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For

A CASE STUDY – 'FAST TRACK' PROJECT EXECUTION

DEVELOPMENT OF THE AFE COST ESTIMATE
COLUMN REPLACEMENT

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I. Abstract

Capital Projects employing 'Fast Track' execution typically receive a 'pass' (or deferral) during the development of the project cost estimate due to the Team's perception that project execution needs to commence immediately. Rarely can a Capital Project be estimated to the AFE level of accuracy required for AFE approval during initial project development. Developing a Project Execution Plan (PEP) to include project design details will establish when the AFE cost estimate can be finalized to the accuracy level demanded of the AFE approval process.

II. Case Study

'Fast Track' project execution is driven by many factors, such as timing established for the project to be implemented, the need to tie-in the project during a planned unit outage, or based upon preliminary project economics, to name just a few. However, 'Fast Track' execution can have adverse consequences due to the accelerated execution approach or lack of necessary documentation to prepare the AFE Cost Estimate, which is an integral part of the capital project AFE documentation.

The premise outlined below is that by utilizing good front-end development efforts, 'Fast Track' execution should only be used within specific limitations to ensure a reasonable cost estimate is developed as part of the AFE approval process. The front-end development efforts can utilize in-house resources relying on refinery knowledge or outside resources, such as an Engineering Contractor. The following study employed both internal refinery resources and external support resources to develop the AFE Total Installed Cost (TIC) Estimate. This study proposes recommendations for when to employ an outside engineering contractor who brings both substantial experience and knowledge in developing cost estimates, which could improve the project cost outcome.

The following is an example of a project release employing the 'Fast Track' execution approach. This study was not prepared to highlight a specific individual or group but to make recommendations that should be considered/evaluated when 'Fast Track' project execution is sanctioned by refinery management.

III. Project Overview

The sequence of events leading to the development and approval of the capital AFE for the replacement of an existing Column follows.

The Maintenance Inspection group identified an existing tower that had reached the end of its useful life, requiring replacement. Engineering confirmed the analysis and met with Turnaround Planning to identify when the next outage would occur to facilitate replacing the existing tower. The timing was established as Fall, which classified the project as 'Fast Track'.

The initial step was to develop a cost estimate to support AFE capital funding for the project, which required multiple activities to begin concurrently. First, the project was transferred from the Turnaround Planning group into the Capital Projects group for execution. Second, based on 'in-kind' replacement and to ensure on-time delivery, the Tower was procured from a fabricator with strong ties to the refinery. Tower early fabrication costs were charged to the Engineering Expense Budget, which was journal vouchered to the capital AFE once approved. Third, initial cost estimates were prepared to support the AFE funding request.

Using past cost data, the Engineering group initially estimated the project's total installed cost (TIC) in the $1.25MM. A few days later, the Turnaround Planning group submitted their TIC estimate valued at $1.628MM (Attachment 1). The Capital Projects group elected to improve upon the cost estimate and implemented two estimating approaches for the new project. First, a new internal cost estimate was performed using recent project results. The Capital Project group TIC estimate was initially $3.6MM, later reduced to $2..25MM to reflect the actual Scope of Work. Second, two Engineering companies were contacted to assist with developing the cost estimate. Identical data were issued to both Contractors, which formed the Owner TIC estimate basis. Contractor #1 submitted a final cost estimate of $1,893,975, less than the Owner's estimate. Contractor #2 submitted a final cost estimate of $2,776,115, slightly more significant than the Owner's estimate. Both Contractor TIC estimates were found to be representative of the project Scope of Work.

IV. Project Estimating

A new internal Capital Project group TIC estimate was prepared using red-lined P&IDs and new Tower documentation from the filing system. Additionally, isometrics were prepared, which defined the Mechanical Scope of Work. Capital Projects commenced the development of a Project Execution Plan, which is integral to defining the execution strategy for the project. The TIC estimate employed the following documentation:

- Utilized the Vendor quotation and Purchase Order for the replacement Tower;
- Owner Costs (from recently completed projects).

- Developed costs associated with the following scope documents:
    - Equipment erection timing, equipment size, and sequence for the heavy lift;
    - Equipment costs (see above);
    - Structural costs from Local Fabricator;
    - No civil costs (to be erected on existing foundation);
    - Mechanical costs estimated using "in-house" piping estimator and hand-drawn isometrics;
    - Instrument costs based on Instrument Index (P&ID's);
    - Electrical costs based on Scope of Work;
    - Painting/Fireproofing/Insulation/Scaffolding are ratioed from recent projects as a percentage of Direct Labor man-hours.

The revised internal cost estimate was $2.225MM.

The Engineering Contractor cost estimates were developed using the same data presented above. Two one-on-one meetings were held with the Owner; the first was to confirm the project Scope of Work, and the second was to review and finalize their respective cost estimates. The list of documents issued to each Engineering Contractor is included as Attachment 2. The Contractors submitted their respective preliminary assessments for review within two weeks of receiving the documentation package. Following the second review, both cost estimates were issued as final to the Owner (Attachments 4 and 5) and is summarized in Table A.

Table A
Engineering Contractor TIC Estimate Comparison

	TIC Estimate	Contingency	Escalation
Contractor #1	**$1,893,975**	**$172,176**	**N/A**
Contractor #2	**$2,776,115**	**$291,500**	**N/A**
Average	**$2,335,045**	**$246,361**	**N/A**

Table B notes the Capital Project group TIC cost estimate, which was used as the basis for the AFE submitted to management for funding.

Table B
Capital Project Group TIC Estimate

Owner Estimate	Contingency
$2,224,700	**$232,605**

V. Considerations and Recommendations

Key considerations when executing 'Fast Track' projects:

- Ensure that when using previous project cost data for estimating a new project, both the reference project cost and final scope are fully known;
- Update reference project material costs to reflect current market pricing (with Procurement support);
- Update reference project construction costs to reflect current market conditions, particularly for Construction Labor (Direct and Indirect) and site Per Diem;
- Obtain proper refinery management approval to use 'Fast Track' execution.

Key recommendations when executing 'Fast Track' projects:

- Determine the level of design documentation available, which will form the basis for the cost estimate and establish a commensurate estimate accuracy level;
- Consider using an Engineering Contractor to perform a 'check estimate' as a data point before finalizing the AFE funding request;
- Employ the Owner Cost spreadsheet to verify that all Owner internal costs have been included in the cost estimate.

VI. Current Project Cost Estimate

The forecast cost at project completion was $2,044,319, which included contingency (Attachment 3). This represents 92% of the Owner Cost Estimate, as shown in Table B.