# Fall and Rise of the Largest Construction Manager-at-Risk Transportation Construction Project Ever

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**Abstract:** All parties agree that the Miami Intermodal Center (MIC) construction project got off to a bad start, but why did this project—so anxiously anticipated, so badly needed, and kicked off with such fanfare—seem destined for so long to be remembered as a high-priced failure? After the bad start, why did the MIC project seem to struggle so for almost four years before—seemingly all at once—finding direction? What were the factors behind the bad start? What were the factors behind the lack of progress once the project started? What were the factors behind a remarkable turnaround? This paper answers these questions and more. The product of four years of research and data gathering, this paper should be of use to researchers and practitioners. It uses dozens of interviews with project planners, Florida Department of Transportation administrators, and construction personnel, as well as pertinent data to tell the story of the first 5 years of the construction of this groundbreaking world-class multimodal facility that is estimated to take 15–20 years to construct and cost approximately $2.5 billion.

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## Introduction

The Miami Intermodal Center (MIC), the first "construction manager (CM)-at-risk" (CMAR) project ever funded by the U.S. Federal Highway Administration (FHwA) is a $2.5 billion construction project located just east of Miami-Dade International Airport (MIA). The facility is envisioned as a state-of-the-art Grand Central Station—a transfer center for passengers using the airport, intercity and commuter trains, rapid transit, local and intercity buses, and cruise ships in and out of the Port of Miami. The project was developed by the Florida Department of Transportation (FDOT) and the Miami-Dade Aviation Department, in cooperation with the Miami-Dade Expressway Authority, Miami-Dade Transit, Amtrak, and various rental car agencies that serve the airport. The MIC project is made up of a series of construction contracts, including one for a consolidated rental car facility (RCF), another for a people-mover connection to the airport, and others for road access improvements around the airport.

What really makes this project unique, however, is the use of the CMAR delivery system. Any number of fast-track construction methods has been used for years in building construction and industrial construction, but these types of contracts are a relatively new phenomenon in the area of civil, or heavy, construction. FDOT started using design-build (DB) contracts in the early 1990's, and the FHWA began funding DB projects in the state later in the decade.

Even with all the emphasis on the project, as well as all the planning and funding for the project, it appeared for a while that this project would be remembered as one of the great mistakes in modern U.S. construction history. For the first four years, the project seemed unable to overcome its unfortunate start. Also, in some respects, it never has.

Relatively recently, however, the project has started to resemble what was envisioned in the beginning. Progress is being made at a much faster rate; payouts are much higher, visible progress is exponentially greater, and the project is shedding its negative image.

Written for practitioners and researchers, this paper documents the turnaround of one of the nation's biggest construction projects. Through dozens of interviews over a four-year period and important numerical data provided by project personnel, the writer is able to answer the questions of why the project got off to such a bad start, why the project continued to struggle for such a long time, and how the fortunes of the project were turned around.

## Literature Review

The Construction Management Association of America defines CM as "a discipline and management system specifically created to promote the successful execution of capital projects for owners" (CMAA 2001). Construction management is a variation to the cost plus contract, involving consulting in development stage and management during the construction stage.

The overwhelming advantage is that all aspects of the project, including the probable cost of the work, are budgeted and monitored by experienced people. Therefore, alternatives can be selected with the owner's best interest in mind and long lead time items can be designed and materials and equipment can be purchased early (Bush 1973).

Construction Management contracts are described as "a situation where one firm is retained to coordinate all activities from concept design through acceptance of facility. The firm represents

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the owner in all CM activities" by Halpin and Woodhead (1998). Dorsey (1997) drives home the point that the CM's works span through various phases of a project (planning, design, construction, and postconstruction) and cooperates with the owner and the designer in achieving the owners' project objectives. In fact, the CM can usually provide any service required by the owner, and can do as much or as little as the owner desires. The duties typically contracted by a CM usually hinge on the construction sophistication and workload of the owner.

In the United States, CM is found in two broad forms: "agency CM" and "at-risk CM." It is possible, as in the case of the MIC, for both types to be present on the same project. Agency CM, often called project management (PM) in the United States, is a fee-based arrangement in which the CM is responsible exclusively to the owner and acts in the owner's interests at every stage of the project. In this approach, the construction firm assumes the role of agent to the owner in a relationship not unlike that of an architect or engineer, but in this capacity, the CM (or PM as it is called on the MIC project) can serve the owner by overseeing the activities not only of the at-risk CM but also those of the design professionals (DPs) (Minchin and Ellis 2005). When the CM's responsibility involves purely administrative roles it is referred to as "pure" agency (Dorsey 1997).

In at-risk CM, the CM is called the "CMAR." In this capacity, the CM functions as the construction firm, or prime contractor, of the project during the construction phase. At-risk construction management commences with the CM in an agency role for preconstruction services. Prior to construction, the firm assumes the risk of delivering the project, working under a guaranteed maximum price (GMP). The unique aspect of at-risk CM is that in this situation, with the CM bound to a GMP, the most fundamental character of the relationship is changed from one where the contractor is an adversary to the owner to one where the contractor and the owner are teammates. This is because when the CM acts in the owner's interest, the CM also protects him/herself (CMAA 2001). During the development of contract documents, the CM and the owner usually agree on a GMP with all the traditional provisions regarding: (1) drawings, specifications, addenda, and general, supplementary, and other conditions on which the GMP is based; (2) assumptions and clarifications made in preparing the GMP; (3) alternates; (4) unit prices; (5) allowance items; (6) date of substantial completion; and (7) statement of the estimated cost organized by trade categories including the fee and contingencies (Dorsey 1997).

## Background

MIA is the first impression of the United States for many international travelers, especially those from Central and South America. For many domestic travelers, it is their first glimpse of Florida. The appearance of the airport and the area around the airport had become such that these first impressions were not positive.

Traffic congestion around the terminal area of MIA was getting worse all the time, making ground transportation very difficult. Several transportation construction projects were planned to help the problem, but it was apparent that traditional remedies would not be enough to alleviate the ever-worsening congestion.

Creativity and boldness were needed, and when funding became available, MIA, with its partners FDOT and FHwA, was able to act on the 1989 recommendation of the MIA Area Transportation Study for a multimodal transportation facility adjacent to the airport. FDOT would act as the "owner" of the project, while FHwA, MIA, Miami-Dade County, and the Federal Aviation Administration had a vested interest. FDOT was in a period of intense growth in its construction program, and since the department has limited experience with the design and construction of vertical projects, they needed expertise and manpower to meet the challenges presented by the MIC project. The solution was to retain a consulting firm to act as PM of the project. Earth Tech was retained in that capacity using standard FDOT procedures for consultant procurement.

The new team was faced with several decisions. A DP was needed, as were construction engineering and inspection (CEI) services and construction services. Also, a delivery system was needed, and numerous permits had to be obtained. The proposed facility was to accommodate the rental car companies around the airport, the Tri-rail system (an above-ground train line that connects the three major south Florida counties: Miami-Dade, Broward, and Palm Beach), the Miami-Dade County Transit Authority (bus lines), Amtrak, cruise line courtesy buses, hotel courtesy buses, Greyhound buses, the existing street and highway system, and numerous other transportation systems and entities.

### Project Funding

With a total construction cost originally estimated at more than \$2.25 billion, financing the MIC was a challenge. For Phase I, the MIC received nearly \$165 million in FHwA grants, \$386 million in FDOT state funds, and a \$25 million Florida State Infrastructure Bank (SIB) loan. The Miami-Dade Expressway Authority added \$86 million in toll-backed funding, and the project also received \$25 million from Florida's SIB specifically for the SR 836/SR 112 connector portion of the project. The Miami-Dade Aviation Department will use airport user fees to fund the \$400 million MIA Mover, a train system to move people back and forth between the MIC and MIA.

The MIC program was too large to fund in a short period of time on a pay-as-you-go basis. Though the state of Florida, the Miami-Dade County Metropolitan Planning Organization, and Miami-Dade County had pledged funding for Phase I of the overall project, the funds were spread over 15 years. This cash flow would have caused Phase I to be spread over more than 10 years, resulting in significantly higher costs for right-of-way acquisition and construction. This would have also disturbed the traffic patterns in the area for a much longer time than desired. A key to the funding of the project came, and continues to come, under the authority of the Transportation Infrastructure Funding Innovative Finance Act (TIFIA). The principal goal of TIFIA is to use credit support rather than grants to help fast track large-scale projects. TIFIA provides credit support by way of loans, loan guarantees, and lines of credit. A breakdown of the funding can be found in Table 1.

### Economic Impact

The MIC project will result in the creation of numerous jobs, both temporary and permanent. The jobs will be within diverse parts of the economy, especially construction, retail, and service. Over the 15–20 years of the entire construction process, it is estimated that 76,000 construction and construction-related jobs will be generated, and 22,000 permanent jobs will be created to operate the facility once it is constructed. This will be a boon to the economy and standard of living in the area around MIA in many ways. The facility will encourage travelers to use the various public trans-



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**Table 1.** Project Funding Sources

| Source | Contribution ($ in millions) |
|---|---|
| Prior and future allocations of state and federal funds in Miami-Dade County's transportation improvement plan (TIP), long range TIP, and other state funding | 249 |
| MIA capital improvement plan | 400 |
| RCF customer facility charge | 25 |
| Miami-Dade expressway authority's capital program | 86 |
| Miami-Dade County | 30 |
| Ancillary revenues for from concessions and joint development | 37 |
| FDOT state infrastructure bank loan | 25 |
| TIFIA loan | 433 |
| Capitalized interest and finance costs | 64 |
| Total | 1,349 |

portation systems integrated by the MIC. It is estimated that by 2011, 75,000 citizens will pass through the MIC daily. Of these, approximately 45,000 will be using the MIA Mover to travel to or from the airport (MIC Project Personnel 2004).

## Project Description

The transportation development portion of the project was divided into two phases. Phase I originally included right-of-way acquisition, the consolidated RCF, access improvements (roadways), the MIA Mover, and commencing the MIC Core. Another major element recently has been added and will be discussed later in the paper. Phase II will include completing the MIC Core, constructing platforms serving elevated Tri-rail, Amtrak, and Metrorail lines, and construction of all MIA landside facilities.

### *Phase I*

While it will take 15–20 years to complete the entire program, the first phase was originally scheduled to be completed over a 5-year period at a cost of approximately $1.35 billion. Due to delays described elsewhere in this paper, it will now take about seven years to complete at a cost of about $1.5 billion. This "Five-Year Program" consists of the following:

- Right-of-way acquisition. Estimated cost: $379 million.
- Access improvements (roadways). Estimated cost: $143 million.
- Consolidated RCF. Estimated cost: $162 million.
- MIA Mover. Estimated cost: $400 million.
- MIC Core (Phase I). Estimated cost: $80 million.

Finance costs, contingency funds, and program management will add approximately $185 million to the cost of Phase I.

### *RCF*

The first major component of the MIC to be constructed will be the RCF. It will be a home to the rental car companies currently located at the airport as well as many of the companies located in close proximity to the airport. The original estimated cost of the RCF was more than $160 million. The sheer size of the building [$427 \times 366$ m$^2$ ($1{,}400 \times 1{,}200$ ft$^2$), with the top floor 18.2 m (60 ft) off the ground] alone made the construction a daunting task, though the size of the building was not the main challenge. Perhaps the most unique aspect of the building is that each floor will house a fuel distribution center where gasoline may be pumped into the rental cars. This will be the first building in the United States to have elevated fuel distribution capability. Therefore, special permits and numerous special considerations are required. The original design for the RCF included the following:

- Ready/return vehicle capacity of approximately 6,500.
- Fleet storage capacity (vehicles not in use) of approximately 3,500.
- Quick-turnaround vehicle fueling and washing facilities.
- Spacious customer service facilities for rental car transactions.

### *MIC Core (Phase I)*

The Phase I portion of the MIC Core, which will cost approximately $80 million, includes construction of the bus depot, Tri-rail passenger parking, and station for the MIA Mover, which will be built adjacent to the RCF. This facility will allow passengers of Tri-rail, city buses, and rental cars to board the MIA Mover and be carried to the airport terminal. The MIA Mover will be a train/tram that features large cars which run on either electric rails or rubber tires. Boarding will take place on the top floor of the building, 60 ft off the ground. This facility is expected to be completed about 2 years after completion of the RCF.

### *Delivery System*

The choice for delivery system came down to three options for each aspect of Phase I; the result was that different portions of the work will be handled using different delivery systems. Since federal funding was important for each aspect, FHwA approval was essential for each delivery system decision. The final decision was that portions of the work would use the traditional FDOT method [the linear method, or Design-Bid-Build (DBB) delivery system]. Other portions of the project would be built using the DB method.

A level of vertical construction expertise that exceeds the requirements of typical FDOT projects was needed for construction of the RCF and the MIA Mover. Building these massive vertical facilities in a confined, urban environment presented a new challenge to FDOT, but the earthwork and site preparation required were similar to that on typical FDOT projects. Also, there were roads and bridges in the project. Therefore, a delivery system was sought that could work with both linear and vertical construction.

In July 2000, the PM performed a technical evaluation of the three candidate delivery systems for the design and construction of the RCF and other related structures. In the end, the decision was that this portion of work, originally budgeted for approximately $230–$250 million, would be let under a series of contracts under the CMAR delivery system. Reasons specified by Earth Tech for this decision were that CMAR offered the following:

- Design process control.
- Ability to meet or exceed schedule requirements.
- Highly qualified contractor.
- Highly qualified designer.
- Budget/cost control.
- Project team formation.
- Constructability input from the CM.

In reviewing these reasons, the first, "design process control" is the one that differentiates CMAR from DB. A matrix used by Earth Tech as a decision-making tool is shown in Table 2. The matrix, designed by Sanvido and Konchar (1998), was custom-



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**Table 2.** Project Delivery System Evaluation Matrix

| Evaluation matrix RCF and associated construction | Design-bid-build | Design-build | CM-at-risk | Comments |
|---|---|---|---|---|
| Ability to meet schedule | X | ● | ● | |
| Unit cost experience | X | ● | □ | Empirical experience |
| Quality experience | X | ● | ● | Empirical experience |
| Control of contractor selection | X | ● | ● | |
| Control of designer selection | ● | ● | ● | |
| Early project team selection | X | ● | ● | |
| Interaction in design phase | X | ● | ● | |
| Early constructability input | □ | ● | ● | |
| Opportunity to partner | X | ● | ● | |
| Ability to prequalify project team | N/A | ● | ● | |
| Ability to prequalify subcontractors | □ | □ | ● | |
| Ability to obtain relevant experience | X | ● | ● | |

Note: ●=excellent; □=fair; X=poor; and N/A=not applicable.



ized and completed by Earth Tech. The rankings shown are the opinions of the raters and not necessarily those of the writer.

The decision for CMAR meant that FDOT had to waive their long-standing provision that all prime contractors had to self-perform at least 50% of project work (since changed to 40%). To receive federal funding, FDOT had to apply to FHWA under Special Experimental Project Number 14 (SEP-14). SEP-14 is an FHWA program that can fund a limited number of projects using construction practices or delivery systems that FHWA has neither procedure nor policy for accepting. MIC was the first CMAR project ever funded under SEP-14.

## CM-at-Risk

Clough and Sears (1994) stated in their popular textbook, "An appreciable share of the private construction market is now being done using the 'team approach.' When this procedure is followed, the private owner selects the architect and building contractor as soon as the project has been conceived. The three parties (then) constitute a team that serves to achieve budgeting, cost control, time scheduling, and project design in a cooperative manner."

The team outlines the project scope and budget, and the DP develops preliminary drawings from which the contractor generates a conceptual cost estimate. The DP then prepares the final drawings and specifications, and the owner endorses the products and procures funding for the project. After financing and the required permits are obtained, construction begins. The DP and the contractor work closely together to modify the design and drawings as needed. This method offers the advantages of time savings, cost control, and improved quality (Clough and Sears 1994).

CMAR, as applied at the MIC, can be seen as an adaptation of this established building construction delivery system, which is commonly used in private industry for civil or heavy construction in a public forum. The GMP as submitted by the CM is the total of the CM's fee, the CM's contingency, the general conditions construction, all the subcontracts, and an estimate for needed future subcontracts. The CM agrees to pay for costs exceeding the GMP that do not result from changes in the contract documents—thus the "risk" in CMAR.

Theoretically, CMAR reduces the level of risk for all parties involved in the project. The team (owner, CM, and DP) exercises control over all facets of the project, and together they control design, construction, and functional requirements. Theoretically, this arrangement fosters a nonadversarial relationship that furthers collaboration in decision making. When the system is properly executed, the CM reviews the drawings before any construction and catches errors while adding input. This reduces the owner's risk. The DP similarly reviews the CM's approach to the work, providing input. The CM takes bids or proposals from subcontractors after entering the contract but before submitting the GMP, which reasonably reduces the CM's risk. The procedure provides for constructor input into the design—unlike the low-bid DBB—and affords the owner more control over design than the DB system, because the DP is under contract to the owner under CMAR. A comparison of the organizations in the DB and CMAR arrangements can be seen in Fig. 1.

Theoretically, the CM, expected to handle any unexpected costs not caused by contract changes, has built in a contingency within the GMP to cover unexpected costs. If any work is affected due to changes in the contract documents, any cost incurred by the CM or subcontractors are reimbursed to the CM. Therefore, the owner also has a contingency fund to take care of some unexpected but justifiable costs.

As a result, any additional money paid to subcontractors for additional work (unless that work is from a change in the contract documents) comes directly from the CM's profit. So, the CM, in essence, represents the owner in negotiating changes with subcontractors and should ensure that any claim is legitimate.

Once the CM submits a GMP for administering the project, or a portion of the project, the GMP is subject to negotiation. Once an agreement is reached, the CM is required to prequalify all subcontractors and oversee the bidding of all trades contracts. In this way, all construction work is competitively bid. The CM can self-perform any construction if they outbid all subcontractors on a portion of the work. This has yet to happen on the MIC project.

The CM is paid a management fee plus expenses to oversee and coordinate the construction process, including project close-out, systems startup, as-built drawings, operation and maintenance procedures, and warranty services. The CM is also


**Fig. 1.** Comparison of organizations in DB and CMAR



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responsible for the quality control, quality assurance, and value engineering (VE) for the project. Any savings resulting from a VE change proposal are split, 70% for FDOT and 30% for the CM. Earth Tech was awarded the CEI work under a separate contract from the one for their PM duties.

Construction to be performed on the project was broken into separate GMP packages by FDOT. Each package is negotiated separately and each has its own letter of authorization. The negotiations are between the CM and the PM, who acts as the agent of FDOT. Note that in the CMAR vernacular, the term "GMP" has two distinct meanings. First, it is simply the GMP for which the CM will deliver the project. However, the term is used also to designate a package of work under a single agreement, such as GMP No. 1, GMP No. 2, etc. The original GMP packages and budgets are as follows:

- GMP I—RCF foundations and underground utilities. Estimated cost: $17.6 million.
- GMP II—MIC Terminal Access Roadways, tunnels, bridge. Estimated cost: $25.2 million.
- GMP III—Tri-rail Station, MIA Mover Station, MIC/MIA Guideway Foundation. Estimated cost: $45 million.
- GMP IV—RCF Building and Bridge. Estimated cost: $160 million.
- GMP V—MIA Mover Lobby. No cost estimate at this time.

### *Phase II*

The transportation development portion of Phase II consists of completing the MIC Core, constructing platforms to serve elevated Tri-rail, Amtrak, and Metrorail lines, and construction of all MIA landside facilities. There is a commercial development portion of the MIC that will be completed in Phase II as part of the Joint Development Agreement (JDA).

#### JDA

The JDA began as a revenue-producing program and now comprises the commercial development segment of the MIC. An oversight committee supervises the commercial development, and ERA, a D.C.-based consultant, was retained to perform a preliminary study. This study confirmed that the area in and around MIA is in need of office towers, parking, ancillary retail, and a hotel/conference center. In early 2002, a request for proposal (RFP) was advertised for a commercial developer to perform that function at the MIC, and the choices were MIC Development, LLC, a joint venture consisting of equity partners (The Codina Group and Mallory and Evans), a hotel developer (The Continental Company), a marketing firm (Market Place Development), and two large DP firms.

## Project Progression

### *Start*

Though, in hindsight, there are some completed aspects of the project that the parties would like to do over, many of the factors that led to the terrible start to the project were beyond the control of the contract parties. One of the main advantages of any fast-track construction delivery system is that the constructor has a great deal of input into the design of the project. Unfortunately, this did not happen on this project.

At a point during the planning stage, permits had been applied for and geotechnical engineers were near the 50–60% design stage of the foundations. There was no CM, architect, or engineer (other than the geotechnical engineer) under contract yet, because it was not thought that they would make any difference in the early portions of the foundation design. The application process was thought to allow for a two-year life span, including two allowed extensions.

On January 29, 2001, FDOT posted a legal notice advertisement requesting Statements of Qualification for a CM for this project. Technical Proposals were submitted by the shortlisted CMs on May 1, 2001, and the selection committee made up of personnel from Earth Tech and FDOT reviewed the proposals and heard oral presentations on May 24, 2001. In a selection process similar to any that uses shortlisting, Turner Construction Company was chosen as CM.

But before the critical tasks of signing a contract, procuring a DP, and negotiating a GMP could be completed, terrorists flew loaded passenger aircraft into the two World Trade Center towers and the Pentagon. Part of the fallout from the disasters of September 11, 2001 was that airline traffic fell to almost nothing. This destroyed the MIC financial model.

At that point, everything stopped as far as selection of the CM and DP. However, geotechnical engineers continued with the design of the foundations, which constituted almost all the design effort for GMP No. 1. FDOT was then shocked to find out that instead of two years, the application for the needed building permit had only a one-year shelf life, since the document specified—rather than two extensions not to exceed one year each—two extensions not to exceed one year total.

In the meantime, Miami-Dade County had implemented a new building code. The new code, written to help buildings better withstand hurricanes, was not seen as appreciably positive or negative as far as difficulty to satisfy, or as far as long-range building performance. The issues were the time and money required for a redesign. FDOT was then faced with a tough decision: start construction immediately or restart the permit process under the new code. To be in compliance with the permit originally granted, FDOT had to produce something to be inspected within 12 months of receipt of the permit, which had been received six months earlier.

The estimate for the geotechnical firm to redesign the foundation for the building was $200,000. The decision was made to commence construction. In hindsight, a decision to spend the $200,000 it would have cost to redesign the structure to comply with the new code would have been money well spent. It would have afforded the owner and the PM more time to organize the project to ensure a smoother and more coordinated commencement. Plus, the CM would have been involved in the design.

Ordinarily, the CM prepares the GMP packages, but in this case, the selecting and contracting of the CM was delayed to a point in time where the foundation had been almost completely designed and it was time for the work to proceed. Therefore, the PM generated the GMP package for GMP No. 1 and began negotiations with Turner. Once a price was agreed upon, the work began on the drilled shafts that made up the foundation of the RCF.

A contract was signed on March 1, 2003, by FDOT, the Florida Department of Management Services, and Turner Construction, Inc. The GMP No. 1 bid package was issued to Turner on April 4, 2003, and the notice to proceed came in mid-July, 2003. Four and one-half months after the execution of the construction contract, a design contract was executed with architectural firm Sequiera and Gavarette. The Organizational Chart for the MIC project is seen in Fig. 2.



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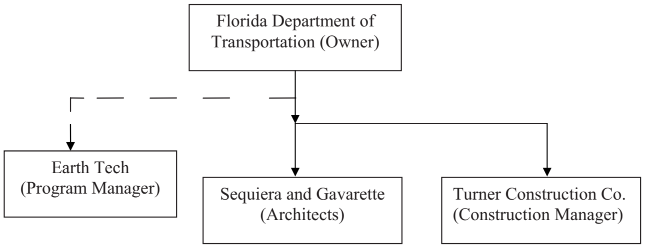


**Fig. 2.** Organizational chart for CMAR Portion of the MIC

Going this long without a DP stymied the permitting process, which was further hindered by an unusually large county personnel turnover at just the wrong time. Also, the project suffered from a lack of credibility at the county offices. Some in county government just did not believe that the project would ever be built, and the complexity and unique aspects of the project seemed to overwhelm the county engineers and technicians. Because of this, project personnel now believe that, consciously or subconsciously, the county assigned the project a low priority. In retrospect, it would have been wise for the project team to have exerted time and energy early in the process toward educating key county personnel about the project and the need for quick permit application turnaround. The project then had to be redesigned, because the effects of the 9/11 disaster on air travel volume resulted in the downsizing of the RCF from a 10,000-car capacity to an 8,500-car capacity. These delays destroyed any remaining semblance of coordination and timing between project design and construction.

### *Early Years*

The plan was for the design of the facility to be completed by the time that foundation construction was 75% complete, which was the late 2003 to early 2004 time frame. Because of all the factors discussed above, the design permit was issued approximately 2 years late. This, of course, caused many problems, such as the fact that the dowel bars extending upward from the long-since-completed drilled shafts were now so rusty that they had to be cleaned and reinspected to determine their acceptability.

Each GMP requires an agreement between the CM and the owner; this is not uncommon for CMAR contracts. An agreement was not easily accomplished on any of the first three GMPs. It was difficult for both parties, because FDOT had a budget for the project and Turner's original submissions for the first three GMPs were all well over FDOT's budgeted amount, based on the engineer's estimate. Turner was at a distinct disadvantage because they were not involved from early in the design process on these GMPs. If they had been, they could have obtained subcontractor estimates during this process and used those to help FDOT and the DP with the preliminary estimates and/or scope of work. As it was, when the CM went out and solicited subcontractor prices, they were higher than anticipated. The CM then passed those higher rates on to FDOT, and the GMP was well over the estimate each time. In each case, lengthy negotiations led to an agreement, and the work proceeded.

The price for GMP No. 4 proved to be the most challenging of all the GMPs to date for the parties to agree upon. However, in the long run, though expensive and late, it may prove that this GMP saved the project. The largest of the five original GMPs, GMP No. 4 called for the construction of the RCF and a bridge for approximately $160 million.

As with the first three GMPs, FDOT and the CM could not agree on the cost of GMP No. 4. However, unlike with the first three GMPs, lengthy negotiations failed to resolve the differences. Once again, the actions by the parties proved extremely untimely with the course of world events. In May 2005, FDOT exercised its option to withdraw the RFP for a CMAR and relet the work as a hard-dollar lump-sum project open to all contractors. About the same time, due to Chinese construction projects consuming so much of the world's steel supply, the construction industry experienced a worldwide steel shortage. The resulting price escalation, along with increases in concrete prices and other factors, led to a low bid in the hard-dollar letting that doubled what Turner had submitted as a GMP. Interestingly, the low bidder in the hard-dollar letting was Turner.

FDOT then decided to not award the project to any of the hard-dollar bidders and reopened negotiations with Turner under a CMAR arrangement. The GMP agreed upon was 10% less than the low bid in the hard-dollar letting, still 90% more than FDOT had rejected a little more than a year earlier. Had FDOT signed the agreement back in early 2005, pressure would have been applied to the designer to procure the building permit, construction would have started two years earlier, and the price would have been 90% less. In April 2007, the contract for the now-designated GMP No. 4a was executed.

That all three prices—the original rejected GMP, the low bid in the hard-dollar letting, and the eventually accepted GMP—were submitted by the same firm means that at least one major construction firm prefers CMAR to the traditional DBB (hard-dollar) project. In interviews, they indicated that this preference was due to the fact that, as a CM, they signed on as an advocate of the owner, while in a DBB scenario, they signed on as an adversary.

### *Turnaround*

Visitors to the MIC from the beginning of construction until fairly recently observed an extremely large, flat, sandy lot with a few construction workers in isolated portions of the project and occasional movement of construction equipment. For a project visitor today, the difference is drastic. The area no longer resembles a vacant lot but a large configuration of structures—both vertical and horizontal—that is abuzz with activity. The change came almost overnight.

So what was behind the change? There is an old saying, "Nothing succeeds like success," and the saying has never been more apropos than in this instance. The turning point for the MIC construction project came when the construction of the largest portion of the largest part of the MIC was contracted. In talking to subcontractors and suppliers of the MIC construction, the writer found that there had been a lingering lack of confidence in the MIC project among this group also—a feeling that when it came the time to put the big money on the table, the project owners would balk. This belief was founded on many of the same issues that led so many county employees and officials to view this project with skepticism:

1. The 14 years between the time that Miami-Dade County accepted the recommendation of the MIA Area Transportation Study that a multimodal transportation access facility be constructed to help mitigate the growing traffic problem in and around the airport, and the time that the project was let.
2. The delay, mostly due to the September 11, 2001 disasters, in getting a CM and DP under contract.
3. The fact that on the first three GMPs, the parties had a very



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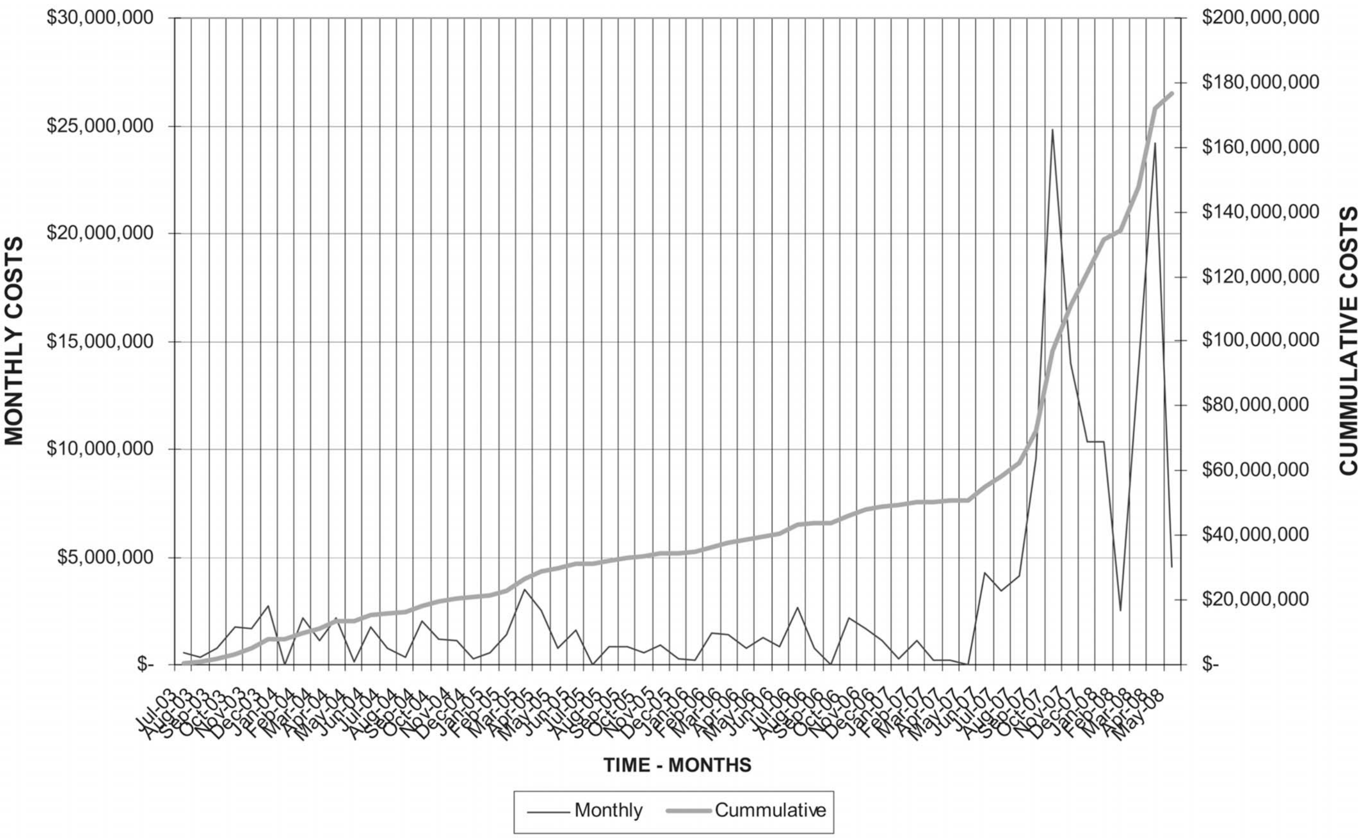


**Fig. 3.** Monthly payouts to the CM

hard time coming to an agreement on the GMP.

4. The fact that on the fourth and largest GMP, FDOT made good on its threat to relet the project under a hard-dollar, competitive, low-bid letting, resulting in another two-year delay.
5. The fact that the first three GMPs summed to little more than half of GMP No. 4.
6. The belief that CMAR was a faulty choice for this size and type of project or for this type of owner.

In short, until the contract for GMP 4a was executed, the marketplace was skeptical and viewed the MIC as "not a real project." Now that the big money is being spent, the marketplace is a believer and subcontractors and suppliers in the marketplace that shunned the project in the early GMPs are now competing to get involved in the project.

The success may have seemed to happen overnight, but of course much work went into this change. Once the two years of negotiating and flip flopping resulted in a 90% price increase, the owners had to have more funding. They applied for a second TIFIA grant, this one for $100 million. While waiting for this to arrive, the owner took a bit of a gamble and started carving out isolated bits of the GMP No. 4a work and having Turner proceed with those pieces of the work. They were able to pay for this work through money that had been accumulating since 2004 from the customer facility charge assessed to all future occupants (car rental companies) of the RCF. The money was originally to be used to retire the debt for the RCF construction. Among the small "projects" paid for in this way were $1 million to get the CM mobilized for GMP No. 4a, $20 million to lock in steel prices, and $25 million to allow the concrete subcontractor to lock in cement and aggregate prices and order formwork. None of this changed the agreed-upon sum of GMP No. 4a.

GMP No. 4a brought the first highly visible, above-ground construction, and this produced a huge psychological boost and had an undeniable and significant tangible effect on the project. Turner has increased its staff from a total of six a year ago to 40 today. There are now 600–700 construction workers on the project, whereas from 2003 until the middle of 2007, the most that were ever on the project was 120, and there was usually fewer than half that number. One worker said that "before, we were working on the little jobs hoping for the big one. Now, we've got the big one." Fig. 3 tracks the progress of the project and shows the sudden increase in production that occurred once the contract for GMP No. 4a was executed.

## Future

Details of planned future work on the MIC can be found in literature (Minchin et al. 2007; Minchin and Ellis 2005) and on the project website (MIC Project Personnel 2004). As for completing Phase I, the MIA Mover Station is set for GMP No. 5. The people mover itself will be built under a separate contract with MIA as the sole owner.

A sixth GMP is now planned, and will be let once the RCF is in operation (hopefully in 2010). This GMP calls for the construction of the MIC Central Station. The design for this is virtually complete, but because the timing problem of the project has never



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Table 3. Original Cost versus Actual Cost

| GMP number | Contract amount ($) | Approved changes ($) | Total approved cost ($) | Actual cost ($) |
|---|---|---|---|---|
| 1 | 17,823,651 | −693,539 | 17,130,112 | 17,130,112 |
| 2 | 25,222,000 | 2,108,702 | 27,330,702 | 27,330,702 |
| 3 | 22,144,777 | −16,019,806 | 6,124,971 | 6,124,971 |

been resolved, the CM has had virtually no input to the design. Their involvement was restricted to a limited constructability review.

## Performance of the Delivery System

The measurables say that the system has performed pretty well. Each of the first three GMPs have been completed within the contract time. Fig. 3 shows how much the activity level as measured by monthly payouts to the CM, changed on the project once GMP No. 4a commenced. Table 3 reflects the performance of the system as relates to cost and Table 4 reflects the system's performance as relates to time. The data for both tables is somewhat skewed by the fact that there was a substantial reduction in the scope of GMP No. 3. The reason for this scope reduction was that the Tri-Rail station was deleted from GMP No. 3 before construction ever began. Developments with adjacent projects necessitated the relocation of the station; therefore it was cancelled in this incarnation. Also, construction of the guideway foundations was discontinued after seven of twelve had been constructed. Again, developments with an adjacent project (future Metrorail extension) changed the alignment of the guideway. It appears that all but one of the foundations constructed will be usable by the contractor that finishes the work under a future contract.

As shown in the tables, the work in GMP No. 1 was completed for 3.9% under budget and GMP No. 2 was completed for 8.4% under budget; the CM exceeded contract duration on both GMPs—by 40.7% on GMP No. 1 and 72.2% on GMP No. 2. Among interviewed project personnel, there is a wide range of opinion as to how CMAR has performed on this project. Some deem it a failure, while some are very pleased with the performance of CMAR on this project. However, the most common response is something to the effect of "we have not seen how CMAR will perform on a project such as the MIC because we have not seen a true CMAR project on the RCF." In fact, it could be argued that there are five major theoretical advantages offered by CMAR, and this project has lost three of them.

The project lost a major CMAR benefit when the CM was not a chief contributor to the design of the project. Another reason, also caused by the loss of coordinated timing due to the 9/11 disaster, is the loss of swift project completion through the fast-track concept. This particular problem has been exacerbated by the inability of the parties to come to timely agreement on GMPs for every GMP (package of work) to date. Collateral damage from the late entry of the CM is that instead of negotiating with several subcontractors, garnering the best possible price for each area of work and using that in calculating the GMP, the CM was forced to act, in essence, like a prime contractor in a DBB project that takes quotes from subs and just passes the cost on to the owner.

Table 4. Contract Duration versus Actual Duration

| GMP number | Contract duration (days) | Actual duration (days) |
|---|---|---|
| 1 | 334 | 470 |
| 2 | 805 | 1,386 |
| 3 | 706 | 179 |

A third major advantage of CMAR has been lost by FDOT not holding the line on the contract language that states that the cost to perform any change to the project that does not materially change the scope of the project is to be borne by the CM. In this respect, the CM, again, performs at times more like a prime contractor on a DBB project, approaching FDOT for additional funding for changes that clearly do not change the scope of the project. By paying many of these requests, FDOT has removed much of the risk in CMAR. This has prompted more than one interviewee to comment, "where's the risk?" or "what risk?"

A fourth advantage has been mostly successfully executed. That benefit is that CMAR gives the owner more control over the design than DB, because CMAR offers a direct contractual relationship between the owner and the designer.

The fifth advantage of CMAR over DBB was verbalized by Turner when they said that, in essence, CMAR reduces contention between parties by making the CM an advocate of the owner instead of an adversary. Even though the full advantage of this has not been realized for the reasons stated, all agree that the number of confrontations between the owner and the constructor have been lower on this project than would have been likely on any DBB project of similar size and scope.

On most larger projects, FDOT retains a PM firm to perform most of the contract administration, with only a small skeleton crew assigned to oversee the PM. However, this project has placed much heavier demands than anticipated on FDOT. On this project, even with the PM firm in place, FDOT maintains an office on site and is very involved in the day-to-day decision making on the project.

## Summary and Conclusions

GMPs completed to date were finished within contract time, but all were delayed in their commencement. As for costs, the work in GMP No. 1 was completed for 3.9% under budget and GMP No. 2 was completed for 8.4% under budget; the CM exceeded contract duration on both GMPs—by 40.7% on GMP No. 1 and 72.2% on GMP No. 2. There was a significant scope reduction in GMP No. 3, which renders that data useless for comparative purposes. The project is now progressing well, after a fitful four years that saw an almost total personnel turnover for the owner and the PM. The commencement of construction on the RCF and bridge, known as GMP No. 4a, has turned the project around. The project suffered for four years from a lack of respect and credibility in the marketplace. GMP 4a has cured that, but what other lessons have been learned? For those agencies considering use of CMAR for a large project in the future, the following Ten Commandments for such an enterprise are offered in no particular order.

1. Thou shalt establish, as early as possible, a partnering relationship with all other stakeholders and work very hard at keeping things friendly between the parties.
2. Thou shalt spend whatever time and resources are necessary up front to educate the permitting and other key agencies (city, county, etc.) about the project.



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3. Thou shalt think long-term and shalt not start the project until thou art ready.
4. Thou shall not start construction before a DP is procured. See No. 3.
5. Thou shalt think twice about changing delivery systems mid-project. Not that it should never be done, but attempting to change the delivery system on this project cost two years and almost $150 million.
6. If thou choosest a CMAR, thou shalt let the CM act as a CMAR. Demand that the CM accept the risk for work changes that are not material changes to the work or the contract. Conversely, depend on the CM to act as your advocate, as intended, and give them the latitude to run the project as they see fit. If the line is held on the CM, they will hold the line on the subcontractors. That is how it is supposed to work.
7. Thou shalt do everything possible to not have most of the work (money) in one GMP, especially if that GMP is relatively late in the project. In this case, it might have been good to move the bridge to an earlier GMP than the fourth one, or do something else to move more money up earlier in the project and help convince the marketplace of the veracity of the project. The same could have possibly been accomplished by combining a couple of the earlier GMPs into one contract.
8. If design activity is put on hold (as in the case right after 9/11/01), thou shalt stop construction also. Do not let them get out of sequence. If this happens at any time, straighten out this problem at the completion of the next GMP.
9. Thou shalt keep things moving. The owner is wise to compromise on the amount of a GMP to avoid delays between GMPs. Long delays from such negotiations injured this project. An exception to this is Commandment No. 8 above.
10. Thou shalt not use a delivery system if the situation dictates that thou wilt lose most of the benefit theoretically and historically offered by that delivery system.

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