Agency Process for Alternate Design and Alternate Bid of Pavements

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ABSTRACT

This paper describes the process the Louisiana Department of Transportation and Development (LADOTD) used to develop a policy that allows selection of pavement type through the bid process, and discusses its application in Louisiana since 1998. The core element in this policy is the procedure named Alternate Design Alternate Bid (ADAB) using Life Cycle Cost Analysis (LCCA) to estimate the long-term costs of asphalt and concrete pavements.

Traditional LCCA is accomplished using assumptions for timing and cost of future activities that are based on two factors: past performance of pavements in Louisiana, and expected additional service life attributable to improved design, materials, and construction procedures. A threshold of 20 percent in difference of life cycle costs is adopted as a reasonable zone within which different pavements types are able to compete. The ADAB bid model adds a factor "C" that represents future rehabilitation costs and user delay costs associated with a particular alternate to each contractor's base bid "A." The "B" component is time-based bidding that may also include an incentive for early completion. The model is therefore known as A+B+C in Louisiana, and the lowest total bid determines the apparent low bidder.

The LADOTD included both major paving industries early in the development process to reach a consensus that allowed the department to fully implement the process as a standard procedure. Comments were also solicited from FHWA and national trade associations prior to final implementation. Thus far, seven projects have been successfully let using the bid model resulting in selection of four asphalt and three Portland cement concrete pavements for construction. One early observation following the implementation of ADAB is a trend toward reduced bid prices that may be related to increased competition. If this trend continues, the process is expected to result in reduced construction costs.

KEY WORDS: Pavement design, Alternate Design Alternate Bid (ADAB), Life Cycle Cost Analysis (LCCA), Contract bidding

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INTRODUCTION

Methods of determining which type of pavement (rigid or flexible) to design for Louisiana's transportation network have varied through the years from executive decisions to committee selections based on the varied experiences of committee members. Much of the original interstate system and many US Routes and urban pavements were built as rigid pavements with the remainder designed as flexible asphalt concrete pavements. Of the state's approximately 37,000 lane miles, 10% are rigid pavements, 60% are flexible pavements, and 30% are composite pavement sections (older rigid pavements that have now been resurfaced with asphalt concrete). Until recently, a general rule for pavement selection in Louisiana was to use rigid pavement on interstates and in urban areas and flexible pavement for the remainder of the system.

Engineers believe, now more than ever, that a combination of sound design procedures and improved materials and construction procedures can result in both rigid and flexible pavements that are viable choices for a wide spectrum of terrain and traffic conditions existing in the state. Economics and cost benefit to the transportation user then become variables that must be included in pavement type selection. Inclusion of these variables will complement the selection process and provide the best choices for the unique conditions and characteristics of each project location.

In 1998 the Louisiana Department of Transportation (LADOTD) began developing a process that allows selection of pavement type through the bid process. The process utilizes traditional Life Cycle Cost Analysis (LCCA) concepts to model the cost of pavement alternatives over a performance period. The selection process is then accomplished through an Alternate Design Alternate Bid (ADAB) procedure that essentially allows industry (the lowest bidder) to determine which pavement type will be constructed. This paper describes development of the procedure and the procedure's resulting implementation as a standard department policy for pavement type selection.

OBJECTIVE

The objective of implementing the ADAB process using LCCA is to allow industry to select pavement type through the bid process, enhance fair competition among paving industries, and promote a more cost-effective use of the highway construction funds. The new process will reduce the tendency for selection determination based only on lowest initial construction cost.

Additionally the process requires the agency to consider future costs of rehabilitation, traffic control, and user delay costs. Incorporation of these factors into the calculation of total costs has the potential to influence design strategy and construction sequencing with the objective of more efficiently managing traffic through the work zone.

DEVELOPMENT OF PROCESS

Process development began with the establishment of an internal committee named the Pavement Structure Review Committee (formerly the Pavement Type Selection Committee). Committee members represented functions of LADOTD that included design, construction, maintenance, research, materials, and pavement management. It also specifically included experts on asphalt and Portland cement concrete pavements within the department in addition to engineers responsible for project bid lettings. The charge of the committee was to steer pavement design engineers in developing a localized standard procedure of LCCA. Over a six-month period, the committee developed pavement performance and rehabilitation scenarios that reflected past performance and anticipated improved performance resulting from improvements in design, materials, and construction.

After the committee reached a consensus, the plan was provided to both local asphalt (Louisiana Asphalt Paving Association) and concrete (Concrete and Aggregates Association of Louisiana) associations for review and comment. Representatives of both industries were invited to attend LCCA and ADAB presentations. Comments were addressed through meetings and correspondence until a final procedure was developed.

By including both major paving industries early on in the process, the LADOTD dramatically increased the chance of developing a consensus process that all groups could endorse as fair and reasonable. LADOTD also solicited comments from FHWA and national trade associations prior to final implementation. The consensus building has allowed the department to fully implement the process as a standard procedure.

LIFE CYCLE COST ANALYSIS (LCCA)

LADOTD generally follows the FHWA's methodology recommended in its interim technical bulletin to conduct the LCCA (1). It contains all standard procedures for estimating and comparing the long-term costs of asphalt and concrete pavements over an analysis period under specific traffic and environmental conditions. The analysis period is the time horizon over which future costs are evaluated and must exceed the initial design life of the pavement. An analysis period of 40 years is used for new construction and 30 years for overlay of existing pavements.

LADOTD follows the FHWA's recommendations for LCCA input data unless local data is available. Examples of local input data include traffic, construction duration, costs, etc. A list of unit bid prices is continuously updated for the purpose of calculating construction costs. Unit bid prices include both material and labor costs. It is important to note that only differential costs are considered between alternates in the LCCA. Common costs such as mobilization, signing, utility relocation, earthwork, etc. are not included. Standard production rates of construction are also continuously updated and used to calculate times of construction.

The activity timing for future rehabilitation is indicated in Table 1. Assumptions for flexible pavements include mill and overlay at years 15 and 30. Assumptions for rigid pavements include patching with joint resealing at year 20 and additional patching along with surface retexturing at year 30.

The procedure and assumptions recognize improvements in both flexible and rigid pavement systems. Some of the improvements in flexible pavements include implementation of SUPERPAVE for all mixes, incorporation of polymers, use of materials transfer devices, and addition of thicker stone bases. Improvements for rigid pavements include thicker slabs, larger diameter coated dowel bars, reduced joint spacing, internal drainage, tied concrete shoulders, or widened lanes.

User delay costs are another important element in LCCA. Estimation of user delay costs also follows the procedure established in the interim technical bulletin of FHWA (1). The user costs considered are the differential costs between competing alternates, which means only work-zone costs are estimated. Work-zone costs result from construction and future rehabilitation that restricts the capacity of a facility and disrupt normal traffic flow. Routine maintenance is reduced with periodic rehabilitation and is not included in the analysis. Likewise, normal operating costs and accident costs are considered equal between alternates and are therefore not included.

User costs are further divided into the working day and non-working day daily user costs. In most cases, the travel capacity of a construction zone on a working day is less than the capacity on a non-working day. User costs associated with non-working days are excluded from the analysis.

An example-working sheet for calculation of LCCA is presented in Table 2. This project on US 171 includes a comparison of two alternates: A1, a nine-inch jointed plain concrete pavement with a total initial cost of $6,221,700, and A2, a nine-inch asphalt concrete pavement with a total initial cost of $4,232,600. The LCC was calculated to be $6,949,800 for A1 and $6,340,600 for A2. Each future rehabilitation activity includes an associated construction cost and a user delay cost. These costs are totaled and discounted to present or "Year 0" costs for calculation of total LCC of each alternate.

ATERNATE DESIGN ALTERNATE BID (ADAB)

The ADAB bid model is accomplished by adding a factor "C" that represents future rehabilitation and user delay costs associated with a particular alternate to each contractors base bid "A." The "B" component is time-based bidding that may also include an incentive for early completion. The model is therefore known as A+B+C in Louisiana, and the lowest total determines the apparent low bidder. Typical time incentive/ disincentive values are indicated in Table 3. An example bid form used for A+B+C bidding is included as Appendix A.

The implementation of ADAB, in general, may result in comparing two competing pavement structures with different total thickness between the subgrade and the final pavement surface. At LADOTD, there is also a minimum rigid pavement thickness of eight inches that causes Portland cement concrete pavements to be less competitive on routes with lower traffic volumes. A threshold of 20 percent in the difference of LCC has been adopted as a reasonable zone within which pavement types can compete. If the difference in LCCs of competing pavement types is larger than 20 percent, the pavement type with a higher LCC will be removed without entering the bidding process.

Having different earthwork quantities for alternates due to different total thickness can be avoided by holding total pavement thickness constant for all alternates. This often requires some recalculation by the designer to meet design requirements without over-designing pavement sections. Designing projects in this manner has allowed the plan development process to flow smoothly by eliminating the need for alternate grading sections.

STEPS IN LCCA/ADAB

A standard procedure is evolving as more LCCA and ADAB projects are conducted. The current LCCA/ADAB procedure has the following steps:

1. Project selection
   Most LADOTD construction projects will be evaluated for inclusion in the ADAB process based on an evolving set of criteria. These criteria include, but are not limited to, AADT (annual average daily traffic), project length, minimum required concrete pavement thickness, etc.
2. Select alternative pavement design strategies for analysis periods that have specified performance periods and activity timing.
3. Estimate agency costs
   Agency costs are the construction costs paid for by LADOTD. These are official estimates prepared by the design sections of LADOTD. These costs are estimated using information provided by the initial designs of pavement structures and their anticipated subsequent rehabilitation strategies.
4. Estimate user costs
   User costs are estimated according to the recommendations made in the interim technical bulletin of the Federal Highway Administration (FHWA), Life-Cycle Cost Analysis in Pavement Design, publication number FHWA-SA-98-079. Only work-zone user costs are estimated in the LCCA/ADAB process. The estimation of user costs requires three steps: calculate daily user costs, determine the duration of construction or rehab activities, and apply appropriate daily user costs to construction or rehab durations.
5. Compute net present value
   The net present value (*NPV*) of the cash flow for each alternate is calculated as follows:

$$NPV = Initial\,Cost + \sum_{k=1}^{N} Rehab\,Cost_k \cdot \left(P/F_k, i\%, n_k\right) \qquad (1)$$

where the discounting factor is,

$$\left(P / F_k, i\%, n_k\right) = \left[\frac{1}{(1+i)^{n_K}}\right] \tag{2}$$

Here, n_k is the year of expenditure, and i represents the discount rate. The discount rate is defined as the difference between interest and inflation rates. Typically, LA DOTD uses a 4 percent discount rate. The costs in Equation 1 represent the construction (agency) and user costs associated with the initial construction and each subsequent rehabilitation strategy.

6. Analyze results and calculate life cycle cost adjustment factor, *C*
After the total *NPV* for each alternate is calculated, their results are compared. If the average difference of total *NPVs* between alternates is greater than 20 percent, the alternate with the lower total *NPV* will be selected for bidding. Otherwise, alternate pavement designs will be included in the plans and a life cycle cost adjustment factor, *C*, will be included in the Construction Proposal for each alternate. As part of the ADAB process, this *C* factor will be added to the contractor's bid. The life cycle cost adjustment factor, *C,* is calculated as follows:

$$C = Total\ NPV\ of\ the\ LCC\ -\ Total\ Cost\ of\ Initial\ Construction \tag{3}$$

IMPLEMENTATION OF ADAB

ADAB was first used experimentally in Louisiana through FHWA Special Experimental Project No. 14, Innovative Contracting Practices (SEP14). The project selected for this experiment was an overlay of a 4.1-mile section of continuously reinforced concrete pavement on Interstate 10 west of New Orleans, Louisiana. The objective of the experiment was to develop a bid model that would allow asphalt concrete and bonded Portland cement overlays to compete as alternates based on their LCCs. Upon calculation it was determined that the LCCs were within 20 percent over an analysis period of 30 years.

The project was advertised and five bids were received. Four contractors submitted bids for asphalt overlay and one contractor submitted a bid for bonded concrete overlay. The asphalt overlay alternate was selected based on the A+B+C bid model. The process was considered successful because of industry's understanding of the bid process and acceptance of the results. While comments were received from both industries suggesting modifications to the process, there were no legal challenges or requests that the agency discontinue the process.

Following Experimental Project No. 14, ADAB has gradually been adopted as the standard procedure for determining pavement type for projects with sufficient traffic to enable the two alternate pavement types to compete. As of July 2003, there have been seven projects let using the bid model, resulting in selection of four flexible and three rigid pavements for construction. Typical bid results from two of the seven projects are included in Tables 4 and 5. Tables 4 and 5 indicate the details of alternate bids for each project and the comparison of agency estimates with the contractor's bids.

Figures 1-a and 1-b indicate the general trend of increasing initial construction cost and LCC corresponding with increasing AADT. These trends are representative of the LCCA model and assumptions used by LADOTD. Initial construction costs converge at high AADT, around 35,000, that represents heavy volume interstate designs. LCCs converge at lower AADT, around 12,000. The model is based on the scenario of a four-lane divided highway and reflects costs based on one roadway mile in one direction.

To determine any trends with respect to costs, unit bid prices are being monitored as projects using the process are let. Figure 2 indicates the scatter of unit bid items expressed in dollars per square foot. It is hoped that with additional competition, bid prices will result in construction savings. Figure 3 indicates the trend of saving funds generated as the ADAB process is further implemented. Savings are implied as a result of comparison between bid prices and department estimates of construction costs that are based upon the historical statewide weighted-average unit costs.

INDUSTRY OBSERVATIONS AND COMMENTS

Throughout the process, industry has been invited to observe process development and to provide comments to the department. One of the early comments concerned the decision to assume approximately equal residual value of materials for both alternates at the end of the analysis period. The net effect is to eliminate residual value of materials in the LCCA. Impact of any differences in material value on the final results of LCCA is considered insignificant, in part due to the degree with which this value is heavily discounted. The discount factor of 4 percent results in present worth multipliers of 0.3083 and 0.2083 at years 30 and 40 respectively.

There is a reasonable argument for crediting the value of reclaimed asphalt pavement (RAP) generated during interim rehabilitation activities; however, the value of RAP is difficult to determine. The department currently includes a bid item for RAP to be retained by the contractor in accordance with state law. Current bid prices for RAP average approximately $5 per cubic yard, although industry has indicated they believe the material is undervalued at this price.

Industry also questioned the way in which the department managed the concept of remaining life of an activity at the end of the analysis period. In other words, future rehabilitation activities, such as resurfacing completed near the end of the analysis period, should receive credit for the period of time in which expected life exceeds the end of the period. For example, an overlay that is assumed to last for 15 years should receive 5 years of credit if placed 10 years prior to the end of the analysis period. The department avoids this issue by adjusting the design life of overlays to match the remaining time for the analysis period, i.e. design a 10-year overlay for 10 years remaining.

User delay cost is another potentially controversial item that continues to be evaluated. One issue is how to obtain the proper traffic data to predict traffic congestion and associated user costs. The procedure at LADOTD relies on traffic data available for the FHWA Highway Performance Monitoring System (HPMS) maintained by the department. This data is used to conduct pavement structure designs and user delay analysis. Field data indicates that traffic data, such as AADT, traffic hourly distribution, the composition of vehicle types, truck percentage, etc., is dynamic and varies daily. Adjustment factors are used to obtain representative values over a year for design use. Among them are the daily adjustment factors that account for variation of traffic within a week, and the seasonal adjustment factors that account for the variation of traffic among different months.

Another comment is that LCCA is based on AADT data, and the information regarding actual construction timing is not available when ADAB is conducted. This means the traffic data used will not necessarily match the real traffic during construction. Available information indicates that the resulting difference of user delays is within 10 percent (2). While prediction of traffic data will always be a challenge, any inaccuracies are applied to analysis of both alternates in the same direction, either conservatively or otherwise.

Additional industry comments concern the inability to model positive attributes or advantages of one pavement type over another, such as better ride, quieter ride quality, or reduced tendency to skid or hydroplane. Current LCCA models are inadequate to quantify benefits from such attributes.

ADDITIONAL DEVELOPMENT

The implementation of ADAB with LCCA in Louisiana appears to be a successful process and has achieved some positive results. Continued improvements in the procedure can be expected with work in the following areas: improving the accuracy of estimating user delay costs and expanding the LCCA from four and multi-lane highways to two-lane highways. Development of a model for two-lane facilities is underway.

User delay cost is not an agency cost; it is the price paid by road users resulting from delay caused by construction activities. Improved estimation of user delay costs will promote the advancement of construction technology management and benefit the users of public facilities. Further consideration should be extended to factors such as traffic detour cost, the impact of traffic variation within a year on LCC, the interaction between construction zones and traffic patterns, etc. In the two-lane highway situation, the relationship between user delay cost and traffic control techniques should be studied.

CONCLUSIONS

The LADOTD's experience with the established process development and application of Alternate Design Alternate Bid (ADAB) using Life Cycle Cost Analysis (LCCA) appears successful and productive, and the process is generally accepted as a means to expand competition while maintaining a fair competitive bidding process. The following factors contributed to successful implementation:

- Agency internal consensus on ADAB and LCCA was established first through a special committee of department experts so that the LADOTD had a reasonable process to present to industry.
- Future pavement performance and rehabilitation activities were predicted from both past performance of pavements in Louisiana and expected additional service life attributable to improved design, material, and construction procedures.
- The LADOTD included both major paving industries early on in process development. Early involvement increased the chance of developing a consensus process that all groups could endorse as fair and reasonable.
- Comments were solicited from FHWA and national trade associations as well prior to final implementation.
- LCCA conducted for ADAB in Louisiana followed FHWA's methodology and recommendations.
- A 20 percent threshold value in difference of LCCs was adopted to establish a reasonable interval in which pavement systems are likely to compete. This will serve to avoid unnecessary evaluation of alternates where traffic volume and load is too low for pavement systems to reasonably compete.
- The results from the implementation of ADAB using LCCA in Louisiana suggests a trend toward reduced contract bid prices, possibly due to added competition.

ACKNOWLEDGEMENT

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Table 1. Scenarios for Future Pavement Rehabilitation

Project Type	Alternate	Year 0	Year 15	Year 20	Year 30
Interstate Overlay	Rigid	New Bonded PCC Overlay	No Action	Clean/Seal Joints 3 Patches Per Mile	N/A
	Flexible	New AC Overlay	Cold Plane & Overlay	No Action	N/A
Interstate New Construction	Rigid	New JPC Pavement	No Action	Clean/Seal Joints Patch 1% of Joints	Retexture Patch 3% of Joints
	Flexible	New AC Pavement	Cold Plane & Overlay	No Action	Cold Plane & Overlay
Other Arterial New Construction	Rigid	New JPC Pavement	No Action	Clean/Seal Joints Patch 1% of Joints	Retexture Patch 2% of Joints
	Flexible	New AC Pavement	Cold Plane & Overlay	No Action	Cold Plane & Overlay

Table 2 (a). Typical Summary Sheet of Life Cycle Cost Analysis

		PV FACTOR = 0.5553	PV FACTOR = 0.4564	PV FACTOR = 0.3083		
ALTERNATE	YEAR 0 6200 ADT	YEAR 15 7800 ADT	YEAR 20 8400 ADT	YEAR 30 9200 ADT	YEAR 40 10200 ADT	PRESENT VALUE TOTALS
A1	**NEW JPC PAVEMENT** 9" JPCP 10" CRUSHED STONE/RECYCLED PCCP BASE COURSE **SHOULDERS** 2.0" AC SHOULDER CONST. COST: $6,061,700 USER COST: $160,000 TOTAL COST: $6,221,700	**NO ACTION** TOTAL COST: $0	**CLEAN/SEAL JOINTS** **PATCHING** PATCH 1% OF JOINTS **SHOULDERS** COLD PLANE 2" OF AC 2" AC WEARING COURSE CONST. COST: $615,500 USER COST: $550,200 TOTAL COST: $1,165,700	**RETEXTURE** TRAVEL LANES ONLY **PATCHING** PATCH 2% OF JOINTS CONST. COST: $472,600 USER COST: $163,400 TOTAL COST: $636,000	REMAINING INVESTMENT LIFE 0 YEARS TOTAL COST: $0	TOTAL INVESTMENT LIFE = 40 YEARS CONST. COST: $6,488,300 USER COST: $461,500 TOTAL COST: $6,949,800
A2	**NEW AC PAVEMENT** 2" AC WEARING COURSE 3" AC BINDER COURSE 4" AC BASE COURSE 10" CRUSHED STONE/RECYCLED PCCP BASE COURSE **SHOULDERS** 2" AC SHOULDER CONST. COST: $3,860,200 USER COST: $372,400 TOTAL COST: $4,232,600	**STRUCTURE REHAB** **COLD PLANE 2.0"** **WITH OVERLAY** (INCLUDING SHOULDERS) 1.5" AC WEARING COURSE 2" AC BINDER COURSE 7" EXISTING AC PAVEMENT 10 " EXISTING CRUSHED STONE BASE CONST. COST: $2,121,300 USER COST: $300,300 TOTAL COST: $2,421,600	**NO ACTION** TOTAL COST: $0	**STRUCTURE REHAB** **COLD PLANE 2.0"** **WITH OVERLAY** (INCUDING SHOULDERS) 1.5" AC WEARING COURSE 2" AC BINDER COURSE 8.5" EXISTING AC PAVEMENT 10" EXISTING CRUSHED STONE BASE CONST. COST: $2,121,300 USER COST: $354,300 TOTAL COST: $2,475,600	REMAINING INVESTMENT LIFE 0 YEARS TOTAL COST: $0	TOTAL INVESTMENT LIFE = 40 YEARS CONST. COST: $5,692,200 USER COST: $648,400 TOTAL COST: $6,340,600

Table 2 (b). Typical Summary Sheet of Life Cycle Cost Analysis

		PV FACTOR = 0.5553	PV FACTOR = 0.4564	PV FACTOR = 0.3083		
ALTERNATE	YEAR 0	YEAR 15	YEAR 20	YEAR 30	YEAR 40	PRESENT VALUE TOTALS
	6200 ADT	7800 ADT	8400 ADT	9200 ADT	10200 ADT	
A1	**NEW JPC PAVEMENT** 225mm JPCP 250mm CRUSHED STONE/RECYCLED PCCP BASE COURSE **SHOULDERS** 50mm AC SHOULDER CONST. COST: $6,061,700 USER COST: $160,000 TOTAL COST: $6,221,700	**NO ACTION** TOTAL COST: $0	**CLEAN/SEAL JOINTS** **PATCHING** PATCH 1% OF JOINTS **SHOULDERS** COLD PLANE 50mm OF AC 50mm AC WEARING COURSE CONST. COST: $615,500 USER COST: $550,200 TOTAL COST: $1,165,700	**RETEXTURE** TRAVEL LANES ONLY **PATCHING** PATCH 2% OF JOINTS CONST. COST: $472,600 USER COST: $163,400 TOTAL COST: $636,000	REMAINING INVESTMENT LIFE 0 YEARS TOTAL COST: $0	TOTAL INVESTMENT LIFE = 40 YEARS CONST. COST: $6,488,300 USER COST: $461,500 TOTAL COST: $6,949,800
A2	**NEW AC PAVEMENT** 50mm AC WEARING COURSE 75mm AC BINDER COURSE 100mm AC BASE COURSE 250mm CRUSHED STONE/RECYCLED PCCP BASE COURSE **SHOULDERS** 50mm AC SHOULDER CONST. COST: $3,860,200 USER COST: $372,400 TOTAL COST: $4,232,600	**STRUCTURE REHAB COLD PLANE 50mm WITH OVERLAY** (INCLUDING SHOULDERS) 35mm AC WEARING COURSE 50mm AC BINDER COURSE 175mm EXISTING AC PAVEMENT 250mm EXISTING CRUSHED STONE BASE CONST. COST: $2,121,300 USER COST: $300,300 TOTAL COST: $2,421,600	**NO ACTION** TOTAL COST: $0	**STRUCTURE REHAB COLD PLANE 50mm WITH OVERLAY** (INCUDING SHOULDERS) 35mm AC WEARING COURSE 50mm AC BINDER COURSE 210mm EXISTING AC PAVEMENT 250mm EXISTING CRUSHED STONE BASE CONST. COST: $2,121,300 USER COST: $354,300 TOTAL COST: $2,475,600	REMAINING INVESTMENT LIFE 0 YEARS TOTAL COST: $0	TOTAL INVESTMENT LIFE = 40 YEARS CONST. COST: $5,692,200 USER COST: $648,400 TOTAL COST: $6,340,600

Table 3. Typical Time Incentive/Disincentive Values

Annual Average Daily Traffic (AADT)	Unit Value, $/day
< 10,000	1,000
10,000 – 15,000	5,000
15,000 – 25,000	10,000
> 25,000	15,000

Table 4. Detail of Alternate Bidding for Project No. 1 (US 171 - Gillis to Ragley)

Project Number	Bid Date	Bid Type	Bidder	Alternate Bid	A Bid[1] (General + Alternate)	General[2] Items	Alternate[3] Items	Days	$/Day	B Value	C Value	Total Bid
024-04-0015	Jan 15, 2003	A+B+C	James Construction	PCC	$18,132,887	$12,923,831	$5,209,055	305	$1,000	$305,000	$736,000	$19,173,887
			Denton James	PCC	$18,380,053	$13,160,924	$5,219,130	360	$1,000	$360,000	$736,000	$19,476,053
			D & J Construction	AC	$17,680,916	$13,380,218	$4,300,697	400	$1,000	$400,000	$2,182,400	$20,263,316
			Gilchrist	PCC	$19,042,639	$13,950,431	$5,092,209	500	$1,000	$500,000	$736,000	$20,278,639
			Merrick	AC	$18,707,278	$14,350,001	$4,357,278	500	$1,000	$500,000	$2,182,400	$21,389,678

[1]LADOTD Estimates: $19,323,499 (PCC) and $17,679,553 (AC)
[2]LADOTD Estimate: $12,977,708
[3]LADOTD Estimates: $6,345,791 (PCC) and $4,701,845 (AC)

Table 5. Detail of Alternate Bidding for Project 2 (US 171 - Longville to Deridder)

Project Number	Bid Date	Bid Type	Bidder	Alternate Bid	A Bid[1] (General + Alternate)	General[2] Items	Alternate[3] Items	Days	$/Day	B Value	C Value	Total Bid (A+B+C)
024-02-0018	Apr 16, 2003	A+B+C	R.E. Heidt	AC	$14,890,762	$9,519,548	$5,371,214	400	$1,000	$400,000	$2,108,000	$17,398,762
			Denton James	PCC	$17,693,753	$11,592,156	$6,101,597	300	$1,000	$300,000	$728,100	$18,721,853
			James Construction	PCC	$17,880,271	$11,975,915	$5,904,356	335	$1,000	$335,000	$728,100	$18,943,371
			Gilchrist	PCC	$17,994,833	$11,907,117	$6,087,716	375	$1,000	$375,000	$728,100	$19,097,933
			Diamond B	AC	$17,250,711	$11,526,144	$5,724,567	400	$1,000	$400,000	$2,108,000	$19,758,711
			Gilbert South	AC	$18,055,214	$12,087,024	$5,968,190	300	$1,000	$300,000	$2,108,000	$20,463,214

[1]LADOTD Estimates: $18,160,391 (PCC) and $16,053,739 (AC)
[2]LADOTD Estimate: $11,089,558
[3]LADOTD Estimates: $7,070,833 (PCC) and $4,964,181 (AC)

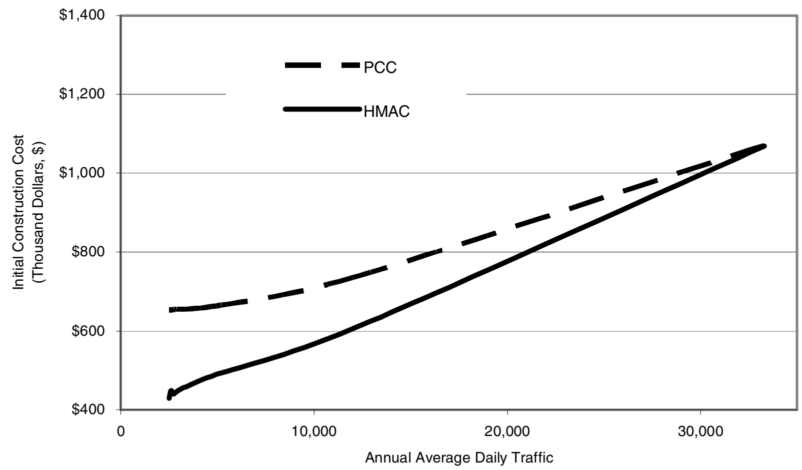


Figure 1-a. General Trend for Initial Construction Cost

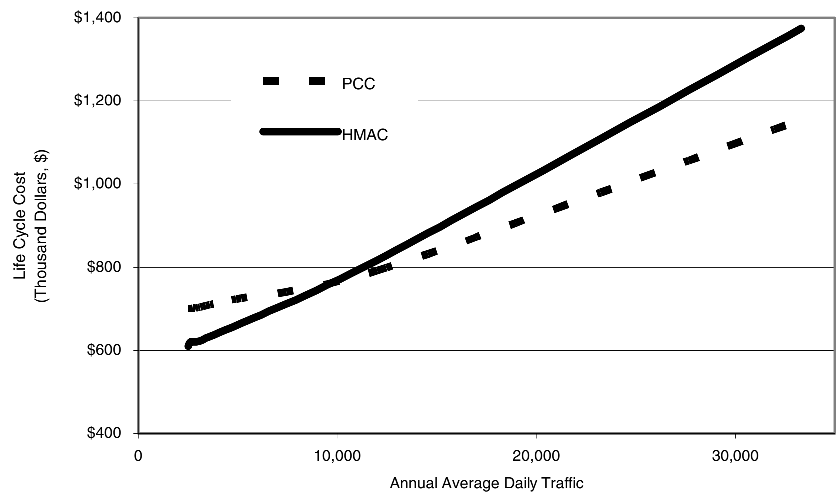
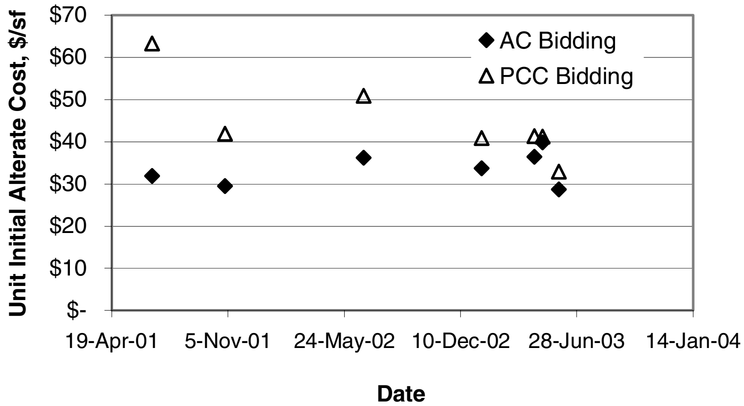
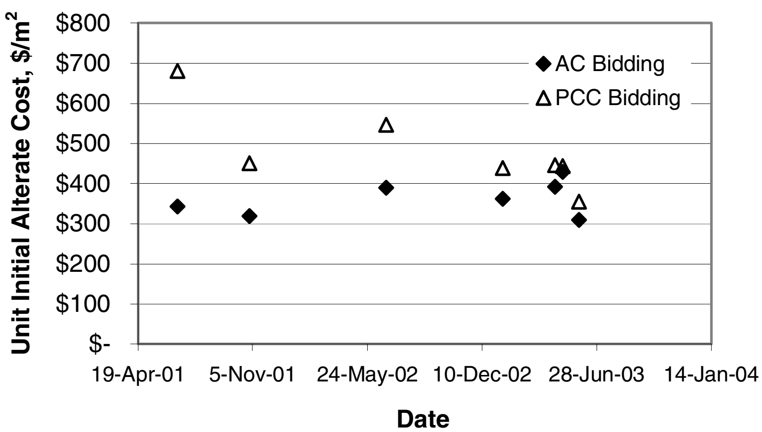


Figure 1-b. General Trend for Life Cycle Cost



(a)



(b)

Figure 2. Scatter of Unit Alternate Items with Letting Date

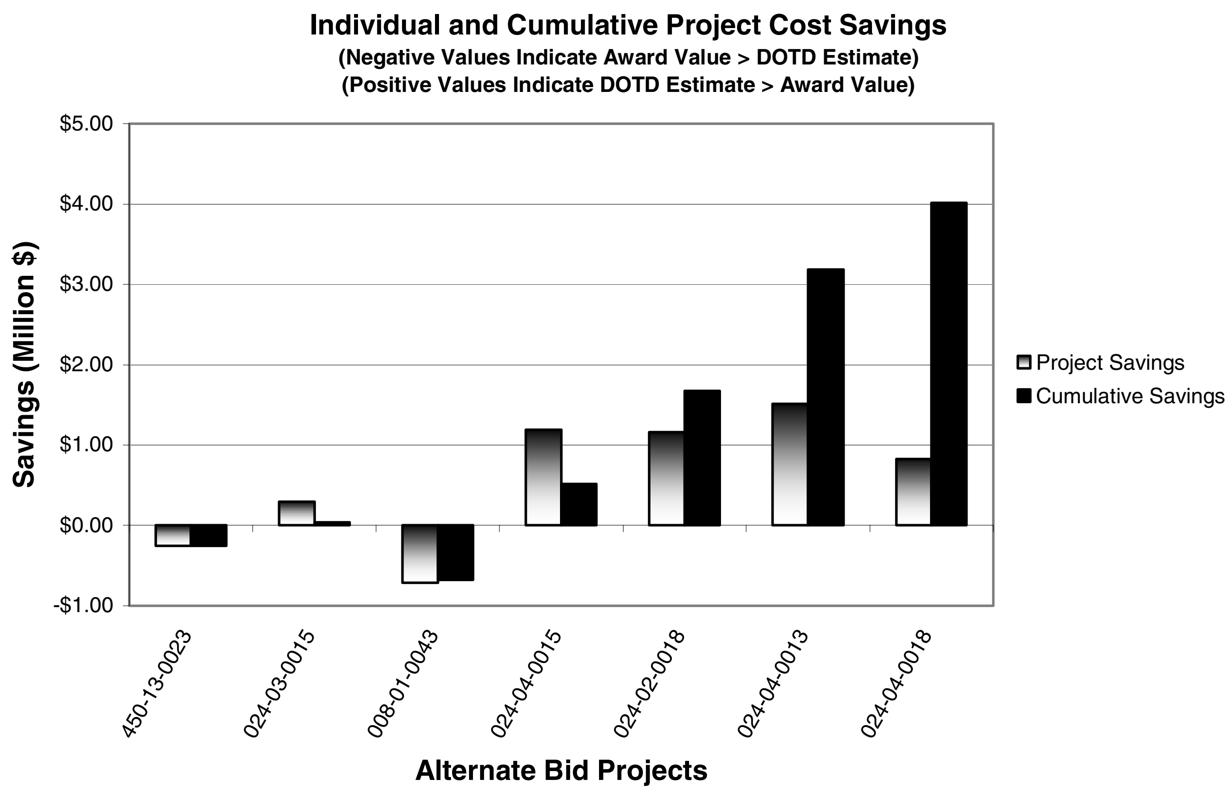


Figure 3. Difference in Award Value versus LADOTD Estimate

APPENDIX A

BID FORM WITH ALTERNATE PROVISIONS

STATE PROJECT NO(S). **024-02-0018 & 024-03-0014**

BIDDER SIGNATURE REQUIREMENTS (APPLICABLE TO ALL PROJECTS)

THIS BID FOR THE CAPTIONED PROJECT IS SUBMITTED BY:

____
Name of Principal (Individual, Firm, Corporation, or Joint Venture)

____
If Joint Venture, Name of First Partner

____
(Louisiana Contractor's License Number of Bidder or First Partner to Joint Venture)

____
(Business Street Address)

____
(Business Mailing Address, if different)

____

____

____
(Area Code and Telephone Number of Business)

____
(Telephone Number and Name of Contact Person)

____
(Telecopier Number, if any)

____
If Joint Venture, Name of Second Partner

____
(Louisiana Contractor's License Number of Second Partner to Joint Venture)

____
(Business Street Address)

____
(Business Mailing Address, if different)

____

____

____
(Area Code and Telephone Number of Business)

____
(Telephone Number and Name of Contact Person)

____
(Telecopier Number, if any)

ACTING ON BEHALF OF THE BIDDER, THIS IS TO ATTEST THAT THE UNDERSIGNED DULY AUTHORIZED REPRESENTATIVE OF THE ABOVE CAPTIONED FIRM, CORPORATION OR BUSINESS, BY SUBMISSION OF THIS BID, AGREES AND CERTIFIES THE TRUTH AND ACCURACY OF ALL PROVISIONS OF THIS PROPOSAL, INCLUSIVE OF THE REQUIREMENTS, STATEMENTS, DECLARATIONS AND CERTIFICATIONS ABOVE AND IN THE SCHEDULE OF ITEMS AND PROPOSAL GUARANTY. EXECUTION AND SIGNATURE OF THIS FORM AND SUBMISSION OF THE SCHEDULE OF ITEMS AND PROPOSAL GUARANTY SHALL CONSTITUTE AN IRREVOCABLE AND LEGALLY BINDING OFFER BY THE BIDDER.

(Signature)	(Signature)
(Printed Name)	(Printed Name)
(Title)	(Title)
(Date of Signature)	(Date of Signature)

CONTRACTORS INFORMATIONAL BID
It is agreed that the total bid(s) shown below, determined by the bidder, are for informational purposes only and that the low bidder for this project will be determined in accordance with the special provision entitled **COST-PLUS-TIME-PLUS LIFE CYCLE COST BIDDING PROCEDURE (A+B+C METHOD)**, as determined by the Department.

A_1=Summation of products of the quantities shown in the Schedule of Items (BASE BID plus Portland Cement Concrete Pavement. ALTERNATE A1) multiplied by the unit prices.
A_1=____
B_1= Bidders proposed contract time for Base Bid and Alternate A1 items multiplied by the Daily User Cost ($1,000).
B_1=___________________________________Working Days x $1,000
B_1=____
C_1=Life Cycle Cost Adjustment Factor for Portland Cement Concrete Pavement., determined by the Department.
C_1= $728,100
Contractors Total Bid (A_1+B_1+C_1) =
OR
A_2=Summation of products of the quantities shown in the Schedule of Items (BASE BID plus Superpave Asphaltic Concrete Pavement ALTERNATE A2) multiplied by the unit prices.
A_2=____
B_2=Bidders proposed contract time for Base Bid and Alternate A2 items multiplied by the Daily User Cost ($1,000).
B_2 =___________________________________ Working Days x $1,000
B_2=____
C_2=Life Cycle Cost Adjustment Factor for Superpave Asphaltic Concrete Pavement., determined by the Department.
C_2= $2,108,000
Contractor's Total Bid (A_2 + B_2+ C_2) =

CS-14AA
04/01