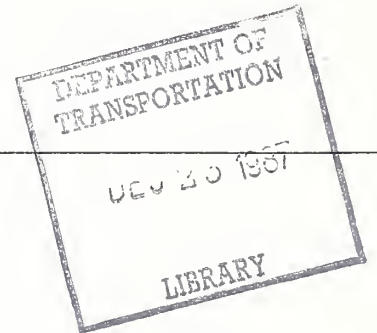


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LEGISLATIVE TRANSPORTATION COMMITTEE



✓
Roadway Cost Accounting and
Project Costing Evaluation
Methodology

In Association With:

TUDOR ENGINEERING COMPANY

August 1986

The original editions of this document included some appendix material specific to Washington State on the application of the methodologies described here. These appendices have been deleted from this reprint of the document.



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Section I

Overview



OVERVIEW

There has been continuing discussion and controversy regarding how to most effectively expend the funds used for roadway construction and maintenance in the State of Washington. The Legislative Transportation Committee authorized a study of the issues to identify a reasonable, equitable method for comparing the costs of roadway projects. This report presents the results of that intensive five-month study.

Nearly \$1 billion is expended annually for roadway construction and maintenance in the State of Washington. Construction accounts for more than 70% of this total. Public agencies contract with the private sector for 85% of this construction work, or more than \$580 million. Agencies themselves perform about \$100 million of construction activity.

Maintenance activities, accounting for more than \$270 million per year, are largely performed by the agencies' own labor forces. Only \$16 million (6% of the total) is contracted to the private sector. Exhibit A shows statewide expenditure patterns for roadway construction and maintenance.

Exhibit A

1984 WASHINGTON STATE HIGHWAY EXPENDITURES (In Millions)

<u>Type</u>	<u>WSDOT</u>		<u>Counties</u>		<u>Cities</u>		<u>Total</u>	
	<u>Expend- iture</u>	<u>% Contracted</u>	<u>Expend- iture</u>	<u>% Contracted</u>	<u>Expend- iture</u>	<u>% Contracted</u>	<u>Expend- iture</u>	<u>% Contracted</u>
Construction	\$478	90%	\$ 77	57%	\$131	83%	\$686	85%
Maintenance	<u>83</u>	10%	<u>119</u>	6%	<u>72</u>	4%	<u>274</u>	6%
Total	<u>\$561</u>		<u>\$196</u>		<u>\$203</u>		<u>\$960</u>	

Source: Unpublished WSDOT data and private survey data.

Reasons for This Study

The overriding concern of both agencies and contractors is to perform construction and maintenance activities in the most cost effective manner. However, they have disagreed on the costs which should be included in comparisons between agency costs and contractor prices to determine cost effectiveness.

Construction and maintenance activities presently performed by agencies include project work which contractors routinely perform for private sector customers. Contractors are concerned that Agencies may be performing work which could be performed by contractors at lower cost. They have raised numerous questions about current agency practices, including:

- Accuracy of definition and interpretation of the terms "construction" and "maintenance," especially in road surface treatments
- Appropriateness of costing methods used to compare private and public cost estimates
- Completeness of accounting methods used to account for roadway construction and maintenance work

Public agencies serve their constituencies by performing essential public services. Roadway construction and maintenance have historically been responsibilities of governmental agencies. Agencies are concerned about providing efficient roadway maintenance and construction services to the public in a low cost, timely manner. Other specific agency concerns include the:

- Need to use the existing Agency workforce throughout the year
- Cost effectiveness of contracting out smaller projects
- Quality control over minor construction and of maintenance activities

Objectives of This Study

The Legislative Transportation Committee authorized this study to address the contractor and agency concerns. The study examines the accounting methodology and project costing techniques currently used by contractors and agencies in the State of Washington. The study makes recommendations to improve the decision making process for roadway construction and maintenance activities. The specific objectives of the study are:

- To compare accounting procedures and costing techniques used by government agencies and private contractors for roadway construction and maintenance projects, and to recommend any changes in BARS accounting procedures needed to facilitate comparable accounting for project costs.
- To develop a model and methodology to compare government and private contractor costs on a project-by-project basis.
- To develop specific recommendations for changes in state and local government laws, regulations, and accounting practices to resolve accounting issues, inconsistencies in definitions, and other problems identified in the study.

Oversight responsibility for the project was given to a select Steering Committee. Members of the Committee represent the various viewpoints involved and have provided guidance to a group of consultants retained to perform the study.

Section II

Study Approach



STUDY APPROACH

The Steering Committee retained Deloitte Haskins & Sells, a management consulting and public accounting firm, to conduct the project. We conducted extensive fact finding and information gathering from representative agencies around the State -- East and West, large and small, cities, counties, and WSDOT district offices. Together with our subcontractors, Tudor Engineering Company and Mr. Paul Hooper, we:

- Surveyed all counties and those cities with city engineers. A survey form was developed to gather information on their cost accounting and project costing procedures. Surveys were sent to 61 cities and all 39 counties with cover letters explaining their purpose. Responses from the 71 surveys returned generally corroborated the findings of our on-site interviews. The actual survey results are included in Part II - Technical Reference of this report.
- Held forums or panel discussions with about 35 county engineers. At each forum, we discussed current operating practices and the effect of various legal and operating constraints in managing the roadway functions in a cost effective manner. One meeting was held in Yakima and the other in Seattle.
- Conducted in-depth interviews with 24 representative agencies around the State. These interview sessions were guided by an interview format to encourage consistency of questions by multiple interviewers. A typical interview team included a DH&S consultant with financial experience and a professional engineer with highway construction experience. A typical interview included the Agency Public Works Director or County Engineer and staff representatives from the main departments such as Maintenance, Construction, and Finance or Accounting.
- Held a forum with private contractors representing Eastern and Western Washington to review general cost accounting and project costing techniques used by private contractors.
- Conducted in-depth interviews with 7 private contractors to discuss specific project costing procedures.
- Reviewed relevant literature and studies conducted elsewhere for background information.

We developed two interim reports for the Steering Committee's review. These reports identified the key issues to be addressed by, and the general design of, the Project Cost Evaluation Methodology.



Section III

Study Issues



STUDY ISSUES

The Steering Committee identified key several issues requiring careful evaluation. These issues include:

- 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
- Labor and union agreements
- Interagency contracting
- Self-insurance costs
- Definitions of construction and maintenance
- Essential services provided by government agencies

Each of these issues is discussed briefly.

Cost Accounting Systems

The crux of the project accounting issue is the concern that all appropriate costs be included in project costing systems. Examples of the costs include overhead allocation, right of way acquisition, design engineering, project engineering and administrative support. If the appropriate costs are not included, then agency costs and bids are not comparable. A related issues is how the Budgeting Accounting Reporting System (BARS) facilitates project costing and whether or not BARS needs modification to support project costing.

Level Playing Field

At issue is the need to provide a costing methodology that "equalizes" the various costing advantages enjoyed by contractors and public agencies. Such advantages are due to different organizational goals, costs of doing work, and existing statutes prescribing certain practices. For example, agency labor costs are generally less than contractor pay scales. But contractors have an advantage in that they do not retain labor year round unless there is work available. By recognizing the various

advantages or disadvantages of the agency and contractor, Steering Committee members anticipated that cost estimates could be adjusted and the resulting comparisons could be made on a "level playing field" basis.

Local Tax Impact of Contracting Out Work

Related to the "level playing field" issue is the Contractors' concern over the tax impact on the local economy when Agency labor is used. Contractors pay different and additional taxes -- such as the B&O tax -- than do state agencies or local government. These costs must be recovered as a cost of doing business and impact the contractor price. The taxes also provide additional revenue to local governments which is not received if the Agency does the work with force labor. The issue is whether or not the local tax impact needs to be considered in the Agency decision-making process.

Overhead Cost Allocation

Overhead is a necessary cost of doing business or running a public agency. Both agencies and contractors have overhead. The issue is comparability in the treatment of overhead costs. Typical overhead costs include:

- Personnel administration
- Finance department
- Data processing
- Facilities management
- Secretarial or word processing support
- Mail room

At issue is whether or not the department head should consider the cost of variable overhead when estimating the agency's project costs. Also at issue is uncontrollable central service department overhead and its relevance in the decision process when comparing agency costs and contractor bids.

Accounting for Materials

The Steering Committee identified accounting for project materials as an issue. The adequacy of agency cost accounting procedures for materials procurement, storage, and distribution and the charging these costs to projects can make a difference in comparative costing. Failure to charge materials and appropriate handling costs to a project would result in understatement of project costs.

Accounting for Equipment

The costing of equipment charged to agency projects was reviewed as a possible issue. Equipment charges are a significant part of project work. The issue is whether or not current accounting procedures include all costs -- including

depreciation and/or replacement -- in the rental rates used to charge equipment costs to projects.

Inspection and Quality Control Requirements

Roadway construction and maintenance activities are inspected for compliance with project specifications. Differences in inspection requirements for contractor work and agency work is a costing issue. The amount of inspection time, if different, has an impact on the comparability of agency cost estimates and contractor bids. The degree and intensity of inspection may also influence the life of the project and, hence, the long-term cost of maintenance or construction activity.

Impact of Bid Limits and Day Labor Requirements

Bid limits are statutory or regulatory limits that have the intent of implementing public policy. Roadway construction and day labor bid limits are intended to direct a substantial portion of agency expenditures into the private sector. As a public policy tool, bid limits are one method to influence agency decision making.

At issue is the appropriateness of existing bid limits in light of current roadway costs. Some believe that existing limits constrain cost effective decision making practices of agency management.

Labor and Union Agreements

Management's use of "cost effectiveness" as a decision tool is of concern to both agency managers and contractors. Existing laws, court rulings, and labor agreements constrain agency management's flexibility in contracting. They may preclude some staffing and work assignment decisions that would otherwise be made by management. For example, WSDOT is expressly precluded from using cost effectiveness as a criteria for contracting out work traditionally performed by state employees.

Interagency Contracting

Interagency contracting is an issue, because it adds an additional competitive factor to the evaluation and decision making process. The concern is that the charge by a bidding agency -- such as a county offering to perform maintenance work for a city -- may not reflect the full cost of the services provided by that agency any more than agency contracting for the work.

Self-Insurance Costs

Public liability insurance coverage is an issue for all agencies and contractors, because there is a potential cost advantage to an agency that is comparing its costs with contractor bids. Agencies may elect to bear the risk and costs of accidents on roadway projects by deciding to "self-insure" themselves (i.e., paying any resultant claims and administrative costs from their own funds rather than from insurance

proceeds. Agencies generally do not impute an estimated cost of such "self-insurance" to roadway projects. However, such agencies would not permit a contractor to "self-insure" but require specific coverage for a given project.

Definitions of Construction and Maintenance

The definition of key roadway terms is subject to much interpretation when applying the definitions to actual work. Current laws require the distinction between construction and maintenance. Yet such definitions form the basis for agency management decisions on when to contract out or use agency labor. At issue is the capability of agency management to apply the definitions in a consistent fashion -- from project to project and from agency to agency.

Consistent application of the terms is needed for comparison of agency cost estimates and contractor prices. A related issue is the impact of BARS accounting guidelines that define the break between maintenance and construction through an arbitrary measure on asphalt thickness.

Essential Services Provided by Government Agencies

Public agencies provide essential services as part of their governmental role. A major issue is defining which services constitute essential services. A related issue is deciding which services should be provided directly by the public agency and which services should be contracted out and administered by the agency.

Clearly this is an area that is changing not only in Washington State but across the country. The cost of publicly provided services is an important issue as budget constraints at all levels impact the ability of agencies to maintain service levels with fewer dollars.

Section IV

Findings and Conclusions



FINDINGS AND CONCLUSIONS

This section of our Final Report summarizes our findings and conclusions about each of the study issues identified in the previous section of the report.

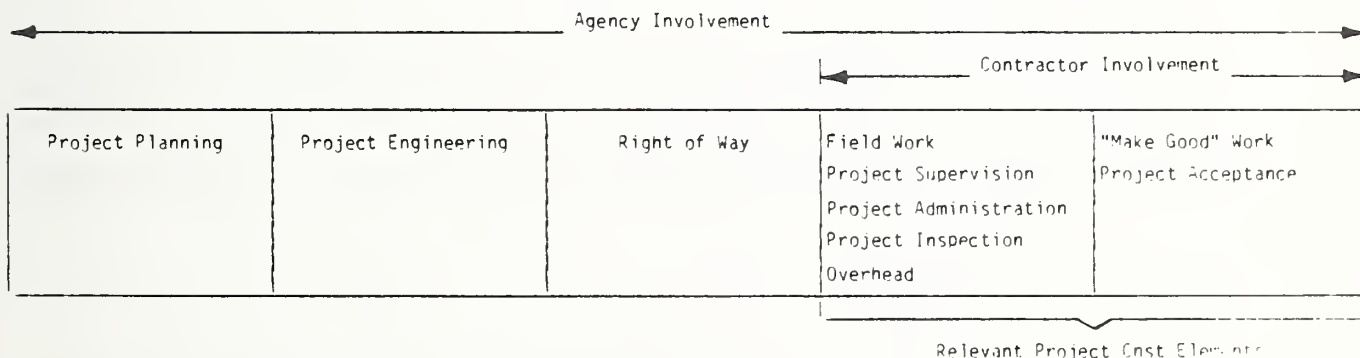
Cost Accounting Systems

Cost accounting for roadway projects is not consistent in interpretation and application among Agencies. In some cases, right of way and design engineering are included in project costs. In other cases, direct supervision may or may not be included as project costs. This lack of consistency makes it difficult to compare similar projects across Agencies and, sometimes, within an Agency. Present project cost accounting practices make it nearly impossible to compare Agency and Contractor costs on similar projects.

Since a Contractor is practically never involved in right of way or design engineering, it is inappropriate to include such costs when comparing Agency cost with Contractor costs. Exhibit B shows some other types of costs which should be included or excluded to make valid comparisons. At present, project cost accounting practices do not consistently include or exclude these cost elements.

Exhibit B

RELEVANT PROJECT COSTS FOR COMPARISON OF AGENCY AND CONTRACTOR COSTS



The BARS chart of accounts is designed for financial reporting, not project costing. Agencies with extensive project work use a separate project costing system which may not be linked to BARS. Generally, the project costing systems used by Agencies only collect costs directly charged to a project. These may include design engineering, right of way, the direct labor, material and equipment charges, and direct supervision. Project costing systems used by Agencies do not routinely allocate overhead to projects.

We do not recommend major changes or revisions to BARS to accommodate project cost accumulation. Instead, we will recommend separate procedures to allocate overhead costs to projects.

Level Playing Field

Agencies and Contractors each have comparative advantages. For example, Agencies can pay lower labor rates, but Contractors can dismiss an employee when there is no work to be done. Agencies have access to lower cost (tax-exempt) financing and self-insurance. Contractors or Agencies may have other advantages, such as more efficient equipment, higher staff productivity, and resources available at very low cost. These advantages or disadvantages will vary widely among Agencies and among Contractors. Since the overall objective is to maximize use of public funds, Agencies should aggressively seek out and use these advantages (Agency or Contractor) wherever possible.

Local Tax Impact of Contracting Out Work

We considered the impact on the Agency of foregone taxes when it uses its own forces to perform roadway projects. The taxes that are significant to a roadway project are:

- Business and occupation (B&O) tax
- Property tax
- Motor vehicle license fee
- Use tax
- Motor vehicle excise tax

After analyzing applicable laws, taxes, and fees, we estimate a 1% difference in the cost of "typical" road work done by Agency labor instead of a private Contractor due to the impact of foregone local taxes. This 1% impact is not a significant factor in the decision process, especially in light of the overall accuracy of the estimating process.

Overhead Cost Allocation

Most Agencies do not have cost allocation systems or methodologies that routinely charge overhead costs (such as facilities, personnel and financing costs) to construction and maintenance projects. Without the allocation of overhead costs, Agency cost estimates are not comparable to Contractor bids. Overhead costs must be included in Agency costs to facilitate a full-cost comparison with Contractor bids or estimates.

Overhead can be broken out into two main components -- fixed and variable. Fixed overhead costs are those overhead costs not affected in the short run by changes in work volume. For example, the cost of operating a central computer does not change from month to month, nor does building rent, even if the volume of Agency work changes drastically.

Other overhead costs do vary as the level of work changes. Variable overhead is sometimes discussed in terms of "out-of-pocket" costs -- those costs that would actually be incurred in order to perform a job. Payroll check stock is an example of variable overhead, because the number of checks used varies directly with the

number of employees and presumably the amount of work. Variable overhead is typically a small percentage of total overhead on any single job.

A contractor's price for a project includes variable and fixed overhead, taxes, and profit in addition to the direct costs of performing the job. The contractor can on occasion charge less than total cost of doing the job. By pricing a job "at the margin," the contractor charges enough to pay for the direct job costs (labor, material, and equipment) and variable overhead, but nothing for fixed overhead costs such as office rent, heat, lights, secretary, etc. From a management perspective, pricing at the margin is only a short-term pricing solution. All overhead costs must be recovered in the long run or the Contractor can not survive. The contractor must allocate some overhead charge to all projects. In the long run, a contractor whose overhead is too high must cut back costs, improve efficiency, or increase the number of projects to which overhead can be allocated.

In the public sector, road construction and maintenance departments benefit from administrative services provided by their agency and/or another agency. However, department heads generally do not have direct control over the costs associated with other service departments or agencies. To the department heads, these support costs appear "fixed." Variable overhead is a small portion of a department's total overhead, because most costs within the annual budget cycle will not vary based on volume.

Accounting for Materials

Cost accounting procedures for materials are generally similar between Agencies and Contractors, with one exception. Contractors generally treat materials as a cost center so all costs, including some overhead, are reflected in the cost of material. Many Agencies treat material stores in a similar fashion. The major difference is the ability to recover overhead. As in other cases, Agencies generally do not apply overhead.

Most Agencies make a concerted effort to charge materials to the relevant project. Since Agencies typically do not maintain a large inventory of materials, the overhead associated with materials is relatively low. Therefore, this does not appear to be a significant source for differences when comparing Agency and Contractor costs. Moreover, allocation of departmental and central service overhead to projects would largely mitigate this issue, because most costs incurred for materials overhead are usually charged to accounts which would be allocated as general departmental and central service overhead.

Accounting for Equipment

Agencies use an Equipment Rental and Revolving (ER&R) fund to pay for the acquisition and maintenance of equipment. These enterprise funds use a rate structure which reflects all the capital and operating costs associated with such equipment.

Agency and Contractor equipment costing procedures are generally comparable. Agencies, as noted elsewhere, typically do not recover certain overhead costs in their rate structure. These costs, however, can largely be recovered through general overhead cost allocation procedures. In a few cases, equipment may have been transferred from the road fund or general fund at little or no cost when the ER&R fund was originally established. If Agencies are adhering to ER&R

guidelines (recovering operating and replacement costs), this should not be a major issue or concern.

Inspection and Quality Control Requirements

The level of inspection required for contract work is nearly always different from the level of inspection on in-house work. Inspection of Agency work depends on management policy. In the latter case, inspection is often left to the foreman of the same crew that performed the work.

Differences in inspection requirements affect the comparability of project costs between Agency cost estimates and Contractor bid prices. They may or may not impact the life-cycle cost of the project depending on a number of factors such as the conscientiousness of the crew and foreman performing the project, and the overall attitude and approach of Agency management toward quality control.

Impact of Bid Limits and Day Labor Requirements

Bid limits vary by the size and type of Agencies (see Exhibit C). There is no apparent economic justification for bid limits, and they appear to be outdated. Bid limits may be forcing Agencies to make decisions based on factors other than the economic realities of a project. As a result, they may be suboptimizing their decisions to comply with obsolete statutes.

Exhibit C

SUMMARY OF EXISTING BID LIMITS

<u>Agency</u>	<u>Construction Bid Limit</u>	<u>Maintenance Bid Limit</u>
Washington State Department of Transportation	\$30,000	None
Cities		
First Class and Code		
Cities over 20,000	\$10,000	None
Second, Third and Fourth Class	\$15,000	None
Counties		
Road Construction Budget:	County may construct in one year: ¹	None
\$500,000 or less	\$250,000 or \$35,000 in any one project	
\$500,000 to \$1,500,000	\$250,000 or 35% of total budget	
\$1,500,000 to \$4,000,000	\$525,000 or 25% of total budget	
\$4,000,000 or greater	\$800,000 or 15% of total budget	

¹Except electric projects which are limited to \$10,000 per project.

The effect of outdated, uneconomic bid limits on project costs and performance could be dramatic. Continued use of outdated limits may result in even more suboptimizing if overhead is allocated to projects. Smaller projects will be impacted most, possibly to the extent of curtailing many small projects currently just under existing bid limits.

Another possible impact of the existing limits may be to force certain "construction" projects into the "maintenance" category. There is, and will always be, gray areas within these two project categories. Accordingly, they may encourage understating Agency cost estimates or "hopscotch" road surface treatment where pavement surface treatment is alternated each year. With uneconomic bid limits, Agencies could be forced into these types of practices in order to achieve their basic mission.

Labor and Union Agreement

Agencies engage in management practices which they might change if they had information on the full cost of a project and additional flexibility in labor management practices. This is a result of constraints of labor laws and agreements. For example, they use labor, hired for peak season activities (e.g., snow removal), for various work. Contracts and civil service regulations agreements do not allow seasonal hiring and layoffs. Private Contractors hire primarily for project work. When the Contractor is finished with the job, the employee is often released from the Contractor's employment. This difference in hiring practices is tempered somewhat by the lower wages for the civil service employees.

Interagency Contracting

Interagency contracting is a routine activity specifically permitted by statute (RCW 35.77.020, 39.34.080). Since Agencies providing services do not routinely include all project costs (e.g., overhead), the Agency receiving services is typically being charged less than the full cost of the services. As a result, the comparison of costs between a provider Agency and a Contractor is not currently an "apples and apples" comparison. If a full cost methodology is developed and used by the Agencies, then it will be possible to compare interagency project costs to Contractor bids on an equal footing.

Self-Insurance Costs

It is common to find differences in public liability insurance costs and availability among Agencies and Contractors. One example is chemical spraying for weed control. If a Contractor is unable to obtain adequate liability coverage, then the Agency must do the work, regardless of whether or not it would be more cost effective to contract out such work.

Agencies can spread the exposure of high risk activities over a much larger range of activities than can a Contractor. Agencies may "self-insure" and have other inherent advantages in providing for liability not available to Contractors. This issue can not be resolved through any cost accounting or project costing technique recommended in this study.

Definitions of Construction and Maintenance

Key roadway terms, such as construction, maintenance, project, and essential services, are neither well defined nor commonly understood. Our study team found that many Agency and Contractor personnel were unable to provide any succinct definitions of these four terms. This lack of operational definitions is manifested in the way project costing practices vary from Agency to Agency when applying these terms.

Essential Services Provided by Government Agencies

Essential services do not have a fixed definition, but generally are guided by public expectations. Public safety and infrastructure projects readily fit the public expectations of essential service.

Practical experience indicates that the direct provider of an essential service does not need to be a government Agency. There are many examples of Agencies contracting essential services such as garbage collection, snow removal, and even fire protection to private companies. Studies have shown that the success of contracting the service is based on the experience and training of Agency personnel in defining specifications for contractual services and in monitoring Contractor performance.

A second element of successfully contracting for essential services is the ability of Agencies to perform multi-year contracting. This is important for services, such as snow removal, where equipment can be quite specialized, expensive, and with limited use outside of snow season. For this type of service contract, the Contractor needs the assurance that the proposed period of the service contract is long enough for him to recover the capital investment in such equipment.

Section V

Recommendations



RECOMMENDATIONS

After reviewing our analysis of the study issues, findings, and conclusions with the Steering Committee, we developed a number of recommendations for further improving the cost effectiveness of roadway construction and maintenance in the State of Washington. These recommendations will have positive impact on both public policy and Agency management practices. In essence, we recommend that the State should, through legislation or regulation, as appropriate:

- Adopt the concept of full project costing -- using the Project Cost Evaluation Methodology -- to assist State Agencies in determining whether or not to contract out roadway construction and maintenance projects to private Contractors or other government Agencies.
- Initiate a one-year PCEM "Pilot Program" to test the methodology on a sample group of Agencies.
- Modify project cost accounting practices to improve comparability of the Agency's estimated costs with Contractor bids.
- Apply overhead cost allocations in project cost estimates for comparisons with Contractor bids.
- Review inspection and quality control procedures to reflect associated costs in total project costs for both in-house and contract work.
- Base bid limits and day labor limits on sound economic criteria to reflect reasonable thresholds for "packaging" work for bidding by Contractors.
- Review state laws and Agency agreements on labor utilization that preclude cost-effective contracting.
- Adopt proposed definitions of project, construction, maintenance, and essential services in concert with the above recommendations.

These recommendations are detailed below.

Project Cost Evaluation Methodology

Agencies should adopt the Project Cost Evaluation Methodology (PCEM) for estimating the cost of roadway construction and maintenance projects.

PCEM can assist Agency management in deciding whether to use Agency forces or private Contractors for project work. The use of the PCEM can assist Agency decision makers by:

- Allocating overhead costs to projects so bid limits, day labor limits, and Agency/Contractor cost comparisons can be analyzed on a full-cost basis.
- Providing marginal costing procedures to compare direct Agency costs to Contractor bid estimates for those occasions when decisions based on full costing would leave Agency forces underutilized.

- Documenting decision making procedures used to identify contract and Agency work and the economic rationale for the decisions.
- Documenting actual project costs after the project is completed to improve estimates and provide for analysis of the decision criteria.

Exhibit D on the following five pages illustrates the PCEM worksheets, the use of which is summarized beginning on page 22.

EXHIBIT D

PCEM WORKSHEETS



PART A
PROJECT COST EVALUATION METHODOLOGY
Preliminary Decision Alternatives

PROJECT NAME: _____ PROJECT NUMBER: _____
DATE: _____

PROJECT DESCRIPTION: _____

PROJECT LOCATIONS: _____

CONCEPTUAL OR ENGINEERS DIRECT COST ESTIMATE: _____ ACTUAL: _____
(NOT INCLUDING DESIGN, RIGHT-OF-WAY, BID COSTS)

1. IS THE PROJECT WORK ACTIVITY(IES) OF SUCH SCOPE THAT IT WOULD AUTOMATICALLY GO OUT FOR BID? _____ YES _____ NO (Go to Question 2)

IF YES:

- 1a. _____ EXCEEDS BID LIMIT/DAY LABOR REQUIREMENTS
- 1b. _____ EXCEEDS AGENCY CAPACITY OR TECHNICAL EXPERTISE
- 1c. _____ OTHER _____

2. IS THE PROJECT WORK ACTIVITY 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. _____ PROJECT TOO SMALL TO WARRANT COST EFFECTIVE BID
- 2c. _____ REQUIRED TO FULLY UTILIZE AVAILABLE AGENCY WORK FORCE
- 2d. _____ PROJECT EXEMPTION STATUS. REASON FOR PROJECT TO BE EXEMPTED FROM YEARLY PCEM REVIEW: _____

- 2e. _____ OTHER _____

3. IF QUESTION 1 AND 2 ARE "NO", USE PART B OF THE PCEM WORKSHEETS.

PART B SUMMARY:

	ESTIMATE	ACTUAL
3a. TOTAL AGENCY PROJECT COST:	_____	_____
3b. TOTAL CONTRACTOR PROJECT COST:	_____	_____
3c. SELECTION WAS MADE FOR: _____ AGENCY _____ CONTRACTOR		

PREPARED BY: _____ TITLE _____ DATE: _____

REVIEWED BY: _____ TITLE _____ DATE: _____

PART B
PROJECT COST EVALUATION METHODOLOGY
B.1 COMPARISON OF COST ESTIMATES

PROJECT NAME: _____ PROJECT NUMBER: _____
DATE: _____

PROJECT DESCRIPTION:

SUMMARY COST COMPARISON

AGENCY	CONTRACTOR	
	Estimate	Actual
1. Agency Cost	_____	_____
2. Project Administration	_____	_____
3. Direct Project Cost	_____	_____
4. Variable Overhead (@ ___%)	_____	_____
5. SUBTOTAL	_____	_____
6. Fixed Overhead (@ ___%)	_____	_____
7. Total Project Cost	_____	_____

Alternative Selected: _____ 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: _____

B.2 AGENCY COST ESTIMATE

PROJECT NAME: _____ PROJECT NUMBER: _____

LABOR ESTIMATE

Direct Labor Hours
Labor Type

_____	_____	Hours @ \$ _____/Hour = \$ _____
_____	_____	Hours @ \$ _____/Hour = \$ _____
_____	_____	Hours @ \$ _____/Hour = \$ _____
_____	_____	Hours @ \$ _____/Hour = \$ _____
_____	_____	Hours @ \$ _____/Hour = \$ _____
_____	_____	Hours @ \$ _____/Hour = \$ _____

DIRECT LABOR SUBTOTAL \$ _____

Fringes (@ _____%) \$ _____

1. LABOR TOTAL \$ _____

MATERIAL ESTIMATE

Type	Quantity	Cost/unit	Cost
_____	_____	_____	\$ _____
_____	_____	_____	\$ _____
_____	_____	_____	\$ _____
_____	_____	_____	\$ _____
_____	_____	_____	\$ _____

2. MATERIAL TOTAL \$ _____

EQUIPMENT ESTIMATE

Type	Quantity	Cost/unit	Cost
_____	_____	_____	\$ _____
_____	_____	_____	\$ _____
_____	_____	_____	\$ _____
_____	_____	_____	\$ _____
_____	_____	_____	\$ _____

3. EQUIPMENT TOTAL \$ _____

4. AGENCY COST
(Total lines 1, 2 and 3) \$ _____

PROJECT ADMINISTRATION, SUPERVISORY OR INSPECTION HOURS

5. Project Administration Cost \$ _____
(_____ hours @ \$ _____/hour & Fringes @ _____%)

6. DIRECT PROJECT COST
(Lines 4 plus 5) \$ _____

B.3 CONTRACTOR PRICE ESTIMATE

PROJECT NAME: _____ PROJECT NUMBER: _____

<u>BID ITEM</u>	<u>QUANTITY</u>	<u>Price/Unit</u>	<u>BID PRICE</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

- 1. TOTAL CONTRACTOR PRICE ESTIMATE \$ _____
- 2. Agency Project Administration Cost \$ _____
 (_____ hours @ \$ _____/hour & Fringes @ _____%)
- 3. DIRECT PROJECT COST (Line 1 and 2) \$ _____
- 4. Agency Variable Project Administration Overhead (@ _____%) _____
- 5. SUBTOTAL (Line 3 and 4) _____
- 6. Agency Fixed Project Administration Overhead (@ _____%) _____
- 7. TOTAL PROJECT COST (Line 5 and 6) \$ _____

WHAT WAS THE SOURCE OF THE CONTRACTOR PRICE ESTIMATE? _____

ARE THERE EXPECTATIONS THAT BIDS WOULD VARY SIGNIFICANTLY FROM THE ESTIMATE?

_____ YES _____ NO

IF YES, DESCRIBE:

ARE THERE EXPECTATIONS THAT OPERATIONAL FACTORS WOULD HAVE A MAJOR IMPACT ON THE COMPLETION OF THE PROJECT?

_____ YES _____ NO

IF YES, EXPLAIN:

B.4 OPERATIONAL FACTORS

PROJECT NAME: _____ PROJECT NUMBER: _____

CONSIDERATION OF OPERATIONAL FACTORS SUCH AS:

<u>Factors</u>	<u>Consideration</u>
	(High, Medium, Low Concern)
Priority	_____
Resource Availability	_____
Timeliness	_____
Competitive Bid Environment	_____

Comments

The PCEM Process

Exhibit E is a "decision tree" that depicts the logical decision process used in the Project Cost Evaluation Methodology. Exhibit E indicates the typical "Yes/No" questions that an Agency should consider to decide if the project should be performed by Contractor or Agency labor. The eventual outcome is that all logical consequences will be decided -- either the Agency or the Contractor will do the project.

The PCEM process should be used by Agency management as a planning and evaluation tool in annual budgeting for anticipated roadway projects. All projects should be identified with proposed engineering or conceptual cost estimates. Each project is entered on a Preliminary Decision worksheet (Exhibit D on page 17).

We anticipate that many Agencies will have certain types of projects that are not traditionally done by a Contractor in the local area. An example might be guard rail repair in a county that does not have any major Contractors. To reduce the administrative costs of using PCEM, such projects could be exempted from yearly consideration until conditions change to warrant reconsideration or a maximum of five years. All other project categories (see Appendix C) would be reviewed on a yearly basis to compare Agency costs to Contractor bid estimates.

Projects are evaluated to compare a fully costed engineer's estimate to bid limits and placed into one of three categories. Category 1 includes all projects that would automatically go out for bid.

Category 2 includes all projects that would go directly to Agency labor. The reason for this decision should be documented on the PCEM worksheet. An example might be a project where Contractor liability is a problem or the project is so small that bidding would not be cost effective.

Category 3 includes all remaining projects. These projects would be analyzed in more detail. For projects in Category 3, we recommend the following steps:

- Prepare Contractor Estimate

The Agency uses historical data on past roadway projects -- its own or those of a similar Agency -- to estimate Contractor bids to be recorded on the PCEM worksheets (Exhibit D on page 20).

Engineering departments can estimate Contractor bids in various ways, including use of the Washington State bid guide. For some projects, the original conceptual estimate may be used if the estimating process was sufficient. This does not take the place of a formal bid, it is merely an indicator of the estimated contract price based on the best available information.

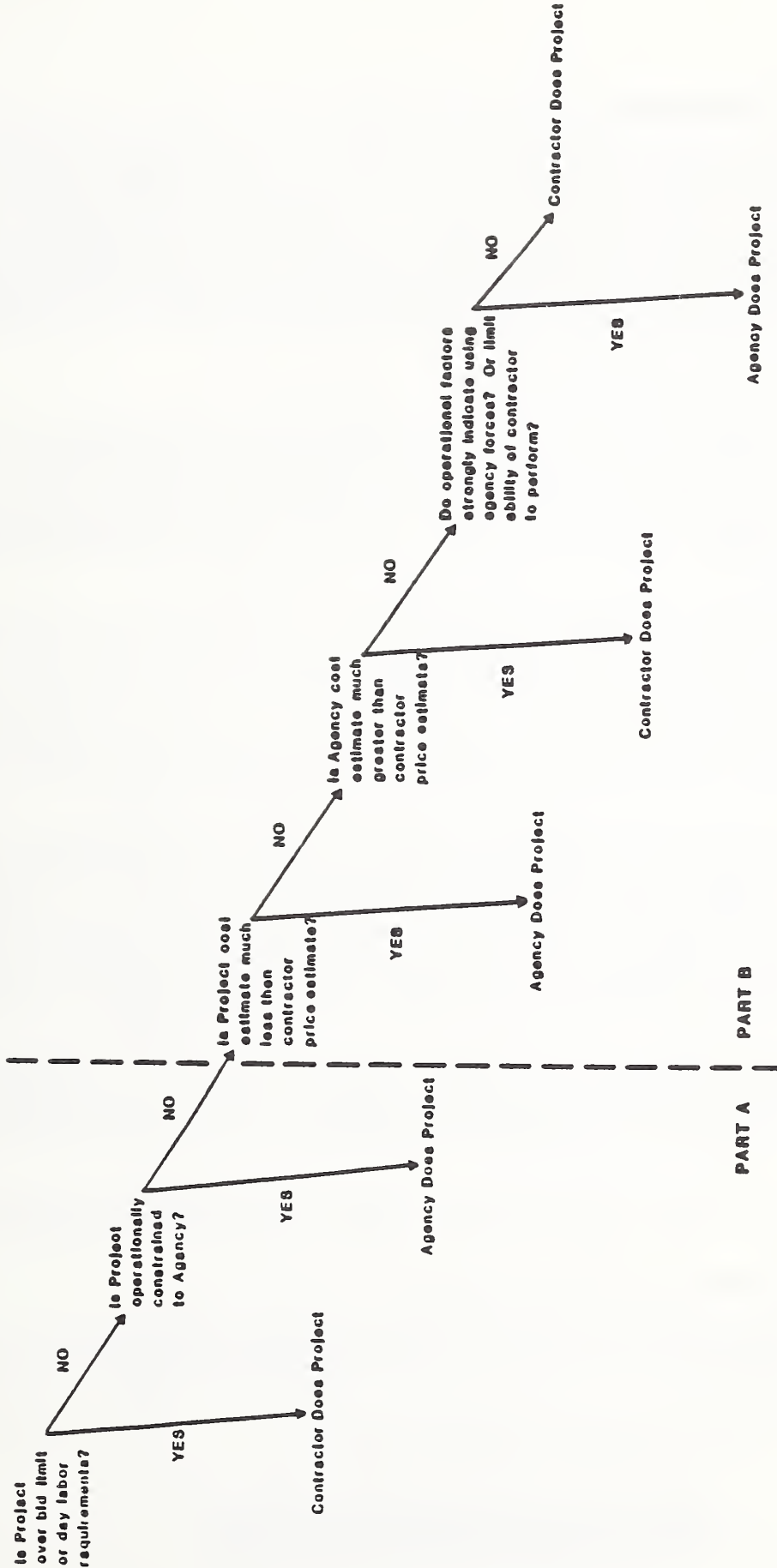
- Prepare Agency Estimate

The Agency then prepares an estimate of its own labor, material, equipment, and overhead costs based on project specifications (Exhibit D on page 19).

Exhibit E

PCEM

Project Decision Tree



- Compare Agency and Contractor Cost

The Agency then compares its costs with bid estimates (Exhibit D on page 18). If the difference between them exceeds 15% of the Agency cost estimate and a choice of the lower-cost alternative is not significantly altered by other operational factors, then the Agency should choose the lower-cost alternative. If the estimates are within 15% of each other, then operational factors should be considered, as indicated in the next step of the PCEM process.

- Evaluate Operational Factors

Depending on the initial cost estimates, the Agency may need to consider other "real world" operational factors as appropriate. This step provides Agencies with the needed management flexibility to make individual cost decisions in a larger context in which the Agency operates. Operational factors should be documented (Exhibit D on page 21).

Decision on projects where Agency and Contractor estimates are within 15% should be made based on costs and operational factors. The Agency will generally perform the project if its estimated costs are less than those of the Contractor or if there are operational factors that work against the Contractor. The project will go out to bid if the Contractor estimate is less than that of the Agency or if there are operational factors that work against the Agency.

The concept of marginal costing can be used if the Agency has excess or underutilized resources available for a roadway project. If full cost is higher than the Contractor estimate, yet Agency forces are underutilized, then the Agency should compare its marginal costs with the estimated Contractor bid. If the Agency marginal cost is lower, then the Agency may consider using Agency labor instead of contracting out the roadway project to the private sector.

If the marginal cost is higher than the Contractor price estimate, the Agency should go out for bid; if the bid prices are in fact less than the marginal cost, the Agency should have the Contractor do the project as it is more cost effective.

As a result of this process, all projects will be assigned to Category 1 or 2. They will be performed by Agency forces or by contract.

- Prepare Annual Report of Projects

Each year, the Agencies should prepare a report that summarizes all roadway projects and their disposition. The report would be a brief listing of:

- Part A Projects, by type and amount:
 - projects automatically contracted out
 - projects automatically done by force labor
 - projects exempted from the PCEM analysis

●● Part B Projects - by type, with estimated and actual expenditures, and decision criteria used to choose between:

- projects contracted out
- projects done by force labor

Exhibit F shows an example of this report. The report will summarize all projects completed by or for the Agency during the most recent fiscal year.

Exhibit F

REPORT ON ANNUAL PROJECT ACTIVITY

Report on Annual Project Activity				
SAMPLE COUNTY FOR YEAR ENDED 19XX				
SECTION I - PART A				
Contracted Out				Expenditure (\$\$)
<i>Handwritten text</i>				
Performed by Agency Labor				Expenditure (\$\$)
<i>Handwritten text</i>				
Exempt Projects		Reason		Expenditure (\$\$)
<i>Handwritten text</i>		<i>Handwritten text</i>		
SECTION II - PART B				
Project	Estimated Expend.	Actual Expend.	Performed By	Reason for Selection
	(\$\$)	(\$\$)		
<i>Handwritten text</i>	<i>Handwritten</i>	<i>Handwritten</i>	<i>Handwritten</i>	<i>Handwritten</i>
<i>Handwritten text</i>	<i>Handwritten</i>	<i>Handwritten</i>	<i>Handwritten</i>	<i>Handwritten</i>

PCEM offers a number of important benefits for Agencies, Contractors, and the general public. These include:

- The PCEM will work within current day labor and bid limit constraints.
- Since PCEM is project based, it cuts across the traditional demarcation for "construction" and "maintenance." When work is organized into projects, it is not necessary to make a distinction between construction and maintenance. (It is important to note that current law does make a distinction between construction and maintenance.)
- By using PCEM, the Agency decision making process should be consistent and well documented. This should reduce areas of misunderstanding between Agencies and private Contractors.
- Using PCEM, a decision maker will be able to base decisions on either full cost or marginal cost. Full cost is direct cost plus all overhead; marginal cost is direct cost plus variable overhead. Full cost will be used for the initial decision on bid limits/day labor requirements and overall comparison of Agency and Contractor estimates. Marginal cost should be used when Agencies have otherwise underutilized resources.

Initiate Pilot Program

As a practical matter, the implementation of the PCEM process may require additional efforts on the part of many cities, counties, and DOT offices. To ascertain the specific effects on public agencies, a Pilot Program approach should be used. The Pilot Program would include the following activities:

- Pick 10 willing agencies - 3 counties, all of different sizes, 6 cities, all of different sizes, and 1 DOT highway district; these would be proposed by the Steering Committee and approved by the LTC.
- Implement the report recommendations for these 10 agencies in 1987 and 1988.
- Modify existing statutes and/or regulations that:
 - .. differentiate between construction and maintenance for the participants in the Pilot Program
 - .. pertain to bid limits or day labor requirements for the participants in the Pilot Program
- Training and instruction for the pilot program agencies by a consultant to ensure that similar criteria are used by all participants.
- Project oversight of the Pilot Program by the current Steering Committee through periodic meetings and reports to the LTC.

Accounting for Project Costs

Current Agency project accounting practices make it nearly impossible to accurately compare costs between Agencies and private Contractors. Agencies need to know the costs for such project elements as preliminary planning, right of way, and design engineering. However, these project elements should be tracked separately to distinguish them from cost elements which are relevant for comparison between Agency performed projects and Contractor performed projects. Since there are wide variations across Agencies in project cost accounting systems, we cannot make more specific recommendations as to precisely how these costs should be tracked. However, Exhibit G summarizes the project cost elements to be included and excluded so valid comparisons can be made.

Overhead Cost Allocation

Agencies should develop an overhead cost allocation process. This process should result in an overhead rate which includes central service overhead (accounting, personnel, and the like) and departmental overhead (e.g., secretaries, supervisors, office supplies). These rates should assist Agencies in determining the full cost of their operations and of individual projects.

To support PCEM decision making, Agencies should develop an estimate of the portion of total overhead which is variable, i.e., it is dependent on performing a certain project or volume of work. This portion of overhead, typically 10% to 15% of the total, is allocated separately from the remaining fixed portion of overhead under PCEM.

There are many techniques for allocating overhead costs. Agencies should select a method which accurately reflects their operations. Appendix B includes a sample methodology for overhead cost allocation.

Inspection and Quality Control

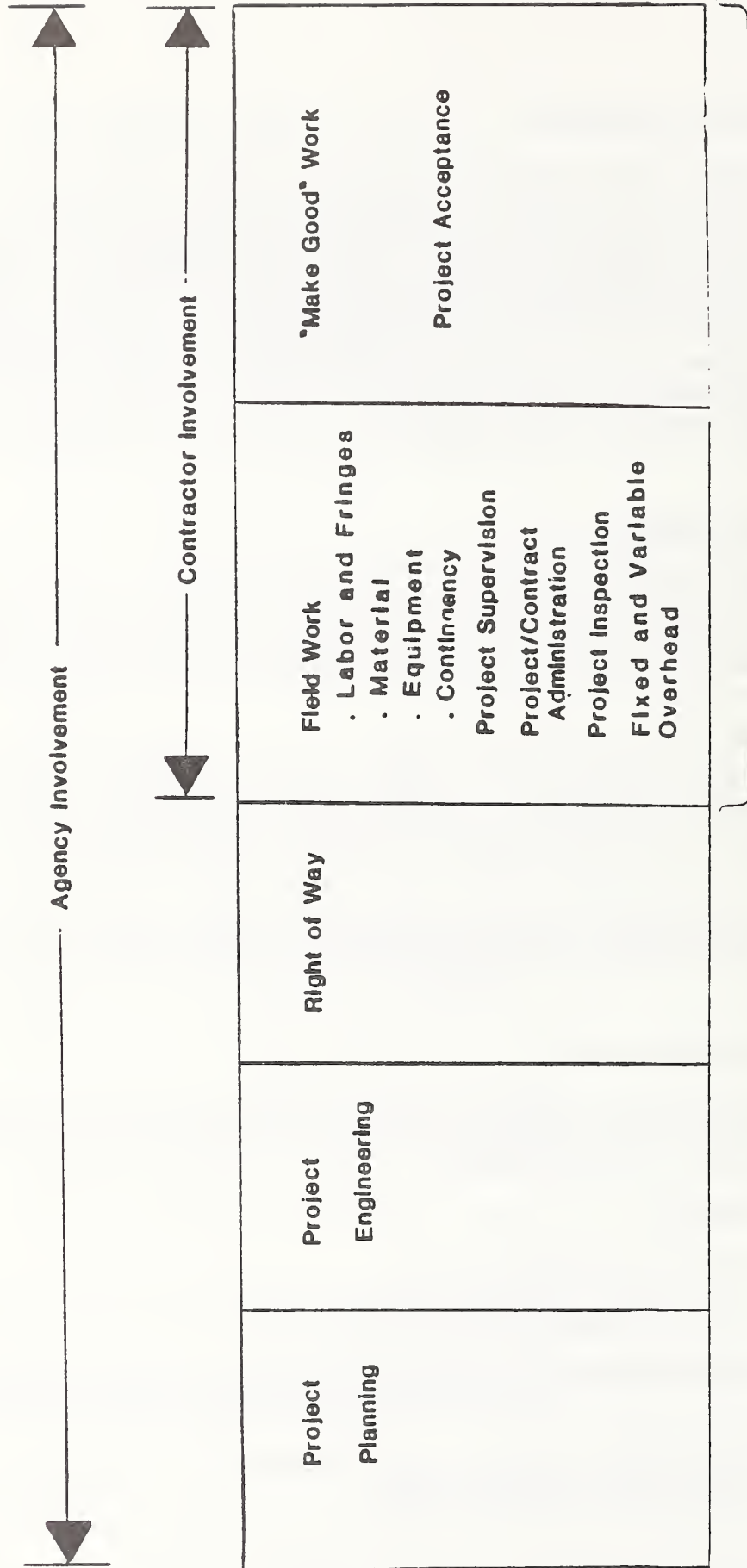
Agencies should develop policies and procedures for consistent inspection of roadway construction and maintenance projects. The guidelines should consider all aspects of project inspection, including:

- Safety implications
- Technical risk (i.e., complexity of work)
- Economic risk (i.e., dollar size of the project)
- Standards of comparability when both Agency and Contractor perform similar work

This will help to ensure consistent quality control over all projects, whether performed by Contractors or Agency forces.

Exhibit G

Relevant Project Costs For Agency/Contractor Cost Comparison



Impact of Bid Limits and Day Labor Requirements

Bid limits and day labor requirements should be reviewed and revised. Existing dollar limits used to determine if projects should be bid out or performed in-house are inappropriate in today's economic environment and may produce suboptimal decisions by Agency management. The dollar limits need to be reviewed to determine a more viable economic basis for these decisions.

Labor Laws and Union Agreements

State laws and Agency labor agreements constraining decision making to less than cost effective decisions should be reviewed. Existing statutes, labor contracts, and court rulings constrain Agency decision making by limiting the use of cost effectiveness as a criteria for selecting how work is performed. Existing contracts and statutes should be reviewed for potential compromise on the use of cost effectiveness as a decision making criteria, especially for new or expanded services.

Definitions of Construction and Maintenance

We have proposed new definitions for the following terms in Appendix C to this report:

- Project
- Construction
- Maintenance
- Essential Services

We recommend these definitions be adopted as policy guidelines for Agency use. If the Legislative Transportation Committee decides to mandate the use of PCEM, the Legislature will need to modify existing RCW's,

Implementation of PCEM will substantially reduce the need for strict definitions and interpretation of construction and maintenance. As the Agencies become more "project" oriented, the distinction between construction and maintenance becomes less relevant and cost effectiveness becomes the primary criterion for deciding whether roadway projects should be performed by private Contractors or the Agencies themselves.

Appendix A

Project Cost
Evaluation Methodology



PROJECT COST EVALUATION METHODOLOGY

The PCEM will assist agency management in deciding whether to use agency forces or private contractors for project work. The use of the PCEM will assist agency decision makers by:

- Providing full cost allocation of overhead to projects so bid limits, day labor limits and agency/contractor cost comparisons can be analyzed on a full cost basis.
- Providing marginal cost decision procedures to compare direct agency costs to contractor price estimates for those occasions when decisions based on full costing would leave agency forces underutilized.
- Documenting decision making procedures used to identify contract and agency work and the economic rationale for the decisions.
- Documenting actual project costs after the project is completed to improve estimates and provide for analysis of the decision criteria.

The PCEM Process

Figure A-1 is a "decision tree" that depicts the logical decision process used in the Project Cost Evaluation Methodology. Figure A-1 indicates the typical "Yes/No" questions that an Agency should consider to decide if the project should be performed by Contractor or Agency labor. The eventual outcome is that all logical consequences will be decided -- either the Agency or the Contractor will do the project.

The PCEM process should be used by Agency management as a planning and evaluation tool in annual budgeting for anticipated roadway projects. All projects should be identified with proposed engineering or conceptual cost estimates. Each project is entered on a Preliminary Decision worksheet (Exhibit D on page 16).

We anticipate that many Agencies will have certain types of projects that are not traditionally done by a Contractor in the local area. An example might be guard rail repair in a county that does not have any major Contractors. To reduce the administrative costs of using PCEM, such projects could be exempted from yearly consideration until conditions change to warrant reconsideration or a maximum of five years. All other project categories (see Appendix C) would be reviewed on a yearly basis to compare Agency costs to Contractor bid estimates.

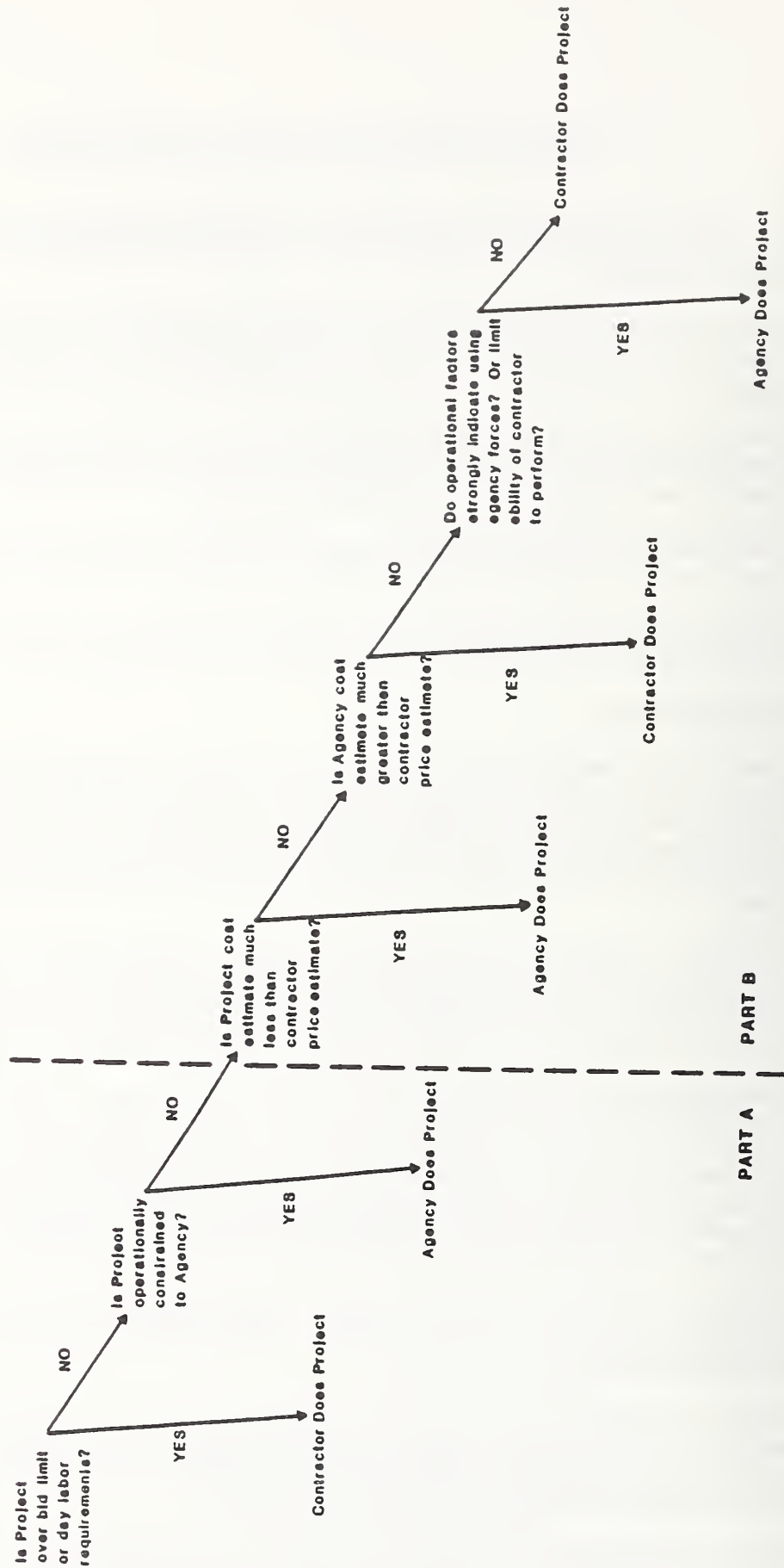
Projects are evaluated to compare a fully costed engineer's estimate to bid limits and placed into one of three categories. Category 1 includes all projects that would automatically go out for bid.

Category 2 includes all projects that would go directly to Agency labor. The reason for this decision should be documented on the PCEM worksheet. An example might be a project where Contractor liability is a problem or the project is so small that bidding would not be cost effective.

Category 3 includes all remaining projects. These projects would be analyzed in more detail. For projects in Category 3, we recommend the following steps:

Figure A-1
PCEM

Project Decision Tree



- Prepare Contractor Estimate

The Agency uses historical data on past roadway projects -- its own or those of a similar Agency -- to estimate Contractor bids to be recorded on the PCEM worksheets (Exhibit D on page 19).

Engineering departments can estimate Contractor bids in various ways, including use of the Washington State bid guide. For some projects, the original conceptual estimate may be used if the estimating process was sufficient. This does not take the place of a formal bid, it is merely an indicator of the estimated contract price based on the best available information.

- Prepare Agency Estimate

The Agency then prepares an estimate of its own labor, material, equipment, and overhead costs based on project specifications (Exhibit D on page 18).

- Compare Agency and Contractor Cost

The Agency then compares its costs with bid estimates (Exhibit D on page 17). If the difference between them exceeds 15% of the Agency cost estimate and a choice of the lower-cost alternative is not significantly altered by other operational factors, then the Agency should choose the lower-cost alternative. If the estimates are within 15% of each other, then operational factors should be considered, as indicated in the next step of the PCEM process.

- Evaluate Operational Factors

Depending on the initial cost estimates, the Agency may need to consider other "real world" operational factors as appropriate. This step provides Agencies with the needed management flexibility to make individual cost decisions in a larger context in which the Agency operates. Operational factors should be documented (Exhibit D on page 20).

Decision on projects where Agency and Contractor estimates are within 15% should be made based on costs and operational factors. The Agency will generally perform the project if its estimated costs are less than those of the Contractor or if there are operational factors that work against the Contractor. The project will go out to bid if the Contractor estimate is less than that of the Agency or if there are operational factors that work against the Agency.

The concept of marginal costing can be used if the Agency has excess or underutilized resources available for a roadway project. If full cost is higher than the Contractor estimate, yet Agency forces are underutilized, then the Agency should compare its marginal costs with the estimated Contractor bid. If the Agency marginal cost is lower, then the Agency may consider using Agency labor instead of contracting out the roadway project to the private sector.

If the marginal cost is higher than the Contractor price estimate, the Agency should go out for bid; if the bid prices are in fact less than the marginal cost, the Agency should have the Contractor do the project as it is more cost effective.

As a result of this process, all projects will be assigned to Category 1 or 2. They will be performed by Agency forces or by contract.

● Prepare Annual Report of Projects

Each year, the Agencies should prepare a report that summarizes all roadway projects and their disposition. The report would be a brief listing of:

●● Part A Projects, by type and amount:

- projects automatically contracted out
- projects automatically done by force labor
- projects exempted from the PCEM analysis

●● Part B Projects - by type, with estimated and actual expenditures, and decision criteria used to choose between:

- projects contracted out
- projects done by force labor

Exhibit A-2 shows an example of this report. The report will summarize all projects completed by or for the Agency during the most recent fiscal year.

Exhibit A-2

REPORT ON ANNUAL PROJECT ACTIVITY

Report on Annual Project Activity				
SAMPLE COUNTY FOR YEAR ENDED 19XX				
SECTION I - PART A				
Contracted Out			Expenditure (\$\$)	
<i>Handwritten scribbles</i>				
Performed by Agency Labor			Expenditure (\$\$)	
<i>Handwritten scribbles</i>				
Exempt Projects	Reason	Expenditure (\$\$)		
<i>Handwritten scribbles</i>	<i>Handwritten scribbles</i>			
SECTION II - PART B				
Project	Estimated Expend. (\$\$)	Actual Expend. (\$\$)	Performed By	Reason for Selection
<i>Handwritten scribbles</i>	<i>Handwritten scribbles</i>	<i>Handwritten scribbles</i>	<i>Handwritten scribbles</i>	<i>Handwritten scribbles</i>

There are several important benefits from using this approach:

- The PCEM will work within current day labor and bid limit constraints.
- Because the PCEM is project based, it cuts across the traditional demarcation for "construction" and "maintenance." When work is organized into projects, it is not necessary to make a distinction between construction and maintenance. (It is important to note that current law does make a distinction between construction and maintenance.)
- By using the PCEM, the agency decision making process will be consistent and well documented. This should reduce areas of misunderstanding between Agencies and private contractors.
- Using the PCEM, the decision maker will be able to base decisions on both full cost and marginal cost. Full cost is direct cost plus all overhead; marginal cost is direct cost plus variable overhead. Full cost will be used for the initial decision on bid limits/day labor requirements. Marginal cost will be available to use when decision makers have otherwise underutilized resources. An example would be in the summer when counties that have snow removal crews available to perform other duties.

Decisions based on full cost where labor is otherwise underutilized might be uneconomic in the short run. This could occur if a fully costed agency project was higher than a contractor estimate yet the marginal cost was lower than the direct contractor price. If the agency has available labor, contracting out would be uneconomic -- the agency pays for the contractor labor and yet agency labor is still being paid but not efficiently utilized. The PCEM specifically allows for this comparison.

- To use the PCEM worksheets, the agency finance and accounting groups will need to provide the agency decision maker with:
 - .. Fringe benefit percentages
 - .. Overhead rate percentages
 - Fixed overhead
 - Variable overhead

The development of fringe benefit percentages is currently performed at the Agencies. The exception is retirement benefits which may be charged to a central services administration account and not to direct labor costs. This benefit will need to be examined at the agency level and fringe benefits modified to include these costs.

The development of an overhead rate is a change for many Agencies. The overhead allocation process and some specific examples of overhead are discussed in more detail in Appendix B.

Detailed PCEM Model

The decision tree shows high level decisions of the PCEM. The attached figures show the PCEM model in terms of detailed decision activities and flows of information.

The "bubbles" in each figure represent activities or decisions, while the arrows represent the flow of information through the decision process (whether the information is electronic or manual based).

Figure A-3

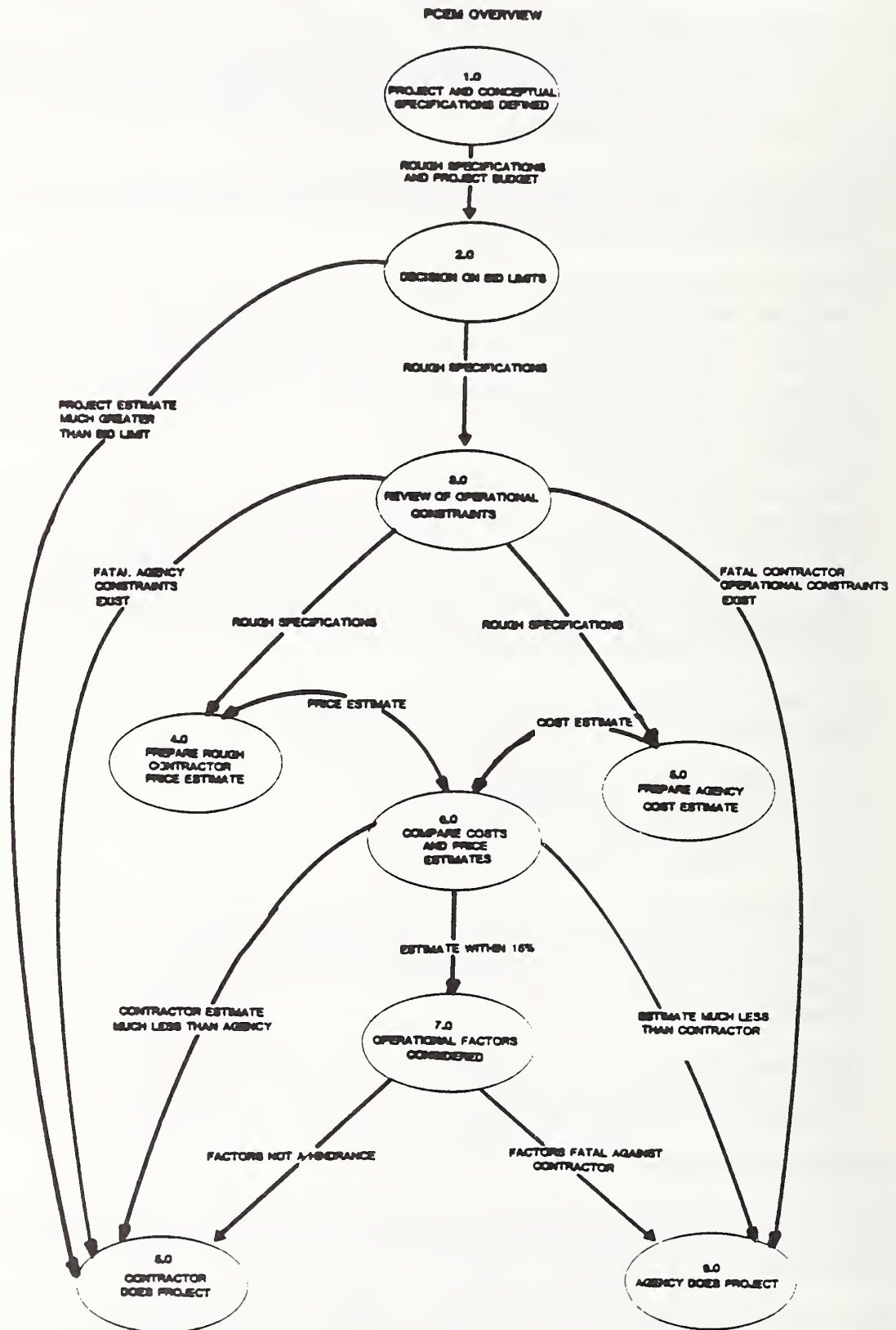


Figure A-4

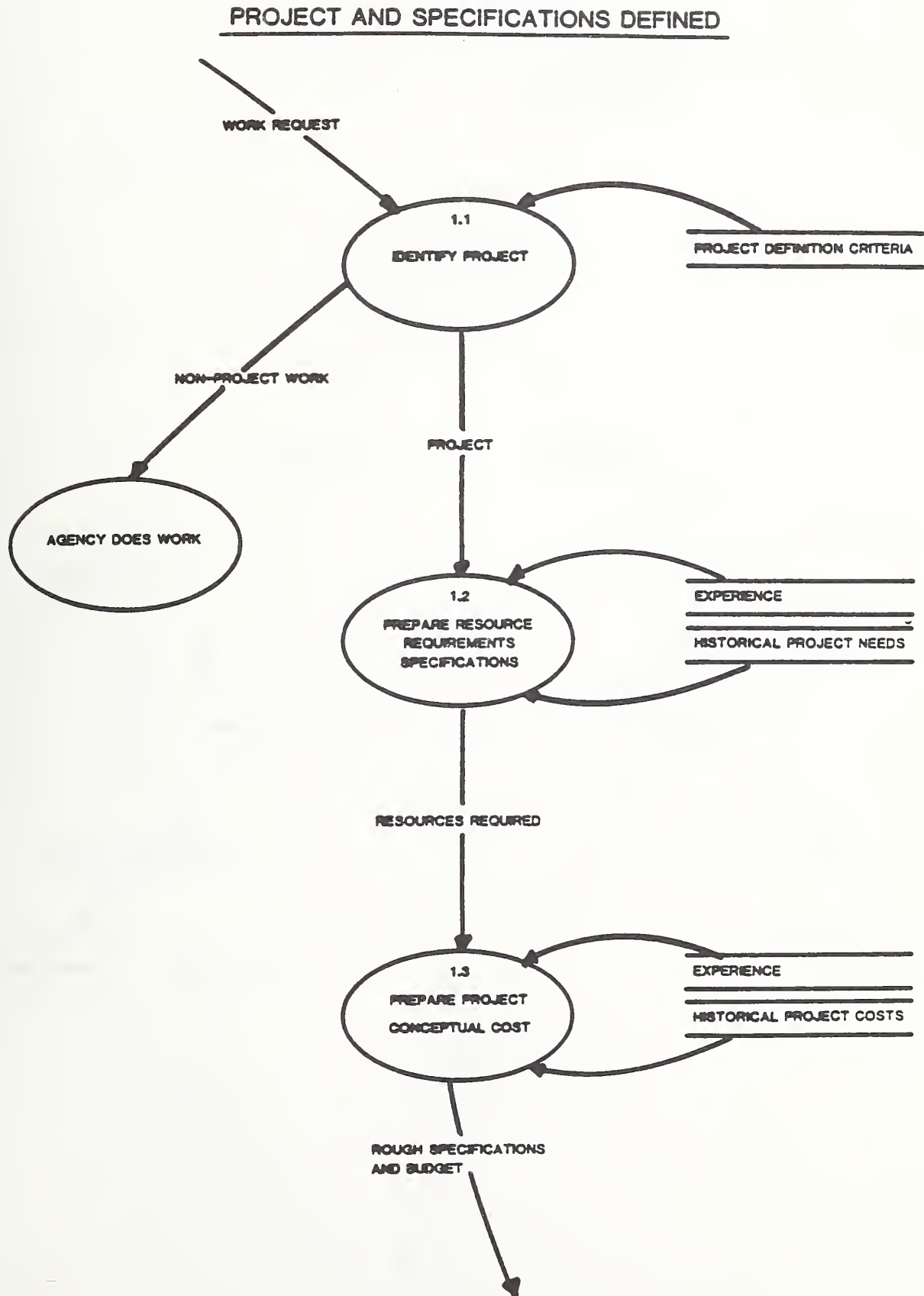


Figure A-5

DECISION ON BID LIMITS

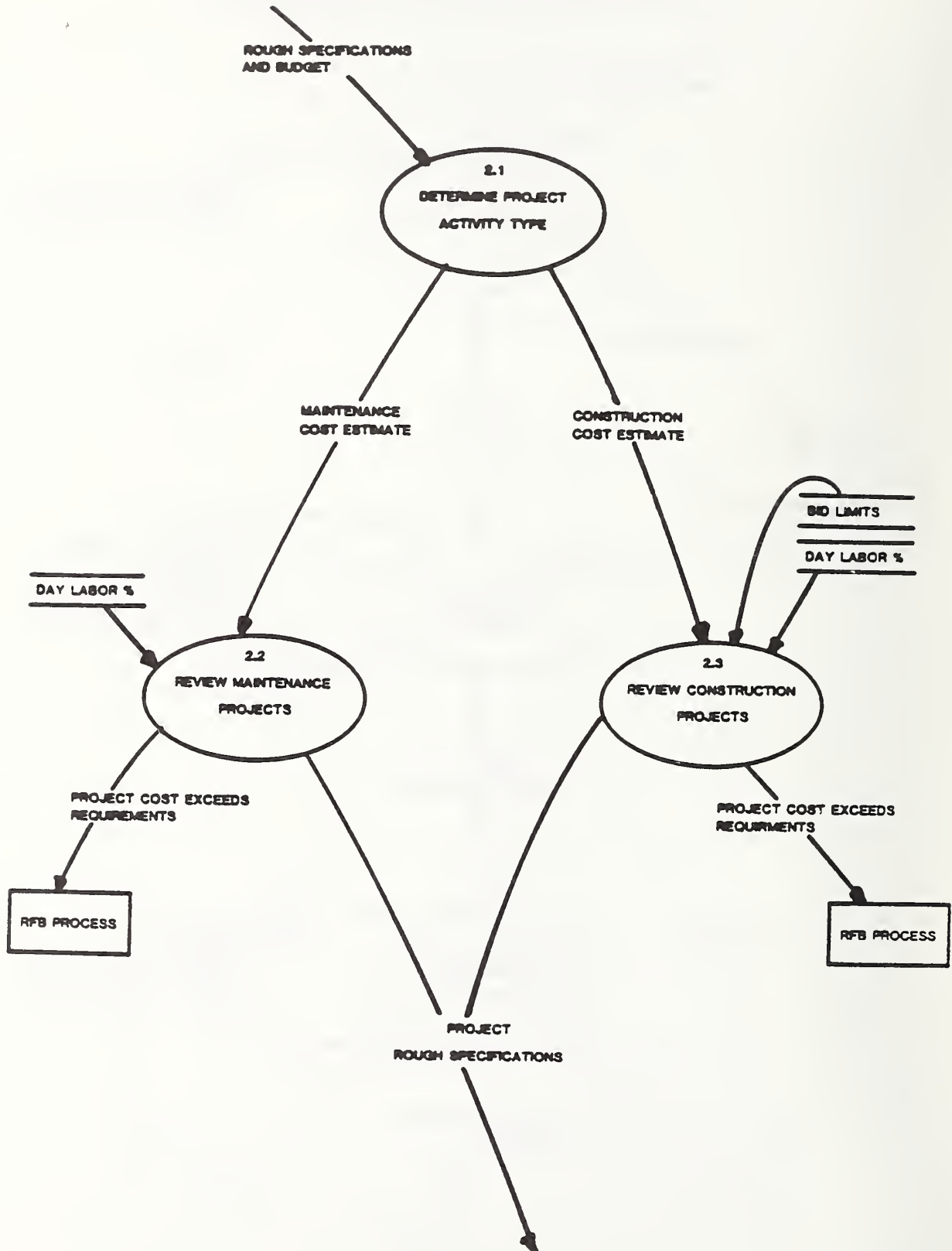


Figure A-6

REVIEW OF OPERATIONAL CONSTRAINTS

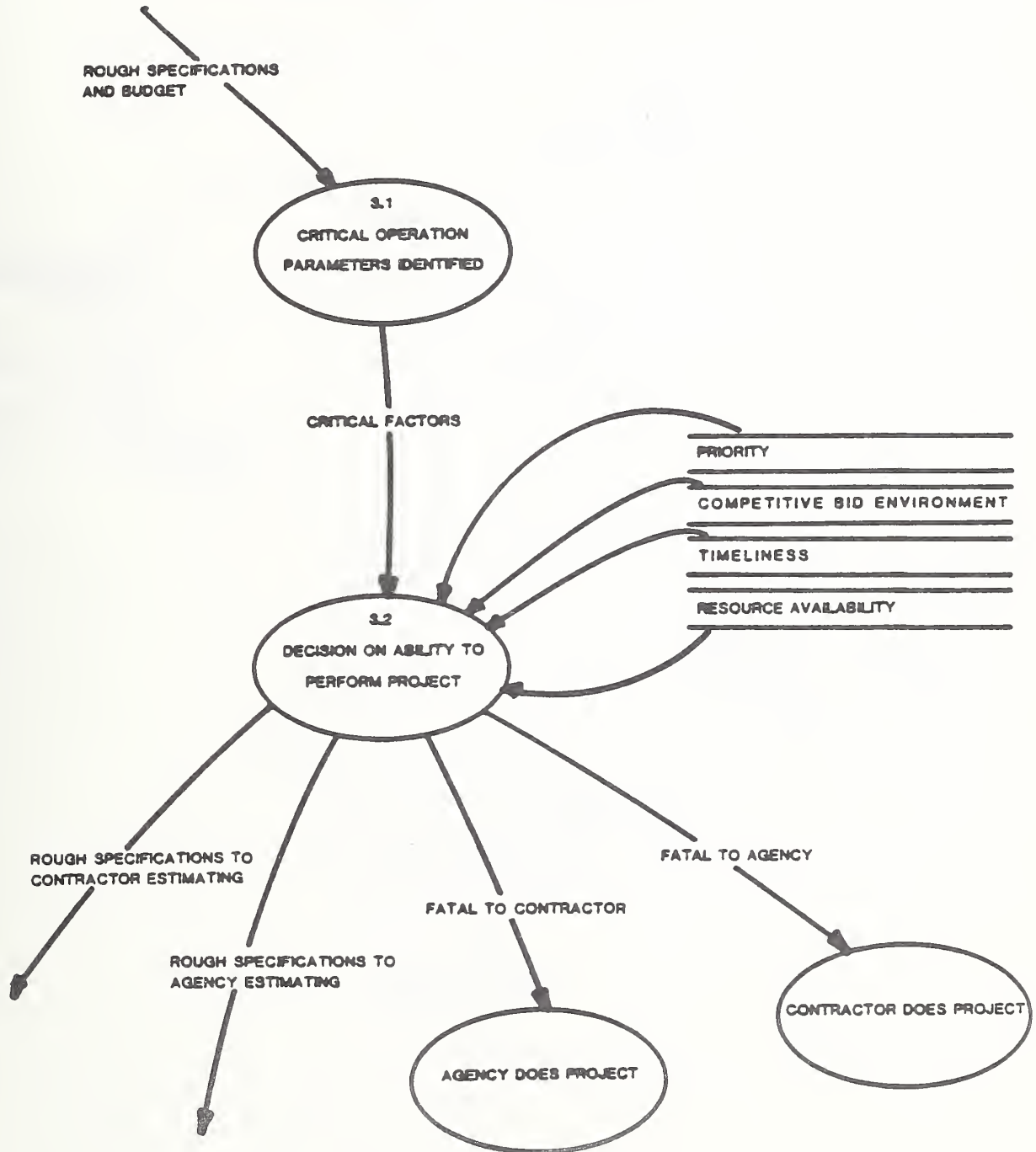


Figure A-7

PREPARE CONTRACTOR PRICE

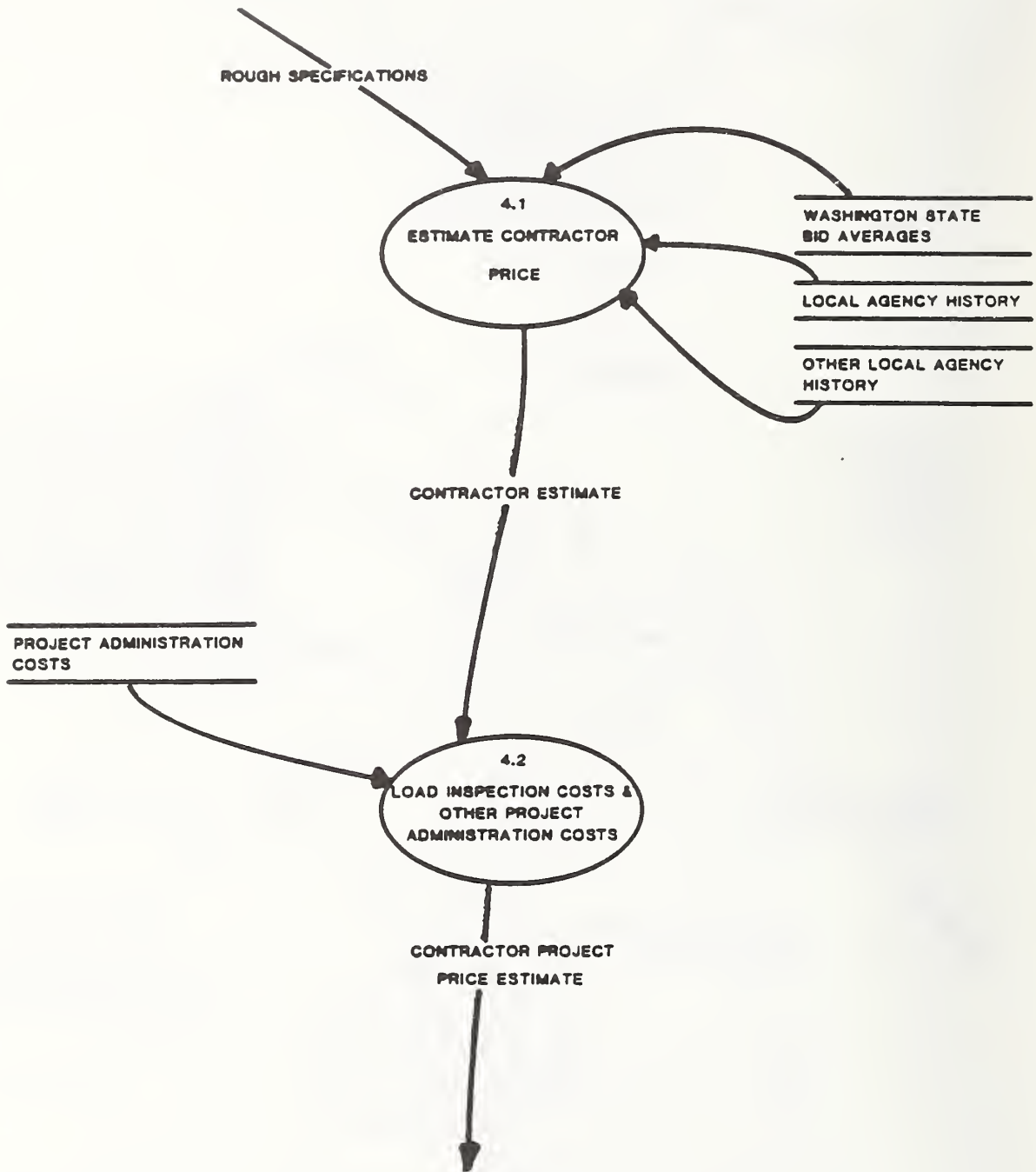


Figure A-8

4.2 LOAD INSPECTION COSTS AND OTHER PROJECT ADMINISTRATION COSTS

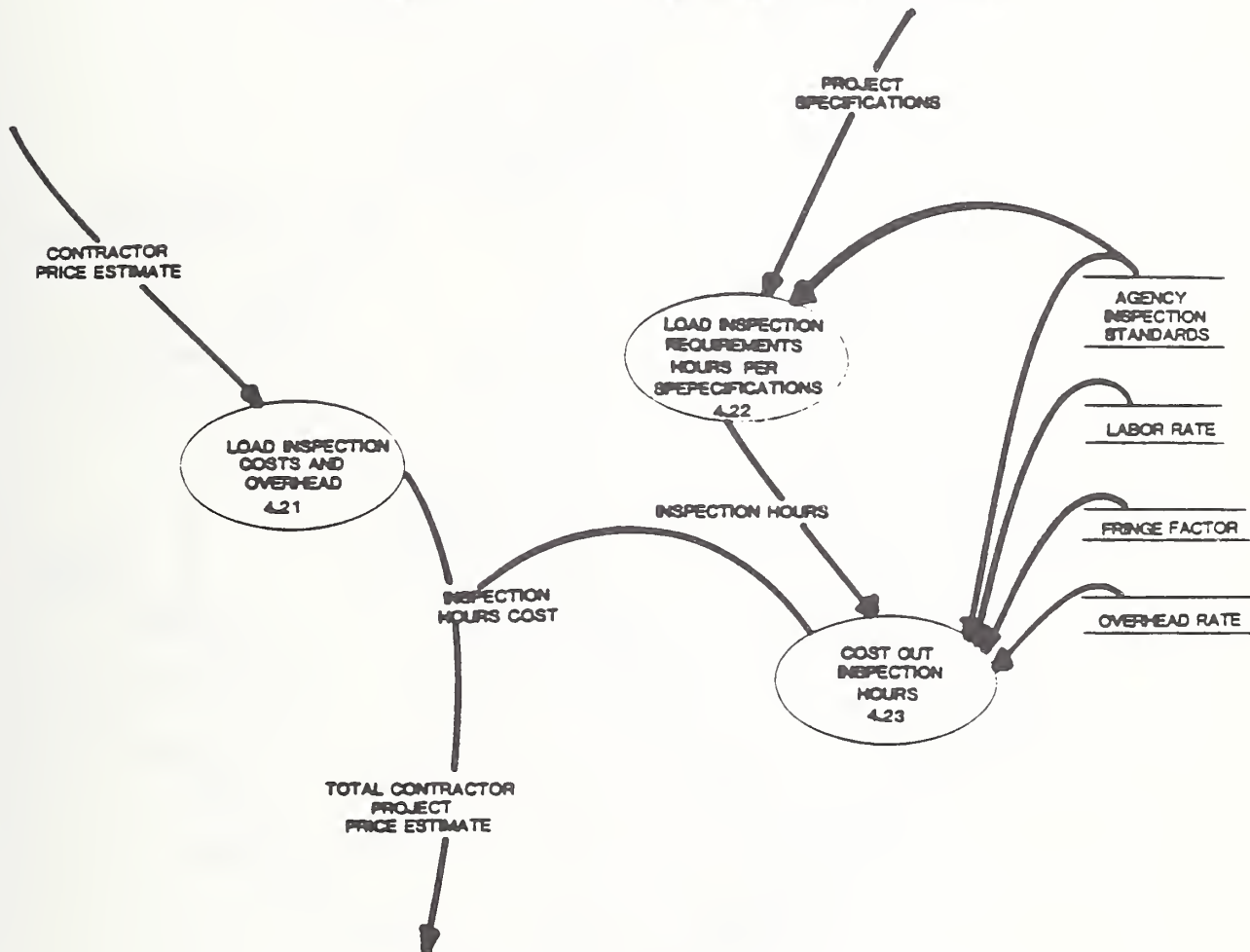


Figure A-9

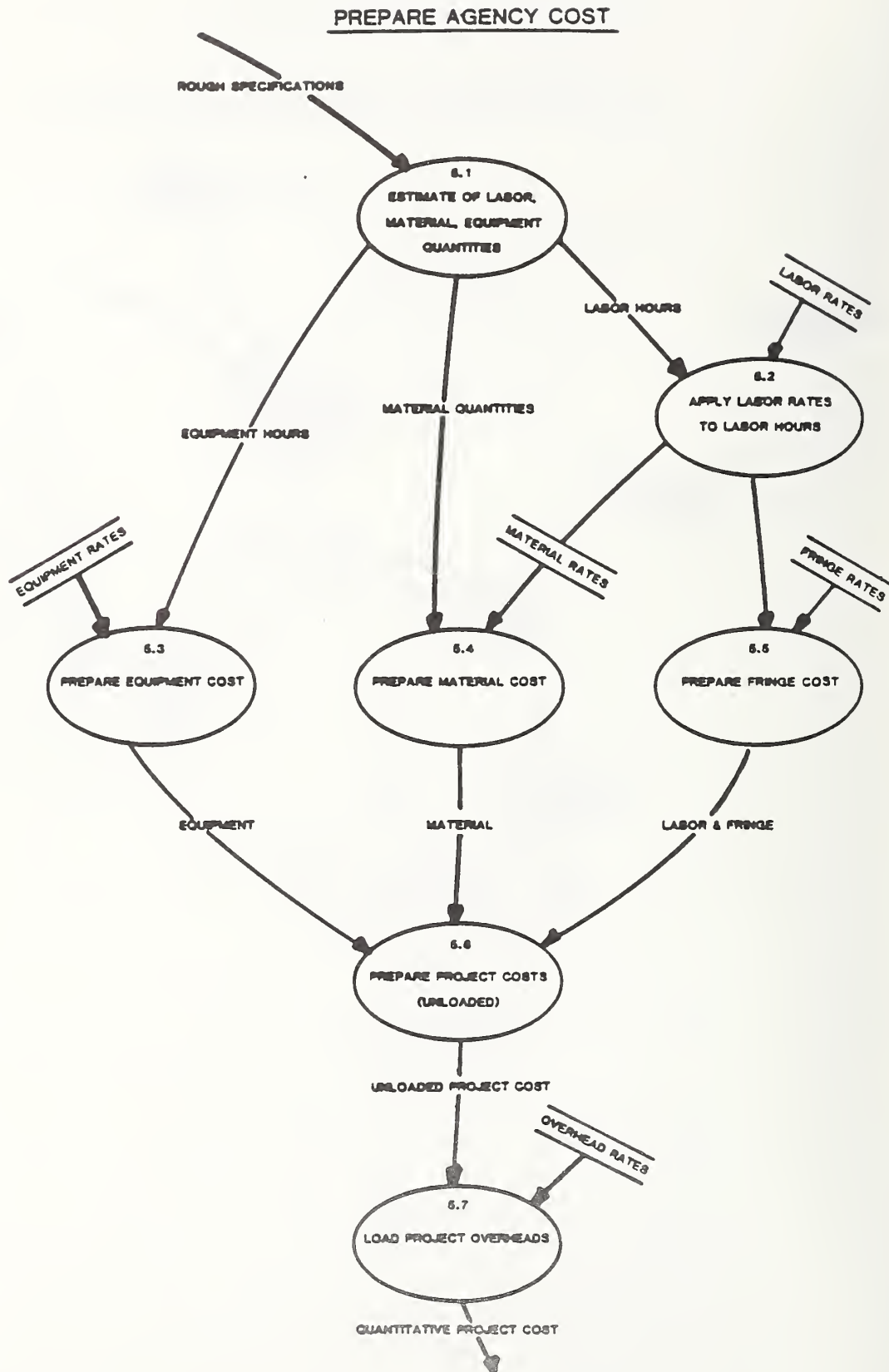


Figure A-10

6.7 LOAD AGENCY OVERHEAD

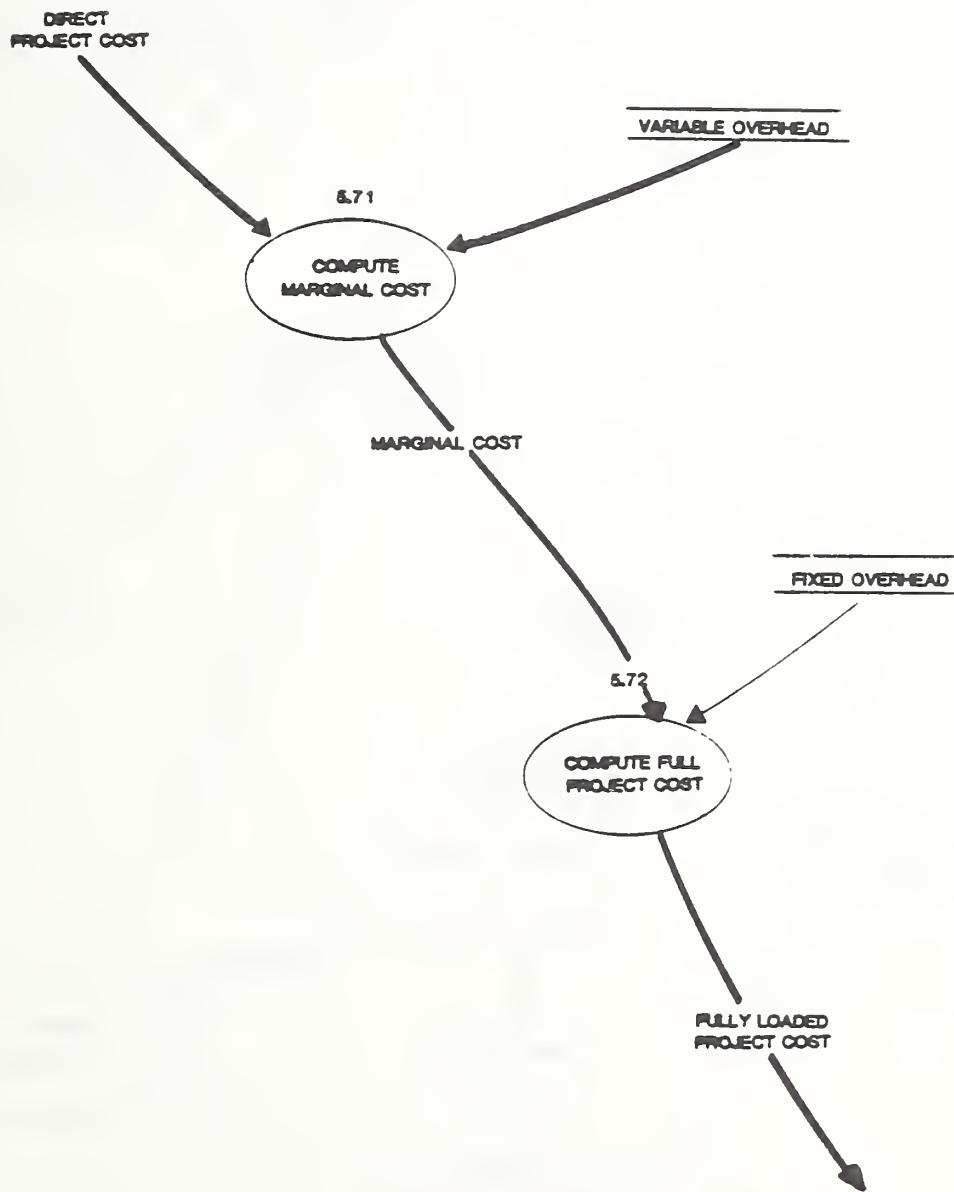


Figure A-11

OPERATIONAL FACTORS CONSIDERED

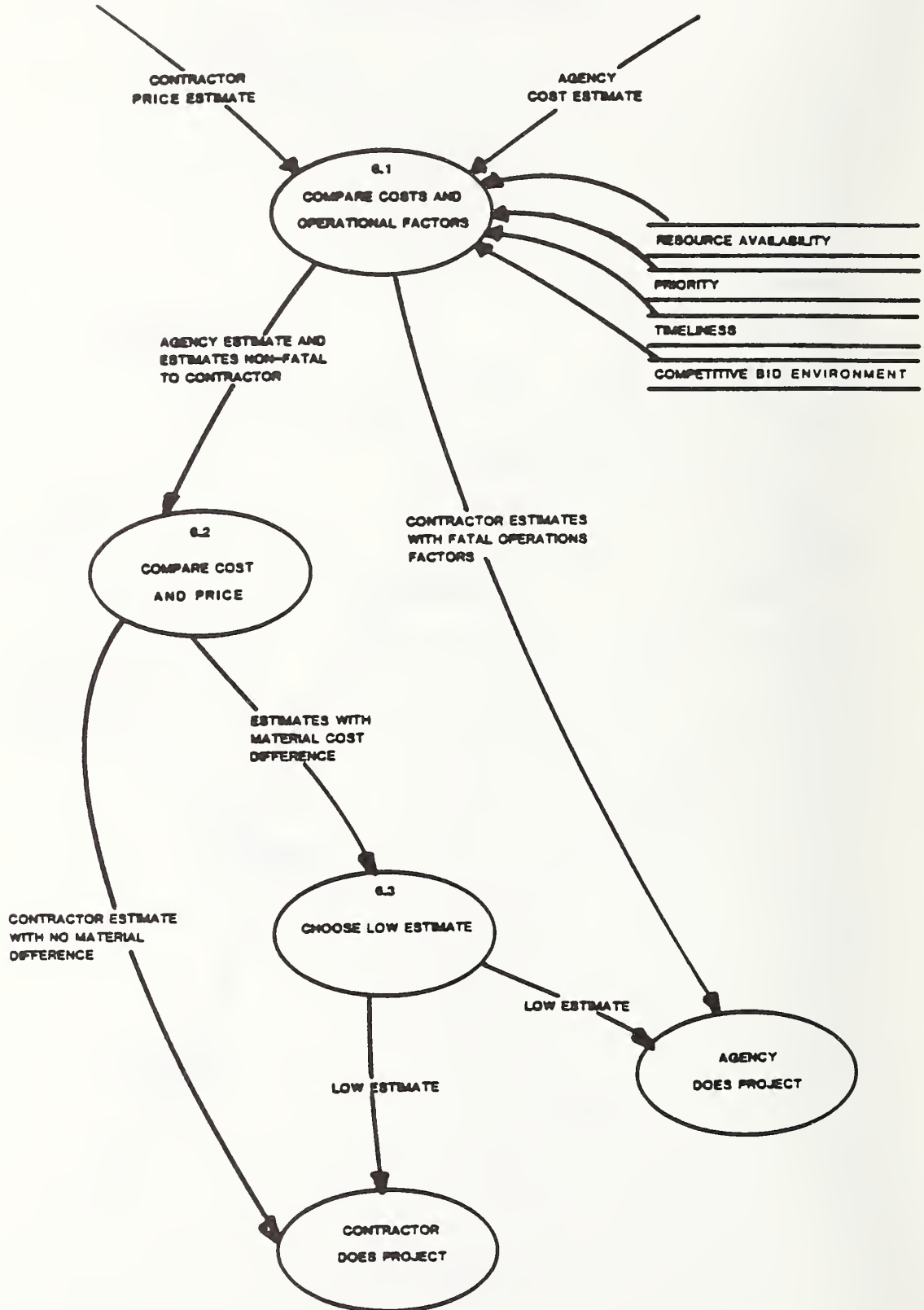


Figure A-12

COMPARE COST AND PRICE ESTIMATE

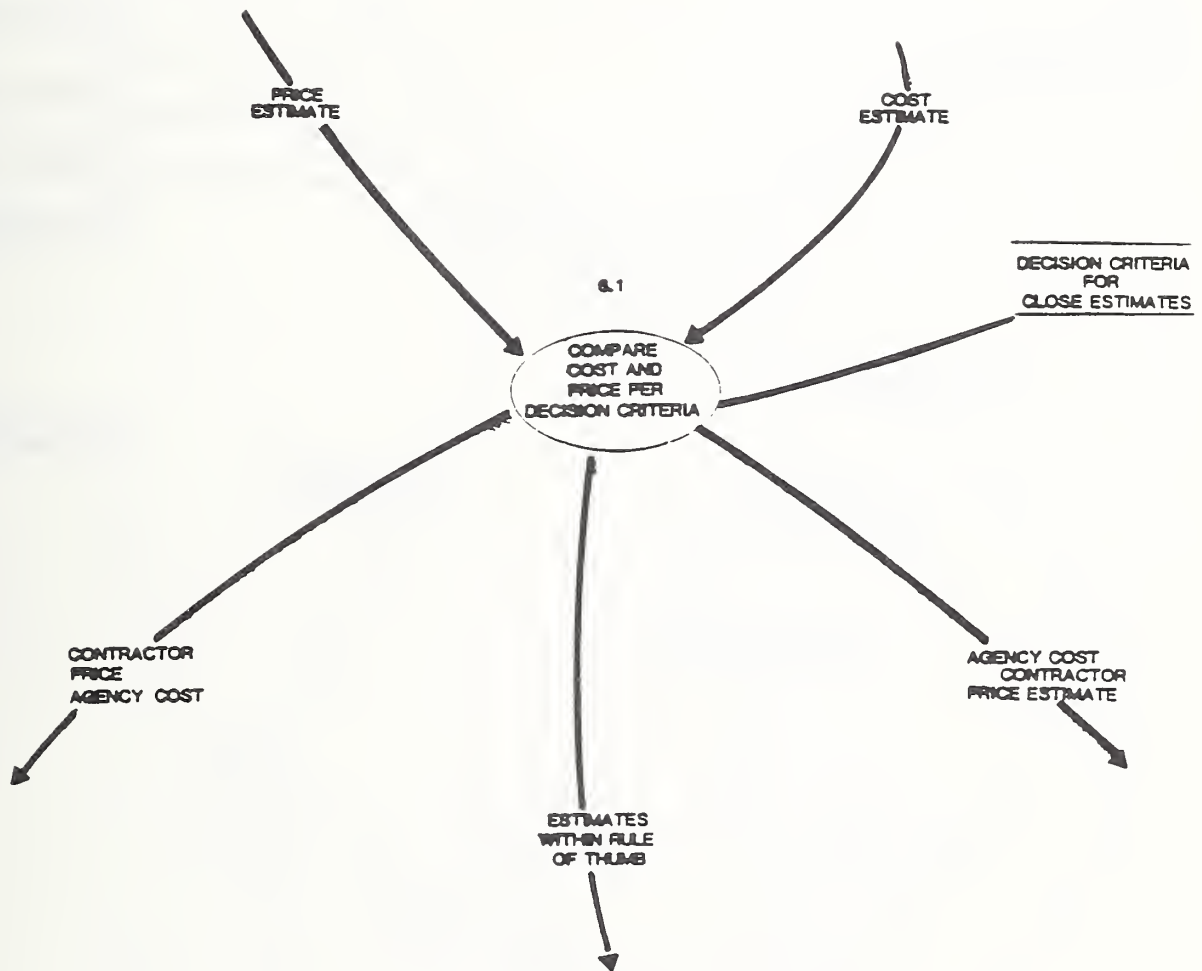
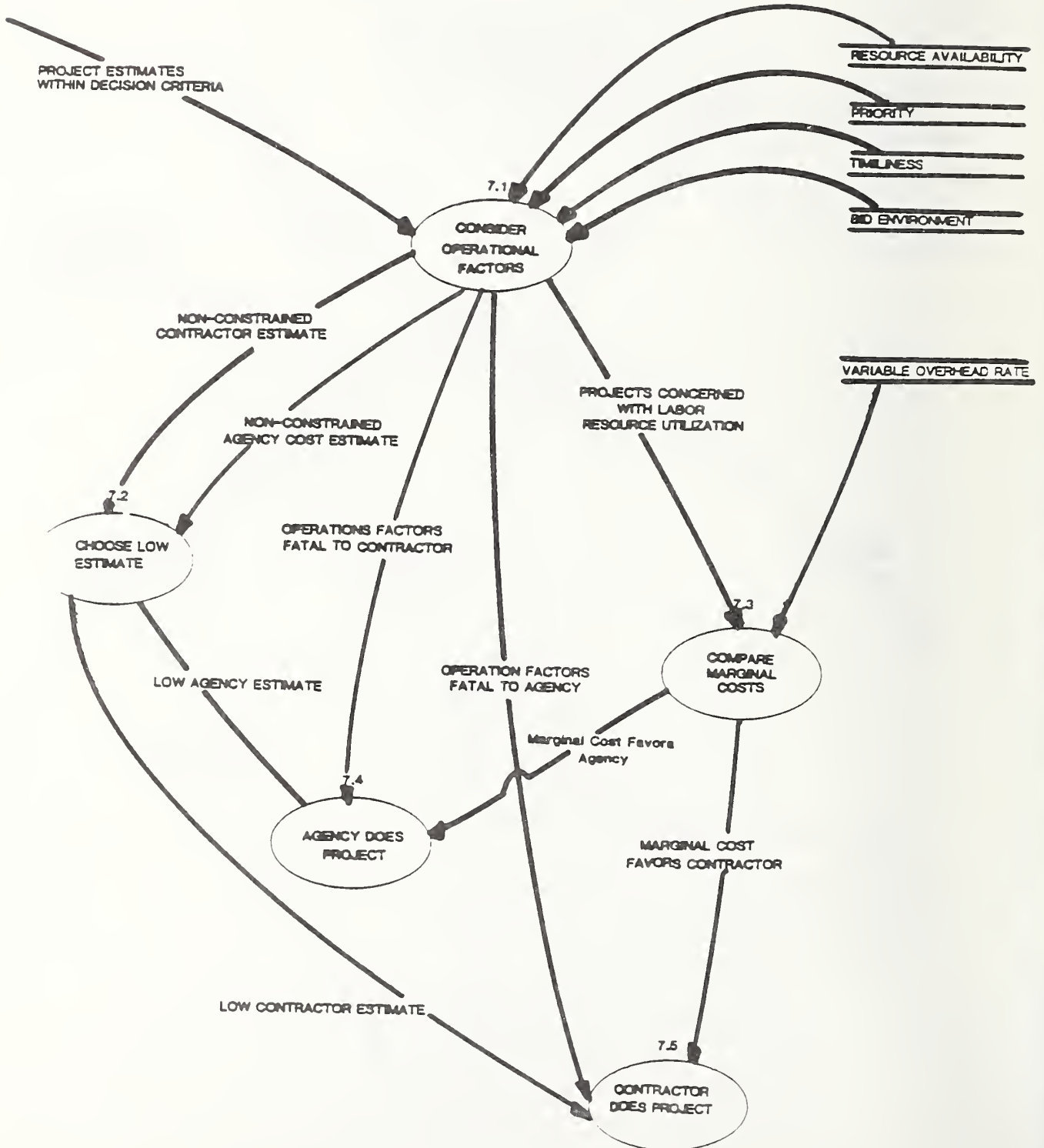


Figure A-13

OPERATIONAL FACTORS



PCEM WORKSHEETS



PCEM EVALUATION WORKSHEETS

The PCEM worksheets provide a convenient, simple way to identify and compare complete full cost project data between the agency and private contractors. Also, the PCEM worksheets provide for consideration of operational factors in a consistent, documented fashion to assist agency decision makers when agency and contractor project cost estimates are within 15%. By documenting the decision process, agency management can develop a data base of historical operating decisions to better judge current decisions.

The following pages provide a step-by-step method and include sample worksheets.

Directions:

The evaluation of a project requires the following steps be performed to determine whether agency day labor or a private contractor bid would be the better decision. The steps outlined below generally illustrate how to apply the methodology in two steps, Part A and Part B. Part A is a Preliminary Determination, and Part B compares costs and estimates for a Final Determination.

Part A: Preliminary Determination

Step 1. Prepare a conceptual or engineer's estimate based on the project specifications to see if it clearly surpasses bid limit or day labor requirements. The estimate should include a full cost allocation of overhead. If the estimate appears much greater than bid limit or day labor statutes, the project should be let out to bid. If it is close to the limit (within 15%) it may need to be further refined to determine whether it is over or under the limit.

Step 2. Generally review the specifications and all operational activities such as labor and other resources to determine if there is a limiting requirement that would make it highly unlikely that a contractor could perform the project. Barring any "fatal" problems, proceed to Part B.

For those projects that, in management's view are constrained to the agency and the situation in the local area appears unlikely to change, then the Part A worksheet would only be completed every five years for "exempted" projects (unless circumstances change materially in the interim).

An example might be weed control where the agency's historical efforts to engage a suitable contractor with liability coverage have not been successful. In this case, Part A would be completed and the "Exemption" box checked.

Part B: Final Determination

If the project work is not automatically decided as either a bid situation or day labor work, the Part B should be completed to assist in the decision making process.

Step 3. Agency detail cost estimates can be computed on page B.2. The information is then summarized on page B.1.

Labor cost estimates will need to apply the fringe benefit percentage as calculated by the Finance department. Fringe benefits include all health, vacation, insurance, and taxes paid.

Project administration types of costs are also included with fringe benefit costs to complete the Direct Project Cost.

Step 4. Estimate the contractor price on page B.3 using available data -- recent local experience (bids), Washington State DOT bid history guides, or other local agency historical estimates. The prices should be realistic approximates of what it would take to do the project.

In addition, the cost of Agency project administration costs, plus fringes, will need to be included to complete the "total" project cost. The price estimates are entered on page B.3, and summarized on page B.1. Agency overhead on project administration is added to complete the Total Project Cost.

Step 5. Agency cost information can be summarized on the first page of Part B. Note that the total agency project cost must also absorb a certain percent of variable and fixed overhead costs. This percent will vary by Agency and is based on an allocation process determined by the Finance department.

Step 6. Comparison of agency cost and contractor price can now be done. Enter the estimates on the summary page (B.1) to compare the dollar cost between Agency cost and contractor price estimates.

Step 7. If quantitative factors alone grossly favor (i.e., greater than 15%) either the contractor or the agency, then the choice for project work can be made at this point. Mark which alternative is selected.

Step 8. If the price/cost estimates are close in dollar amount (within 15%), then the operational factors on page B.4 of Part B should be reviewed.

The explanations and suggested guidelines/examples for scoring purposes are attached. Their purpose is to assist in ranking the High-Medium-Low level of importance of each factor.

Step 9. These and other significant factors are used in the decision process to help make decisions where agency costs and contractor prices are relatively close. The decision rules below indicates the type of review needed.

- If there are no overriding, or "fatal", factors preventing the contractor from doing the work, or if there are no overriding agency concerns, then the project most likely is justified to go to bid. (An example might be if the timeliness of work is unacceptable as it prevents other projects from being done until too late in the construction season.)
- If there are highly ranked factors against the contractor or there are highly ranked factors indicating agency concerns, then the project should most likely be performed by agency forces.
- If there are concerns against the contractor performing the project and there are highly ranking factors indicating agency concerns, the project is justified to be done with day labor.

A specific example is marginal cost situations. This is the situation where agency full cost is higher than the contractor estimate yet the agency has underutilized labor resources. (In effect the agency would pay twice for the work if contractor labor was used in this situation.) In this case, the decision maker would review agency direct cost plus variable overhead. If this "marginal cost" were less than the contractor price estimate, the agency could justify the use of its own labor forces.

Step 10. A post project review is done to record actual expenditures, compare (and improve) estimates, and prepare a yearly report on expenditures.

Actual expenditures are recorded on Part A or the summary page (B.1) of Part B worksheets. Comparison of actual to estimated costs can assist decision makers in the estimating process.

At the end of each year, a report is prepared for all projects. The purpose of the report is to summarize and communicate actual and estimated expenditures by project and type of decision.

A sample report, shown in page A-4, indicates the general layout of the report.

PART A
PROJECT COST EVALUATION METHODOLOGY
Preliminary Decision Alternatives

PROJECT NAME: _____ PROJECT NUMBER: _____
DATE: _____

PROJECT DESCRIPTION: _____

PROJECT LOCATIONS: _____

CONCEPTUAL OR ENGINEERS DIRECT COST ESTIMATE: _____ ACTUAL: _____
(NOT INCLUDING DESIGN, RIGHT-OF-WAY, BID COSTS)

1. IS THE PROJECT WORK ACTIVITY(IES) OF SUCH SCOPE THAT IT WOULD AUTOMATICALLY GO OUT FOR BID? _____ YES _____ NO (Go to Question 2)

- IF YES:
- 1a. _____ EXCEEDS BID LIMIT/DAY LABOR REQUIREMENTS
 - 1b. _____ EXCEEDS AGENCY CAPACITY OR TECHNICAL EXPERTISE
 - 1c. _____ OTHER _____

2. IS THE PROJECT WORK ACTIVITY 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. _____ PROJECT TOO SMALL TO WARRANT COST EFFECTIVE BID
 - 2c. _____ REQUIRED TO FULLY UTILIZE AVAILABLE AGENCY WORK FORCE
 - 2d. _____ PROJECT EXEMPTION STATUS. REASON FOR PROJECT TO BE EXEMPTED FROM YEARLY PCEM REVIEW: _____

 - 2e. _____ OTHER _____

3. IF QUESTION 1 AND 2 ARE "NO", USE PART B OF THE PCEM WORKSHEETS.

PART B SUMMARY:

	ESTIMATE	ACTUAL
3a. TOTAL AGENCY PROJECT COST:	_____	_____
3b. TOTAL CONTRACTOR PROJECT COST:	_____	_____
3c. SELECTION WAS MADE FOR:	_____ AGENCY	_____ CONTRACTOR

PREPARED BY: _____ TITLE _____ DATE: _____

REVIEWED BY: _____ TITLE _____ DATE: _____

PART B
PROJECT COST EVALUATION METHODOLOGY
B.1 COMPARISON OF COST ESTIMATES

PROJECT NAME: _____ PROJECT NUMBER: _____
DATE: _____

PROJECT DESCRIPTION:

SUMMARY COST COMPARISON

AGENCY	CONTRACTOR	
	Estimate	Actual
1. Agency Cost	_____	_____
2. Project Administration	_____	_____
3. Direct Project Cost	_____	_____
4. Variable Overhead (@ ___%)	_____	_____
5. SUBTOTAL	_____	_____
6. Fixed Overhead (@ ___%)	_____	_____
7. Total Project Cost	_____	_____

Alternative Selected: _____ 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: _____

B.2 AGENCY COST ESTIMATE

PROJECT NAME: _____ PROJECT NUMBER: _____

LABOR ESTIMATE

Direct Labor Hours
Labor Type

_____	_____	Hours @ \$ _____/Hour = \$ _____
_____	_____	Hours @ \$ _____/Hour = \$ _____
_____	_____	Hours @ \$ _____/Hour = \$ _____
_____	_____	Hours @ \$ _____/Hour = \$ _____
_____	_____	Hours @ \$ _____/Hour = \$ _____
_____	_____	Hours @ \$ _____/Hour = \$ _____

DIRECT LABOR SUBTOTAL \$ _____

Fringes (@ _____%) \$ _____

1. LABOR TOTAL \$ _____

MATERIAL ESTIMATE

Type	Quantity	Cost/unit	Cost
_____	_____	_____	\$ _____
_____	_____	_____	\$ _____
_____	_____	_____	\$ _____
_____	_____	_____	\$ _____
_____	_____	_____	\$ _____

2. MATERIAL TOTAL \$ _____

EQUIPMENT ESTIMATE

Type	Quantity	Cost/unit	Cost
_____	_____	_____	\$ _____
_____	_____	_____	\$ _____
_____	_____	_____	\$ _____
_____	_____	_____	\$ _____
_____	_____	_____	\$ _____

3. EQUIPMENT TOTAL \$ _____

4. AGENCY COST
(Total lines 1, 2 and 3) \$ _____

PROJECT ADMINISTRATION, SUPERVISORY OR INSPECTION HOURS

5. Project Administration Cost \$ _____
(_____ hours @ \$ _____/hour & Fringes @ _____%)

6. DIRECT PROJECT COST
(Lines 4 plus 5) \$ _____

B.3 CONTRACTOR PRICE ESTIMATE

PROJECT NAME: _____ PROJECT NUMBER: _____

<u>BID ITEM</u>	<u>QUANTITY</u>	<u>Price/Unit</u>	<u>BID PRICE</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

- 1. TOTAL CONTRACTOR PRICE ESTIMATE \$ _____
- 2. Agency Project Administration Cost \$ _____
(_____ hours @ \$ _____/hour & Fringes @ _____%)
- 3. DIRECT PROJECT COST (Line 1 and 2) \$ _____
- 4. Agency Variable Project Administration Overhead (@ _____%) _____
- 5. SUBTOTAL (Line 3 and 4) _____
- 6. Agency Fixed Project Administration Overhead (@ _____%) _____
- 7. TOTAL PROJECT COST (Line 5 and 6) \$ _____

WHAT WAS THE SOURCE OF THE CONTRACTOR PRICE ESTIMATE? _____

ARE THERE EXPECTATIONS THAT BIDS WOULD VARY SIGNIFICANTLY FROM THE ESTIMATE?

_____ YES _____ NO

IF YES, DESCRIBE:

ARE THERE EXPECTATIONS THAT OPERATIONAL FACTORS WOULD HAVE A MAJOR IMPACT ON THE COMPLETION OF THE PROJECT?

_____ YES _____ NO

IF YES, EXPLAIN:

B.4 OPERATIONAL FACTORS

PROJECT NAME: _____ PROJECT NUMBER: _____

CONSIDERATION OF OPERATIONAL FACTORS SUCH AS:

Factors

Consideration

(High, Medium, Low Concern)

Priority

Resource Availability

Timeliness

Competitive Bid Environment

Comments

1. PRIORITY

<u>DESCRIPTIVE BASIS</u>	<u>CODE</u>
ESSENTIAL TO PUBLIC SAFETY-- CONSEQUENCES OF NOT TAKING ACTION IMMEDIATELY COULD MEAN LOSS OF LIFE OR SEVERE PROPERTY DAMAGE.....	HIGH
ESSENTIAL TO PUBLIC SAFETY, BUT NO IMMEDIATE OR IMMINENT THREAT TO LIFE OR PROPERTY.....	MEDIUM
IN THE PUBLIC INTEREST WITH SAFETY/PROPERTY LOSS CONSEQUENCES, OR WITH HIGH PREVENTIVE MAIN- TENANCE DOLLAR RETURN IN ONE YEAR.....	MEDIUM
IN THE PUBLIC INTEREST TO DO TO PROVIDE PROPER PREVENTATIVE MAINTENANCE.....	LOW

2. RESOURCE AVAILABILITY

<u>DESCRIPTIVE BASIS</u>	<u>CODE</u>
LITTLE TO NO PROJECT WORK TO DO; LABOR UTILIZATION LESS THAN 25% PER WEEK.....	HIGH
SOME PROJECT WORK TO DO; LABOR UTILIZATION LESS THAN 60% PER WEEK.....	MEDIUM
SUFFICIENT PROJECT WORK TO DO; LABOR UTILIZATION GREATER THAN 60% PER WEEK.....	LOW

3. TIMELINESS

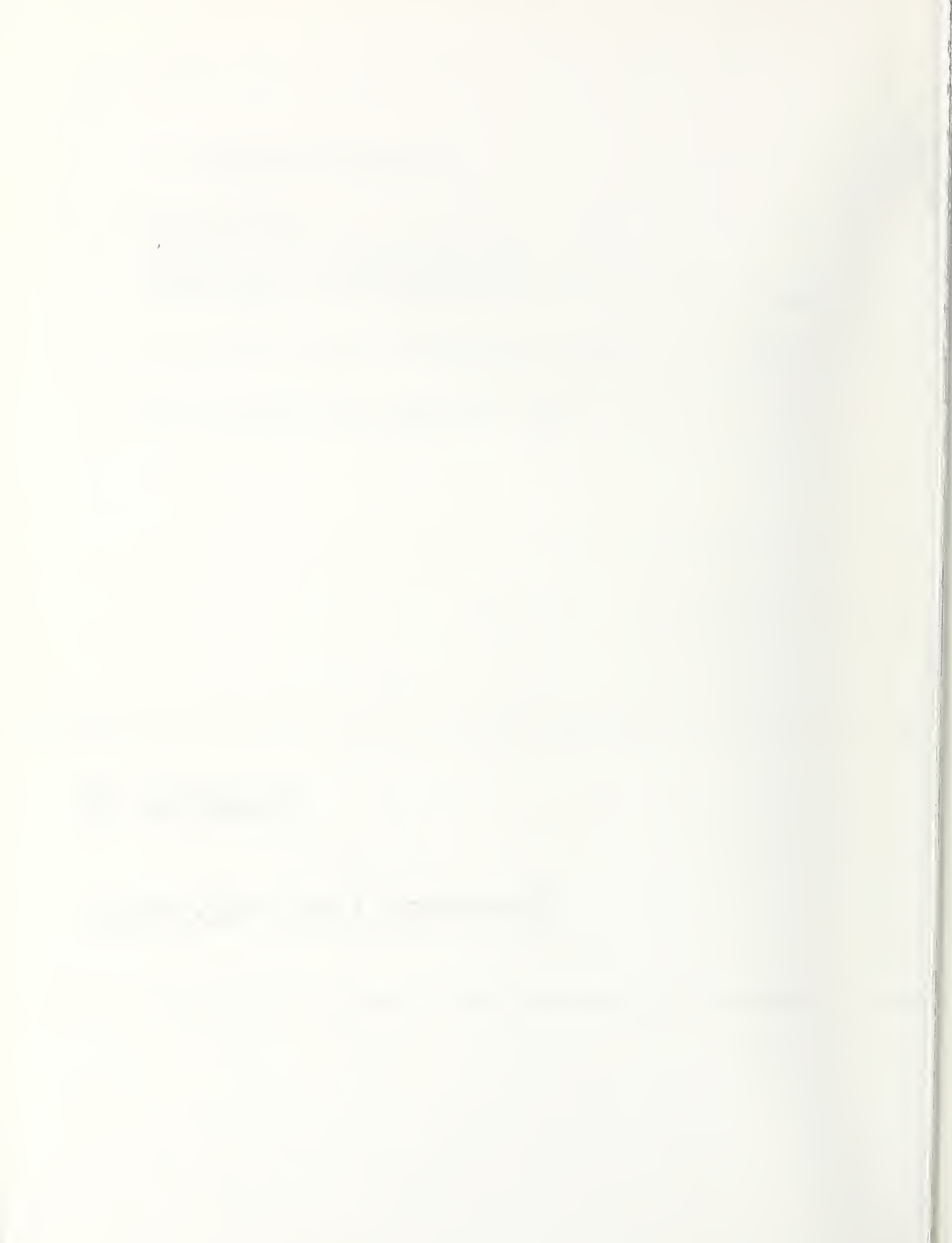
<u>DESCRIPTIVE BASIS</u>	<u>CODE</u>
ESSENTIAL THAT PROJECT BE DONE WITH OTHER CONCURRENT WORK ON SAME ROAD TO PREVENT REDOING OF WORK.....	HIGH
ESSENTIAL THAT WORK BE DONE IN CURRENT BUDGET YEAR OR AGENCY ALLOCATION OF FUNDS WILL BE LOST.....	HIGH
SEASONAL NATURE OF WORK REQUIRES CRITICAL RESPONSE TO PROJECT.....	HIGH
COULD BE DONE WITH OTHER WORK TO EFFECT SOME COST OR COORDINATION SAVINGS.....	MEDIUM
WORK CAN STAND ALONE OR BE PERFORMED AT ANY TIME DURING CONSTRUCTION SEASON.....	LOW

4. COMPETITIVE BID ENVIRONMENT

<u>DESCRIPTIVE BASIS</u>	<u>CODE</u>
GEOGRAPHIC, PROJECT TIMING, OR SEASONAL FACTORS INDICATE CONCERN OVER COMPETITIVE BID RESPONSE.....	HIGH
NO REASONS NOT TO EXPECT A REASONABLE BID RESPONSE.....	MEDIUM
MANY COMPETITORS, HIGHLY COMPETITIVE BIDDING.....	LOW

Appendix B

Overhead Cost Allocation



OVERHEAD COST ALLOCATION

Our recommendations to change agency costing practices to allocate overhead to projects is a major change for the Agencies. Currently, Agencies are charging work activities with their direct labor costs through time reporting activities and project accounting systems already in place.

The fact that contractors and Agencies have different costs (e.g., B&O tax, federal income tax) is a "given" fact that is not likely to change. The contractor must, in the long run, recover all costs to stay in business. The agency, in order to compare costs, should assign all relevant costs to projects as well. How well the contractor or the agency applies its resources in its operations, is a matter of efficiency which drives the cost or price of projects. This is an operational concern beyond the scope of this costing study.

Currently indirect costs such as Central Service functions (finance, legal, personnel, etc.) and Department administration costs (salary, fringes, office costs, secretarial support and related administrative costs) are not routinely allocated to projects. In order to compare agency project costs with contractor prices, the Agencies will need to develop allocation procedures for indirect costs.

By including overhead costs as part of the Agencies project costs, the full cost of providing services to the public is correctly stated. Arguments made to the effect that Central Services costs are "fixed" and would not vary if one project or even department such as Public Works or Roads was eliminated are true in the short run only.

An effective Public Works or Roads department requires the type of services provided by Central Services. The only way to adequately estimate project costs for comparison with contractor price estimates is to include all costs of necessary services in the cost of each project. The PCEM provides for the collection and evaluation of the costs relevant to each project.

The use of marginal costing (direct project costs plus variable overhead cost), is a short-term decision making procedure. It is useful when resources are available but would not be utilized if the full cost of a project was higher than the contractor price. If marginal cost is frequently used as a decision criteria, it may indicate a review of existing labor and equipment resources as needed.

General Approach to Overhead Allocation

A generalized procedure for allocating overhead, in simplest form, involves the following:

- Identifying which administrative services benefit various line operations;
- Determining the primary function of each administrative service;
- Identifying a meaningful output which can be used to measure the effort of the administrative service;
- Measuring the effort expended for each line operation;
- Computing the proportion of total effort which benefits each particular line operation; and

- Distributing the cost of an administrative service to each benefiting line operation proportionally.

In applying this procedure three key points must be kept in mind. First, the allocation should be made on a fair and easily measurable basis. The basis seldom will result in absolute equity but should strive for reasonableness and avoid significant distortions.

Second, the basis should be easy to understand. It should relate directly to the primary function of the administrative area whose costs are being allocated. Complex and multiple allocation calculations usually do not materially change the outcome. They do add greatly to the cost of preparing the allocation.

Finally, materiality in the accounting sense should be considered. In many cases the largest share of costs in an administrative area relates to a single activity. The time and expense required in calculating additional allocation factors should be avoided where possible.

In a few cases costs will be distributed relatively equally among several activities of an administrative area. If that is the case, it is appropriate to use more than one allocation factor but the number of factors should be kept to a minimum. Additional allocation factors should be used only where they will have a significant or material impact on the total costs for a line operation.

Allocations should be updated when any of the following changes occur:

- A line operation is added or removed from the construction or maintenance departments
- A major change occurs in the amount of effort an administrative department devotes to each line operation
- The major duties of an administrative department change (when functions are added to or removed from the administrative department)
- The method used in performing an administrative department's major duties changes substantially (for example, going from manual to computerized billing)
- An administrative department's organizational structure is substantially changed, changing duties and levels of effort
- One line operation grows or shrinks much more rapidly than others
- A major organizational change in a line operation occurs which impacts an administrative department.

When one of these changes occurs, some or all allocations related to the affected administrative service unit or line operation may need to be changed. There are specific methods for determining the effect of any change on the allocation process and are discussed in more detail in various reference materials.

Step Down Allocation Method

There are several procedural ways to allocate overhead, a "step down" approach is being suggested for use by Agencies to determine a "loading factor" to charge projects for overhead costs. The allocation process derives its name from the several "steps" it makes "down" the organization ladder to develop and charge the various pools of overhead costs.

The "step down" allocation procedures is based on, and is consistent with, the methods set forth in leading cost accounting texts and the Cost Accounting Standards, Part 418 - Application of Direct and Indirect Costs. Additional federal resources are OASC-10 from DHHS and OMB Circular No. A-87.

The allocation method determines the full overhead cost to be charged to each project dollar. The total overhead charge is broken into two pieces, variable and fixed overhead.

Variable overhead is the estimated portion of overhead that can be eliminated if a project is not done by agency day labor. Over a yearly budget cycle, a certain percent of the Department expense is variable and should be acknowledged in the decision making process. A review of this area was not performed as part of the consultants work, but based on their experience, a general rule of thumb is that 10% to 15% of the overhead is variable

The fixed overhead portion is that part of the full overhead cost that won't go away if one project is not performed by agency forces. (In the long run, virtually all overhead is variable.)

Variable overhead, when added to the direct project cost, becomes the "marginal cost" for a project. This cost figure is used by agency decision makers in situations where the agency full cost estimate is higher than the contractor price estimate, yet the agency would have underutilized labor if the contractor were picked on the basis of agency full cost. In these cases, marginal cost is used to compare agency and contractor estimates. If the agency marginal cost is less than the direct project price estimate (excluding direct agency contract administration costs and overhead allocation), then the agency may be justified in doing the project to avoid "double-paying" for services.

The overhead allocation procedure is outlined graphically in Figures B-1 and B-2. This is a generalized example for illustrative purposes only. Other procedures can be used. Several of the larger Agencies are already using extensive computerized allocation methods. Additional examples are contained in the federal Department of Health and Human Services (DHHS) Circular OASC-10, A Guide for State and Local Government Agencies. The guide presents federal standards for purposes of recovering costs. There are potential differences between allocation plans for cost recovery purposes and an allocation plan used solely for decision making. Less detail is required for the decision making allocation plan. It need only be as good, in terms of accuracy and materiality, as the process used for estimating price and costs. The level of effort required for a decision making allocation plan is generally less than for a cost recovery allocation plan.

Figure B-1 is a generalized agency organization chart that indicates the major functional departments. The goal of the allocation process is to form indirect cost pools of the relevant general and administrative costs. Figure B-2 shows the process of forming indirect cost pools and allocating the pools in a "step down" method.

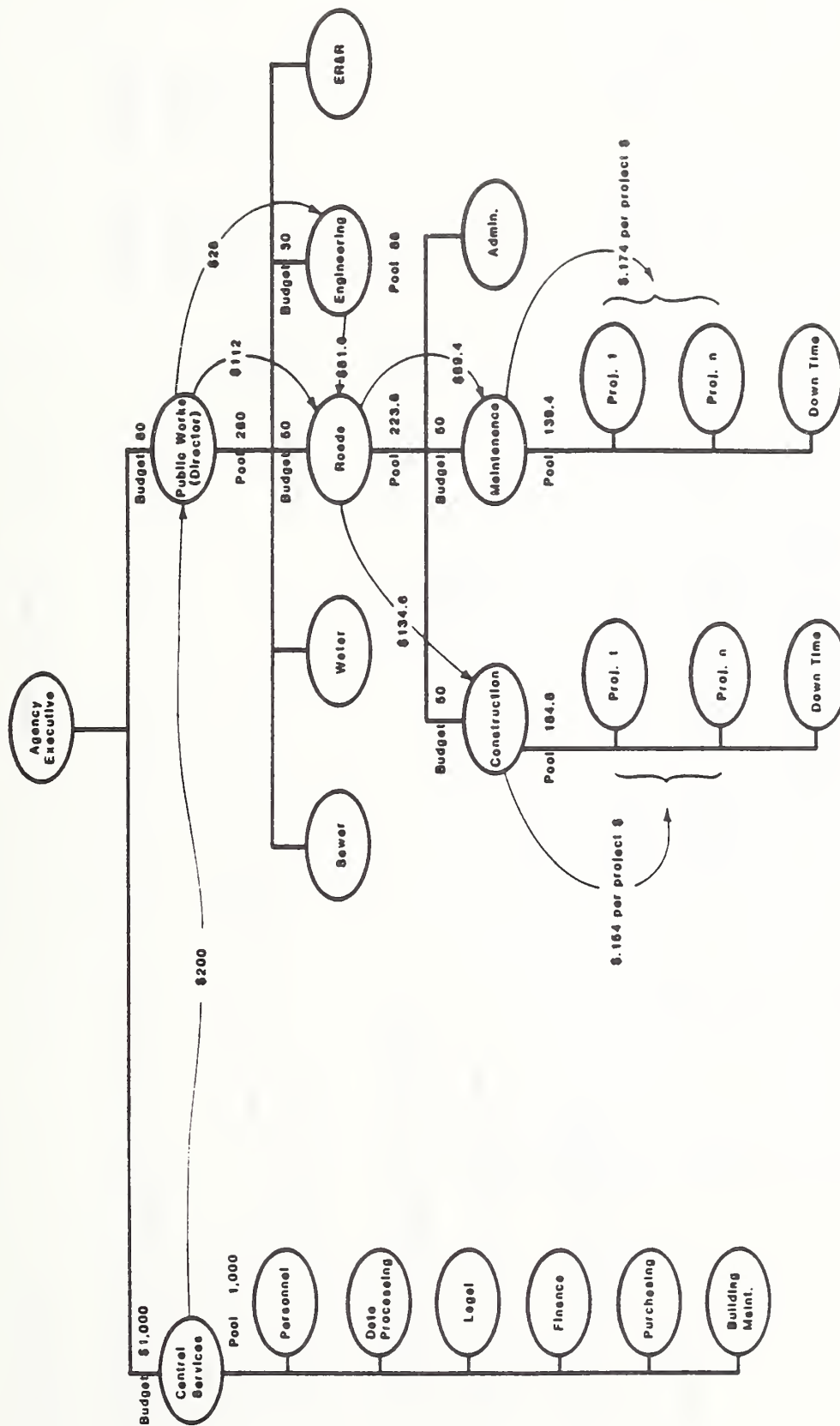
The Legislative, Executive and related administrative costs are not allocated. Since these costs are a general cost of government which are mandated and cannot legally be eliminated, they are usually relatively insignificant to fully allocated costs.

The indirect cost pools will then be allocated to projects on the basis of an appropriate allocation base, such as the agency's portion of project costs, as in this example. More elaborate allocation bases and methods can be developed, but more extensive accounting and recordkeeping is required.

Figure B-1 shows graphically how the allocation and formation of indirect cost pools are "stepped down" to the individual project level.

Figure B-1

**DEPARTMENT OVERHEAD
OVERHEAD LOADING METHODOLOGY**
(Multiple Indirect Cost Pool Allocations)



\$.164 per project \$

\$.174 per project \$

Figure B-2

STEP DOWN ALLOCATION METHOD
INDIRECT COST POOLS BY DEPARTMENT

<u>ACTUAL COSTS</u>	<u>AGENCY EXECUTIVE</u>	<u>CENTRAL SERVICES</u>	<u>PUBLIC WORKS DIRECTOR</u>	<u>ENGINEERING</u>	<u>ROADS</u>	<u>MAINTENANCE</u>	<u>CONSTRUCTION</u>
Department Administration Accounts	\$ 100,000	1,000,000	60,000	60,000	60,000	60,000	60,000
Indirect Cost Pool Allocation Basis (Reasons)							
Not Allocated	\$ - 0 -						
Budget Dollars (P.W. Budget is 20% of Total Budget)		<u>(200,000)</u>	<u>200,000</u>				
Budget Dollars (80% of P.W. goes to Engineering & Roads) (20% of the 60% goes to Engineering, remainder to Roads)			<u>(140,000)</u>	<u>26,000</u>	<u>112,000</u>		
Budget Dollars (70% of Engineering goes to Roads)				<u>(61,000)</u>	<u>61,000</u>		
Project \$ Basis (40% of Projects in Maintenance, 60% of Project in Construction)					<u>(223,000)</u>	<u>69,400</u>	<u>134,100</u>
TOTAL OVERHEAD POOLS						<u>136,400</u>	<u>164,100</u>
Divide by Budget Dollars for Overhead Rate (Maintenance Budget \$600,000, Construction Budget \$1,200,000)						<u>\$.174/Proj \$</u>	<u>\$.164/Proj \$</u>
Unallocated Pools		<u>\$800,000</u>	<u>140,000</u>	<u>26,400</u>	<u>0</u>		

Appendix C

Relevant Definitions



RELEVANT DEFINITIONS

PROJECT

A "Project" is a work activity or a series of closely related work activities that can be grouped together. In order to be classed as a project, the work activities must be definable so as to be communicated and also measurable so as to be controlled. AASHTO applies a more specific interpretation related to contracting:

PROJECT– The specific section of the highway together with all appurtenances and construction to be performed thereon under the contract.

For roadway project costing, the goal is to aggregate similar pieces of work in order to compare economic tradeoffs between doing the project work by agency forces or contracting out to private industry.

Attached are maintenance and construction activities, grouped into general categories of projects, that are definable since they are the standpoint of being closely related, able to be specified, measurable from a performance standpoint, and potentially contractable.

Not all agency maintenance or construction activities would be grouped into the maintenance or construction projects listed. Management flexibility in decision making is important. There is a point at which it may be uneconomic, or where management control may suffer, from too many work activities being grouped together. For example, a large county may do seal coating on two different roads, but in isolated parts of the county. In this situation, with separate mobilization charges and different supervisory personnel, management control becomes an issue. The supervisors and job crews performance measures could suffer if their work efforts were rolled into one project. A situation might occur whereby averaging together the two work activities, management would not easily be able to distinguish good work from bad. For example, if one crew did 25% better than standard, and the other 25% worse, management would only see average results which would be misleading. A double check on the criteria for a project is:

If scope and sizing of a work activity is critical to performance or if evaluation criteria would be lost, a separate project would be in order.

Besides control issues, other criteria, such as timing and complexity of the work, may help define a project. Contrasted with a major project is the quick turnaround work activity, such as patching a pothole. This level of work activity can be communicated verbally, without written specifications, and is not complex for experienced employees. In this type of situation, a project approach would not be warranted from the management viewpoint of cost and risk. This provides another check on the criteria for a project:

If it takes longer or costs more to put specifications and plans together than it would take to do the project and the work is relatively low risk (i.e., not complex or involving public safety liability), a separate project is probably not warranted.

The project timeframe is an important economic consideration when contracting out a project. For example, snow and ice removal meets the criteria for a "project" and is a candidate for contracting out. Historically, Washington State

Agencies infrequently contract this service. The quotes are "too high" for single year, or trial period contracts. Agencies that do not let multi-year contracts may find it difficult to get good prices because the time frame is too short.

The project time frame must be considered in light of the anticipated usage and contract recovery period. Specialty equipment with minimal alternative use, such as snow plows, are very difficult to be priced to recover their cost in a single year, or, to justify the risk of the agency not continuing to contract out the service beyond a one year trial period. For a project to be reasonably bid, the recovery period must match the usage factor of the required equipment. Expensive, single purpose equipment such as a snow plow cannot be economically justified if the contract period does not have the potential to match the economic recovery period of the asset.

MAINTENANCE PROJECTS

<u>Task</u>	<u>Project</u>	<u>Typical Project Activity</u>
Paved Roadway Surfaces	Resurfacing	Seal Coat Plant Mix Seal Preparation for Overlay
	Resurface Preparation	Surface Patching Patching and Leveling Erosion and/or Settlement Repair
		Shoulder Restoration Unpaved Shoulders: Grading & Shaping Adding Material
	Street sweeping	Mechanical Sweeping and Flushing
Unpaved Roadway Surfaces	Unpaved Resurfacing	Grading Adding Aggregate
	Dust Control	Dust Oiling
Drainage Cleaning Enclosed Systems		Paint Culvert marks Clean Culver Ends Clean C.B., M.H., D.W. Clean & Repair Closed Systems
	Open Ditching	Heavy Ditching Ditching, Motor Grader
Snow and Snow and Ice Control Ice Control		Plowing Sanding Snow Removal

MAINTENANCE PROJECTS

<u>Task</u>	<u>Project</u>	<u>Typical Project Activity</u>
Roadside Maintenance	Grass & Weed Control	Mowing Chemical Vegetation Control Noxious Weed Control
	Sidewalk, Path & Trail	Sidewalk, Path & Trail: Resurfacing Patching Signing, Delineation Sweeping
Traffic Control	Signs Inspection & Control Devices	Clean Signs Reset Signs & Posts Repair, Replace Delineator
	Markings	Centerline & Lane Striping Edgeline Striping Gore & Special Striping Paint Message, Arrow, Stop Bar, Crosswalk Replace Lane Markers, Buttons
	Signals & Lighting	Relamp Signal Inspect, Repair Controller Repair Signal Head Replace Poles Repair Detector
	Guardrail	Paint Guardrail, Posts Repair or Replace Guardrail Repair Traffic Curb

CONSTRUCTION PROJECTS

<u>Task</u>	<u>Project</u>	<u>Typical Project Activity</u>
New Construction	Construction Clearing	Grading Roadway Base Placement Roadway Surface Treatment New Surface Course, or to meet: Increased Design Speed, Level of Service Change, Design Capacity Change Drainage
New Traffic Control	Traffic Control (Related to Construction)	Signs Markings Guardrails
New Traffic Signals	Traffic Signals	Install New Signals, or to Upgrade to New Design Volume
New Bridge-work	Structural Activities	Bridgework

ESSENTIAL SERVICES

"Essential Services" are those services that a societal unit (e.g. local government agency) feels necessary to maintain for the common good, usually the safety, health, and security of its citizens. Performance of essential services are ordinarily retained by the governmental (i.e., taxing) authority in order to spread the cost of current operating expense (such as 9-1-1 service) or of financing costs of long lived physical plant assets and services (such as roads or utilities) over the entire citizenry, even though all citizens may not make use of the service.

"Essential" is not a fixed term and changes as technology and society's values change. The provider of the essential service is not fixed, either. Many public "essential" services are being moved to the private sector and provided by non-government employees. Garbage collection service has long been subcontracted to industry. Fire and even police services have been contracted to the private sector.

"Essential" is based on public perception of need, risk, and willingness to pay. Where there is pressure on costs of government, the perception that essential public services should be provided by public agencies is being challenged and found not to be required in all situations.

CONSTRUCTION AND MAINTENANCE

The definition of "construction" and "maintenance" with regard to roadway work is not agreed upon between agency to agency nor between private contractor and public agency. The need for a definitive break point between what activities constitute construction vs. maintenance appears driven by federal requirements for reimbursement-- federal monies will reimburse construction but not maintenance. Additionally, current RCW's stipulate limits to force work based on construction vs. maintenance activities.

For example, current standards use 3/4" of asphalt overlay and above to constitute construction. This appears to be an arbitrary standard made to benefit the accounting department classification of expenditures for bookkeeping purposes. It appears that, in the absence of other definitive measurement criteria, the accounting convention has been made a de facto standard often used in agency decision making. Yet there is reasonable argument put forth by professional engineers that in some situations, the maintenance needs of roadway surfaces can dictate that a thickness of greater than 3/4" is appropriate. What is agreed on is that a hard and fast rule is difficult to apply due to changing situational requirements.

The essence of construction is to construct, or build, as in something "new". Maintenance, on the other hand is the process of keeping what is there in good condition based on the original level of service or design volume of the highway. The gray area comes from where the transition from "good" to "new" begins.

The definition and intent of the term "betterment" is appropriate to review to help distinguish between construction and maintenance. AASHTO defines "betterment" to be:

The improvements, adjustments, or additions to a highway which more than restore it to its former good condition and which result in better traffic serviceability without major changes in its original construction. (Emphasis added.)

This definition parallels the accounting treatment of betterment which is the extension of service of an asset, beyond its original intent, or, that it is changed from one level of service capability to another. A few generalized examples are appropriate:

Painting a house or apartment building certainly improves the building, but does not change the core or structure of the building. Based on the original operating design parameters for a house, it is expected that cosmetic or weather sealing coatings will wear out and need replacing before the actual core or structural elements wear out. Even the best paint applied over a rotten core will not keep the building from collapsing.

The application of aluminum siding, if it were structurally supportive to the frame, and therefore improved the structural life of the building, would be betterment, because the structure has had its operating life extended beyond its original design parameters. If, on the other hand, the siding was only to weatherize the surface (and to keep from having to paint as often), it could be considered maintenance, albeit a major maintenance activity. The core or foundation of the structure would not be prolonged nor would the buildings

capacity for use be changed. The investment decision was made to treat the weathering surface with more up front money so as not to have to perform the normal, expected maintenance activity of painting as often.

Reinforcing the load carrying capacity of the second floor of a building so that the space can be utilized for light manufacturing, even if the support does not extend the life of the building, is betterment because the original operating design parameters have been changed. The building can now be used for something other than its original intent.

The illustration of the building is relatively straightforward since there are performance parameters designed into the structure. If the original life is not extended, the work activity performed is maintenance. The magnitude of the maintenance activity, or its cost, does not make the activity into betterment. Additionally, if the work performed is such that the building takes on a new or different operating parameters, then the building is fundamentally changed, and the work is betterment.

By extension, roadway construction and maintenance can be defined similarly:

Work activity that changes the original operating design parameters as measured by appropriate traffic standards such as Design Capacity or Level of Service or, activity that extends the life of the roadway bed (includes bridge structures), is construction.

Work activity that corrects normal wear and tear on the surface or wearing course or external appurtenances to the roadway but does not improve the load carrying ability of the road, as measured by traffic standards such as Design Capacity or Level of Service, is maintenance.



DOT-I-87-19



TECHNOLOGY SHARING

A Program of the U.S. Department of Transportation