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Diseño-construcción-financiación en los EE.UU.: El caso de iROX, proyecto de ampliación de la carretera interestatal 75

Design-Build-Finance in the US: The case of iROX, I-75 Road Expansion Project

Autores

FORCAEL, E. Assistant Professor, Depto. de Ingeniería Civil, Universidad del Bío-Bío, P.O. Box 5-C, Concepción, Chile
E-mail: eforcael@ubiobio.cl

ELLIS JR., R. Associate Professor, Dept. of Civil & Coastal Engineering, University of Florida, P.O. Box 116580, Gainesville, Florida, USA
E-mail: relli@ce.ufl.edu

JARAMILLO, F. DBIA, Project Controls Manager, ACCI/API, A Joint Venture, Fort Myers, Florida, USA
E-mail: fjaramill@ajaxpaving.com

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Abstract

This project is part of the Interstate 75 road expansion, located in Southwest Florida and consisted of an expansion from four to six lanes along a 30-mile stretch. The paper presents a design, build and finance (DBF) approach applied to a US highway. This work focuses on the financial structure of the project, which did not include a concession (operation); the bidding procedure, which took into account an interesting bid evaluation criterion and; project management matters. The information on the case study was acquired by exhaustively examining the documentation of the project and by interviewing the Project Controls Manager. The financial structure used in the project showed that it is possible to extend the payment period beyond the construction deadline without resorting to a toll system. As usual, the bid evaluation criteria of this project included price, time and technical background; however, these aspects were evaluated through the use of a compensated score. Finally, some interesting management aspects of the project are addressed, in order to generate some recommendations for future DBF projects in the US and the world.

Key words: Design-Build-Finance project, transportation construction projects, management.

Resumen

Este proyecto forma parte de la expansión de la carretera interestatal 75, ubicada al suroeste del Estado de la Florida en los Estados Unidos y consistió en la expansión de cuatro a seis pistas en un tramo de 48 kilómetros. Este artículo presenta un método de diseño, construcción y financiamiento (DBF) aplicado a un proyecto de infraestructura vial en los EE.UU. Este trabajo se centra en la estructura financiera del proyecto, el cual no consideró el uso de la modalidad de concesión (operación); el proceso de licitación, que tuvo en cuenta un interesante criterio de evaluación de propuestas y; materias relacionadas a la gestión del proyecto. La información acerca de este caso de estudio fue adquirida mediante un exhaustivo estudio de la documentación del proyecto y a través de entrevistas con el gerente de control del proyecto. La estructura financiera utilizada en el proyecto demostró que es posible extender el período de pago más allá del plazo de construcción sin recurrir a un sistema de peaje. Como es habitual, los criterios de evaluación de las ofertas de este proyecto incluyeron el precio, el tiempo y los antecedentes técnicos; sin embargo, todos estos aspectos fueron evaluados mediante el uso de un método de puntuación compensada. Por último, se abordan algunos interesantes aspectos de gestión del proyecto, a fin de generar algunas recomendaciones para futuros proyectos de DBF en los EE.UU. y en el mundo.

Palabras clave: *Diseño-Construcción-Financiamiento, construcción de infraestructura vial, gestión.*

Introduction

The US National Highway System consists of 160,000 miles of highways, being the largest highway system in the world (Slater, 1996); therefore, it is important to support each initiative that can help improve procurement systems, design, building and financing of transportation projects. Governments have always played a fundamental role in designing, building, financing, operating and maintaining the road infrastructure. However, during the last decades some countries have begun changing their policies in relation to this important role. As far back as twenty years ago, the propagation of different procurement systems caused an increasing demand for methods of selecting the most appropriate arrangement for a particular project (Skitmore and Marsden, 1988). The advent of the Private Finance Initiative (PFI) has allowed governments to achieve more of their projects through procurement of goods and services instead of doing themselves (Masterman, 2002). On the other hand, during recent years, the proliferation of Public-Private Partnership (PPP) in the US has been crucial to develop more sophisticated projects in the transportation sector (Davis and Allison, 2008).

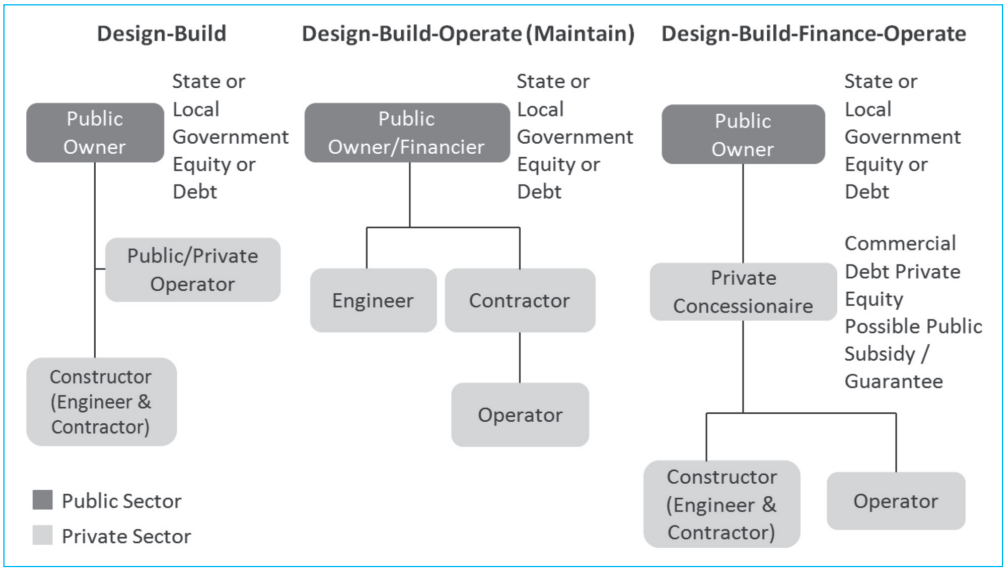
One of the first private initiatives for procurement systems has been the Build, Operate and Transfer (BOT) projects, which has been broadly applied to infrastructure development worldwide since the middle of the 80's (Shen et al., 2002). From a financial point of view, BOT is very convenient for governments because the main investment is made by private companies (concession) instead of using public resources. Nevertheless, BOT projects have a problem related to concession period; a long concession period is commonly more favorable to the private party (contractor/investor), but an extended concession period may lead to loss to the government (Shen et al., 2002). In order to deal with this problem, this paper presents an alternative payment approach.

Based on the BOT procurement method, other procurement systems have been developed such as BOO (build, own and operate), BOOT (build, own, operate and transfer), BRT (build, rent and transfer), BTO (build, transfer and operate) and finally, DBFO (design, build, finance and operate); one of the most widely known systems (Masterman, 2002). On the other hand, Design-Build and Finance (DBF) projects, whose procurement system is also addressed in this paper, have been used since the middle of the 90s (Stager, 1995).

In the US, the Federal Highway Administration (2009), defines three approaches for new build facilities as shown in Figure 1: Design-Build; Design-Build-Operate (Maintain) and Design-Build-Finance-Operate.

This paper presents a case study research which used an alternative approach to the DBFO, which

Figure 1 *Procurement systems in the US according to the FHWA (2009)*



does not consider operation as a part of the model. In order to absorb the financial pressure over the local government, because of the non existence of a period of operation to pay the contractor for his work (concession), the paper also includes an alternative financial solution to this problem. The case study presentation includes a description of the project, financing, procurement method and management aspects related to the project.

The project – iROX Interstate 75 Road Expansion Project

The iROX Interstate 75 Road Expansion Project (FDOT, 2007) consisted of an expansion from four to six lanes along a 30-mile stretch in the Interstate 75, from Golden Gate Parkway in Collier County to Colonial Boulevard in Lee County. Both counties located in Southwest of the State of Florida. The total cost of the contract was $430.5 millions of dollars (plus $38.5 million for project management and inspection) and, the company awarded with the project was ACCI/API, a joint venture comprised of Anderson Columbia Company Inc. (ACCI) and Ajax Paving Industries (API), and the design firm, HDR Engineering,. The construction engineering and inspection services were provided by the Florida Department of Transportation (FDOT), through Metric Engineering, Inc. Miami/FL. This widening of the Interstate 75 is the largest roadway project in Southwest Florida history and the largest construction bid in FDOT history at the time it was let (FDOT, 2007).

Building a transportation project of this size involves many potential problems related to cost overruns and traffic forecast (Flyvbjerg et al., 2003). Keeping these potential problems in mind, the iROX-75 team designed and built each part of the project, in order to minimize the cost overruns and to face future road expansions because of traffic increments.

The project included resurfacing the existing four lanes of Interstate 75 and adding one new 12-foot travel lane northbound and southbound with 10-foot shoulders to the inside of the existing lanes, providing three travel lanes in each direction. Work started at the Golden Gate Parkway interchange located south and moved north. Widening the interstate to the inside allowed the iROX-75 team to build the job faster, because building to the outside of the existing highway would have required additional fill material for embankments, placement of retaining walls, and modifications to existing interchange exit ramps that add time to the project increasing the final cost.

In relation to construction sequence, teams of construction crews ground up pavement and laid down new asphalt on the highway shoulders and main roadway. Then, traffic shifted to the outside for workers to begin clearing the median and start working on the new inside lanes. This choreographed construction effort ran simultaneously as other crews moved earth and built new retention ponds. All while designers prepared plans for other segments of the project as work progressed. In conclusion, iROX-75 involved much more than 30 miles of new pavement; more than two-dozen bridges were widened or reconstructed; and iROX-75 crews carved out 23 retention ponds along the 30-mile corridor.

In addition, the project included the reconstruction of a road interchange called Immokalee in Collier County. Extensive work at the Immokalee Road resulted in two new bridges, more lanes beneath the overpasses, and an interchange ready for any future expansion of the Interstate 75.

It was a matter of fact that this congested highway required an expansion; however, a project of this size traditionally could take eight years to complete. To decrease this construction years, bringing congestion release to the users of this highway, a technique internationally used was adapted to this project: Design-Build-Finance-Operate or DBFO (Shaoul et al., 2006); but, without including operation. This was possible based on the new Florida legislation promoting public-private partnerships (FDOT, 2008). By using the Design-Build-Finance (DBF) approach, the completion of the project was only three years instead of eight; the original project duration. The project began in the fall of 2007 and was expected to be finished by the end of 2010. However, the six lanes of the project were opened in December 23, 2009, one year ahead of schedule and the Interstate 75/Immokalee Road interchange will be completed in May 2010, eight months earlier.

Financing of a DBF Project

As found in a DBFO Project, in a DBF project it is necessary to have a company which can develop the design and construction at the same time. In addition, this company has to be able to finance the entire project and to offer a guarantee (bond) to ensure the full completion of the project. This guarantee allows the owner (public sector) to take control over the project in case of extreme situations, like bankrupt of the private company in charge of the project for example. Figure 2 shows the flowchart of a DBF project.

Figure 2 *Flowchart of a DBF project*

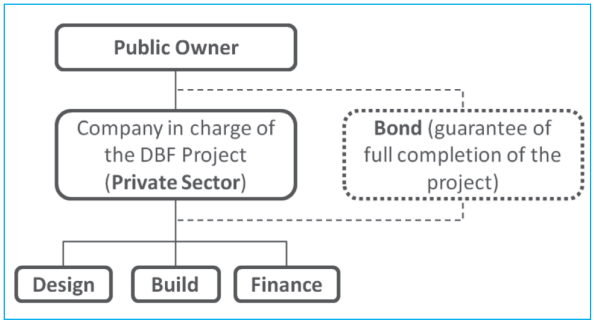
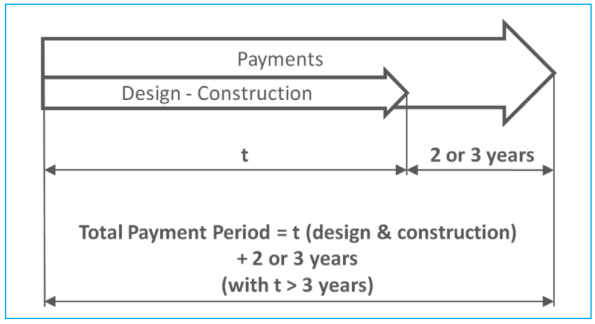


Figure 3 *Flowchart for payments in a DBF project*



As mentioned, the total amount of the contract was $430.5 millions of dollars. To ensure the entire accomplishment of the project, ACCI/API had to give a $600 millions of dollars bond larger than the total cost of the project. This forced the awarded company to get a partner to absorb this commitment. In this case, through a Joint Venture mechanism (Yoshino and Rangan, 1995): "ACCI/API, a Joint Venture".

The main difference between a DBF Project and a DBFO project is in the financial method used. In a DBFO project a private company, or a consortium conformed by more than one company, receives a concession from the government (in some cases from a private entity), to finance, design, construct, operate, maintain and finally transfer a specific road to the entity that originally awarded the concession. The period of a concession may vary depending on the type of project, but is normally between 20 and 30 years. During those years, the company awarded with the concession receives a monetary compensation for its investment, materialized through a toll charged to the drivers who use the transportation system (roads, bridges, etc.). With this mechanism, the government is freed from the need of disbursing large sums of money to finance the construction of the project. In contrast, in a DBF project the payment period is shorter than in a DBFO project, because there is no period of concession where drivers have to pay a toll. One interesting aspect of the DBF approach is that the payment period is not as large as a concession (20 or 30 years); but, it is not as short as the construction period either. Instead, payment period is in the middle of them as shown in Figure 3.

In the case of iROX-75, the period of time for design and construction (t) was three years, and the contractor (ACCI/API) was required to defer the payments to five years, according to the payment plan showed in Figure 4. In other words, the payment plan consisted of spreading payments over five years, instead of paying during the proposed contract time (three years). Due to the high cost of equipment and machinery of this project, the largest payment (28.6%), was disbursed at the beginning of the project and, the subsequent payments were decreasing as shown in Figure 4.

The previous financial mechanism accomplished two objectives; the first one was to avoid using a toll system (concession) and the second one was to financially alleviate the FDOT through deferring the payments beyond the construction period.

Procurement system used in the iROX-75

In a procurement process, when choosing a construction company, the main factors commonly considered are cost, time and quality. Moreover, other factors are taking into account, such as prestige and previous experience of the awarded company (Rintala et al., 2008).

The procurement system in a DBF project is based on the same criteria used for a DBFO project; except in the selection process of the contractor. In this case study, the Florida Department of Transportation (FDOT) designated a commission of Evaluators. These Evaluators calculated a score using an evaluation criteria table, which was based on aspects shown in Table 1.

Figure 4 *Payment plan for the iROX 75 project*

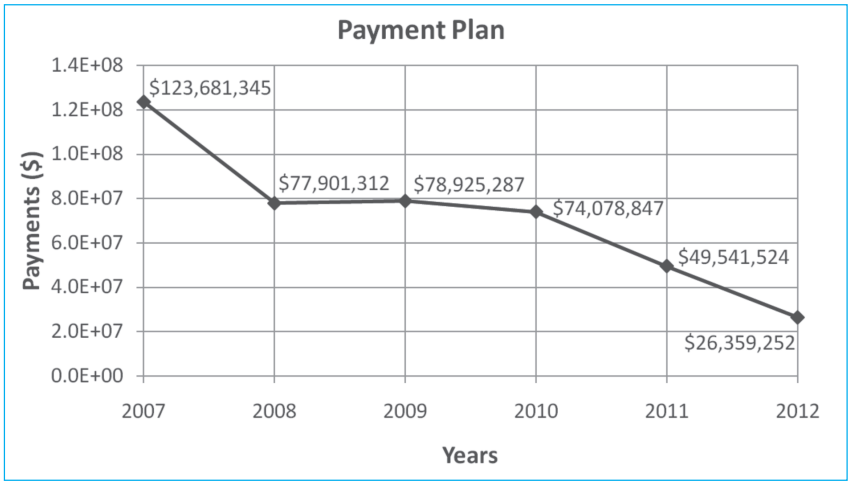


Table 1 *Evaluation Criteria Table used by FDOT Evaluators*

Item	Evaluation Criteria	Score
1	Permitting/Environmental Protection/Commitments	(0.00-10.00)
2	Maintainability	(0.00-10.00)
3	Contractor Guaranteed/ Value Added	(0.00-8.00)
4	Schedule	(0.00-5.00)
5	Coordination	(0.00-10.00)
6	Quality Management Plan	(0.00-8.00)
7	Maintenance of Traffic	(0.00-15.00)
8	Aesthetics	(0.00-2.00)
9	Design and Geotechnical Services	(0.00-25.00)
10	Construction Methods	(0.00-12.00)
11	Proposal Compatibility with I-75 Ultimate 2030 Concept	(0.00-5.00)
	TOTAL	110.00

Regarding with the evaluation criteria showed in Table 1, each item has a description that explains how each evaluator assigned a score per item, as shown in Table 2.

Then, a prorated technical score (TS) was calculated according to equation (1), where *n* is the number of evaluators.

$$TS = \frac{\sum_{i=1}^{n} ES_i}{n} \quad (1)$$

This technical score was calculated for each company that participated in the procurement process; two for this case study. The partial scores per evaluator and the technical score (TS) per company are shown in Tables 3 and 4.

From these tables we see that TS for Company 1 (Table 3) was 92.67 whereas for Company 2 (Table 4) was 87.57. In addition, two other factors were considered: Bid Price Proposal and Proposed Contract Time. With these additional factors and TS, a Compensated Score (CS) was computed according to equation (2).

$$CS = \frac{BPP + (PCT \times TVC)}{TS} \quad (2)$$

Where,
BPP = Bid Price Proposal.
PCT = Proposed Contract Time.
TVC = Time Value Costs ($100,000.00 per day).
TS = Technical Score.

Table 2 *Evaluation Criteria Description*

Item	Criteria
1. Permitting / Environmental Protection / Commitments (10 points)	Credit was given for minimizing impacts to the environment during the design, permitting, and construction phases of the project, while insuring that all environmental commitments were honored. Specifically for this case study, credit was given for innovative construction techniques that minimized impacts to wetlands and the selection of mitigation alternatives that were most cost effective for the impacts. Stormwater permitting, that included consideration for future expansion of I-75, was looked upon favorably.
2. Maintainability (10 points)	Credit was given for a design that minimized periodic and routine maintenance. The following elements were considered: access to provide adequate inspections and maintenance, access to structure's lighting system, and quality of construction materials. Credit was assigned for exceeding minimum material requirements to enhance durability of structural components.
3. Contractor Guaranteed / Value Added (8 points)	These points were based on additional features above the requirements of the document "Request of Proposal", which included items such as adding time to warranty period, varying the threshold limits, varying the degrees of distress associated with each evaluated item, etc.
4. Schedule (5 points)	Credit was given for a comprehensive and logical schedule that demonstrated the ability and commitment to minimize impacts and complete the work within the proposed duration. Critical path elements of the schedule were addressed.
5. Coordination (10 points)	Credit was given for a coordination plan/effort that included, as a minimum, coordination with the following groups: Department management team; Community organizations/businesses/ property owners/general public; Permitting/environmental/regulatory agencies; Utility owners; Local governments; FHWA; Public Information Consultant; Other infrastructure projects.
6. Quality Management Plan (8 points)	Credit was given for an efficient, complete and comprehensive quality management plan, which incorporated effective peer reviews and included all phases of the project.
7. Maintenance of Traffic (15 points)	Credit was given for a Maintenance of Traffic (MOT) scheme that minimized disruption of roadway traffic. This included: Minimization of lane closures and traffic control plan phases; Provisions for adequate lane and shoulder widths; Avoiding visual obstructions; Avoiding reductions in speed limits.
8. Aesthetics (2 points)	Credit for aesthetics was considered in the geometry, economy, and appropriateness of structure type, structure finishes, shapes, proportion and form. Architectural treatments such as tiles, colors, emblems, etc., were not considered as primary aesthetic treatments. Other proposed project aesthetic features were considered for credit when in compliance with the aesthetic guidelines.
9. Design and Geotechnical Services Investigation (25 points)	Credit was given for the quality of the following elements: Quality of proposal plans and design features; Quality and quantity of design staff and resources; Design coordination and plans preparation schedule; Design and construction coordination plan; Geotechnical investigation plan; Test load program; Structure design; Innovation.
10. Construction Methods (12 points)	Credit was given for construction methods that: Minimized disruption to traffic; Mitigated impacts to other projects; Minimized impacts to the environment; Reduced cost; Provided worker safety; Exceeded minimum material requirements to enhance durability of structural components; Minimized impacts to property owners; Minimized visual, noise, vibration, and dust impacts.
11. Proposal Compatibility with I-75 Ultimate 2030 Concept (5 points)	Credit was given for compatibility of the Design-Build Firm's project proposal with an ultimate 2030 year concept. The following was evaluated: Geometrics; Ultimate drainage; Stormwater management; Salvaging constructed sections in the future; Design-Build Firm's recommended construction/procedure for future ultimate construction implementation; Constructability which included MOT.

The company with the lowest CS was awarded with the DBF project. To calculate the CS, the following three alternative projects were considered:

1. A segment of the I-75 from Golden Gate Parkway to South of SR 80 in Collier and Lee Counties, including Immokalee Road and Daniels Parkway Interchanges.

2. A segment of the I-75 from Golden Gate Parkway to South of SR 80 in Collier and Lee Counties, including Immokalee Road Interchange.

3. A segment of the I-75 from Golden Gate Parkway to South of Colonial Boulevard in Collier and Lee Counties Including Immokalee Road Interchange.

The difference among these three previous alternative projects was related to the cost of the project (Bid Price Proposal). The first alternative project was more expensive than the second alternative project, and in turn the second alternative project was more expensive than the third alternative project. The TS values per alternative are shown in Table 5 and the BPP values per alternative are shown in Table 6.

The TS values obtained from Tables 3 and 4; the BPP values for each one of the three alternative projects (Table 6) and; the PCT values offered by the two companies involved (Table 7), are used to finally compute the Compensated Scores (CS) per company as shown in Table 8.

Table 3 *Evaluation Criteria and scores for Company 1*

Evaluators	Evaluation Criteria (Company 1)											Score Total (ES)	Technical Score (TS)
	1	2	3	4	5	6	7	8	9	10	11		
Evaluator 1	9.0	9.0	4.0	4.0	8.0	6.5	13.5	1.5	23.0	11.5	4.5	94.5	92.67
Evaluator 2	9.0	8.0	8.0	5.0	8.0	7.0	14.0	2.0	22.0	11.0	3.0	97.0	
Evaluator 3	9.0	9.0	5.0	5.0	10.0	8.0	13.0	2.0	23.0	10.0	4.0	98.0	
Evaluator 4	9.0	9.0	4.0	3.0	9.0	7.0	11.0	2.0	23.0	9.0	3.0	89.0	
Evaluator 5	9.0	8.0	4.0	4.0	9.0	8.0	14.0	2.0	24.0	8.0	3.0	93.0	
Evaluator 6	8.0	8.0	6.0	4.0	7.0	7.0	10.5	1.0	19.0	10.0	4.0	84.5	

Table 4 *Evaluation Criteria and scores for the Company 2*

Evaluators	Evaluation Criteria (Company 2)											Score Total (ES)	Technical Score (TS)
	1	2	3	4	5	6	7	8	9	10	11		
Evaluator 1	7.0	8.0	3.0	3.5	7.0	7.0	13.5	1.0	22.5	11.0	4.5	88.0	87.58
Evaluator 2	8.0	8.0	7.0	4.0	8.0	7.0	13.0	2.0	24.0	10.0	5.0	96.0	
Evaluator 3	9.0	9.0	4.0	4.0	10.0	8.0	12.0	2.0	24.0	10.0	5.0	97.0	
Evaluator 4	8.0	8.0	2.0	3.0	7.0	7.0	12.0	0.0	22.0	10.0	4.0	83.0	
Evaluator 5	8.0	7.0	2.0	3.0	8.0	7.0	12.0	1.0	21.0	11.0	4.0	84.0	
Evaluator 6	8.0	7.5	6.0	3.0	7.0	7.0	9.0	1.0	17.0	9.0	3.0	77.5	

For each alternative project, Company 1 obtained the highest Compensated Scores; therefore, the company awarded with the project was Company 2 (for this case study: ACCI/API/HDR) and the project selected was Alternative Project 3 (the cheapest one).

In summary, using a simple method to calculate a compensated score, which considered the bid price proposal, the proposed contract time and the technical score of each company, it was possible to choose the most qualified company to carry out the project at the lowest price.

Table 5 *Technical scores per alternative project*

Companies	Technical Score (TS) Alternative Project 1	Technical Score (TS) Alternative Project 2	Technical Score (TS) Alternative Project 3
Company 1	87.58	87.58	87.58
Company 2	92.67	92.67	92.67

Table 6 *Bid Price Proposal per alternative project*

Companies	Bid Price Proposal (BPP) Alternative Project 1	Bid Price Proposal (BPP) Alternative Project 2	Bid Price Proposal (BPP) Alternative Project 3
Company 1	$547,866,306.75	$500,156,298.53	$430,487,941.11
Company 2	$654,850,000.00	$563,511,000.00	$486,053,000.00

Table 7 *Proposal Contract Time per alternative project*

Companies	Proposed Contract Time (PCT) Alternative Project 1	Proposed Contract Time (PCT) Alternative Project 2	Proposed Contract Time (PCT) Alternative Project 3
Company 1	1,150	1,150	1,150
Company 2	1,136	1,136	1,136

Table 8 *Compensated scores per alternative project*

Companies	Compensated Score (CS) Alternative Project 1	Compensated Score (CS) Alternative Project 2	Compensated Score (CS) Alternative Project 3
Company 1	7,568,435.732	7,023,695.221	6,228,239.968
Company 2	8,292,596.070	7,306,926.954	6,329,685.864

Important aspects about the iROX-75 project & construction management

According to ACCI/API/HDR, the main management skills that assured the proper completion and success of this DBF project were organization, leadership, motivation and respect. All parts involved, regardless of which organization they belong to, came together to tackle this project. On the other hand, despite the fact that labor force was very diversified (veterans and young inexperienced labor); it was possible to lead to a cohesive workforce. As a joint venture, the design-build approach gave the construction team (ACCI/API) major design insight. Likewise, the engineering partner (HDR, Inc.), learned from the construction team, in terms of what it wanted to build.

Regarding the hierarchical structure of the project, the Project Director had the power to make contract and field decisions –big plus–; however, he was consistently questioned by the Project Executive Committee. This balanced system brought positive effects over decisions which were significant for the project.

As any transportation construction project, during the construction phase, iROX-75 faced some technical difficulties; being Maintenance of Traffic (MOT) the most relevant, because designers had to keep in mind that two lanes had to remain open to traffic northbound and southbound at all times. Despite the fact that the FDOT did not allow ACCI/API/HDR lowering the speed limit, this problem was successfully overcome because FDOT allowed the company closing down the interstate at some specific and unavoidable occasions. From a technical point of view, construction sequence of the bridges and the construction of temporary tieback walls and an extra 18' of deck were fundamental to deal with these problems. It is remarkable that any of these technical solutions did not bring extra costs for the owner. The key recommendation given by ACCI/API/HDR to manage this type of problems was: "bring the owner (FDOT) and the Maintaining Agency in on the decision making meetings; the contractor must get their buy in".

On the issue of scheduling for iROX-75, the project ran productively at all times, including a 24/7 worksite. Also, uncommon long dry seasons led to an unbelievable start which brought important time savings. On the other hand, permits were acquired ahead of schedule. In addition, the project was split by two separate grading companies; ACCI (JV Partner) brought a second grading company on board to build the southern half of the project, doubling the earthwork production. All of these actions allowed the project to be on schedule during the whole time and to be completed eight months ahead of schedule. In order to assure completion of the project on time, FDOT provided an Incentive/Disincentive Clause into the contract. The incentive was $100,000 per day for the first 150 days completed early which equaled a possible $15,000,000 bonus. However, the same clause had a disincentive of $100,000 for the first 150 days completed after the last contract day plus $119,000 a day Liquidated Damages penalty which equaled a potential $15,000,000 disincentive plus any Liquidated Damages. As the project finished eight months ahead of schedule, ACCI/API was awarded with the maximum bonus.

Regarding costs and financing, for ACCI/API the main two reasons to successfully manage this project were: 1) Lump sum subcontracts, by passing the risk of design build to the subcontractors which minimized the amount of change orders and cost overruns; 2) Field Supervisors involved in cost control of the project, verifying subcontractors units on unit price contracts. Despite the successfully managing results, the project faced some financing difficulties related to the recession in the US (National Bureau of Economic Research, 2007); financing options and credits were low, few and far between and, interest rates were unusually high. A good financial management perspective and the management team skills allowed overcoming these financial problems.

In contrast, in terms of labor, the recession in the US brought unexpected benefits to the project, because Lee County (where the project was located), was one of the hardest affected areas in the nation with the top 5 countrywide foreclosures. As a consequence, ACCI/API/HDR received as many as 10 job applications a day during the first year of the project. The contractor was able to hire highly skilled construction workers without having to pay for denim and housing.

In the area of quality, the project had two quality control plans; one for design and one for construction. Design Quality Control plan was developed by the lead engineering firm HDR. To comply with the FDOT Quality Control standards and policies (FDOT, 1995) ACCI/API created a Construction Quality Control plan. To assure verification of quality, an external company was contracted by the FDOT (Metric Engineering, Inc. Miami/FL.). The main problems to assure quality were rain fall and high water levels which led to a poor roadway bed. ACCI/API overcame this problem by purchasing the base rock in advance, allowing it to dry naturally; dry base rock leads to a strong roadway bed.

With regard to legal issues, there were some misunderstandings between the owner and the contractor, because this project was the first of its type in the US. For example, the contract included language which handed over the asset management to the contractor (maintenance work typically done by others). Owner and contractor often disagreed about what was maintenance related and what was construction related. On the other hand, the contract did a good job crossing federal, state and local design guidelines; however, the contract used words such as coordination and communication with third party agencies which had their own policies and design criteria, generating some misunderstandings and confusions among the parties. Therefore, as a design builder, ACCI/API/HDR had to compare their guidelines with contract guidelines, and then work with the owner and their representatives in deciding what was designed and built. According to ACCI/API/HDR, trust was the key; companies must know and trust each other. Nevertheless, they have to hire the services of construction law professionals. In other words, trust but verify.

Discussion and Conclusions

During the last decades, the role of governments in designing, building, financing, operating and maintaining the road infrastructure has been changing all over the world. In the US, despite the fact that some innovative approaches have been attempted, the incorporation of new approaches to achieve road infrastructure has been slower than in other countries. In this work we showed that a new approach to carry out transportation construction projects, such as Design-Build-Finance, can bring positive effects to the development of road infrastructure in the US. One of the benefits is to shorten the construction period, because DBF approach allows designing and building at concurrent times, saving years of construction. Another benefit is to bring financial release to local governments, through deferring payments beyond the construction period; but without the need of implementing a toll system.

Regarding the procurement systems side, we presented a simple evaluation method to choose a qualified contractor. Using this method, we were able to gather the most relevant aspects in a project: price (through the bid price proposal), time (through the proposed contract time) and quality (through the technical score of each company).

On the subject of project and construction management, one of the most remarkable benefits gained for the companies involved in the joint venture was the opportunity to strengthen their capabilities each other; the construction team (ACCI/API) acquired a deeper design perspective, and the engineering partner (HDR) learned in terms of what it was wanted to be built. Within the joint venture, equalitarian participation of the Project Director and the Project Executive Committee brought necessary project balance.

In terms of scheduling, multiple actions were taken to finish the project on time; administrative actions (permits were obtained in advance), technical actions (widening the interstate to the inside) and, contractual actions (splitting the project by two separate grading companies). Despite the fact that the project was finished eight months ahead the schedule, quality was well handled through stringent auto control plans and external supervision. Legal issues were mainly limited to misunderstanding problems, because of inexperience of the parties in this type of ventures. In addition, some unexpected situations due to the recession in the US were faced during the project; some of these situations against the project (high interest rates and low credits) and others in favor of it (availability of highly skilled construction workers).

In conclusion, despite the inexperience in the US to carry out a DBF project and the problems faced by the iROX-75, the results were outstanding. Therefore, it would be highly recommended to replicate this initiative elsewhere in the US and the world.

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