Project Cost Evaluation Methodology Approach to Privatization in the Washington State Department of Transportation

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For many years there has been an ongoing debate between the private and public sectors as to which entity can accomplish highway construction or maintenance work of better quality at lower cost. In 1985 the Washington State legislature commissioned a study to better understand the differences and develop cost comparisons. The initial study objectives were to review existing roadway accounting and cost practices, develop a new methodology for comparing public and private contractor costs on a project-by-project basis, and recommend changes in laws and regulations. The Project Cost Evaluation Methodology (PCEM) was developed as a process that organizes cost-estimating data, puts projects out for private- and public-sector bids, documents award decisions, captures actual costs for comparison, and reports results so that comparisons can be made on a project-by-project basis. The Washington State Department of Transportation participated in a 3-year test of the methodology in which both construction and maintenance projects were put through the PCEM process. The results of the maintenance element of study have demonstrated that there is more potential for savings if more flexibility were available. The testing of the PCEM process has demonstrated that there is no clear-cut final answer to the question of whether the public or the private sector can accomplish work at lower cost. PCEM has demonstrated the need to evaluate projects individually when change from current practice is contemplated.

Throughout the years there has been an ongoing debate between the private and public sectors as to which entity can accomplish highway construction or maintenance work of better quality or at lower cost. Within Washington State, these decisions are currently guided by artificial bid limits or day labor requirements. The Washington State Department of Transportation (WSDOT) is constrained by a bid limit of $30,000. Identifiable maintenance or construction projects are subject to contract if they exceed $30,000. Virtually all of the major maintenance programs for resurfacing or other roadway surface treatments in excess of 500 ft are considered a part of the construction program and are contracted out.

On the other hand, the WSDOT maintenance program is also constrained by court rulings, labor agreements, and state law. Washington State statute prohibits contracting out any work done by state employees before April 23, 1979. Accordingly, elements of the maintenance program not identifiable as construction projects are done with agency forces. Less than 5 percent of the total maintenance budget is contracted out.

The bid limits were the subject of intense lobbying from both the public and private sectors. In 1985 the Legislative Transportation Committee (LTC) commissioned a study of roadway project costing. The study was directed by a steering committee appointed by the LTC. The committee included representatives of the LTC, Department of Transportation, labor, contractors, cities, and counties. A consultant team of Deloitte & Touche (Deloitte, Haskins & Sells) and Tudor Engineering was selected to conduct the study. The study objectives were to review existing roadway accounting and cost practices, develop a new methodology for comparing public and private contractor costs on a project-by-project basis, and recommend changes in laws and regulations.

Several issues were identified for evaluation during the study:

- Project cost accounting systems,
- Level playing field,
- Local tax impact of contracting out work,
- Overhead cost allocation,
- Accounting for materials,
- Accounting for equipment,
- Inspection and quality control requirements,
- Impact of bid limits and day labor requirements,
- Labor and union agreements,
- Interagency contracting,
- Self-insurance costs,
- Definitions of construction and maintenance, and
- Essential services provided by government agencies.

PROJECT COST EVALUATION METHODOLOGY

The steering committee agreed with the consultant that it was not practical to develop a cost comparison methodology that would take into account each of the adjustments that would be necessary to address all of the issues. A new methodology was developed to

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- Capture all indirect and direct costs;
- Be simple and practical to use;
- Give results that are accountable and open for review;
- Account for real world constraints such as emergency conditions, manpower constraints, project timing, and so forth; and
- Achieve cost savings.

The Project Cost Evaluation Methodology (PCEM) was developed by the consultant in response to the issues and criteria identified by the steering committee (*1*). The PCEM approach recognizes that it is impossible to develop a model that ignores the fundamental differences between the public and private sectors. However, PCEM organizes cost-estimating data, documents award decisions, captures actual costs for comparison, and reports results such that a "fair" comparison can be made. The PCEM approach consists of six main activities, which ultimately lead to a comparison of public- and private-sector bids on a project-by-project basis. The process does not lead to a "final" determination of whether public or private is "best." Rather, it is a continuing process to evaluate projects and make decisions on an individual basis. The PCEM process uses a series of forms (see Figures 1 through 6).

The project control summary documents the entire budget and serves as a master list to track the projects during the completion of the process.

PCEM Part A forms document the budget amount for each activity and the decision as to whether these activities are biddable. For example, an agency may decide that certain activities such as snow removal are too critical to be contracted out. Other activities may be kept in-house because of a need to maintain current practice due to work force requirements.

PCEM form Part B is completed for activities that may be available for bidding. PCEM Part B consists of a series of forms that require the agency to prepare an estimate of agency costs, including labor, materials, and equipment necessary to complete the project. The costs include estimates for project management, overhead, and inspection to be comparable with private-sector bids. The forms and estimates are completed by the agency in the context of a "bid" and are compared with bids submitted by contractors following a formal project advertisement for bids.

Whereas preparation of specifications and bid documents is a normal process for traditional contracting of construction projects, it is necessary to prepare similar documents for work traditionally done in-house that will now be put through the PCEM process.

Actual costs and quantities must be collected for PCEM projects that are completed with agency forces as they would be for contracted work. If the costs and quantities are different from the bid, this information is documented to track whether the project was actually completed for less than

PCEM PROJECT CONTROL SUMMARY

Agency: _____ Maintenance? ____ Date: _____
Construction? ____

Budget Item	Reference Number	Budget Dollar Amount	Part A Complete?	A $	Part B Complete?	B $	Bid Y/N	Bid $	Are Spec's: Avail?	Needed?	When?	Date to Bid	Work Start
Total:													

FIGURE 1 Project control summary.

Project Cost Evaluation Methodology (PCEM)

Part A Preliminary Decision Alternatives

Agency:	WSDOT Dist. 4	**Year:** 1990	**Will project cover more than one budget year?**	**Yes** ___ **No** ✓	
Budget Item Description:	Shoulder Residual Herbicide Spraying	**Reference Number:**	1875A		
		Today's Date:	4/18/90		
Maintenance Budget?	✓	**Construction Budget?**	___		

Budget Item Estimate: $23,971

1. **Is the budget item work activity(ies) of such scope that it would automatically go out for bid?** ___ **Yes** ✓ **No.** Go to Question 2

   If yes:

   1a. ___ Inadequate equipment available
   1b. ___ Exceeds agency technical expertise
   1c. ___ Other ___

2. **Is the budget item work activity(ies) of such scope that it would be constrained to agency force labor?** ___ **Yes** ✓ **No.** Go to Question 3

   If yes:

   2a. ___ Quick project response time needed
   2b. ___ Budget too small to warrant cost effective bid
   2c. ___ Emergency/liability issues
   2d. ___ Other ___

3. **If Questions 1 and 2 are "No," use Part B of PCEM Worksheets to develop the agency bid and document the lowest contractor bid.**

Prepared By: ___ Title: ___ Date ___

Reviewed By: ___ Title: ___ Date ___

FIGURE 2 Preliminary decision alternatives.

the "unsuccessful" bid amount adjusted for changes in quantities.

Just as in normal contracting, projects through PCEM must be inspected even if the work was completed with agency forces. Differing levels of inspection are necessary for different kinds of work, such as brush cutting or asphalt patching.

TESTING THE PCEM PROCESS

Legislative Action

Following the development of the PCEM, the steering committee elected to test the new methodology against real world maintenance and construction. The Washington State legislature enacted RCW 47.28.180, which, until June 30, 1991, required agencies participating in the project to "use the project cost evaluation methodology for evaluation of projects. The projects shall be performed based on the lowest estimated cost regardless of who had performed the work historically." Six cities and five counties volunteered to participate in the methodology test under these conditions.

Unfortunately, in response to labor concerns, the bill further specified that WSDOT participate in the project with a portion of one or more of its districts but that the PCEM process be used only to evaluate its projects and draw conclusions as to which projects would have been done in-house and which would had been contracted out had the quoted flexibility been available.

This so-called "shadow approach" only allowed WSDOT to identify projects, prepare in-house bids, call for bids from contractors, track actual agency costs for completing the projects, and then compare the results. No projects could actually be awarded to private contractors. Whereas this dampened the enthusiasm of the districts and private contractors, a good faith effort was made by all parties to give the process a valid test.

Project Cost Evaluation Methodology (PCEM)

Part B1 Comparison of Cost Estimates

Agency: Washington State Department of Transportation

Project Name: Shld. Res. Herb. Application **Project Number:** 1875 A

Related Budget Item (i.e., Part A): _____

Project Description: Vegetation control on state highway shoulders in Clark County Area 5 of District 4.

Historically Performed by Agency? **Yes** ____ **No** ____

Summary Cost Comparison

Agency	Estimated	Actual	Lowest Contractor Bid	Estimated	Actual
1. Agency Cost	21,027	30,070	1. Contractor Price	31,185	
2. Project Administration	2,944	750	2. Project Administration	6,237	
3. Direct Project Cost	23,971	30,070	3. Direct Project Cost	37,422	
4. Overhead (On Direct Labor) (@59.1%)	7,411	4,250	4. Overhead (On Agency Proj. Admin) (@_____%)	3,686	
5. **Total Project Cost**	31,382	35,070	5. **Total Project Cost**	41,108	

Note: Please submit one copy of each Part B.1 after evaluating bids (without actual costs) and another copy after work is completed (which includes actual cost).

Alternative Selected: __X__ Agency _____ Contractor

If the lower cost alternative was not selected, please explain:

_____

_____

_____

_____

Estimate Prepared By: _____ Date _____

Selection Approved By: _____ Date _____

Post Project Review By: _____ Date _____

FIGURE 3 Comparison of cost estimates.

Problems with Implementation

A test period of three construction seasons (1988–1990) was required to learn the process and adequately test it with viable projects. Typical problems for WSDOT and local agency participants included the following:

- A lack of bid specifications: Work that had been traditionally done in house did not previously require specifications. The development of these specifications as well as bid documents was a learning process for personnel not previously involved in these processes.
- Incompatibility of budgets with project identification: The WSDOT maintenance budget consists of 10 major work groups and subcategories of work functions and work operations (e.g. roadway maintenance—asphalt patching—roller operation). Maintenance superintendents were not used to planning the work according to predetermined projects. Rather, work was identified and completed in generally small increments as conditions and availability of work force and equipment allowed. This proved to be a continuing problem throughout the course of the study.
- Traditional construction projects: WSDOT has long completed its construction program through private-sector contracting. Whereas PCEM was intended to provide an opportunity to test the completion of construction work by in-house forces, maintenance personnel do not have sufficient labor, equipment, or expertise to complete major construction work, which is typically completed by private-sector contractors. As a result, it was difficult to develop any viable bids for typical construction work.
- A contractor distrust of the process and a lack of interest in participation: Some projects failed to generate any contractor bids. An extensive public information campaign was

Project Cost Evaluation Methodology (PCEM)

Part B2 Agency Cost Estimate
*For Fixed Price Contracts

Project Name: Shld. Res. Herb. Application **Project Number:** 1875 A
Agency: WSDOT, District 4 **Date:** 4/18/90

Direct Labor Hours Labor Type	Labor Estimate	
Maint. Tech. II Spray Operator	97 Hours @ $19.73 /Hour =	$1,913.81
Maint. Tech. II Driver	97 Hours @ $18.50 /Hour =	$1,794.50
Maint. Tech. II Traffic Control	41 Hours @ $18.50 /Hour =	$ 758.50
_____	__ Hours @ $_____ /Hour = $	_____
_____	__ Hours @ $_____ /Hour = $	_____
_____	__ Hours @ $_____ /Hour = $	_____
(1) **Direct Labor Subtotal**	$	4,466.81
Fringes (@ incl. %)	$	-0-
(2) **Labor Total**		$ 4, 466.81

Material Estimate

Type	Quantity	Cost/Unit	Cost	
Krovar	480.81 kg.	7.29	$7,727.40	
Diuron	377.02 kg.	3.91	$2,903.24	
Roundup	201.45 L	60.35	$3,198.55	
R-11 Surfactant	201.45 L	9.02	$478.06	
Sta-Put Drift Retardant	201.45L	7.83	$414.99	
(3) **Material Total**				$14,722.24

Equipment Estimate

Type	Quantity	Cost/Unit	Cost	
6D6 Truck	97 hrs.	8.80	$853.60	
21035 Sprayer	96 hrs.	8.75	$848.75	
5D3 Pickup	41 hrs	1.06	$43.46	
10D9 Arrow Board Trailer	41 hrs	2.25	$92.25	
(4) **Equipment Total**				$1,838.06

(5) **Total Agency Cost Estimate** (Total Lines 2,3, and 4)	$21,027.11
(6) **Project Administration Cost** (Must be developed prior to bid opening) (_____ Hours @ $_____/Hour & Fringes @_____%)	$2,943.80
(7) **Direct Project Cost** (Line 5 plus 6)	$23,970.91
(8) **Agency Overhead on Direct Labor** (@ _____%)	$7,410.61
(9) **Total Project Cost** (Total Lines 7 and 8)	$31,381.52

FIGURE 4 Agency cost estimate for fixed price contracts.

directed at increasing the contractor's knowledge of and participation in the project. Some projects failed to generate bids because the contractors were too busy with work traditionally awarded to them.

Project Results for WSDOT

The dollar impact of PCEM on projects can be identified in two areas. First, direct savings are measurable by comparing the actual costs of the project with the bid submitted by the agency or the private contractor that normally would have done the work. Second, indirect savings are not readily measurable, but in general include efficiency gains that should occur over time through improved crew productivity, competitive bidding with better bids, and improved methods and procedures. The results of WSDOT participation are measured only in terms of direct savings.

During the 3-year test of PCEM, WSDOT applied the process to both construction and maintenance projects. Typical maintenance projects included brushing, mowing, herbicide spraying, striping, signpost installation, raised pavement marker replacement, sand hauling, guidepost replacement, and safety berm construction. A total of 21 small maintenance projects with a total budget estimate of $530,000 were tested. Had the shadow approach not been required, seven of these projects normally done with in-house labor would have been awarded to private contractors. Had awards been made on the basis of lowest bids, it was estimated that approximately $47,000 would have been saved.

It was more difficult to apply the process to construction projects because the majority of these projects are beyond the scope and capability of WSDOT maintenance staff capabilities. To attempt to test PCEM for construction, agency force bids were prepared for selected bid items in larger con-

Project Cost Evaluation Methodology (PCEM)

Part B2 Agency Cost Estimate
*For Multiple Bid Item Projects

Project Name:	Shld. Res. Herb. Application	**Project Number:**	1875 A
Agency:	WSDOT, District 4	**Date:**	4/18/90

Agency Cost Estimate

Bid Item	Estimated Quantity	Cost/Unit	Bid Cost
Shldr. Res. Herb. Spraying	85.793 H	99.18	21,027.11

(1) **Total Agency Cost Estimate** $21,027.11

(2) **Project Administration Cost** (Must be developed prior to bid opening) (__-__ Hours @ $__-__/Hour & Fringes @ __incl.__%) 14% $2,943.80

(3) **Direct Project Cost** (Line 1 plus 2) $23,970.91

(4) **Agency Overhead** (@ 59.1 %) **on Direct Labor Estimate of** ($_____) $7,410.61

(5) **Total Project Cost** (Line 3 plus 4) $31,381.52

FIGURE 5 Agency cost estimate for multiple bid item projects.

struction contracts. These were construction projects being completed as a part of the normal WSDOT private-sector construction program and were not readily suitable for PCEM. Nevertheless, 26 bids were prepared for the selected bid items contained in these projects. Typical work included guardrail installation, striping or temporary traffic signals, culvert repair, and bituminous surface treatments. An analysis of the results indicates that WSDOT bids for selected work items were less than contractor bids in 15 instances. However, most of these results are not considered a valid test since contractors bid projects in their entirety, and the individual bid items may be over-or underloaded based on the application of overhead or cashflow considerations.

Although not directly the subject of this paper, the PCEM process was more extensively tested with city and county projects. The primary reasons for the more extensive testing were the larger number of participants (11) and the ability to actually award projects to private contractors. For all agency participants, there were a total of 68 maintenance projects bid at a total of $3.5 million in the third year of the project alone. Direct measured savings totaled $326,000 (*2*). These are actual savings and validate the savings measured through the shadow approach used by WSDOT.

CONCLUSIONS AND RECOMMENDATIONS

WSDOT has traditionally contracted the major portion of its highway construction program. Whereas the participant districts made a good faith effort to participate in the process with construction projects, the results have confirmed that WSDOT does not intend to make fundamental changes in the way construction program contracts are awarded to the private sector. There is a limited potential for construction work to be completed with agency forces. The current bid limit of $30,000 represents an artificial barrier to WSDOT's ability to

Project Cost Evaluation Methodology (PCEM)

Part B3 Lowest Contractor Price Estimate

Project Name:	Shld. Res. Herb. Application	**Project Number:**	1875 A
Agency:	WSDOT, District 4	**Date:**	4/18/90
Contractor:	P. S. G. Chemical Applicators		

Contractor Price Estimate

Bid Item	Estimated Quantity	Price/Unit	Bid Price
Shldr. Res. Herb. Spraying	85.793 H	147.10	31,185.20

(1) **Total Contractor Price Estimate**	$31,185.20
(2) **Agency Project Administration Cost** (Must be developed prior to bid opening) (__-__ Hours @ $__-__/Hour Fringes @ __incl.__%) 14%	$6,237.04
(3) **Direct Project Cost** (Line 1 plus 2)	$37,422.24
(4) **Agency Overhead** (@ 59.1 %) **on Project Administration Direct Labor** (Line 2)	$3,686.09
(5) **Total Project Cost** (Line 3 plus 4)	$41,108.33

Are there expectations that operational factors would have a major impact on awarding the project? ____ Yes ____ No

If yes, explain: _____

FIGURE 6 Lowest contractor price estimate.

use its own forces for the limited portion of work that could be done with its own forces, and state law and union agreements prevent contracting of work that could be better done by the private sector.

The results of the maintenance element of study participation have demonstrated that there is more potential for change within WSDOT if more flexibility were available. The bid limit of $30,000 and state law and union agreements represent artificial constraints on the most efficient way of managing the maintenance program. The savings identified from the maintenance projects is consistent with the expected 8 to 10 percent identified by the consultant team and is a realistic expectation should artificial constraints be removed.

The consultant team's conclusions are that the PCEM process, when properly applied, provides an effective decision-making tool and provides potential cost savings and better utilization of resources. Further, PCEM is an efficient tool for many, but not all, decision situations. It is efficient for larger projects, with a single quantifiable objective over a discrete location or area (asphalt work). It is less efficient for smaller, less defined projects with specifications more subject to interpretation (street cleaning). PCEM can be implemented but should not be mandated. PCEM is recommended for use by agencies at the discretion of management or at the request of contractors after review of agency work plans. Bid limits or day labor requirements would not be in effect for agencies using PCEM. Savings of 8 to 10 percent are considered to be reasonable expectations of implementation (2). It is expected that these recommendations will be presented to the Washington State legislature during the 1993 legislative sessions.

Most of the work anticipated for potential PCEM application for WSDOT falls within the category of smaller, less defined projects with specifications more subject to interpretation or of such small dollar value that there is limited contractor interest. As such, full implementation of the PCEM

concept within WSDOT is not recommended. Rather, a limited project-by-project approach should be undertaken. Projects proposed for possible change from current practice (beyond $30,000 with state forces or contracting work currently done with state forces) should be subject to a PCEM or similar economic analysis. In many instances a full detailed PCEM approach would not be justified to accomplish projects at the lowest cost for the taxpayer. Such items as detailed contract plans or project inspection may not be necessary on every project.

Whatever approach is used, the PCEM process has demonstrated that there is no clear-cut final answer to the question of whether the public or private sector can accomplish work at the lowest cost. PCEM has demonstrated the need to evaluate projects individually when change is contemplated.

REFERENCES

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