A CASE STUDY OF AN OFFICE COMPLEX PROJECT FOR THE KUWAIT OIL COMPANY (KOC) UNDER FIXED PRICE LUMP SUM (MODIFIED) CONTRACT

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Abstract- A case study is done in order to evaluate the FIXED PRICE LUMP SUM (MODIFIED) project and lesson learnt during its execution to further improve it. Company prepared approximately 150 drawings of Architectural, Civil & Structure, Electrical, Mechanical, HVAC, Instrumentation (Building, Security and Life Safety Management), IT/Telecom, LAN and respective technical specifications under each discipline along with KOC standards, specifications, drawings and reference drawings in order to define the basic scope of work (FEED). These documents and their priorities were defined in MOA (Memorandum of Agreement). Contractor developed the complete detailed design based on the above documents along with contract specification and different attachments to Form of Tender and executed the project as per contact term and condition. The consultant was chosen from approved list of consultants of Kuwait Oil Company under Category 39 (Civil Works Consultants).

Keywords- Complex Project, KOC, Drawings, MOA

I. INTRODUCTION

The main building is ground floor plus two stories with offices (450 plus employees) of various dimension / configurations, conference room, meeting rooms, waiting areas, guest rooms with reception at roof, covered walkway, skylights and an auditorium (150 plus seats), equipped with latest state of the art accessories. All the conference room, meeting rooms and auditorium are equipped with audio and visual aids. The building is equipped with security desk, access control by suitable scanning arrangement, staircases, emergency exits (fire escapes) etc. Covered walkways are connecting the main building to other buildings. The ancillary buildings such as the multipurpose hall, cafeteria, kitchen (serving 170 people at a time, equipped with state of the art kitchen equipment, electronic hood, freezing and chiller room), central plant (equipped with air cooled package chillers, chilled water circulation pumps, chilled water distribution piping network, central station air handlers, fan coil units and other accessories with automatic temperature control system). Clinic (with latest equipment to handle casualty as well as emergency), mosque (400 people at a time), shaded parking for four hundred (400) cars, sewage treatment plant (water available for irrigation after treatment of waste water, conservation of water and energy), access roads and landscape.

Project details and brief milestones achieved under contract are as follows:

- Contractor: Associated Construction Co.
- Contractual Start Date: 17 October, 2010
- Contract Duration: 1080 Calendar Days
- Contractual End Date: 30th September, 2013
- Contract Value: KD 17,241,953.000 (~58,673,720.080USD)
- Provisional Sum: KD 819,140.611 (~2,787,325.190 USD)

II. OBJECTIVE OF THE OFFICE COMPLEX

The complex with modern landscape and state of the art facilities would result a comfortable working atmosphere forthe employees. This would result in achieving the goal of production under Kuwait Oil Company‘s 2030 strategy.

III. IMPROVEMENT DURING DETAILED DESIGN ALONG WITH CONSTRUCTION.

The Consultant Office developed various design drawings keeping in consideration the minimum requirements mentioned in the drawings and technical specifications complying with various codes and standards listed in the document, as required by the contract. During this process, many significant suggestions came from the design consultant taking into view the latest technology and its integration with latest codes and its compliance or any requirements arising due to the latest need of the company. Few significant changes that gave value addition to the project during detailed design are as under:

A. The bridge fully covered with glass connecting the floors of the main building was analysed in order to make it more environment or user friendly. The required airflow with full glass situation would create noise beyond the comfort level. Therefore, to reduce the noise and the heat load, (energy saving) was initiated. The design consultant proposed to cover 50% of the full glass bridge

with aluminium composite panels (Alucobond). The Company agreed with the proposal, which resulted in reduction of electric power consumption and provided more comfort inside the bridge. Hence an environmental friendly solution was achieved.

B. The Company initiated reduction of water requirements for landscape works and to search means that would help to achieve this without affecting the overall design of the contract. Alternative design of different patterns of crushed stones, rocks and cobbles for rockiness of different sizes replacing the grass and integrating with overall landscape and services was prepared by the design consultant in consultation with the Company's engineers and managed to save almost 35% to 40% of daily water requirement for irrigation purpose.

C. Aesthetical integration of ancillary buildings (kitchen and cafeteria building, substation building, clinic building, guard houses and covered walkways) with the main office complex building with additional aluminium composite panels (alucobond) was initiated by the Company during detailed designand a value addition was done to the project.

D. Due to usual improvement in KOC-HSE rules and regulations, it was required to extend the fire hydrant coverage to the covered parking and sewage treatment plant areas as well. A value addition was done to the project during detailed design stage.

E. Due to update of KOC-HSEMS, a new requirement of four additional external concrete emergency stair cases arised at a very late stage of the contract butwas successfully constructed to fulfil the latest safety requirement and a value addition was done to the project.

F. Interior Designer, being part of the contract requirement, studied the functionality of the office complex in line with the latest developments in the industry. Made significant changes in the interior design and furniture. Upgradation of the furniture in upper management levels, meeting rooms, conference rooms, auditorium, and different grade of users improved the overall aesthetic and functionality of the Office Complex.

Further to improve the functionality, Company realized that the covered walkways and the main building should be connected.

It would give more comfort to the employees commuting between walkways and the main building during harsh weather conditions.

G. Deduction of deleting revolving doors, as air lock was made available inside the building. It improved the HVAC performance and accessibility. Contributedtowards the cost saving to the company.

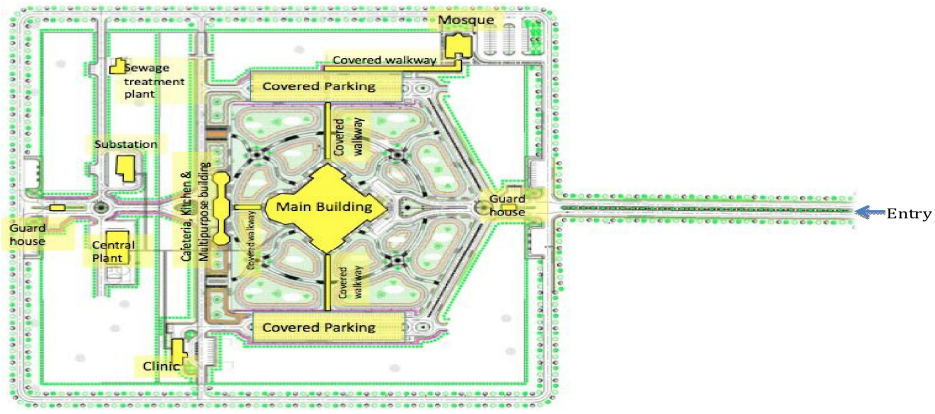
IV. PROVISIONAL SUM

Two adjustment orders were raised in order to achieve the above improvements. Provisional Sum is utilized to meet the amount of the Adjustment Orders. It is an amount (approx. 5% of the contract value) available to the Company within the contract for paying to the contractor for any additional work requested. If the sum is not utilized then it would go back to the Company. So far only 70% of the Provisional Sum utilized and 30% of the provisional sum is returned to the Company.

Provisional sum is a part of the contract cost, which gives flexibility to the Company in order to cater the requirement arising due to development in technology during the time of execution of the work. The construction industry is changing rapidly and latest material, equipment, technology in the market are compelling the designer to adoptthem in their latest deign.

Therefore, during detailed design stage, whenever it starts, contractor is bound by the contract to comply with the latest code and provide options with the latest technology so that the company could review and if it is accepted then it has to be adopted in their design subject to availability of the fund.

V. OVERALL LAYOUT OF THE OFFICE COMPLEX



V. SALIENT FEATURES

- Main building(434 Offices, 12 TLs, 4 Managers,1 DMD & their secretaries, auditorium with 164 seats, 5 meeting rooms, 2 conference halls, 3 training rooms, library, central file, lounge etc.)
- Cafeteria (with 164 seats), Kitchen (Full fledged) &Multi purpose hall
- Mosque with Gents (375 people) and Ladies (50 people) prayer hall
- Clinic (Includes Doctor's room, check up room, dental, emergency treatment facility and separate male & female treatment room)
- Covered Walkway – Fourwalkways connecting main building to Mosque, Cafeteria & Parking
- Guard House – Two in Nos.
- Covered parking Approximately four hundred cars
- Substation (Four Transformers, one Diesel generator)
- Central Chilled Water Plant (Four chillers with chilled water pumps. One chiller has acapacity of 361 ton of refrigeration (Tr).
- Sewage Treatment Plant (capacity of 250 m^3)
- Landscaping(Area 77,500 m^2)
- Total Covered Area (23702 m^2)
- Total Plot Area (278725 m^2)

VI. ADVANTAGES OF THE FIXED PRICE LUMP SUM (MODIFIED) CONTRACT

1. Saving in Time:

i. The company prepares the basic scope of work (FEED) by taking all the concern teams on board. The data collection and concerns are filtered by means of communication among the team members during the preparation of thecontract documents. The surprise elements during execution are drastically reduced.

ii. The superintendent of the contract is the single point of contact, which paves the way for time saving.

iii. The contractor develops the detailed design along with the construction activities, utilizing the basic design documents, whereas for other type of contract e.g. Fixed Price Lump Sum (FPLS), there is a complete separate design cycle. Contractor dives into action only for construction. Therefore, the secondshall require more time in order to complete the similar kind of project (of reasonable amount) right from design to its completion point.

2. Manpower Improvements and Cost Saving to the Company

i. Consultant fees are reasonably high for developing the basic design (FEED), as most of them are not fully aware with company rules, regulation and other requirements.

ii. The company and its personnel have reviewed almost two thousand (2000) plus documents of the design subcontractor to ensure their compliance to the Company's contract documents (drawings, technical specifications, and KOC standards etc.). In this process, company engineers are exposed to the latest technology, state of art design, latest codes which help them to update themselves. The interaction of KOC engineers with Design Consultant Office gives them an opportunity to learn about the latest available technology in the market, which definitely would be used in the future projects.

iii. Company trained the under development trainees (UD's) under each discipline by assigning them with project review team and by exposing them to real on site design/construction issues. This is a hidden gift to the new engineers in order to attain the most practical way of training by going through the detailed design, calculation and other relevant documents. It is a premium chance to get our UD Engineers to be trained and developed through the interaction with the local consultant office during detailed design stage.

iv. Company saved a significant amount of money by reviewing and supervising the project in house, which would have been spent on supervision separately by engaging a supervision consultant.

VII. RECOMMENDATION

Therefore, based on the above study, we highly recommend the THE FIXED PRICE LUMP SUM(MODIFIED) mode of Contract. However, few important points should be noted:

- The lessons learnt from this project during its execution shall be strictly applied on the next project.
- There shall be sufficient and capable engineer to handle the project.
- Provisional Sum is mandatory for such building complex to cater the unforeseen requirements, as already taken care in this project.

REFERENCES

Contract # 45844 between KUWAIT OIL COMPANY (KOC) and ASSOCIATED CONSTRCTION CO.WLL (ASCO).

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