A SUCCESSFUL VE STUDY FROM SAUDI ARABIA

This document was presented at the 1993 International Conference of the Society of American Value Engineers (SAVE) at Fort Lauderdale, Florida by Abulaziz S. Al-Yousefi, Riyadh, Kingdom of Saudi Arabia. It was published in the SAVE Annual Proceedings and is copyrighted . Permission to upload this document to CompuServe has been given by SAVE.

Abdulaziz Al-Yousefi, CVS, for the last five years was the VE Team Leader and Coordinatior for the for the VE and TR Section of GDMW-MODA. He is working with a team in developing an Expert System for VE. Abdulaziz has both a BSEE and MS in Telecom-munications. He has conducted and participated in more than 15 VE workshops; he has specialized in the application of computer technique in VE and has just completed a book in Arabic *Value Engineering - Its Concept and Its Application.* Abdulaziz is a member of SAVE.

ABSTRACT

This paper summarizes a successful VE study done in Riyadh, Saudi Arabia on a health and social club for the elderly. It also outlines the reason behind this success.

INTRODUCTION

This VE study was done on a charity project called " Prince Salman Social Center for the Elderly, PSSCE "in Riyadh, Saudi Arabia. It is a social and health club for the elderly which was named in honor of Prince Salman, the Governor of Riyadh region, who is truly respected for his generous and continuous support for charity projects. PSSCE is headed by an independent establishing committee. The chairman of the committee is the former mayor of Riyadh and the members are ten highly distinguished people, each of them is a leader in his own field. The general Director of PSSCE is Ph.D. Graduate from Boston University and his dissertation was on " The development of a model for a sociomedical facility for the elderly in Saudi Arabia".

One of the members is the founder and owner of one of the leading and most prestigious Architectural and Engineering firms in Saudi Arabia.He is a former Dean of the College of Engineering at King Fahad University of Petroleum and Minerals. His contributions to charity projects and to PSSCE in particular were enormous. One of his contribution to this project was doing the design totally free of charge. He, also, volunteered to do the supervision of the project at no cost.

Therefore, you can see that this project is already in good hands and that is one of the reasons that made this VE study successful

PROJECT DESCRIPTION

The project which already been designedoccupies an area of 10,500 M^2 consists of five major parts (Fig. 1A) ; a club for men, an identical but smaller one for women, a central facility, two staff accommodations and a mosque. Each club consists of some recreational and athletic facilities such as swimming pool, Gymnasium, Hobby workshop area. It also has a small clinic, Hydrotherapy, Therapeutic exercises, Electrotherapy, a restaurant and a Video & books library. The central Facility includes a kitchen at the basement, an auditorium in the ground floor and an administration offices in the first floor.

WHY THE VE STUDY.

Some contractor were invited to bid after the design was completed. Eight contractors submittedtheir proposals. The bids ranged from $24.8 millions to $ 34.5 millions; the average was $28.65 millions. But the funds allocated to the project were only $ 16 Million. Since there was a need to build the project soon without any financial burden, the construction cost had to come down considerably. PSSCE committee approached the VE section of the General directorate of Military Works (GDMW) of the Ministry of Defense and Aviation of Saudi Arabia (MODA) to do the VE study. The VE section was established in 1986 and since then has conducted more than 60 VE studies.

A TEAM LEADER DILEMMA

I was a member of the VE section of GDMW and I was tasked to be the team leader of the VE study; that was just the beginning of my dilemma. At that time I was negotiating with PSSCE to be the project manager of the very same project. Later on I accepted their offer and joined them while the VE study was in progress. Thereafter, throughout the VE study I was wearing two hats. I was leading the VE team and at the same time I was fighting with them. On one hand I cared about the VE study and wanted to get as many ideas as possible, but on the other hand I knew that whatever ideas we will come up with I will be stuck with them. I will be the one who has to make sure that those ideas are implemented ... on site.

THE VE STUDY

A multi-discipline VE team was formed of seven members (The team leader, An architect, a Civil/Structural, Mechanical, an Electrical, the AE representative and the owner representative). Occasionally, the AE chief designer participated in some of our meetings. The study lasted three weeks; one week to prepare for the study, a second for the VE Workshop, and a third for presentation and reporting.

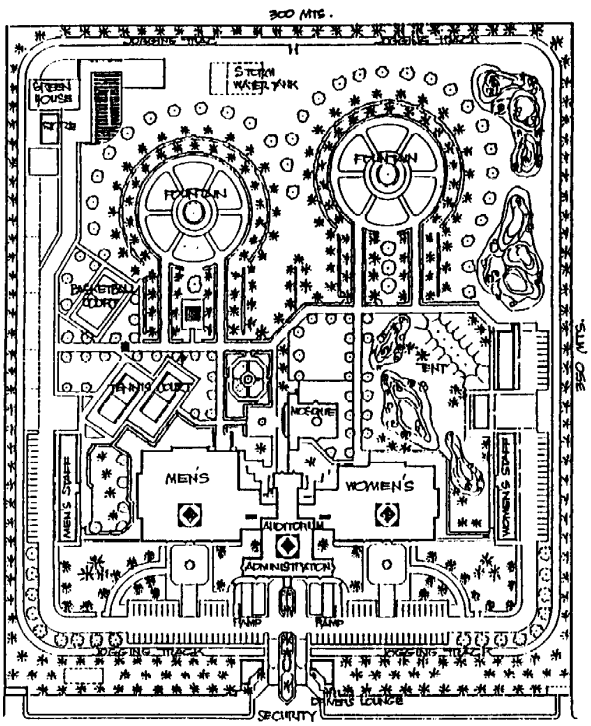

Figure 1 A
Site plan before VE

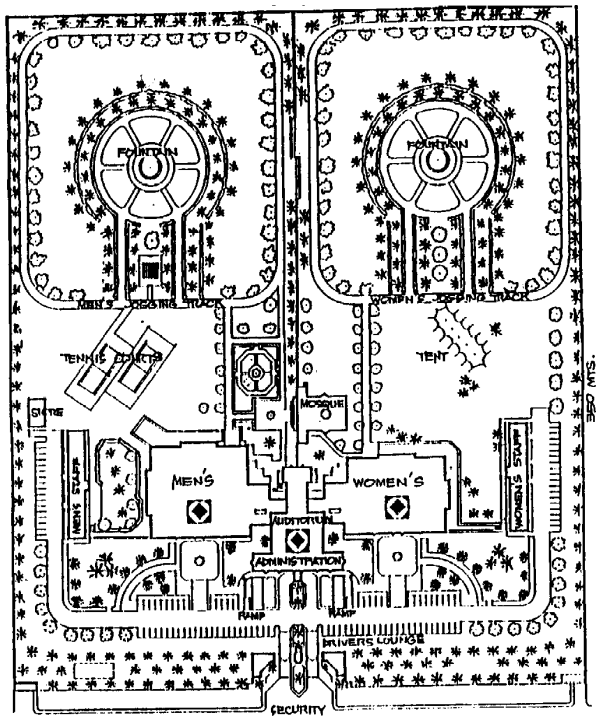

Figure 1 B
Site plan after VE

THE VE JOB PLAN

Information Phase

Unlike other projects we have studied, we had full information about the project. Beside the drawing, specification, soil report and the design calculations, we had the eight bidder's priced bill of quantities. We met with the owner (in this case it is the PSSCE establishing committee) and with the designer who had a full knowledge about the needs of the end users (the elderly) and the requirements ofthe owner.

The most important requirement was not to have any major redesign due to the urgency of building the project. Besides, the project had already gone through so many changes and was finally approved as shown in Fig 1A. Another requirement was to comply with the Saudi Arabian Tradition. There has to be a complete segregation between men and women. Each side has to have complete and identical facilities. The finishing has to be prestigious and elegant to show respect for the dear hearted elderly who have well served their community and their country.

To make a more realistic cost analysis, we took the average of the four lowest bidders. From the graphical presentation of the cost distribution of this average (Fig. 2). We noticed that the major high cost areas, in ascending order, were: Electrical work, Site work, Finishing, Concrete, Plumbing, Furniture and Equipment. Therefore, We focused our study on these areas.

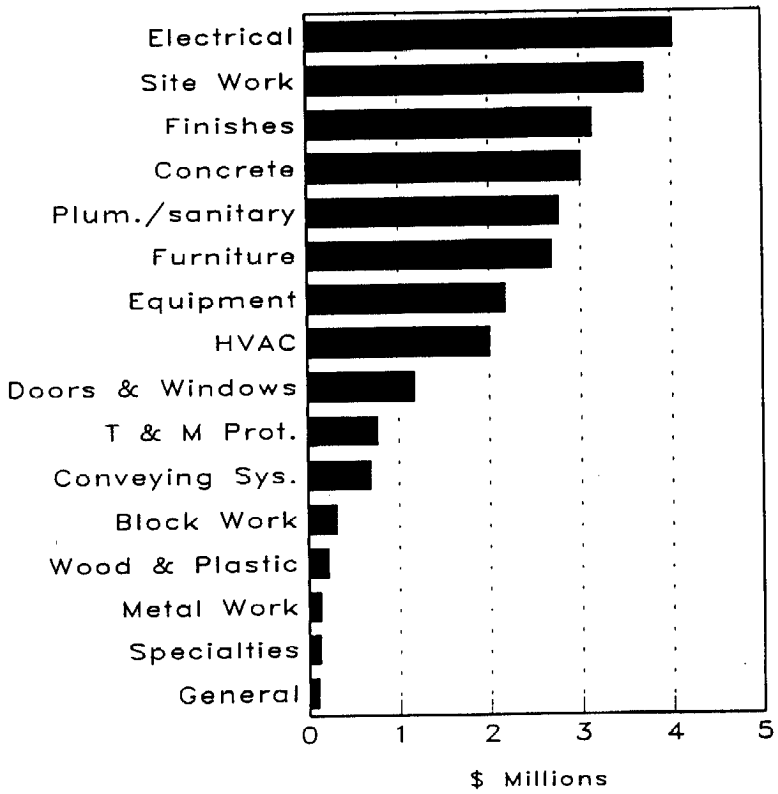

Figure 2
Cost Distribution of the
average of the four lowest bids

FUNCTION ANALYSIS

We spent the first two days of the workshop defining, discussing, analysis and brainstorming functions. We first listed the components of the project, identified their function and then classified them as Basic Function (B), or Secondary Function (S) and Required Secondary Function (RS).

Function									
A. Eluminate Space	A								
B. Prepare Site	A/B	B							
C. Support Loads	C/2	C/1	C						
D. Condition Enviroment	A/B	B/D	C/1	D					
E. Convey Liquid	A/1	B/1	C/2	D/2	E				
F. Partition Space	F/1	B/F	C/E	D/F	F/1	F			
G. Convey Objects	A/2	B/2	C/2	D/2	E/1	F/2	G		
H. Maintain Convenence	F/1	B/F	C/H	D/H	H/2	F/H	H/2	H	
I. Aid Services	A/I	I/1	C/I	D/I	I/2	F/1	I/1	H/I	I
Weight	6	8	11	8	1	10	0	8	8
%	55	73	100	73	9	91	0	73	73
Cost (Million SR)	15.1	14.3	16.6	9	10.4	16	2.6	15	10.1
%	91	86	100	54	63	96	16	91	61

HOW IMPORTANT
2 - Major Preference
1 - Minor Preference
1 - Letter / letter Same Preference
(One point each)

Figure 3
Function - Cost Comparison

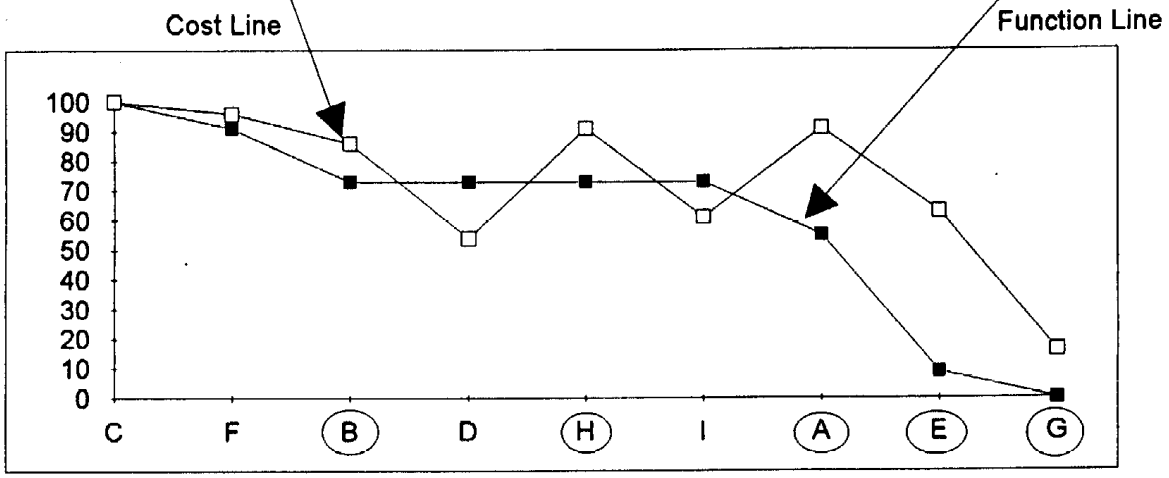

Figure 4
Graphical Representation of Function - cost Comparison

Now that we had the functions defined and the cost analyzed, we made a function-cost comparison. We grouped the 16 items of figure 2 into 9 Construction categories and defined their functions. Then we determined the weight of each function and the weight of each cost as shown in Fig 3. To visualize this better we represented the results in a chart shown in Fig. 4. When comparing function with cost according to the well-known value index formula :

$$\text{Value Index} = \frac{\text{Function}}{\text{Cost}}$$

$$\text{or} = \frac{\text{Function + Quality}}{\text{Cost}}$$

we can see clearly that we need to improve items A, B, E, G and F.

Item A, Electrical Work.
Item B, Site Work .
Item E, Plumbing & Sanitary.
Item G, Elevators.
Item H, Finishes & Equipment

CREATIVITY & IDEA GENERATION

The picture has become clearer. At this stage, we had a full information and knowledge about the elderly requirements and the functions that need to be performed. We started brainstorming ideas. At First we generated about 200 ideas. Many were the result of the concentrated function analysis and the AE involvement. Unlike other designers the AE participated full time in the VE study. This AE didn't think that improving the value of his work would hinder his credibility.

EVALUATION

Ideally, the VE team would evaluate all the ideas but due to time constraints, we focused on the ideas that improve value and represent the greatest potential saving. A weighted evaluation was applied in some cases to account for impact other than just

cost. The ideas were ranked by the VE team and the idea listings were further reviewed and discussed with the owner and the designer. The result was 59 proposals finally accepted. The potential Saving was estimated to be $8 Million or 25% of the initial cost.

DEVELOPMENT

The ideas were expanded into workable solutions. This solution was summarized into a VE report that contains the description of the proposals, the recommended design, life cycle cost analysis, a detailed evaluation of the advantages and disad-vantages, sketches and some design calculation.

Due to the limited length of this paper, I will only highlight five proposal each representing one of the high cost areas.

1) Relocate Electrical Substation.

We found that about 60% of the electrical cost was due to the cables. The electrical substation was located at the bottom left corner of the site. We proposed to shift the substation to the main entrance area. This action will considerably reduce the amount of service cables. The initial cost saving will be 30% of the electrical work cost without sacrificing any function.

2) Delete the computer network.

In this fast moving computer technology age, it is not recommended to specify and design for a computer system that will not be used before three years from now. We propose to delete the computer network but leave the conduits and design the computer network when the building is complete and take advantages of the computer technology then.

3) Reduce number of elevators from 11 to 6.

The building is only two stories high and it is not recommended to have this many elevators. We proposed to maintain 6 elevator; two for the kitchen, one for the mosque, two for use of disabled elderly and one for the VIPs.

4) Change a service void to a full basement.

Underneath the club buildings, service voids were designed to overcome the soil condition. With little additional cost, we propose to convert the service void underneath the mens club to a full basement. This basement will be used for car parking and as well as a shelter and can also accommodate any future expansion.

5) redesign site plan.

During the design, the shape of the site plan and building went through many revision. It was finally accepted as shown in Fig. 1A. The shape of the building seemed to be all right but the site plan needed to be modified. We proposed to change the site plan as shown in Fig. 1B. This proposal is a result of combined ideas such as modifying the running track, deleting the family housing since it does not have any function here, deleting one basketball court, level part of site and delete the retaining wall around the buildings and redesign of the landscaping and the irrigation system.

6) postpone some items

It was decided to take some items out of the contract and deal with them as separate contracts such as furniture, equipment and landscaping. The furniture could be locally manufactured and administratively it is better to order the equipment at the end of the contract. Landscaping will be reduced and match the plants and vegetation of Saudi Arabia.

IMPLEMENTATION, POST STUDY PROCEDURE

To implement the proposals we had to alternatives to choose from :-

1) Bid alternates: Where we consider all the proposal as bid alternates to the base bid. The contractors indicate the changes in price, either additive or deductive; to be made to their bid proposal submitted earlier. In this case the contractors will be responsible to provide any redesign necessary to implement any of the bid alternates.

2) Re-bid. Where we consider the proposals as an addendum to the contract and ask the contractor to submit a new modified bid based on the modifications. We evaluated both alternatives and we chose the second alternative for two reasons :-

1) We tried the first choice in previous VE studies but we had difficult time when analyzing the bids and the great variation between the contractors pricing and redesign made the bid even more confusing.

2) The AE offered to do the redesign at no cost.

The AE revised drawing along with an addendum were then given to the contractors for rebid.

After two weeks, the contractors submited their new and modified bids. The bids ranged from $16.7 Millions to $20.06 Millions and the average was $19.84 Millions. That is an actual saving of $8.81 or 31% of the original bid. This saving turned out to be even better than we expected. Figure 5 tabulates the bids before and after the VE study.

CONCLUSION

After negotiations with the lowest bidder, the contract was awarded at $15.6 million. There were several reasons behind the success of this VE study. These reason could be considered as recommend-ation for getting a successful VE study.

1) Doing more and more function analysis makes the study only better

2) PSSCE Establishing committee are decision makers. Their prompt and quick decision was effective in this study.

3) The cooperation and the involvement of the AE played a significant role in the success of this VE study and in any VE studies.

4) Full information was available to the VE team at the very beginning of the study.

5) Incentive for VE team members is needed. In this case the VE team was motivated by the noble cause of the PSSCE and the team leader was even more motivated since he became the project manager of PSSCE.

6) The VE team preferably not be more than seven members otherwise controlling would be very difficult.

Figure 5

Bids	Before VE (Million $)	After VE (Million $)	Saving %
1	24.8	16.7	33%
2	26.3	19.3	27%
3	26.4	18.9	28%
4	26.6	17.3	35%
5	28.6	19.3	33%
6	28.8	21.9	24%
7	33.2	20.6	38%
8	34.5	24.7	28%
Average	28.65	19.84	31%

From the above we can conclude that There is no such thing as "Perfect Design". Every AE has his own professional opinion and it has to be respected. Perfection does not depend only on the quality of the AE performance but also on the coordination skills between the AE, the owner and the end user. To have a good quality project there has to be clear design directives prior to the commencement of any design.

Although this VE study proved to be successful, it would have been even more successful if the VE study was performed at the concept stage where we have no design restrictions.

Acknowledgment:

I truly thank Engineer Khalil Badran and architect Louis Humsy from the AE office for their fine effort and contribution to the VE study. Without their help, this work wouldn't be possible.