THE ROLE OF LEADERSHIP IN A SUCCESSFUL RESOURCE-BASED PROJECT

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What Is Al-Pac?

Alberta-Pacific Forest Industries (Al-Pac) has recently completed construction of the world's largest single line Bleached Kraft Pulpmill located 200 km north east of Edmonton, Alberta. The total cost of this project was close to $1.3 billion. Alberta-Pacific is a Joint Venture whose participants are Crestbrook Forest Industries Ltd. of Cranbrook, B.C.(40%), M.C. Forest Products a subsidiary of Mitsubishi Trading Corporation of Japan (35%) and New Oji Paper of Japan (25%).

The pulpmill complex is located on a 2,000 acre site on the Southern boundary of the wood supply area which covers about 10% of the province of Alberta. The mill will produce 1,500 air dry metric (ADT/d) tonnes per day of Bleached Kraft Pulp which will be sold in the United States, Japan and other Asian countries as well as Europe.

Project Performance

By the standard measures of project performance - quality, cost and time - the Al-Pac project is a success. The plant has demonstrated the capability to produce the design quantity of product at a better-than-budgeted quality level. See the start-up production curve included as Figure 1.

When the announcement to proceed with construction was made in late April 1991, the date set for the start of commercial production was September 1, 1993 and that target was attained. The actual progress plotted in Figure 2 shows that we were ahead of our plan in the Spring and Summer of 1992 but could not hold the rate of progress planned from October 1992 to April 1993. This occurred during our peak construction period when we could not increase manning due to the lack of accommodation in our camp and the surrounding area.

The control budget for the engineering and construction phase was set at $1 billion. The final cost of this phase of the project will be approximately $1,004 million or $4 million over the control budget. The control budget was set after a $13,000,000 reduction had been made to our original estimates as a result of savings realized on initial purchases of equipment. This final cost of $1,004,000,000 represents an overrun of 0.4% of the control budget but is 1% below the original estimate of $1,013,000,000.

The Role of Leadership

The subject of leadership did not get a lot of discussion in the course of the project although these requirements were a part of many decisions. Groups of people worked to decide what had to be done and how to do it. We had plans for all aspects of the project. (ie. a forestry plan, a plant design and construction plan, a financing plan) We did not however produce a "leadership" plan. The role of leadership was "taken for granted" and people carried out their various activities utilizing the leadership skills they had developed through their own training and specific experiences.

In response to the PMI '94 Call For Papers with the theme "Leadership in a World of Change", we realized that we had just completed a project which experienced a considerable amount of change and that we had several real-life experiences related to leadership which we felt were worth sharing.

First was the realization that without the vision and persistence of the individual who was responsible for the development phase, there would never had been an Al-Pac project. Second, without decisiveness and team-building during the implementation phase, the project might not have been successful. Finally was the retrospective realization that one position on the management team had different leaders for different phases but their leadership attributes did not match the needs of the phases they were responsible for and, had it been possible to reverse the timing of their participation, many difficulties may have been avoided.

Our presentation provides a brief history of the - development and implementation phases of the project concludes with a comparison of our observations with respect to the role of leadership in the two project phases with reference to other recent publications on leadership in projects.

History of Development Phase

In 1986, Crestbrook was an integrated forest products company headquartered in Cranbrook, British Columbia, that operated one pulpmill, four sawmills, a veneer plant and a plywood plant. The long term viability of the

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company was threatened by its relatively small size and the age of its plants.

In 1987, a new corporate philosophy committed Crestbrook to expand within the forest products business into other products and jurisdictions.

After considering a number of alternatives, Crestbrook concluded that its first choice was to pursue the development of a pulp and paper complex in Alberta which was relatively close to their own operations but which promised a large sustainable resource which could be initially developed for pulp with the potential to support other projects in the future.

Between May and November 1988, a Crestbrook Task Force investigated the potential of this preferred alternative. This task force was headed by the President of the company plus three senior executives with expertise in mill operations, woodlands and engineering. Consultants were retained to assist in the development of forest resources, process design, site selection, and environmental impacts. During this same time period, Crestbrook submitted its development proposal for to the Alberta government. Since there was competition for this resource from a large U.S. based integrated company, Crestbrook had to show initiative and foresight with respect to the proposed development by developing programs for forestry, woodlot development, and independent operators in wood harvesting. It also proposed the development of a pulpmill complex to be followed at a later date by a paper mill. In addition, Crestbrook agreed to encourage the development of an industrial service sector and maximize the amount of design and material procurement to be done within the province of Alberta.

In late December 1988, the Alberta government advised Crestbrook that it was successful in its application and that the company could proceed with the project subject to receiving environmental approval. The date was December 15, 1988 and spending to date on the project was approximately $6,000,000.

At the same time, the operations group was working with Alberta Environment to establish the process to obtain environmental approval. Since receipt of this approval was anticipated in the first half of 1989, it was decided to commence detailed engineering immediately. A basic agreement had been reached with a Joint Venture of H.A. Simons of Vancouver and Stanley Industrial Consultants of Edmonton to carry out the engineering of the project. This joint venture (SSJV) was formed to provide more pulpmill engineering experience to Alberta engineers. By May 1989, Crestbrook was in a position to place orders for major equipment. This had to be done at this time or the engineering would have to cease as vendor information was a critical component. Over the period of May to August 1989, Letters of Intent with a value in excess of $200,000,000 were signed.

During the first half of 1989, efforts continued to obtain the environmental approval. Although previous projects in Alberta had received permits from the Alberta government without a formal public review process, it became obvious that this would not be the case on our project and it also appeared that the federal government wished to display a much higher profile in the approval of this project.

By mid August 1989, it was obvious that environmental approval was still several months away. Since we were paying our equipment suppliers for their design work, they were asked to stop work until we could confirm the project. Total spending to this point was $35,000,000.

The process selected for obtaining environmental approval was a joint hearing panel representing the Federal and Alberta governments which was finally established in late September 1989. Between October and December of that year, the panel heard submissions for 27 days in 13 different communities. Although the panel described the proposed mill as "...one of the safest of its kind in terms of environmental impacts, anywhere in the world", their March 1990 report recommended a delay in licensing the project due to concerns about the effluent to be discharged to the Athabasca River. This had to be the low point for morale on the project and was certainly a milestone from the perspective of the role of leadership.

To mitigate these concerns, Crestbrook and their consultants conceived a new process design that reduced the discharge of the chlorinated organics to near zero. At that time it was a bold approach to justify a $1.3 billion project. By April 1990, we were convinced that the redesigned process would be successful and requested that the government review the modified process. After review by a group of experts, the government announced in December 1990 that they were going to allow the modified project to proceed. Total spending to this date was now $50,000,000.

Once approval for the project was received, it was necessary to confirm financing for the project. This process, which took approximately four months, included an audit of the design by an outside engineering firm appointed by the banks. Final presentations were made to potential equity partners as well as to the bank consortium and the Alberta government in April 1991. The project would be owned by an unincorporated joint venture and operated by Alberta-Pacific Forest Industries which would be wholly-owned by Crestbrook.

Implementation Phase

Building the Team

When the release for construction came on 29 April 1991, the nature of the project changed and so did all the rules we had been operating under. We had been conserving money by limiting the number of people kept on the core team. Overnight we had that task reversed to build up the Al-Pac management team and then, build the design team from 20 to what peaked at 350 a year later.

The Al-Pac team was lean by design with the leader plus one full-time representative in each of the three design offices and an Owner's Representative in the site office. Technical input came from the Operating group who similarly started to recruit their staff when the project was released.

Building the design team was a formidable task for SSJV and, to some extent Al-Pac may have retarded the build-up by insisting on reviewing the qualifications of every person assigned to the design team. This was a key strategy in our quality management program - ensure you get the best people on the team in the first place. To the best of our recollection, there were only a few individuals who were rejected but we believe that the very act of reviewing personnel in advance enhanced the standards of those selected for the team.

In the planning stages of the project, we considered both consulting engineers and contractors to provide the construction management function for the project. There is not a history of using contractors as construction managers in the western pulp and paper industry like there is in the southern U.S. Some of the major installation contractors declined to consider the construction management assignment as it meant not bidding on the construction work. While we were aware that there are shortcomings in using the design consultant as the construction manager, we felt after this review that it was our best option and SSJV were awarded this work.

Quick Start-up of Construction

The most notable feature of the climate in northern Alberta are the short summers and long cold winters when temperatures can and do drop to below minus 30 degrees C for extended periods. There is considerable expertise in cold weather construction in Alberta but site grading and soil compaction (which requires water) are activities that need mild temperatures. Since freezing temperatures can still be experienced in April and can resume as early as October, it is imperative to use the summer months to maximum advantage.

When the project received the environmental permits in late 1990, we gained confidence that the project would proceed. The Engineering Group spent the first three months of 1991 preparing for the release of construction. We planned the initial construction program in some detail. The site grading work, the concrete pile contract and the building foundations were tendered and ready for award. When the release came, the initial contractors were on the site within 7 days and most of this work proceeded remarkably well - until 14 October when the temperature dropped to the -20_0 C degree range and stayed there for 10 weeks. The part of the work most affected by this cold weather was the underground piping which involved a lot of excavation and backfill and required a minimum temperature for joining sections of plastic pipe.

Quick Award of Major Equipment Contracts

Once construction was underway, the focus shifted to purchasing the major equipment around which the plant would be built. Much of this equipment had been selected in 1988 so the negotiations generally covered revisions to the commercial terms. Only one vendor that had an early commitment failed to receive an order and that was primarily due to an exchange rate shift during the delay. As stated previously, about $50 million had been spent by the release of construction. Approximately $300 million was committed in the first two months following approval. This aspect reinforces our theme that one of the prime leadership qualities during implementation was decisiveness - there was no time to get all the information to make perfect decisions but a lot of intense work was necessary to make these decisions in a short period of time.

Procurement

The project purchased several hundred million dollars of equipment which was received in time and met specifications. A major effort was made throughout the course of the project to provide as much Alberta content as possible. This effort was very successful and 62% of purchases came from Alberta. The Edmonton region has very good shop facilities which provided a large number of the major components. Utilizing the provincial "oversize load" highway corridor which passes close to our mill site allowed for very large components to be manufactured in the Edmonton area and be shipped to the site by truck.

We experienced two supplier bankruptcies during the project but in both instances, we were able to recover without impacting the schedule but there was a cost implication in one case.

Process Piping

Piping is the most challenging area of pulpmill projects and represents a significant portion of the mechanical contract costs. In view of the past problems, a lot of time was spent reviewing alternative strategies for the design, supply and installation of process piping. On the advice that there was a lot of pipe available from inventory due to the low level of construction activity, we chose not to order raw material but to award separate contracts for the supply, fabrication and delivery for each type of pipe material - carbon steel, stainless steel, and fibreglass.

Although we had some minor problems with the supply of carbon steel and fibreglass pipe, these were trivial compared to the problems in the supply of the stainless pipe spools. Not only couldn't the engineer release the isometric drawings for stainless spools as quickly as scheduled but the stainless steel material available in inventory was quickly depleted and suppliers were not replacing it. This combination resulted in long waiting periods for some material and significantly held up the delivery of pipe spools.

Selecting Contractors

During our construction strategy sessions, there were extensive debates about the best way to package the mechanical and electrical construction work. We chose to tender the work in five mechanical and five electrical contracts. Due to packaging of some contracts, we ended up with four separate mechanical contractors and two electrical contractors.

The major problem with most of these contracts was the growth in scope from the time of award. In our planning, we had set the criteria that our drawings were to be 80% complete with close to 100% of the scope defined; we now know we had closer to 60 to 70% of the scope defined at the time of the award.

This major deficiency in information as to the degree of completion of design work affected not only our choice of contract strategy but also the projected cost of the contracts. One of the most damaging repercussions of the deficiency was the owner's and the construction manager's attitude to the contractors with respect to their claims for additional compensation. We believed they were overstating the cost of changes and the initial discussions with them on this matter turned very negative. The final resolution of the claims on these contracts will be covered later.

Schedule Management

Overall, the scheduling of the engineering phase was quite adequate for the design and procurement activities. A critical path method (CPM) on Primavera software was used. As is standard practice at the front end of a project, engineering and procurement activities were at a detailed level while construction activities were at a summary level. The project schedule did not however, uncover the problem of the design work being behind the schedule for the construction. Better methods of measuring actual work completed and comparing that to the total design work - not just the apparent design work are required. The schedule did not include construction activities to the same level of detail as engineering and did not track construction progress as closely. When later construction contracts were awarded, the master schedule had not been completely updated and therefore did not match the reality of the field. Although the project management community has heard it before, let us reiterate that it is imperative to get meaningful, mutually agreed schedules from contractors and have a single integrated plan that all participants accept and work to.

Construction

Construction on the project commenced in May 1991 and the mill was turned over to the Operating group 27 months later (August 1993). Construction was totally complete in October 1993 for a total duration of 30 months. This was in accordance with the project plan. Total construction hours for the project were 7.4 million manhours. The work force peaked at 3,200 persons from the fall of 1992 until early 1993.

From the safety perspective, our accident frequency was low compared to other recent projects, but the program was marred by three fatalities during construction. Safety procedures were established prior to the commencement of construction and three on-site audits of our safety program took place throughout the course of the project. The first audit was by Alberta Occupation Health and Safety and the second by the Alberta Construction Safety Association. Arthur D. Little of Cambridge, Mass. conducted the last audit after the third fatality. Their recommendations stressed the need for more formal follow-up of systems as well as a higher profile for safety activities. The results were a drastically higher visibility of the safety program across the site. Communications were enhanced with a newsletter and cash awards. There was more formal reporting of safety issues through the construction management staff. The results were a further reduction in the accident frequency. We would recommend that construction safety programs be reviewed by an outside professional firm before construction commences.

The project started out as an "open site" which allowed both union and non-union contractors to work on the site. Al-Pac wanted the ability to hire local people and use local businesses in construction regardless of their affiliation; the building trades were anxious to show that they could operate on a closed site without conflict. We successfully negotiated such a letter of understanding with the building trades to achieve these objectives which worked well on the project.

Claims Resolution

As previously mentioned, the major problem with the mechanical and electrical contracts was the late realization that the work defined by the initial bid drawings was much less than the total scope of the final contract drawings. Contractors pressured us to re-evaluate the contract values and once we realized the total scope of the increased contracts, a major effort was made to come to a fair understanding and valuation of the increased contract scope. We established a claims resolution team to resolve these contract claims as quickly as possible. The first contract to be resolved was one of the civil contracts where we had the engineer do extensive analysis of the claim prior to negotiation. We found that the cost of this analysis was too high compared to the relatively small role that the analysis played in the settlement as compared to the influence of the contractor's actual costs. For the major mechanical and electrical contracts, we retained a retired construction executive who had extensive construction experience in Alberta to validate the contractor's actual costs. We also completed a valuation of each contractor's entitlement given the changes in scope and the impact of delays. This approach led to a good understanding of the value of the work and provided a less combatative resolution. In most cases, a fee was negotiated and the contractor's records were audited by another team of specialists to establish actual costs. This process worked out well and all major claims were resolved before plant start-up in a manner which was fair to both parties.

Commissioning

The plant commissioning process was split into two phases - Checkout and Pre-Commissioning followed by Operational Commissioning. The Pre-commissioning phase included final check-out of equipment, piping and control systems as well as running checks of equipment, flow tests and system operation. By July 31, 1993 this work was completed and all areas were "green tagged" and turned over to Operations. The Operational Commissioning phase was managed by Operations and included water and product trials. A contractor crew was made available to assist the Operations group in any corrective action needed during this final stage before mill start-up. This second phase of commissioning was completed by the end of August, 1993. With the record production results of the start-up phase, the commissioning phase should be considered as one of the successful components of the overall project.

Role of Leadership

Development Phase

From our perspective, the two most significant leadership characteristics in the 3 year development phase were vision and persistence.

Persistence has a nagging connotation that was not applicable to our situation. After the project was completed, a representative of one of the Japanese participants said they viewed the difficult development phase as one of "patience and co-operation". Reference (1) quotes John Rehfeld's book, "Alchemy of a Leader" where he used the expression "aggressive patience" to describe a desirable leadership characteristic. It is these characteristics that we encompass with our definition of persistence.

At the start of a development phase, neither scope, time nor cost of the phase were known. After the feasibility study had been completed, the scope of the project was reasonably well defined. There were also reasonable estimates of capital costs and time to implement - after project approval. The big unknown was the time required to obtain environmental permits. At the time Alpac thought they were completing their development phase, the approach to the approval of large projects was changing throughout the world. Environmental groups were very actively opposing any new developments and another company abandoned their proposal to build a similar plant in Australia as a result of these pressures. There were no rules of the game - the Government of Alberta was trying to develop a project review process that was acceptable to all the stakeholders.

The original timeline for developing the project was a June 1991 start-up if all project approvals were received by December 1988. The delay in receiving approvals was 2 years as approvals were actually received in December 1990.

The development phase took 3 years and $50 million to reach the decision to proceed. The strongly-held vision of a new future for Crestbrook provided the incentive to persevere and get the project approved. While others walked away from similar circumstances, the leadership of Crestbrook demonstrated the necessary persistence to stay in the game and the flexibility to change the process to meet the changing requirements.

Implementation Phase

With the scope, time and cost of the project well defined at the start of this phase, it was our observation that the key leadership characteristics during the Implementation Phase were team building and decisiveness.

In contrast to the development phase which could be characterized as shorter periods of intense activity separated by longer periods of waiting for approvals, the implementation phase was noteworthy for its sustained and intense activity over the entire duration of the phase. While it was essential during the Development Phase to take the time to get the overall scope perfected, there was seldom time to make perfect decisions during the Implementation Phase. The major decisions in the project were made during the development phase (what kind of plant, where to build, how big and finally, should we do it?), but we would quantify the number of decisions as being in the thousands. During the implementation phase, the magnitude of the decisions were generally smaller (who shall we award this work to, how many engineers shall we relocate to Edmonton, how many hours per week should the contractors work, how much money will we need to cover unexpected costs) but the volume of items requiring decisions would be measured in the millions. There were many people making those decisions but they were made within the policy framework set out by the leadership of this phase. Considering this reality, it is not surprising that it was the chief executive officer of a construction company who was quoted as saying (1), "the ability to make up your mind on insufficient evidence is a vital leadership characteristic". The same comment has probably been made by numerous military leaders throughout history.

Team building was not a large consideration during the development phase -the number of people was relatively small (measured in the tens) and the rate at which the team grew allowed for easy assimilation. The opposite was the case during the implementation phase as the design team which counted into the hundreds was assembled in a matter of months and at peak for about a year at peak while the construction forces which counted into the thousands was assembled over a year and maintained at its peak for only a few months.

Starting with a recognition that people are the key to design and construction, the following policies were put in place:

- keeping the core design teams well briefed during the delay period
- screening the design team members to ensure competence
- interviewing contractor project managers and superintendents prior to award
- adding recreation facilities to the camp
- recognizing achievements at completion of milestones
- working closely with people at all levels of the design and construction teams.

Differing Leadership Requirements in Project Phases

Our initial observation was that we had different leaders in the two phases of the project and different leadership characteristics were evident. To determine if there was any support for the leadership qualities that we observed during this successful large project, we reviewed the PMI Proceedings for the last five years for any reference to the different leadership requirements for different phases of a project. Although there were more papers dealing with leadership issues in the later years, it was Kezsbom"s 1987 paper "Leadership and Influence: The Challenge of Project Management", (1) that provided the only direct reference to our position with the following statements: "Appropriate leadership style, therefore, can be regarded as changing over the life cycle of the project." and; "Project managers must develop a variety of leadership styles that permit them to appropriately respond to the changing and complex challenges of a dynamic life cycle. Although difficult, project managers must be able to diagnose a variety of situations and adapt their behaviour or leadership style of the customer, as well as the professional needs of the project team members." It is our position that it is equally valid to change the leader to match the skill requirements for the different phases. It may be too much to expect that any one individual could have such a broad range of skills and be able to swing from one set of requirements to another at the appropriate time.

Another reference for this topic, "Selecting a Leadership Style for Project Team Success" (2), concluded that successful leadership is achieved by matching the project manager's traits with the team member needs and the project situation.

Even though we found some validation of the principle of different leadership characteristics during different project phases, we did not find any reference to which specific leadership attributes are required in different phases. We leave that challenge to others.

Since vision had played such a large role in the success of Al-Pac, we pursued this one topic a step further. In his latest book, "Visionary Leadership" (3), Burt Nanus, says "There is no more powerful engine driving an organization toward excellence and long-range success that an attractive, worthwhile, and achievable vision of the future, widely shared".

We would fully support that quote.

References

1. Barry Maude, Leadership in Management, Business Books Limited (1978).
2. Kezsbom, Deborah S., Leadership and Influence: The Challenge of Project Management, PMI'87 Proceedings.
3. Martin and Wysocki, Selecting a Leadership Style for Project Success, PMI'90 Proceedings.
4. Burt Nanus, visionary Leadership, Jossey-Bass Publishers (1992).

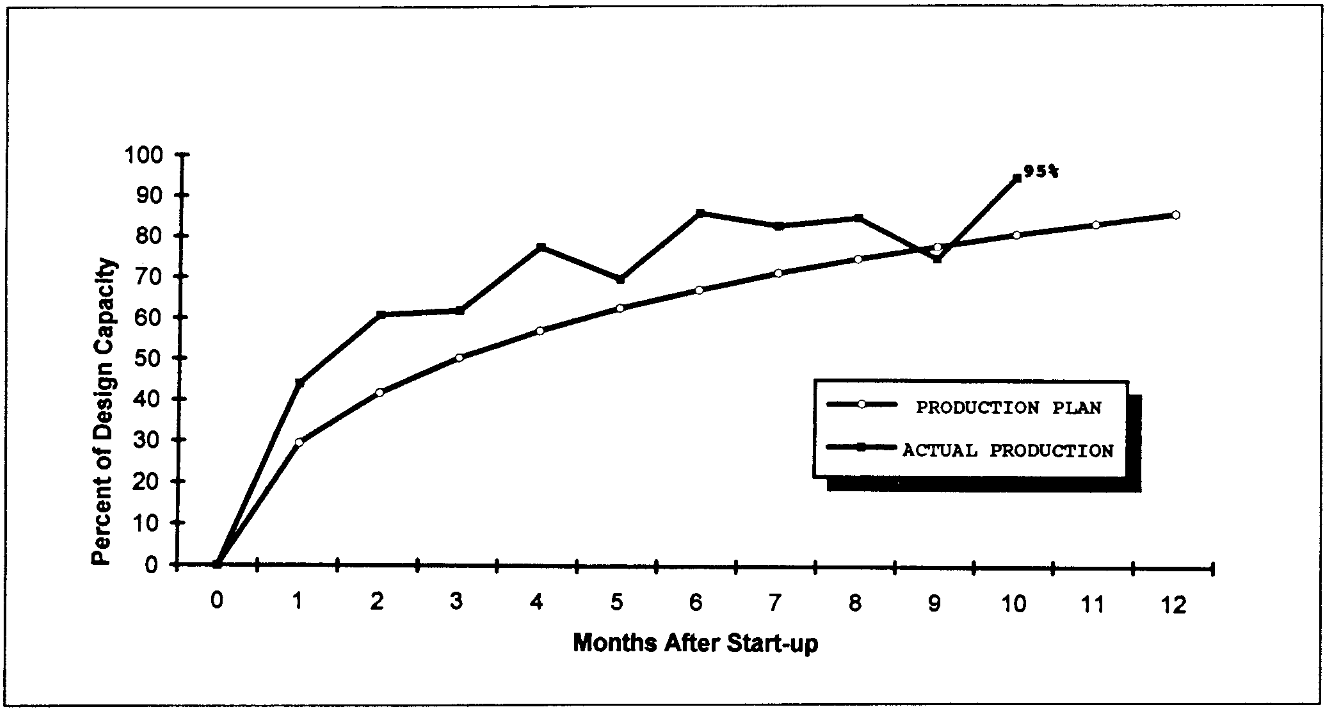

FIGURE 1. PRODUCTION COMPARED TO PLAN

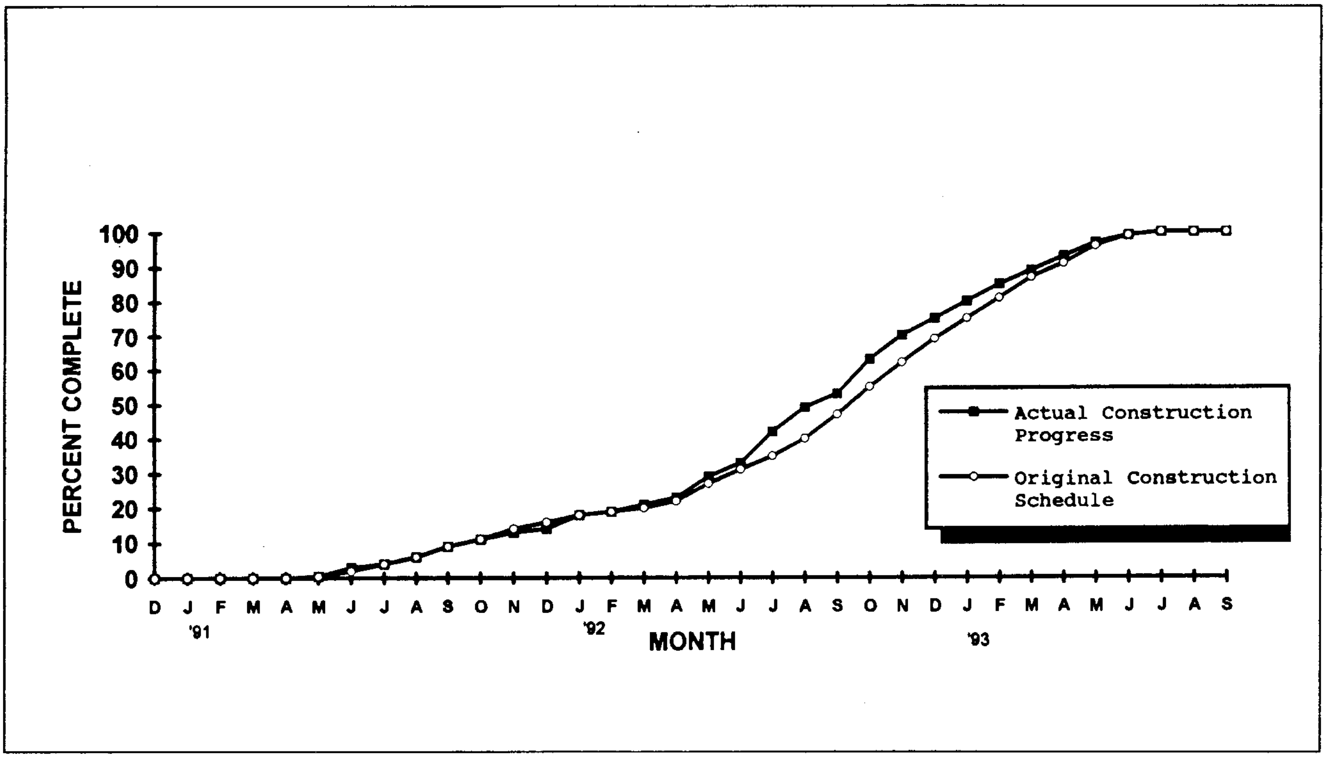

FIGURE 2. CONSTRUCTION PROGRESS