders, ramps, intersections, roadsides, bridges, rest areas, picnic areas, weigh stations, and traffic operations. The intent of the project was for the contractor to relieve the department of all duties traditionally performed by the department in maintaining and operating the highways. It is anticipated that no change orders, except state or federal statutes or catastrophic event emergency reimbursement, will be executed during the course of the contract.

Each month TxDOT determines whether the contractor is meeting the required standards. In addition, the contractor must constantly monitor the condition of the highway. If the contractor or engineer discovers a deficient section, the contractor reports to the engineer measures that will be taken to correct the situation. Standards have been developed and will be monitored for the following areas:

- Asphalt surfaces (travel lanes and shoulders),
- Concrete pavement (travel lanes and shoulders),
- Vegetation management,
- Landscaped areas,
- Litter and debris pickup,
- Sweeping,
- Graffiti removal,
- Picnic areas,
- Rest areas,
- Tree and brush control,
- Drainage,
- Removal of illegal signing and other encroachments,
- Mailbox installations,
- Bridge maintenance (railing, deck, superstructures, channels),
  - Embankments,
  - Traffic operations (loops, signs, highway lighting, pavement graphics, pavement markings, RPMs, traffic buttons, impact attenuators, overhead signs), and
  - Snow and ice control.

The bid proposal document contained the statement "This is an experimental project." Further wording in the document indicates the contract can be terminated within 30 days if both parties agree. A proposal form to identify work was required, which contained the following information:

- The location and description of the proposed work,
- An estimate of the various quantities and kinds of work to be performed,
  - A schedule of items for which unit prices are requested, and
  - The time within which the work is to be completed.

The official total bid for this proposal was determined by multiplying the unit prices for each pay item by the estimated quantities shown in the proposal and then totaling all the extended amounts. This total became the "total bid amount" and was to be full compensation for the work for the 5-year period of the contract.

The bid proposal document stated, "When the final quantity of work done under any major item of the contract is less than 75 percent of the quantity stated in the proposal, the adjusted unit price to apply to the final quantity of work performed under the item will be determined by multiplying the unit price bid by the factor shown below."

<i>Percent Decrease</i>	<i>Factor</i>
25 to 50	1.05
51 to 75	1.15
76 to 99	1.25

The bid proposal document also stated, "In no instance shall the product of the adjusted price and the final quantity of work exceed the product of the original contract unit price and 75 percent of the original contract quantity, and in no instance will the unit price be adjusted to more than 125 percent of the original contract unit price." The contractor's payment may also be reduced if any of the project limits requires major rehabilitation work during the term of the contract. The reason for this is that maintenance of the roadway becomes the responsibility of the rehabilitation work contractor, with the maintenance contractor having no work requirements within the limits of the rehabilitation project.

A contract requirement was for the contractor to begin work within 30 days of being declared the successful bidder. After more than 6 months of experience by both parties, TxDOT believes this requirement should be extended to at least 3 months on future contracts of this type. The current belief is that the project would gain better acceptance by both the state and the contractor if a longer transition period were available.

Even though it is early in the process, TxDOT was asked to discuss positive and negative reactions to the performance of the contract so far. The comments received appeared to be positive reinforcement for the process, with a few observations as follows:

- Ice and snow control by the contractor was very good. Compared with TxDOT performance, the contractor raised the level of service above what the agency normally delivered.
- Potholes, which would be repaired immediately by TxDOT, remain in place longer because the contractor, for efficiency, tends to wait until more potholes develop before scheduling work crews to make repairs.

## District of Columbia

The District of Columbia Public Works Department (DCDPW) recently awarded a 5-year project for the National Highway System (NHS) routes that fall within the city's boundaries. The project involves a unique partnership between the DCDPW and FHWA, who are providing oversight and assistance for the project. Part of the oversight duties involved selecting an engineering support consultant company to take a complete inventory of the many roadway assets and their condition located within the NHS rights-of-way. Once this was completed, a private contractor was selected using a "best buy process" for a 5-year performance-based maintenance contract to maintain the highway infrastructure. Working with FHWA and the engineering support consulting company, the DCDPW has identified and developed measurable performance standards for the infrastructure items to be maintained by the contractor. It is believed that a measure of the effectiveness of the program can be obtained by implementing measurable performance standards and annual objective system evaluations and reporting techniques.

The NHS project is designated as a demonstration project and eventually may be duplicated in other areas of the District or in other major urban areas that require preservation and maintenance work and have limited public agency staffing. The total NHS segments in the District are about 553.5 lane kilometers (344 lane miles), which consists of the city's most important and heavily traveled roadways. A contractor for the 5-year contract has been selected, and the project is proceeding toward award. The contract is expected to have a total value of \$73 million, and work is anticipated to begin on or about June 10, 2000. The following activities are included in the scope of work:

- Pavement maintenance,
- Drainage maintenance,
- Roadside and landscape maintenance,
- Bridge maintenance,
- Tunnel maintenance,
- Snow and ice control, and
- Traffic control and safety maintenance.

The tunnels on this contract, which amount to about 20 percent of the total bid price, cause it to be somewhat unique among the more traditional asset management style of routine maintenance contracts. Typically most routine maintenance contracts are exactly what the title infers—routine maintenance—with an occasional pavement and bridge rehabilitation added to some projects. The four tunnels in this project, however, require a significant rehabilitation effort that is expected to be completed within 1 year of the start of the contract. Once the tunnels are rehabilitated they will be maintained at the specified benchmark until the end of the contract.

For this project, the development team evaluated and quantified the condition of the existing asset elements to establish the existing baseline condition. Based on this information the team established benchmarks for each of these conditions. The contractor was then required to respond to this information with ideas about how to proceed. The contract was not prescriptive in the approach to take in preserving the system and sought to promote innovation from the contractor in recommending actions.

Some of the wording made available to contractors about the condition of the tunnels included the following:

- "The tunnel was rehabilitated completely in 1997, however significant needs remain. This is partly because not all problems were addressed by the rehab. And partly because the new systems have not been maintained. Needs may be as high as \$3 to 4 million."
- "Drainage problems still occur, but solution is unclear (sources may be the Labor Building, reflecting pool, groundwater). Some water damage is present, but no impact on the structure."
- "New computer control system was put in, but is not functioning. Lighting system is operating in manual mode."
- "Low clearance results in significant numbers of occurrences of damage to lights—possible need to redesign lighting to avoid this problem."
- "Fans haven't been well-maintained, some are not functioning properly (motor problems)."
- "CO monitoring system replacement—never functioned properly."

As can be seen from the items listed, the concept of routine maintenance contracting has taken a new twist, which may open up an entirely different method for agencies to outsource work. Somewhat like the design, build, and maintain concept that is currently being considered by many agencies, this new direction could be entitled redesign, rebuild, and maintain.

## Florida

On May 1, 2000, FDOT opened bids and declared an apparent successful bidder for a 409-km (254-mi) contract on the I-75 corridor that spans the boundaries of five districts. Once the contract is executed, FDOT will oversee the maintenance management program and conduct evaluations based on performance specifications established in the contract. In the RFP issued for the contract, the following statement was included: "The use of performance specifications, which effectively transfers day-to-day managerial and administrative responsibility to the contractor, with oversight by the FDOT was chosen because methodology specifications would require

the FDOT to perform extensive contract administration consisting of work identification, work assignment, inspection and documentation." The anticipated starting date for the \$73.5 million contract is July 1, 2000. The contract, which is for a lump sum amount, is payment in full for the 7-year duration of the project. The lump sum price for a second 7-year period (extension) is specified as being the first period price plus 15 percent. Both parties must agree to the second 7-year period for it to be extended.

The project includes all components of the transportation facility (including interchanges, crossroads, and ramps; canals; and storm water management) within the limited access right-of-way. The contract will have a single project manager to interface with the contractor. Requirements of the contractor are to achieve and maintain a maintenance program rating (MRP) of 80. All elements (roadway, roadside, traffic services, drainage, and vegetation/aesthetics) shall have a MRP of 75 or above and each characteristic shall meet the desired conditions a minimum of 70 percent of the time.

Proposals were evaluated and graded in accordance with the criteria detailed below and, as indicated, give each proposer a percentage of the 65 points based on their price versus the low bid price (which gets all 65 points):

- Technical proposal (100 points): Evaluation is based on the proposer's executive summary, management plan, and technical plan for understanding the project, qualifications, approach, and capabilities, to ensure a quality project.

- Price proposal (65 points): Price evaluation examines the prospective price without evaluation of the separate cost elements and is conducted through the comparison of the total price submitted for the 7-year contract period. The criterion for the price proposal was based on the following formula:

$$(\text{low price/proposer's price}) \times \text{price points} = \text{proposer's awarded points}$$

Innovation and contractor methods of efficiency will be passed on to the agency through the competitive bid process. Although the agency has not had time to evaluate all aspects of the bids as of this date (May 1, 2000), savings of about 15 percent are anticipated by utilizing a private contractor compared with FDOT's current method of getting work accomplished.

## Mississippi

The Mississippi Department of Transportation requested expressions of interest from contractors interested in asset management of about 209 km (130 mi) of US-78.

The project, which was anticipated to last for a 5-year term, includes all assets within the no-access right-of-way on US-78, its interchanges, overpasses, and underpasses. The successful contractor is expected to keep the roadway at or above predetermined performance standards.

Each expression of interest was to contain an asset management plan consisting of evaluation methods, repair procedures, and detailed maintenance standards for performing the following items and their corresponding subitems:

- Asphalt roadway maintenance,
- Concrete roadway maintenance,
- Roadside maintenance,
- General physical maintenance,
- Traffic service maintenance,
- Drainage maintenance,
- Snow and ice control,
- Shoulder and approach maintenance, and
- Bridge maintenance.

The project will not include major bituminous overlays, bridge or structure replacement, or concrete overlays, but it will include concrete punchout repair and mechanical asphalt pavement repair.

Each asset management plan should include a complete initial inventory of all assets and a detailed reporting system, which should be documented by monthly reports of all work done, and also an annual report—all for the purpose of evaluating the overall effectiveness of the pilot program. The plan should also include responses to emergency situations.

Responses to the advertisement of this project were due in September 1999. An apparently successful firm was identified from the expressions of interest and negotiations started. To date no contract has been signed.

## CONCLUSION

In the past 30 years, contract maintenance has evolved from its early infancy stage of single-service unit-priced contracts into full-service asset management contracts. Industry is now beginning to understand the needs of agencies and organizations are being created to meet these new opportunities. As competition increases, better pricing and service availability will most certainly become available. As this evolution continues, what the predominant model will be remains to be determined. But one thing appears certain: a public-private partnership will be an essential element for most governmental agencies to accomplish their increasing workload requirements.