

# Using the Workshop Process to Foster Innovative Designs

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## ABSTRACT

The Workshop Process has proven to be an effective management technique which creates an environment that fosters innovative design. The process brings together a small group of experts with a variety of specialty talents to focus their creative energies on a specific design problem. The Workshop Process borrows many techniques from the Value Engineering (VE) Study Process. Like the VE Study, the Workshop Process is carried out in a short time period, usually five days following a specific agenda. A typical agenda for a workshop team includes the following:

1. Information Exchange Phase
2. Creative Phase (Brainstorm Design Alternatives)
3. Develop Weighted Criteria for Judging Alternatives
4. Evaluate and Concentrate Design Alternatives
5. Develop and Enhance Most Promising Alternatives
6. Written and Oral Presentation of Recommendations.

The Workshop Process was effectively used to develop the preliminary design for replacement of the Broad Street Bridge over the Scioto River in downtown Columbus, Ohio. Because this bridge is located in a prominent location within an historic district, special emphasis on aesthetics and historical compatibility was important. For the Broad Street Bridge, two design workshops were held. The first workshop generated 117 different alternative designs which were concentrated and refined to 13 design alternatives for public consideration. The second workshop incorporated the public response to the results of the first workshop and developed the recommended design alternative for the replacement of the Broad Street Bridge. Because aesthetics were an important consideration in the design of this bridge, scale models and numerous perspective sketches and renderings were prepared to assist both the workshop team and the public in their consideration of the various alternatives. The resulting final design, most likely would not have been conceived by routine design processes.

## INTRODUCTION

The Workshop Process has proven to be an effective management technique which creates an environment that fosters innovative design. The process brings together a small group of experts with a variety of special talents to focus their creative energies on a specific design problem. The Workshop Process borrows many techniques from the Value Engineering (VE) Study Process. Like the VE Study, the Workshop Process is carried out in a short time period, usually five days following a specific agenda. Unlike the VE Process which is used to analyze something already designed, the Workshop Process is used to create a design. This paper will first describe the Workshop Process and then briefly illustrate its use in developing the preliminary design for the replacement of the Broad Street Bridge over the Scioto River in downtown Columbus, Ohio.

## WORKSHOP PROCESS

The Workshop Process usually follows a specific agenda which is completed in about five days (see Figure 1). The Workshop Process is subdivided into six specific phases. Each phase, as with a VE Study, is important and must follow specific guidelines to be effective.

FIGURE 1. TYPICAL WORKSHOP AGENDA

### PREWORKSHOP:

- Define the scope of the design problem
- Select Workshop Team
- Schedule Workshop

### DAY 1

- Phase 1 - Information Exchange (4 hours)
- Phase 2 - Creative Phase (1-2 hours)  
(Brainstorm Alternatives)
- Phase 3 - Develop Weighted Criteria for Judging Alternatives (2-4 hours)

### DAY 2

- Phase 4 - Evaluate and Concentrate on Design Alternatives (8-12 hours)

### DAY 3

- Phase 5 - Develop and Enhance Most Promising Alternatives (8 hours)

### DAY 4

- Phase 5 - Continued from Day 3 (8 hours)

### DAY 5

- Phase 5 - Concluded from Day 4 (4 hours)
- Phase 6 - Written and Oral Presentation of Team's Recommendations (4 hours)

### Preworkshop Activities

Working with the Owner, the Workshop Coordinator develops in detail the scope of the design problem. The scope of the design problem usually involves design of some facility such as a bridge. The Workshop Coordinator determines from the Owner such needs as:

- Required capacity, size, shape, durability
- Aesthetic considerations
- Performance criteria, operating characteristics
- Functions, primary and secondary
- Acceptable costs
- Safety requirements

Once the scope of the design problem is determined, the Workshop Team is selected. As with a VE Study, the Workshop Team seems to work well with from four to seven or eight members from various backgrounds depending upon the design problem. Often knowledgeable representatives of the Owner are chosen to participate on a Workshop team because of the special perspective that they bring. For example, a Workshop Team to study a bridge replacement project in an historic area could include: bridge engineers, cost estimator, traffic engineer, Owner's representative, construction specialist and an architect experienced in civic architecture.

It is important that the Design Workshop be held at a location isolated from everyday distractions. It is good to provide at least one banquet-size work table for each team member. The room should accommodate two or three easels and perhaps a chalkboard. Telephone and copying services should be available. These accommodations are often available through hotels. Each team member should commit to attend the entire Workshop. Sometimes it may be necessary to schedule a Workshop over a weekend to accommodate the schedules of busy experts desired for the team.

### Phase 1—Information Exchange

The actual Workshop Process for the Workshop Team begins with Phase 1, the *Information Exchange*. Each team member is furnished with copies of material collected by the Workshop Coordinator. During the information exchange, the scope of the design problem is completely described. The team may visit the site of the design problem. Photographs of the site, where appropriate, should be available and described to the team. Presentations to the Workshop Team by individuals to outline the scope of the problem should be scheduled during this phase. This will allow the team to question individuals presenting information, thus reducing potential misinterpretation. Important information for the information exchange includes:

- Existing plans, maps, etc.
- Survey data, topography, traffic counts
- Environmental data, weather, floods, etc.
- Construction cost data
- Constraints; funding, legal
- Regulatory requirements, design standards, codes
- Specifications

### Phase 2—Creative Phase

During the *Creative Phase* of the Workshop Process, the team "brainstorms" alternative solutions (ideas) to the design problem. In a VE Study, this often is called the *Speculative Phase*. Brainstorming is a deliberate effort to generate ideas without making any judgment regarding their practicality or usefulness. The following rules for effective brainstorming should be enforced by the Workshop

### Coordinator:

1. No idea may be criticized. Judgment and evaluation are postponed to a later phase.
2. All ideas are written and posted in full view of the team during this phase.
3. Freewheeling is encouraged. Wild ideas are welcomed. It is easier to tone down a wild idea than to juice up a tame one.
4. Strive for many ideas. The more the better. Greater numbers increase the potential for more good ideas.
5. Combine ideas. Improve ideas. Build on ideas of others.

### Phase 3—Developed Weighted Criteria for Judging Alternatives

Alternatives or ideas generated in the brainstorming session of Phase 2 need to be evaluated based upon some criteria. A technique borrowed from VE involves using a matrix to weight selected criteria. The various criteria should be mutually exclusive, i.e., no over-lapping criteria will be allowed. The Workshop Team should carefully define and select the criteria for judging each alternative. Criteria for judging alternatives could include such items as:

- Initial cost
- Estimated life
- Aesthetic appeal; appearance
- Flexibility
- Operating cost
- Time to design and construct

Each criteria item is compared with the other criteria items using a matrix similar to Figure 2. For example, in the A-C box, the notation of A-4 indicates a major preference (4 points) in favor of criteria A over criteria C. Total points are counted for each criteria and a weight of 10 assigned to the highest scoring criteria. Whole number weights are assigned in proportion to the raw score of the remaining criteria. It is important that the Workshop Team fully discuss and agree upon the criteria and the weighted criteria before moving to the next phase. The workshop Coordinator should strive to arrive at the weighted criteria by consensus of the entire team.

### Phase 4—Evaluate and Concentrate Design Alternatives

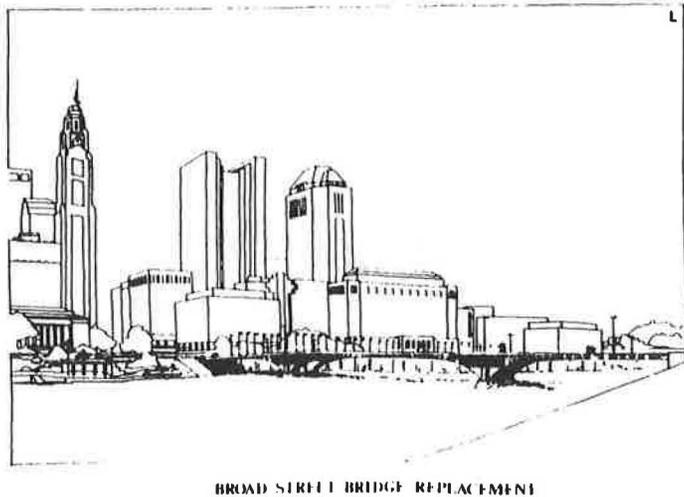
Alternatives (ideas) generated in Phase 2 are now evaluated and concentrated in this phase. When ideas are evaluated, often new ideas are suggested. It is important to always be open to and accept new ideas or alternatives, especially in this phase. New ideas should be added to the listing developed from Phase 2.

Ideas can be screened using a form similar to Figure 3 which quickly notes perceived advantages and disadvantages. The Workshop Team, by consensus, rates each idea from 1 to 10 points. The highest scoring ideas are retained for further evaluation. The other ideas will not be evaluated

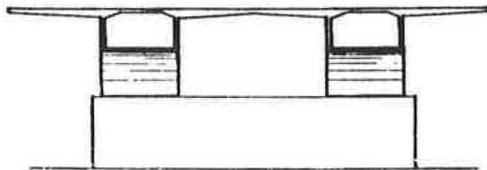




**FIGURE 6. PRELIMINARY ALTERNATIVE L, SKETCH**



**FIGURE 7. PRELIMINARY ALTERNATIVE L, SECTION AND DESCRIPTION**



Three-span, continuous, deep haunched, twin concrete box girder bridge with span lengths of 190'-300'-190'. The transversely posttensioned deck is supported by twin concrete box girders. Girders vary in depth from 17 feet at the piers to 6 feet at mid-span and abutments. Extra depth is provided at pier haunches to enhance the arch effect.

Cast-in-place methods of construction will be used. Construction will require a contractor familiar with posttensioning. Construction cost is estimated at \$7,800,000. This bridge will require normal maintenance. Inspection will require special equipment for below the deck and access manholes into the box girders.

Two variants of the haunch girder have been studied, one with a 12-foot deep section at the piers and the other with this dimension increased to 17 feet. The difference is primarily a matter of choice on aesthetic grounds, the lesser-depth haunch providing a lighter and more open appearance, and the deeper one presenting a stronger profile with more pronounced curvature.

Both of the concrete haunched girder structures use box girder sections, resulting in pleasing smoothness of forms and surfaces with the possibility of interesting textures and colors. Particularly observable from below, the underside of the girders will be smooth.

**SUMMARY**

The Workshop Process provides an effective management technique to focus and concentrate a wide variety of talent for innovative design. It provides a systematic and democratic process to assimilate a wide variety of viewpoints into design solutions. It creates an environment favorable to innovation. The Workshop Process can reduce development time where innovative design is needed or desired. The process is usually found to be stimulating and fun by the participants. It helps make "early" design decisions before expending significant effort by using experience of the team.

Research and development areas to improve the Workshop Process could include:

- Workshop Team composition,
- Optimum team size,
- Idea generation techniques, and
- Idea scoring and rating techniques.

Use of the Workshop Process is not appropriate in every instance. Innovation is often not necessary or desired. The process is best suited where:

- Innovation is desired,
- The best solution is not obvious, and
- Where diverse training and experience need be balanced.

The process is capable of dealing with design of a wide variety of things in addition to bridges. For instance, it could be used to help design an organization with its organizational chart and position descriptions. The strength of the process is that it permits a wide variety of talent to work within an innovative environment toward a design solution. It provides a good tool to foster innovative design.

**SOME VE REFERENCES**

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