Effectiveness of Bridge Design Competitions in the United States (1989-1998)

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Bachelor of Science in Architecture
University of Michigan, 2009

Submitted to the Department of Civil and Environmental Engineering in Partial Fulfillment of the Requirement for the Degree of

MASTER OF ENGINEERING
in Civil and Environmental Engineering

at the

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

June 2012

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ABSTRACT

Surrounded by a constantly changing built environment, the design community is charged with the responsibility of constantly reacting and adapting, creating and innovating, and competing to make the best products. Design procurement methods serve as a vehicle for design professionals to enact change within their built environment and this thesis seeks to address and analyze one such method, bridge design competitions. Unlike Europe, the United States has held few bridge design competitions over the last 20 years, and this thesis focuses on three as case studies: the U.S. Naval Academy Bridge design competition (1989), the San Francisco-Oakland Bay Bridge design process (1997), and the Woodrow Wilson Bridge design competition (1998).

This study uses published literature, newspaper and journal articles, design competition literature, and personal interviews with key players in the bridge design community in the United States and Europe. Thorough histories and personal accounts were compiled for each case study, which included both facts and personal opinion from competition organizers and participants. Advantages and disadvantages of bridge design competitions are discussed, as well as recommendations for the future goals and ambitions of design in the United States. Discussion and conclusions address current design procurement methodologies while posing commentary on the future of bridge design.

Bridge design in the United States must rise to the challenge and rival the best design communities around the world. We must break away from lowest cost designs and move toward an environment that fosters and encourages innovation, creativity, and professional debate.

Thesis Supervisor: John A. Ochsendorf
Title: Associate Professor of Building Technology and Civil and Environmental Engineering

ACKNOWLEDGEMENTS

Our role models shape the way that we live, act, respond, and think; my role models have taught me to never stop learning and to always ask questions. Without their guidance, influences, thoughtfulness, and support, my thesis would never have come to fruition.

Thank you, John Ochsendorf, for providing the encouragement and wisdom necessary to produce my thesis. Without your perpetual assistance and helpful consideration, my thesis would not have achieved a quality of which I would be proud; thank you for helping me hone and craft a product that has true value for me.

Thank you Mom, Dad, Zack, and Doug. Thank you for your endless motivation, encouragement, and cajoling. Thank you for urging me to always aim higher, reach farther, and fight for my beliefs. Thank you for dealing with complaints, confusion, anger, and resentment. Thank you for playing an integral role in my upbringing, my education, my many ambitions, and my thesis.

Thank you MIT, Dr. Jerome Connor, Dr. Eric Adams, and the M.Eng. program for taking a chance on an Architecture student from the University of Michigan. My interests and goals have been expanded and diversified thanks to an incredibly fulfilling year. My thesis is a product of the hard work and long hours that I've put into this program.

Thank you to those who have allowed me to interview them for this thesis. When choosing a topic and planning my content, I would never have dreamed that the end product would be so valuable to me. I have learned so much from this process and appreciate the hours others so graciously spent on the phone during my interviews. Thank you Mr. Bob Healy, Mr. Paul Matys, and Mr. Mal Kerley for sending me crucial documentation, competition literature, and articles; without these documents, my thesis would not have come to light. Thank you Mr. David Billington, Mr. "Jock" Freedman, Mr. Fred Gottemoeller, and Mr. Angus Low for allowing multiple phone calls, emails, and interactions—your opinions and helpful words helped shape my thesis. Thank you Mr. Tom Jenkins, Mr. Bart Ney, Mr. Randy Rentschler, Mr. Ted Zoli, Mr. Miguel Rosales, and Mr. Anil Agrawal for finding time to talk to me about my work —my thesis has truly benefitted from your experiences and knowledge. Without these 13 interviews, my thesis would lack the wonderful anecdotes, thoughtfulness, and personal accounts that are so crucial to the history narrative of bridge design competitions.

Thank you to my fellow M.Eng peers. I honestly would not have survived this school year without your help, tutelage, and friendship. My thesis has benefitted from your helpful advice, knowledge, and occasional criticism.

Without the constant encouragement and support of those mentioned above, I would not be nearly as gratified with my end result.

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Chapter 1 : Introduction

"Bridge design is an art, an art that uses science and mathematics to support many of its judgments. Other choices are made during the design process that science cannot help, such as decisions about appearance" (F. Gottemoeller 2004)

While bridges are built for people to use, they are designed for people to look at, to move across, and to pass beneath. Bridge design is an art form, a skill that must be practiced and perfected; the design community offers an array of venues and outlets for bridge designers to express their creativity in an ever-changing environment. One such vehicle for innovation and creativity within the design procurement spectrum are bridge design competitions, which are rarely held in the United States despite their widespread popularity in Europe. Although they offer many advantages over traditional procurement methods, competitions are overlooked and brushed aside in the United States for cheaper designs and procurement methods that opt out of public input and professional debate. Europe holds bridge design competitions every year, and though competitions across Europe are not always structured similarly, participants and residents learn from the experience.

How can design professionals in the United States adapt to changing trends, materials, and environments, as our neighbors in Europe seem to accept so fluidly? The following chapters seek to determine whether bridge design competitions in the United States enable and support a culture that craves contrasting views and opinions. A design community that lacks professional debate runs the risk of ceasing to adapt and progress. Do bridge design competitions enable and catalyze discourse among design professionals? Through careful examination of the bridge design process and reasons for which competitions are held, this thesis questions the role of the owner in providing a better bridge for the public.

Owners and sponsoring agencies in the United States have become increasingly concerned with the final cost, the bottom line. Cost of labor and materials in an era of recession and limited spending has caused owners to push aesthetics and innovation to the back burner. Can the design community combat this culture of cheaper is better through alternative procurement methods? An excerpt from Mr. Fred Gottemoeller's book, *Bridgescape*, discusses the importance of effective bridge design:

> Engineers are the professionals to whom our society has given the responsibility of designing bridges. Our society asks that its bridges perform well, cost no more than necessary, and look good. The public wants assets to their communities, in every sense of that word (F. Gottemoeller 2004).

Design professionals create change and develop innovative ideas that alter the design environment. This thesis questions whether bridge design competitions can effectively serve as a vehicle for enacting design breakthroughs. The following chapters seek to address the effectiveness of bridge design competitions at producing a better bridge for the public. The thesis will analyze three bridge design case studies in the United States (1989-

1998) and confront the advantages and disadvantages of the design competition method before questioning whether the design community in the United States should urge state officials and sponsoring agencies to conduct design competitions in the future. Why has the United States been slow to accept the design competition process? Can the bridge design community continue to adapt to a changing environment without a competitive design process that encourages innovation?

Literature detailing the processes and merits of design competitions in the United States is lacking; published literature exists primarily in the form of newspaper and journal opinion articles surrounding the few major competitions held in the United States. Competition information, compiled before and after the competition processes, provides a detailed outline of the competition structure, project constraints and guidelines, and jury processes. Advantages, disadvantages, and recommendations for the future of bridge design competition processes in the United States have not been addressed as they relate to specific case studies through the eyes of key participants. Case studies analyzed in the following chapters include the U.S. Naval Academy Bridge design competition (1989), the San Francisco-Oakland Bay Bridge design process (1997), and the Woodrow Wilson Bridge design competition (1998). Design processes for each bridge are examined through the lens of published literature and news sources, competition literature, and personal interviews.

1.1 Methodology

For each of the three case studies examined in this thesis, I researched, analyzed, and considered multiple resources, including published engineering literature, news sources (newspapers, journal articles, videos), web sites, competitions literature, and personal interviews. Information, both fact and opinion, was compiled for each case study in order to best present a well-rounded understanding of the competition process.

I conducted a series of personal interviews with 13 carefully selected members of the design community who provided facts and opinions about competition processes and results. Interviewees were selected based on their involvement in and understanding of the bridge competitions as well as their standing within the bridge design and competition communities. The following list provides a brief description of the persons I interviewed, along with their roles in the design processes:

U.S. Naval Academy Bridge Design Competition (1989)

- Professor David Billington: A professor at Princeton University, Professor Billington sparked interest in and organized the U.S. Naval Academy Bridge design competition. Previous experiences and background working with world-renowned Swiss bridge engineers provoked Billington to pursue and urge design competitions in the United States. Billington helped to organize the process and served on the jury during the competition.

- Mr. Frederick Gottemoeller: An employee of the Maryland DOT, Mr. Gottemoeller served as a competition advisor during the U.S. Naval Academy Bridge design competition.
- Mr. Earle "Jock" Freedman: Serving as a bridge engineer for the Maryland Department of Transportation for more than 62 years, Mr. Freedman was a crucial member of the organizing committee and jury for the U.S. Naval Academy Bridge design competition.
- Mr. Thomas Jenkins: Mr. Jenkins was the manager of the winning design team (employed by *Grenier, Inc*) for the U.S. Naval Academy Bridge design competition.

San Francisco-Oakland Bay Bridge Design Process (1997)

- Mr. Bart Ney: As senior communications manager for the toll bridge program for the California Department of Transportation (Caltrans), Mr. Ney has been part of the design and construction process since 2004.
- Mr. Randy Rentschler: As spokesman for the Metropolitan Transportation Commission, Mr. Rentschler summarized the reasoning behind the San Francisco-Oakland Bay Bridge design process.

Woodrow Wilson Bridge Design Competition (1998)

- Professor David Billington: A primary reason and driving force for holding a bridge design competition for the Woodrow Wilson bridge, Billington served on the Selection Panel for the Woodrow Wilson Bridge design competition. He also prompted the Naval Academy Bridge competition.
- Mr. Earle "Jock" Freedman: Mr. Freedman was Deputy Chief Engineer for Maryland DOT, one of the reasons for holding competition, and member of Selection Panel for Woodrow Wilson Bridge design competition. He, too, worked with the Naval Academy Bridge competition.
- Mr. Frederick Gottemoeller: Author of *Bridgescape: The Art of Designing Bridges* and advisor on the competition for the U.S. Naval Academy bridge, Mr. Gottemoeller worked on the Environmental Impact Statement (EIS) for the Woodrow Wilson Bridge design competition.
- Mr. Robert Healy: Mr. Healy was state project manager and member of the Potomac River Crossing (consultant group) for the Woodrow Wilson Bridge design competition
- Mr. Thomas Jenkins: Mr. Jenkins served as a member of the Technical Advisory Committee for the Woodrow Wilson Bridge design competition. He served as manager of the winning design team for the U.S. Naval Academy bridge competition.
- Mr. Mal Kerley: Mr. Kerley was State Structure and Bridge Engineer for the Virginia DOT and member of the Selection Panel for the Woodrow Wilson Bridge design competition
- Mr. Miguel Rosales: Mr. Rosales was Principal of the firm of the winning design team (*Rosales + Partners*) for the Woodrow Wilson Bridge design competition.
- Mr. Theodore Zoli: As a bridge engineer for *HNTB Corporation* in New York City, he worked on the team that submitted design for Woodrow Wilson Bridge design competition.

General Bridge Design Competitions/Traditional Procurement Methods

- Professor Anil Agrawal: Prof. Agrawal is Professor of Civil Engineering at City University of New York and Chief Editor of the *ASCE Journal of Bridge Engineering*.
- Professor David Billington: Professor of Engineering at Princeton University, Mr. Billington has spent much of his life studying bridge design.
- Mr. Frederick Gottemoeller: Having more than 42 years of experience in bridge design, Mr. Gottemoeller, now Principal of *Bridgescape, LLC*, consults on major infrastructure projects.
- Mr. Angus Low: As bridge designer for *Arup International*, Mr. Low has spent years working on bridge designs around the world; living in the UK, Mr. Low has participated in more than 50 bridge design competitions during his career
- Mr. Miguel Rosales: As Principal of Engineering and Architecture firm (*Rosales + Partners)*, he has been a bridge designer and a participant in multiple design competitions.
- Mr. Theodore Zoli: As a bridge engineer for *HNTB Corporation* in New York City and 2009 MacArthur Fellow, Mr. Zoli leads *HNTB* design teams through competitions.

1.2 Thesis Organization

The following chapters pose, discuss, and evaluate bridge design competition processes in the United States. Chapters 2-4 describe and evaluate three bridge design processes: the U.S. Naval Academy Bridge design competition (1989), the San Francisco-Oakland Bay Bridge design process (1997), and the Woodrow Wilson Bridge design competition (1998). Case studies were compiled through newspaper and journal articles, competition literature, and personal interviews. Each case presents the background and context, the competition process, designs considered, judging, competition outcome and results, and a summary. Summary sections of the case studies discuss the merits of the competition process and lessons learned for future processes. Following the detailed case studies, Chapter 5 presents a discussion of the advantages and disadvantages of bridge design competitions in the United States as they relate to alternative design procurement methods. Lessons learned from the various case studies expose key takeaways from design processes. Chapter 6 synthesizes lessons learned from the competitions with future goals for the design community; the conclusions recapitulate the importance of innovation and creativity in the field of engineering through the use of various design processes.

Chapter 2 : Case Study 1 – United States Naval Academy Bridge (1989)

2.1 Background and Context

Badly in need of rehabilitation and replacement, the former Maryland 450 span over the Severn River in Maryland had been in use for more than 60 years by the mid- 1980s. The deteriorating drawbridge, built in the early 1920s and shown in Figure 2.1 below, had been built to bring people and vehicles through the eastern entrance into Maryland's capital city of Annapolis. According to Petroski (1999), the historically significant city, filled with Georgian and Victorian architecture, became the backdrop for the Maryland 450 replacement span. Those involved in the design process for the new bridge recognized the potential angst and outcry of the residential communities surrounding the bridge location. The new bridge would sit near the mouth of the Severn River, where it empties into Chesapeake Bay. Visible from many areas in the city and multiple residential neighborhoods, constantly utilized by recreational sailboat traffic, and an important feature of one of the city's main entrances, the new design required approval from multiple parties. Program Rules of the Design Competition noted that the bridge's western approaches fall within the U.S. Naval Academy grounds, while the eastern approaches fall within a scenic overlook and the popular Jonas Green Park—all aspects of the new bridge would be visible to the surrounding community (Petroski 1999) (Freedman 2012) (SHA and GOAC 1989).

Figure 2.1 Original Severn River Bridge built in the 1920s; *Source:* (SHA and GOAC 1989)

Prior to beginning the design process for the revitalized bridge, the state government needed convincing that a large-scale and expensive infrastructure project was necessary. During a phone interview, engineer Earle "Jock" Freedman noted the importance of convincing the then current Governor, William Donald Schaefer, of the need for a

replacement span. Mr. Freedman spoke of meeting the Governor early one morning in Annapolis after which he and the Governor maneuvered a boat beneath the existing bridge to gain a better vantage point of the deteriorating structure. Later that day, Governor Schaefer expressed an interest in a new design to include an overlook so that the public may enjoy the river and views of the area. Once he had convinced Governor Schaefer of the need for a new bridge, Mr. Freedman toured the community and presented a slideshow highlighting the existing bridge's problems and deteriorating structural health. Mr. Freedman recognized the importance of community support for such a high visibility project and made significant efforts to gain residential endorsement (Freedman 2012).

As the residents and state government warmed to the idea of a new bridge, both the Maryland State Highway Administration (SHA) and the Maryland Governor's Office of Art and Culture (GOAC) began to contemplate the best possible design and delivery method for the new structure. During the interview, Mr. Freedman noted two main drivers when determining the design delivery method: importance of stakeholder representation throughout the design and construction processes, and benefit of an innovative competitive process (after which the winner is awarded complete design of the project). Mr. Freedman remembered a conversation with Professor David Billington during which the Professor noted "nobody has had a contest in the last 100 years where the winner [of the competition] got to design the bridge," rather the project was not built, or the concept was passed off before final design. Mr. Freedman went on to recognize that traditional design methods allow for only one consultant where the design is constrained by the ideas of a single firm's key people versus a competition method where the design benefits from the ideas of 7-8 consultants (Freedman 2012).

After much deliberation and strong urging from Professor David Billington, the SHA and GOAC chose to hold an international design competition. Petroski's article, "Drawing Bridges," made mention of an earlier quote from Professor Billington, in which he deemed the process as the "First international engineering-design competition held in the U.S. in almost a century" (Petroski 1999). The Design Competition Program and Rules stated that the two organizations recognized

> This was an engineering competition. Its goal is to bring to this important site those people who know the most about bridge engineering, and to encourage them to think technically, economically and aesthetically about how best to bridge it. The result should be a work of structural art, which will make Maryland proud (SHA and GOAC 1989).

The high visibility of the project and its significance within the community catalyzed the SHA and the GOAC to structure their competition similar to competitions in Switzerland. World-renowned Swiss bridge designer, Christian Menn, was brought on to the team to aid Professor Billington in providing guidance to the SHA and GOAC throughout the competition process. The two men set in motion a historically significant bridge design competition that could serve as the groundwork for future bridge design competitions.

2.2 Design Constraints and Guidelines

Multiple parties played a role in setting up the Severn River Bridge design competition, and the competition was co-sponsored by Maryland SHA and the Governor's Office of Art and Culture. Prior to the authoring and induction of the official Program Rules, Mr. Freedman met with members of the Naval Academy to determine the required underclearance for Naval boats pending the decision to have a fixed bridge versus a movable bridge. During Mr. Freedman's meeting, the Naval Academy exercised authority over the River and mandated the underclearance be a minimum or 65' for any new designs. Twenty feet higher than the existing bridge, the new designs seemed a threatening new addition to the views of many Annapolis residents. In order to quell fears, the SHA chose to prove to the community, with the help of some large balloons, that a 65' underclearence would not impede unto any views of the river. On a relatively windy day, Mr. Freedman and his colleagues set to tying balloons to the existing span so that strategically situated members of the community could view the new height from various points around Annapolis. Despite interference from the wind, Freedman and his colleagues convinced the community that a 65' height would cause no obstruction to views of the river (Freedman 2012).

Additional constraints, as noted in the official Program and Rules, had been developed in an earlier project-planning study that included a public hearing. Specific constraints were deemed mandatory and included (SHA and GOAC 1989):

- Location of the new bridge must be immediately south of the existing bridge, span approximately 2700 feet, and must not disrupt Jonas Green Park
- Bridge must be a fixed, high-level crossing with the capacity of carrying two lanes of traffic, two shoulders, and two pedestrian sidewalks
- Minimum underclearance must be 65' and provide a 300' wide main channel with a maximum vertical grade of 5%
- Traffic lanes and boat passage must be maintained throughout construction and the existing bridge must be removed following completion of the new bridge
    - Design entries must discuss potential construction staging for areas of conflict, on the approaches, with the existing bridge
- Estimated construction costs must be held within $25 to $30 million in 1989 dollars
    - Designs over $30 million will be evaluated but penalized under economic grounds

Each design entry was charged with meeting the above criteria prior to final evaluation; the competition process and structure are outlined in the following section.

2.3 Competition Process

Maryland SHA and GOAC faced fundamental decisions throughout the entire competition process, beginning with the competition's structure. Both parties were aware that residents of the community, engineering experts, and competition entrants would

scrutinize decisions made during the competition process. The competition process extended over many months and was segmented into two main competition stages: (1) interested parties would submit qualifications and letter of intent, and (2) then a shortlist of finalists would submit designs. A key ingredient during the competition was keeping the selection process fair for all entrants; the competition committees achieved fairness through a number of measures. The competition's impartial conditions included: anonymous submittals where each was assigned a letter of the alphabet (i.e. A, B, C, D) as an identifier in lieu of the firm's name, feedback from four key committees comprised of powerful members of the engineering field and Annapolis community, streamlined renderings drawn by one artist, and a unanimous jury selection.

The Program and Rules of the competition clearly outlined the process phases for entrants, jurors, and stakeholders. Stage one of the design competition was advertised to include "any interested qualified party," both domestic and international, and required applicants to submit a Letter of Interest along with their firm's qualifications, resumés, and proof of design of 3 to 5 similar bridge projects. All entrants were encouraged to include minority participation and were given the choice of working individually or as a joint venture. Additionally, firms were required to include a consulting engineering firm experienced in long span bridge design projects. By April 3rd, 1989, SHA and GOAC received 21 responses from firms located in both the United States as well as Western Europe (Mastaglio 1996). A small selection committee consisting of members from SHA, GOAC, and Professor Billington evaluated the entrants based on engineering ability, evidence of innovation and quality of design, and evidence of ability to design bridges (SHA and GOAC 1989). By May 1st, 1989, the selection panel had chosen 6 shortlisted finalists and alerted the shortlist that should they withdraw prior to the deadline for submission, they would be subject to a $5,000 fine. Of the shortlisted firms, 5 were American firms and one was an international firm (Petroski 1999) (Billington 2012). The shortlisted firms included (Kurdle 1990)

- *Calatrava-Vals S. S.* of Zurich, Switzerland
- *Arvid Grant and Associates* of Olympia, Washington
- *Grenier, Inc* of Towson, Maryland
- *HDR-Richardson Gordon, Inc* of Pittsburgh, Pennsylvania
- *Howard, Needles, Tammen & Bergdorf (HNTB)* of Kansas City, Missouri
- *Steinman, Boynton, Gronquist & Birdsall* of New York, New York.

According to the official Program and Rules, Stage 2 required the shortlisted finalists to prepare proposal in just under four months, due by August 21, 1989 for the bridge design that included:

- Preliminary design development
- Engineering calculations of major structural elements
- Drawings illustrating size and shape of major members as well we feasibility of design

Upon completion of Stage 2, along with determination of a complete submittal package, shortlisted applicants would receive $20,000 toward their incurred design costs. In his interview, Mr. Fred Gottemoeller noted the reasons for distributing money to the entrants:

> So that they could defray some of their expenses. They all spent, I'm sure, much more than that. That's part of the deal, I think, with competitions is you really have to face the fact that if you want good work from these guys you've got to give them something, otherwise it's too big a risk for them (Gottemoeller 2012).

An additional $25,000 was reserved for prize money awarded to entrants and divided as the jury saw fit (SHA and GOAC 1989) (Petroski 1999).

Anonymity, paired with renderings created by one artist, pushed the entrants onto an even playing field and allowed the jury members to assess the designs with an objective eye. During an interview, Mr. Paul Matys of the Maryland SHA noted the importance of normalizing the entries so that the final jury may view the designs from common vantage points in consistent renderings. The SHA and GOAC recognized difficulties involved with multiple artists rendering designs and instead hired one artist to streamline the final products to allow for a more fair output. A simplified design process chronology may be found in Appendix B.

2.4 Designs Considered

Five of the six shortlisted firms submitted designs for consideration and evaluation. The sixth firm of Calatrava-Vals pulled out of the competition just days before final proposals were due (Billington 2012) (Kurdle 1990). Given relatively loose criteria concerning specific structural design, three main design types may be established from the five entries; superstructure types included: two concrete arch-type bridges, one concrete cable-stayed bridge, and two composite steel box girder bridges. The designs, along with the firms that entered them, may be found below in Figure 2.2 through Figure 2.6.

Entry B – *Greiner, Inc* Figure 2.2
Grenier Inc's proposal was comprised of two trapezoidal box girders supporting a concrete slab, which carried the roadway and sidewalks. Beneath the road slab sat girders that were interconnected by steel box diaphragms at columns. Main channel girders were shaped to haunch over the main span piers; the main span allowed a 300' channel while remaining spans varied between 105'-185'. Girders at each pier were support by two tall, thin octagonal columns; jurors felt that the thin columns allowed superstructure to dominate aesthetically (Kurdle 1990).

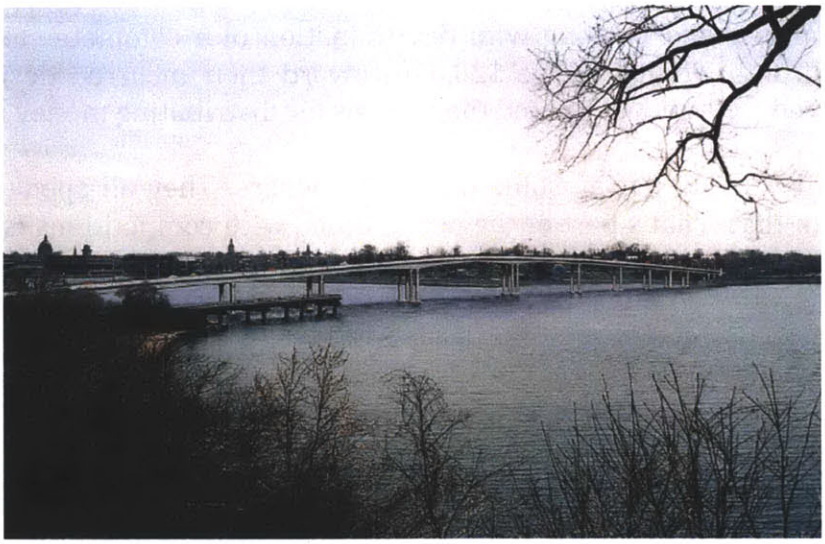

Figure 2.2 Severn River Bridge Design Competition, Entry B – *Grenier, Inc.; Source:* (Kurdle 1990)

Entry C – *HNTB* Figure 2.3
HNTB's proposal was designed as a poured-in-place concrete arch bridge. Aesthetic design intent was to provide deck overhang; designers chose to maintain an arch width equal to one third of the total bridge width to allow a pronounced overhang. Arch structure was comprised of hollow box cross sections and secondary smaller arches between primary arches supported the deck. The design's main span was 300' and included arched approach spans with smaller widths (Kurdle 1990).

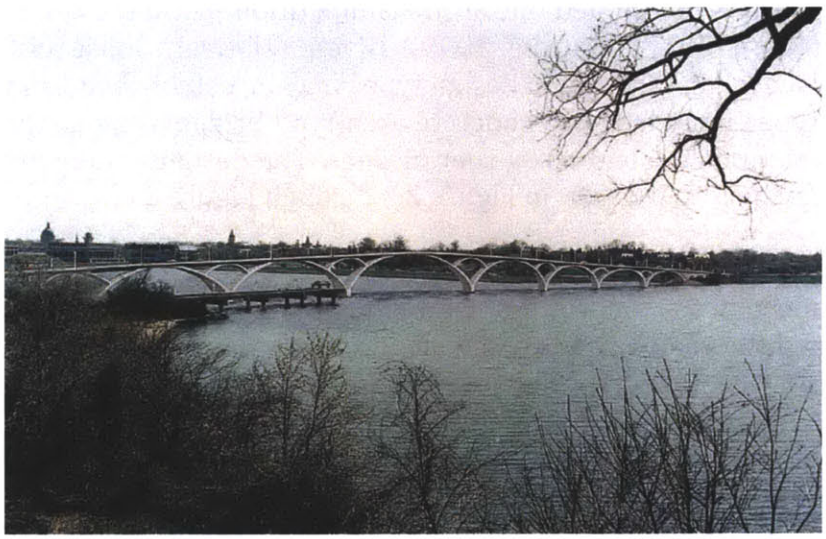

Figure 2.3 Severn River Bridge Design Competition, Entry C – *HNTB; Source:* (Kurdle 1990)

Entry D – *HDR-Richardson Gordon* Figure 2.4
HDR Richardson Gordon's design consisted of a cable-stayed bridge whose main girders were supported by cables hung from a main tower. Two main concrete spans of 450' were set on either side of 320' concrete tower; one either side of the main spans, approach spans

were supported by Y-shaped piers. Piers heights decreased as the spans extended toward the shoreline. Jurors claimed that Entry D would be "the strongest at providing a 'signature' bridge at this important point" (Kurdle 1990).

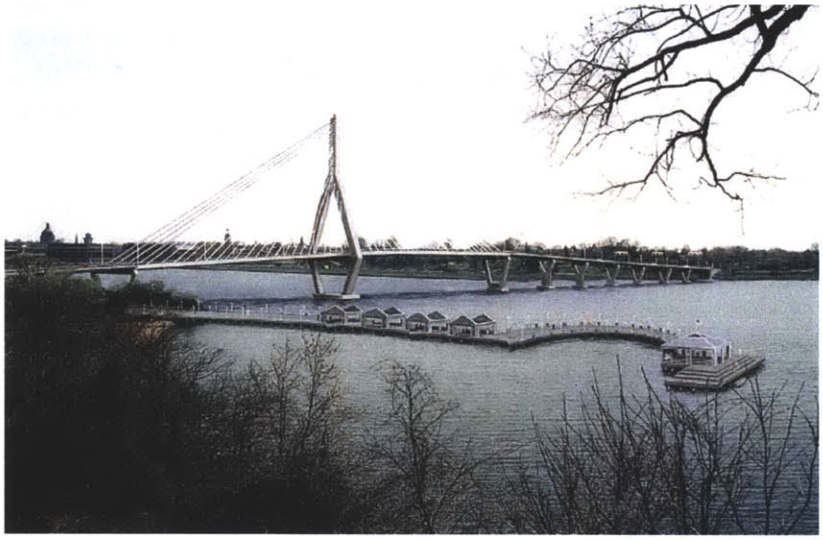

Figure 2.4 Severn River Bridge Design Competition, Entry D – *HDR-Richardson Gordon; Source:* (Kurdle 1990)

Entry E – *Steinman, Boynton, Gronquist & Birdsall* Figure 2.5

Steinman, Boynton, Gronquist & Birdsall proposed a hybrid bridge, which combined a segmented post-tensioned precast concrete girder with a precast concrete arch scheme. The design's lightweight concrete deck width allowed for an overhang and arches connected to girders via thin, closely spaced vertical spandrel members. One main span allowed a 300's channel width with approaching spans that decreased in width toward the shore. Girders were designed to support the dead loads of entire bridge while arches were designed to support the live loads (Kurdle 1990).

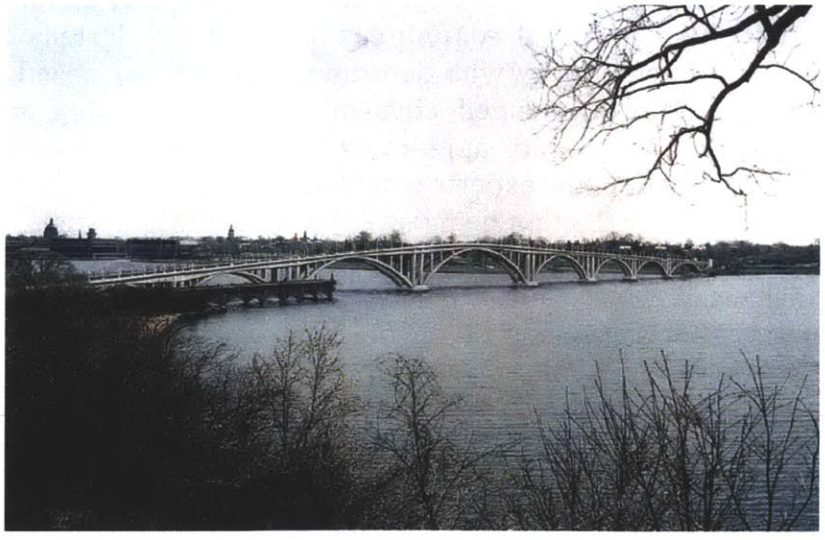

Figure 2.5 Severn River Bridge Design Competition, Entry E - *Steinman, Boynton, Gronquist & Birdsall; Source:* (Kurdle 1990)

Entry F – *Arvid Grant and Associates* Figure 2.6
Arvid Grant and Associates proposal was comprised of two steel box girders with rectangular cross sections that supported a high-strength concrete deck. Piers resembled the form of abbreviated an hammerhead shape and supported haunched girders. The width of the main span was 300' and provided additional spans decreasing in width toward shore. Designers included a "light tube," intended to outline the bridge with a continuous band of light (Kurdle 1990).

Figure 2.6 Severn River Bridge Design Competition, Entry F - *Arvid Grant and Associates; Source:* (Kurdle 1990)

2.5 Judging

Final judging of the designs was structured similar to the entry set-up and was segmented into two stages: first, two technical committees assessed the designs and published a report, followed by a 14-person jury who determined the winner based on the technical committee's reports and three planned days of discussion. During an interview, Mr. Freedman discussed his reasoning for appointing two technical committees to assess the proposals. He recognized that panel experts would have a chance to ground the ideas based on technical feasibility rather than on being swept away by nice designs. Two committees were formed: a design committee and a construction committee. The design committee, charged with considering the technical merits of each proposal, consisted of five bridge engineering experts from various civil engineering firms. A construction committee, comprised of four experienced contractors from various construction companies, focused its efforts on reviewing constructability and the proposal's cost estimates. A report generated from both technical committees was given to the final jury to serve as a baseline for making educated decisions concerning design feasibility, estimated costs, potential construction issues, and expected future maintenance (Kurdle 1990) (Jenkins 1995).

Following reports from the technical committees, a 14-person jury, chaired by Ms. Florence Kurdle and including Billington and Freedman, spent three days reviewing technical reports, touring the site, and discussing the five proposals. The jury consisted of design professionals, state agencies, local government representatives, and members from the surrounding community; a detailed list of the jurors and their various backgrounds may be found in Appendix B. (Kurdle 1990) (Mastaglio 1996) (Jenkins 1995). The official Program and Rules set specific evaluation criteria for the proposals:

> This is an engineering design competition, meant to integrate the best state of the art thinking about the economy, aesthetics and technology in a single structure. High quality in one factor must be matched by high quality in the other two. The bridge as a work of structural art must enhance its environment (SHA and GOAC 1989).

Additionally, proposals were assessed based on integration of aesthetics, technology, and economy, effectiveness of meeting overall goals of the project, constructability, maintainability, and durability, and overall cost (Kurdle 1990). All five proposals received by August 21, 1989, were deemed feasible for design and construction and each of the five firms was awarded the allotted $20,000 for their efforts through stage 2. The 14-person jury met for three full days in November 1989 to discuss the proposals, tour the bridge site, and review reports from the technical committees (Kurdle 1990). SHA and GOAC recognized the importance of an almost unanimous vote to determine the winning design, as many stakeholders would be affected by the chosen design.

2.6 Competition Outcome and Results

Following jury deliberation, announcements were made public and a Jury Report was published explaining the jury's reasoning behind its choices. Additionally, a Competition Exhibition brochure was mailed to the surrounding community providing details of the outcome and awarded prize money. By an overwhelming majority vote, *Grenier, Inc* of Towson, Maryland (Entry B) was awarded first prize and final design rights for the new bridge. *Grenier's* twin steel box girder design, described as a "graceful haunch" won based on its elegant geometries and form. Among the many reasons for deeming *Grenier's* design first prize, the jury report noted, "The superstructure will appear as a thin, curving ribbon arching over the Severn River" (Kurdle 1990).

Figure 2.7 U.S. Naval Academy Bridge design competition winning entry by *Grenier, Inc*; *Source:* (Mastaglio 1996)

Several articles following design and construction of the bridge refer to the design as a "Ribbon of steel." One jury member went on to note, "This bridge, with its carefully shaped and sophisticated geometry, will give Maryland one of the most exciting and distinctive bridges in the United States" (Kurdle 1990). Despite positive feedback, the jury made several refinements to the bridge design including combining awkward curves into a single flowing curve, replacing four traditionally-styled columns under haunches with two columns, and removing pylons that were meant to appear as a "gateway to Annapolis." Pending acceptance of the design refinements, *Grenier, Inc* was awarded $15,000 for their winning design.

The remaining four finalists were not left empty-handed; each finalist was awarded a smaller sum of prize money. Second place, worth $4,000, was given to *HDR Richardson* (Entry D). Despite its many attractive features, the design was deemed "too large for the site," and "heavy-handed" (Kurdle 1990). Honorable Mentions and $2,000 each were given to the remaining three firms of *Arvid Grant and Associates* (Entry F), *HNTB* (Entry C), *and Steinman, Boynton, Gronquist & Birdsall* (Entry E) (Kurdle 1990) (Maryland State Highway Administration 1990). The SHA and GOAC created a public exhibition of competition entries in May 1990.

Following the competition, nearby residential communities seemed in full support of the winning design and there was little, if any, public backlash. Mr. Paul Matys seemed to remember only compliments, and Mr. Fred Gottemoeller felt that nothing substantially negative was expressed (Matys 2012) (Gottemoeller 2012). However, the competition winner, Mr. Tom Jenkins, seemed to recall a varied public reaction; " . . . the public was not necessarily in agreement with the jury's selection, I would say it was mixed . . . though over time the public has grown to very much appreciate the bridge" (Jenkins 1995). Mr. Theodore Zoli, a renowned bridge designer with HNTB who was not with the firm at the time of the competition, expressed HNTB's disappointment with the jury's outcome following the design competition. He refers to office chatter and exclaims "the winning team was non-compliant with the criteria . . . We felt the analysis of HNTB's submission was flawed . . . the technical analysis was not quite correct" (Zoli 2012). Mr. Zoli also noted that ". . . design competitions have the potential to be . . . troublesome because you're more pitching an idea to a specific audience as opposed to necessarily developing the best idea for the project. And that depends quite a bit on who's judging" (Zoli 2012).

Following the competition outcome, members of SHA and the jury were pleased with the final result; several felt that a fitting design had been achieved. In separate interviews, jury members Professor Billington and Mr. Freedman deemed the winning design a success; Freedman went on to exclaim his excitement with the beautiful bridge (Billington 2012) (Freedman 2012). According to a Baltimore Sun article written in 2010, Mr. Freedman of the state's Office of Bridge Development, had been with the SHA for decades and still felt strongly about the project: "Of all the bridges he's worked on in his 60-year career, it's the one he takes most pride in" (The Baltimore Sun 2010).

Following announcement of the winner, the SHA and GOAC planned to advertise bidding for construction in 1992 with completion in 1994. The total budget for the project was

approximately $34 million, a figure that held true throughout the construction process (Siegel 1995). Named for the U.S. Naval Academy in 1994, the bridge has won several award distinctions including one from the American Society of Civil Engineers and another from National Endowment for the Arts (Siegel 1995).

2.7 Summary

Without precedent for nearly 100 years and with much to prove, the Severn River Bridge Design Competition in Maryland opened the door for future innovative design processes. Despite receiving some criticism, the competition served its purpose: finding an appropriate design that fit aesthetic and technical constraints through a transparent process that allowed and encouraged public input. Mr. Fred Gottemoeller concluded that the competition

> . . . did a couple things: for one thing, it did raise the bar . . . and the second thing was that it resolved controversy about the bridge design because we put on the jury representatives that had been objective about the previous design . . . and the chairman of the jury was wise enough to insist that the judgment was unanimous (Gottemoeller 2012).

He went on the say that he felt the competition was successful at producing a better bridge for the public; the project team laid out aspirational rules and pushed for a high quality bridge that got the designers out of mindset of typical welded plate girders. Mr. Gottemoeller felt that Maryland really got what they wanted which was a first class bridge (Gottemoeller 2012).

After analyzing Maryland's unprecedented design competition, one can note a number of factors that contributed to the overall success of the competition process and outcome. Though a few hiccups and mistakes were made along the way, the city of Annapolis and a majority of its residents welcomed the bridge as its new gateway to the city. Those who pioneered the process summarized the necessary ingredients for a successful competition, which included:

- Transparent and highly visible process which allows for community involvement and input from the beginning
- Jury comprised of design professionals as well as community representatives
- Unanimous jury vote for winning design
    - Along with diverse jury, a unanimous vote ensures that all parties must remain satisfied with the chosen design
- Proper amount of time and money available to accrue and maintain participants
- Winner of competition is given the prize of designing the bridge

Though not all Annapolis residents agreed with the chosen design, the competition achieved international participation, recognition, and acclaim. Engineers across the country took note of Maryland's avant-garde endeavor; though the final design was not

groundbreaking or record setting, the competition sparked interest and conversation within the design community and public spectrum. Members of the jury and sponsoring agencies spoke of the successes of the competition; Mr. David Billington noted,

> There is no doubt in my mind it was a better bridge . . . But at that span, it's not too much you can do without doing something foolish but the bridge is very nice and I think most people will look at it carefully would agree that it's a very nice bridge, it's not a dramatic one, but for that span and for that view, I think it's much -- It's better, very much better than they would have gotten otherwise (Billington 2012).

Mr. Paul Matys, Maryland's project manager for the competition, felt similarly regarding the merits of the final bridge and exclaimed,

> I think we would have ended up with a steel, girder bridge . . . And I think what we ended up with here would be far superior than what we would have came up with. I think it probably would have been a multi-girder bridge, you know you have all the bracing underneath, the diaphragms and the underside of this bridge, it's so clean (Matys 2012).

A participant in the competition, Mr. Tom Jenkins, believed that the competition achieved the primary goals that it has set out to attain:

> I think that it certainly gave them a bridge that they otherwise probably would not have gotten. And it was an opportunity for designers to, sort of, put forth technically good work to be judged. I think that the rationale for the competition was to gain public acceptance for the structure, and I think that the competition succeeded in doing that. In other words, it was a contentious circumstance because of the high visibility of the bridge and the public, sort of, is apprehensive of change . . . there was a strong public sentiment not to really replace the bridge, just to maintain what was already there (Jenkins 1995).

Prior to making judgments as to the technical and aesthetic merits of any particular design, we consider whether the competition achieved its desired results. Maryland's primary motivations for holding a design competition stemmed from motives of gaining public acceptance. Through a competition process, Maryland was able to fulfill the interests of all stakeholders while also catalyzing interest and acclaim across the design community. When determining whether the design competition was effective at producing a better bridge for the public, we must consider the popular alternatives practiced in the 1980s, traditional procurement methods. As noted earlier, Mr. Freedman spoke of the bridge design benefitting from 7-8 consultants, rather than a single firm's capabilities; Maryland's design competition successfully produced multiple results and achieved regional acceptance.

Chapter 3 : Case Study 2 – San Francisco - Oakland Bay Bridge (1997)

3.1 Background and Context

The 15-second earth-shaking Loma Prieta earthquake on October 17, 1989 affected thousands of people and countless structures, including the Oakland Bay Bridge shown in Figure 3.1 below (Fountain 2012). The earthquake's magnitude reached 6.9 on the Richter scale, a force large enough to dislodge a 50-foot section of the upper roadway, causing major damage to both upper and lower decks. Acting quickly, officials moved to expediently repair the span, and within one month, the bridge was once again operable; though fixed, the repairs were but a temporary band-aid to a much larger problem—the bridge was in dire need of updating to account for the seismic disturbances common to the area. Conscious of repairs causing potential disruptions to traffic and commerce, the California Department of Transportation (Caltrans) undertook a 7-year study to determine the most appropriate methods to deal with necessary updates (Petroski, The Bay Bridge 2005).

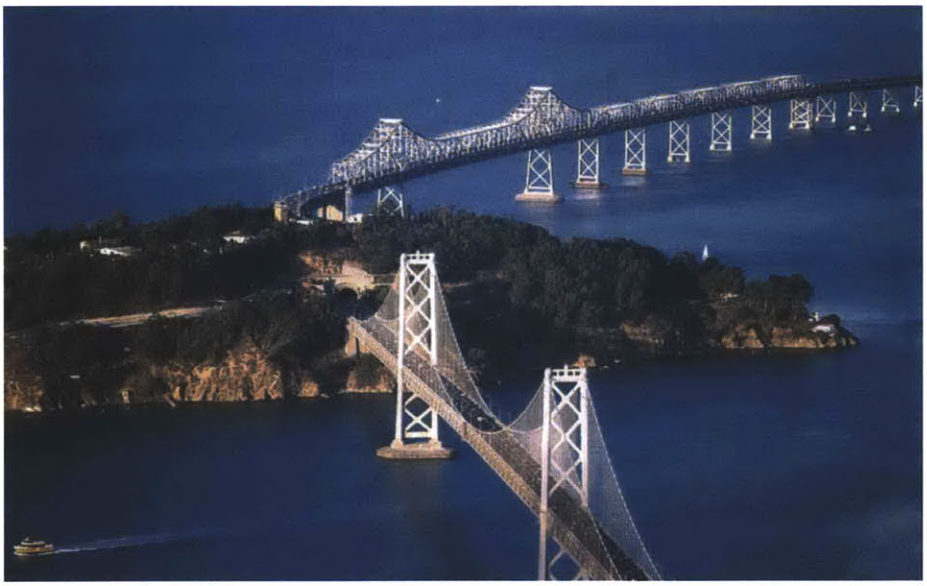

Figure 3.1 Original San Francisco-Oakland Bay Bridge. West span in foreground and East span (to be replaced after Loma Prieta) in background; *Source:* Barrie Rokeach 2005, Metropolitan Transportation Commission

Throughout their study, which concluded in 1997, Caltrans considered the importance of the bridge to the region before recommending that a new bridge be built, rather than a retrofit. The existing bridge (shown Figure 3.1 above), serving as a vital infrastructure link between San Francisco and Oakland for nearly 70 years, carried Interstate 80 across the Bay and boasted upwards of 280,000 vehicles per day. Built between 1933 and 1936 in accordance with the 1930 *Uniform Building* Code for buildings, seismic accelerations of 0.1g were considered, much less than today's standards (Tang, et al. 2000). Costing

approximately $77 million, the project was comprised of an 8-mile span, 4.5 of which careened over water.

Reinforcing the 70-year-old bridge to meet current standards was estimated at $909 million and determined to be extremely disruptive to traffic. Thinking a new span would cost little more than a retrofit, Caltrans urged officials to build a new bridge rather than update the existing span (Petroski, The Bay Bridge 2005). Following the January 1997 Caltrans appeal for a replacement span, the Metropolitan Transportation Commission (MTC) was asked to oversee the bridge design process. Recognizing the need for additional support and management, the MTC formed the 7-person Bay Bridge Design Task Force in March 1997 to develop a regional consensus on an eventual proposed design. Acting together with the Task Force, MTC created the 35-person Engineering Design Advisory Panel (EDAP) to advise on technical issues surrounding the new bridge design. Prior to the formation of MTC's advisory committees, estimates for a replacement span had already ballooned to nearly $1.3 billion (Pollack 2004).

While residents and lawmakers rallied in both support and opposition of a new signature span, key officials set out to secure funding, regardless of the bridge's outcome. Additional supporting agencies asked to participate in the process included the Federal Highway Administration (FHWA) and the San Francisco Bay Conservation and Development Commission. Countless citizens and council-members also participated in the bridge activities, which lasted nearly 18 months, by attending public hearings in four counties, placing hundreds of phone calls, and writing thousands of letters and emails (Tang, et al. 2000) (Diaz and Akizuki 1998). Rather than hold a structured design competition, participating agencies had hoped to set in motion a joint panel-public process to determine the design of the new bridge. Many residents of surrounding communities and state representatives, including Mayor-elect Jerry Brown, felt that sponsoring agencies were not allowing for a transparent design selection process. During a personal interview, Mr. Randy Rentschler, MTC's Director of Legislation and Public Affairs, spoke of the 18-month design process:

> A very significant public process began, of which my agency led it, by statute . . . It appears to the observer that this was just almost a chaotic anything goes kind of thing, right. But the reality of it is that it was much more constrained than any sort of a public competition like a normal person could understand (Rentschler 2012).

Conditions of the Bay were a driving force in the overall process to create and then choose a design. Geologists and seismologists worked countless hours to determine appropriate locations for foundations of the new bridge. In addition to geologic concerns, the region was positioned between two faults, the Hayward Fault and the San Andreas Fault, both of which greatly affected the design outcome. Mr. Rentschler noted the significance of the Bay conditions:

> The Bay is not really building a bridge across the water, it isn't. It's completely deceptive. What it is, is building a bridge across a giant canyon . . . the Bay is a canyon that had been gouged out by a couple of rivers . . . the island is one of the

> ledges in the canyon. And the rest of the Bay is a really shallow bit of water, in some cases 7-10 feet, in most cases across the Bay. Of which below that water is just mud, layers and layers of mud that goes down like 300 feet . . . So the bridge is not over water, the water is just a disguise. The bridge is a bridge over a canyon . . . a canyon filled with mud. So the exact engineering, how you build the structure became the most important thing. And so the designers were totally restricted by a panel of seismic experts who had to determine if any design was seismically safe (Rentschler 2012).

EDAP, the technical committee comprised of architects, engineers, and seismic specialists from various firms, both designed and chose the form of the new signature span for the San Francisco-Oakland Bay Bridge. Mr. Rentschler addressed EDAP's role throughout the 18-month design process:

> What we have here wasn't just a bridge that people wanted to make beautiful on the Bay, but we have a big seismic problem here. So that really restricted down the design options and, in fact, who could do the design. And, in fact, because we had created this panel of 25 experts who'd volunteered to participate, we essentially already had the world expertise already sitting on a panel. And so the people who really, at the end of it all, were involved in the real competition, they were also the judge and the jury as well (Rentschler 2012).

Designs created and considered by EDAP throughout the selection process stemmed from constraints and guidelines surrounding Bay conditions and community interest. During an 18-month period, selection of the design of the new span materialized as an amalgamation of a competition and a design charette.[1] Though longer than typical competitions, EDAP's process awarded no money to participants.

3.2 Design Constraints and Guidelines

Among aesthetic considerations for the new signature span, geologic and seismic constraints governed the proposed designs. During EDAP's various meetings, several key criteria were established as guiding features for proposed designs. Structural safety during and after a seismic event guided designs; the bridge must remain serviceable after a major earthquake to act as a "lifeline" route across the Bay. During a personal interview with Mr. Bart Ney, Senior Communications Manager for Caltrans, he spoke of the design constraints:

> Aesthetics was a big part of the decision-making here . . . Of course the number one criteria in this decision-making process was seismic safety. And we actually created new criteria, that we call 'lifeline,' for the design of this bridge. The design would have to not only not fall down in an earthquake, but be immediately usable after the quake for emergency services. And then be able to be out back into public service

[1] A charette is an intense effort to solve any architectural or design problem within a limited time (http://www.charette.org/charette_definition.html)

without being rebuilt. So that's what the new criteria was that everyone had to take into consideration when they were putting their designs forward (Ney 2012).

MTC, the Bay Bridge Task Force, and EDAP established further guidelines for the new signature span that included (Tang, et al. 2000) (Petroski, The Bay Bridge 2005),

- Incorporation of a pedestrian and bike path separated by a median
- 10 traffic lanes and 4 shoulders—5 lanes and 2 shoulders in each direction
- Potential to be adapted for a future light-rail service
- Built north of the current bridge with single deck structure
- Visual consistency throughout the structure – skyway spans, detail of piers entering water
- Towers must not exceed height of Western span towers (518')
- Navigational requirements: horizontal clearance of 500-foot minimum, and vertical clearance of 135-foot minimum

Addition of a pedestrian and bike lane within the design was not introduced until partway through the design process; angry citizens spoke out against the initially absent pedestrian and bike paths. Early May 1997, Caltrans estimated newly incorporated pedestrian bike paths to cost roughly $167 million above the cost of the bridge design (Pollack 2004).

Design of the new signature span transpired over an 18-month process that included an informal concept competition, multiple EDAP workshops and meetings, input and feedback from passionate residents, and an extraordinarily unique design and selection procedure.

3.3 Process

Oakland residents and city officials regarded the matter of choosing a new signature span an immensely important undertaking. Sponsoring agencies recognized the importance of choosing a design that was appropriate from both an aesthetic as well as technical point of view. Caltrans offered an initial design for a "skyway," or viaduct, across the Bay; Caltrans' viaduct design was met with scrutiny and distaste from members of the surrounding community and labeled "a freeway on stilts" (Ney 2012). Early in the design process, MTC removed design responsibilities from Caltrans, Mr. Randy Rentschler noted:

> Organizations are often dominated by what they can do, their expertise. Caltrans and Departments of Transportations across America are often experts in one single thing —they know concrete . . . DOTs can do concrete . . . when one talks about a design bridge competition and all this stuff, the most important policy issue is to remove it from an organization that can only do one thing and put it into a venue where creative thinking can take place by people that are good at all sorts of things, does this make sense? (Rentschler 2012)

Mr. Rentschler was referring to the 18-month design process that ensued following Caltrans viaduct proposal. Given barely two weeks notice in late April 1997, ten firms and

Caltrans submitted designs to an informal concept competition, whose purpose was to generate ideas, for a replacement span of the Bay Bridge; Caltrans submitted four designs by various members of EDAP's panel (Pollack 2004). Submitted concepts included the following bridge types: single and double tower cable-stayed bridges, a curved cable-stay bridge, self-anchored suspension (SAS) bridges, a floating bridge, hybrid cable stayed/arch bridge, free form modified arch bridge, steel arch (above deck) bridge, segmental concrete arch bridge, single tower (tetrapod) suspension bridge with an observation tower and gondola cars, and repeating spans of cable-stayed or self-anchored suspension bridges (Frick 2005).

Following a 3-day workshop in May 1997, EDAP voted to narrow design choices to four concepts, which would be carried through further design. Much to the dismay of participating firms without EDAP representation, chosen concepts included (1) a single-tower self-anchored suspension (SAS) bridge, (2) a single-tower cable-stayed bridge, (3) a single-tower curved cable-stayed bridge, and (4) Caltrans's concrete skyway (Pollack 2004) (Frick 2005) (D. B. Rosenbaum 1997). Mr. Randy Rentschler spoke of the design process that took place in the 18 months following EDAP's vote:

> There was no way that we were going to allow an open process to come in and someone to be awarded a design in this particular case because of the seismic issues. It was much more constrained than that. So it was as though the seismic requirements was imposed on the designers to kind of incrementally work through. And as soon as they passed some sort of reasonable sign off by this advisory group, they were then allowed to continue in the process (Rentschler 2012).

Majority-rule voting was established within the 35-member EDAP, a process that allowed for little public input and received public and government scrutiny. In the months following the concept competition, EDAP again voted to remove the single-tower curved cable-stayed bridge, reducing the number of concepts to 3; single-tower options were chosen due to difficult geologic conditions and difficulty surrounding multiple towers. Initial cost estimates for the three designs, with the skyway as the baseline, gauged the single-tower SAS to overshoot the baseline by 34% and the single-tower cable-stayed to run 8% above baseline. MTC requested one year to prepare 30% design documents for the two more costly options; November 1997 MTC hired joint venture T.Y. Lin/Moffatt & Nichol Engineers to manage the fabricated design documents (Pollack 2004).

T.Y. Lin/Moffatt & Nichol Engineers hired additional engineering and architectural firms to help draft design documents. The San Francisco-based company Donald MacDonald Architects and the New York-based Weidlinger Associates were hired to work on the single-tower SAS proposal while Philadelphia-based H2L2 Architects were enlisted to assist on design documents for the single-tower cable-stayed bridge (Fang 1998). Design teams worked countless hours and held multiple meetings with EDAP throughout the 30% design document process. In March 1998, T.Y. Lin's design teams proposed several variations to the chosen concepts, including designs with two and three towers. Despite urgings from both design teams, who recommended throwing out the single tower designs because of increased cost, EDAP claimed that a single tower was the most simple and

elegant choice and suspension bridges are more aesthetically pleasing than cable-stayed bridges (Barnum 1998).

Two months later, in May 1998, 30% design documents were presented to EDAP along with the underlying notion that overall cost of the structure had yet again risen from initial estimates. Following a majority vote in late May 1998, EDAP recommended that MTC move forward with designs for a single-tower SAS. EDAP's decision met considerable opposition from leaders in the East Bay area, including engineering and seismic experts sitting on the Panel (Pollack 2004) (Yee and Mina 1998). One member of the Panel, T.Y. Lin, stated that a "suspension bridge represents an ignorance in engineering" and that "it will be a testament to our ignorance. We'll be the laughing stock of the whole world." Mr. Lin, no longer affiliated with the firm he once founded, meant that EDAP had been faced with designs that were both cheaper and easier to construct (Frick 2005). Additional parties enraged by EDAP's decision included the Mayor, Mayor-elect, and other mayors and city council members; the opposing parties joined forces in an attempt to cause a two-month delay in MTC's decision in hopes of spurring interest for an international design competition (La Ganga 1998). Within four weeks of EDAP's recommendation, both the Bay Bridge Design Task Force as well as MTC accepted the single-tower SAS proposal (Pollack 2004).

Four years passed before MTC was able to continue onto the construction process; disagreements and angst from various agencies further delayed MTC's ability to move forward. While California officials worked to quell arguments, estimates for final bridge construction (East span, not including approaches) ballooned upwards of $2.6 billion. Groundbreaking for the new signature span took place January 2002; by August 2004, past a point of no return, estimates reached $5.1 billion (Pollack 2004). A simplified design process chronology may be found in Appendix C.

3.4 Designs Considered

During the 18-month design process, EDAP reviewed multiple designs during a roughly structured charette process. An initial concept competition, held in May 1997, bore many concepts from individual firms and Caltrans. Though treated less as a competition and more as a workshop, the concept competition catalyzed future creativity and innovation throughout the drawn out design process. Discarded concepts put forward during the workshop may be found in Figure 3.2 through Figure 3.19 below. Designs advanced through EDAP's workshop included several from Panel members as well as Caltrans's proposed viaduct.

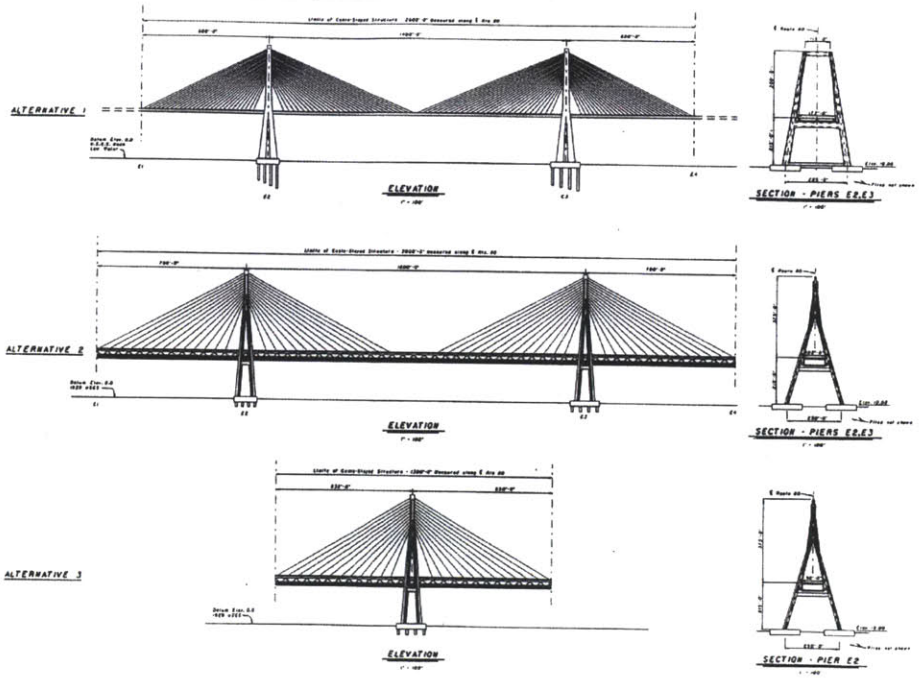

Figure 3.2 Caltrans Cable-Stay Variations; *Source:* (Frick 2005)

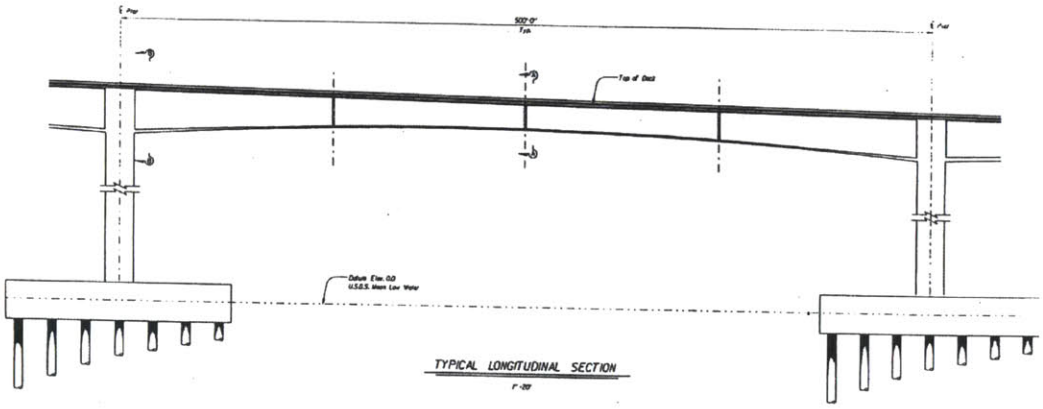

Figure 3.3 Caltrans Viaduct Proposal with 500' spans; *Source:* (Frick 2005)

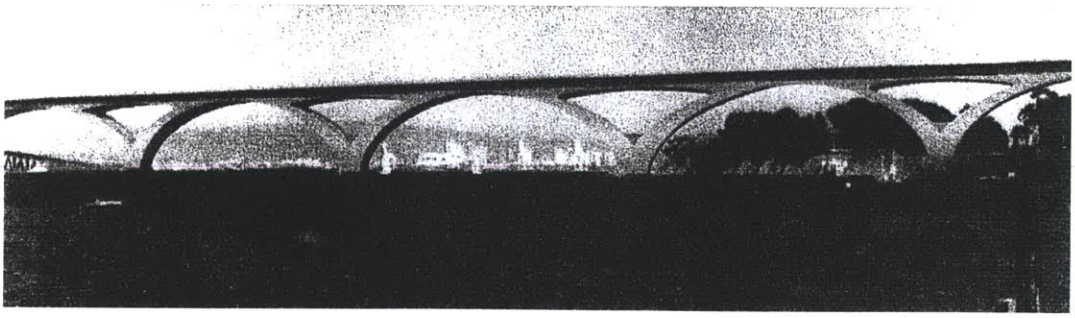

Figure 3.4 Caltrans Arch Viaduct Proposal; *Source:* (Frick 2005)

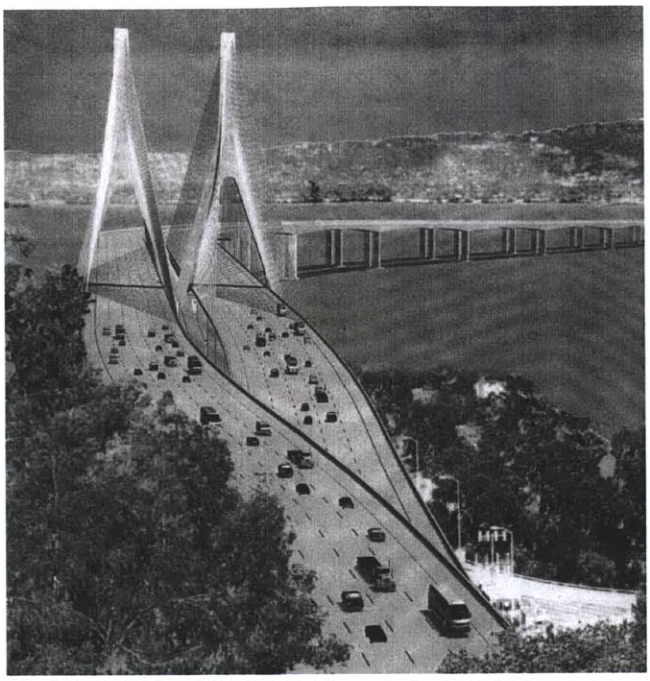

Figure 3.5 Two Tower Cable-Stay by URS Grenier, Imbsen Associates, Inc, and LoBuono, Armstrong, and Associates; Source: (Frick 2005)

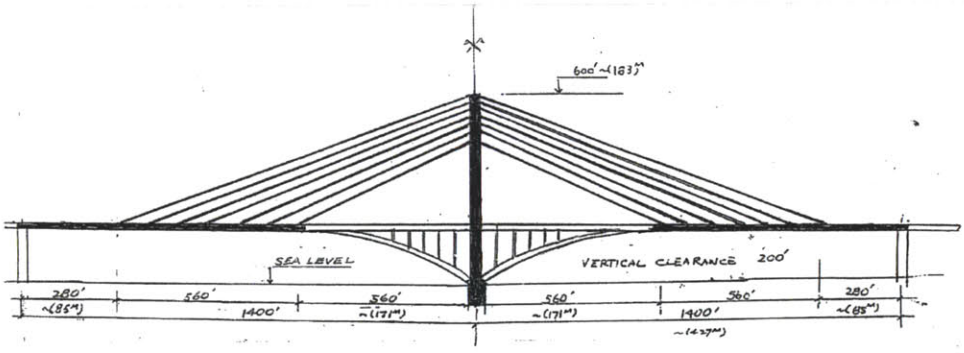

Figure 3.6 Cable-Stay (with Single A-shaped tower) by Zhong Lin-Hsue; *Source:* (Frick 2005)

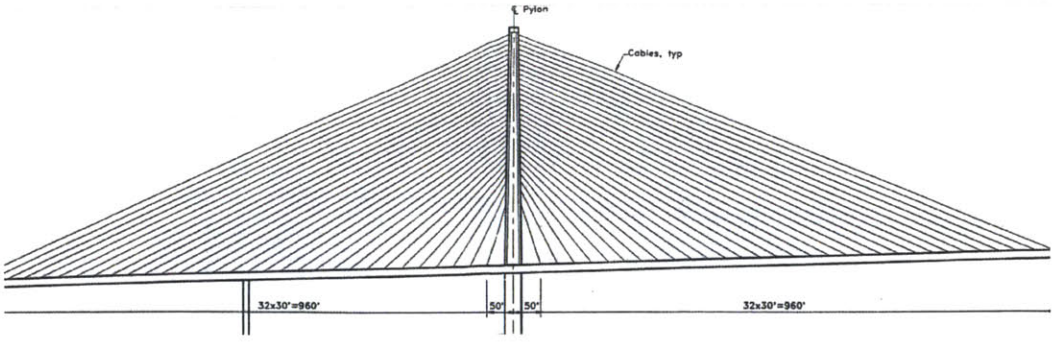

Figure 3.7 Cable-Stay proposal by *T.Y. Lin International*; *Source:* (Frick 2005)

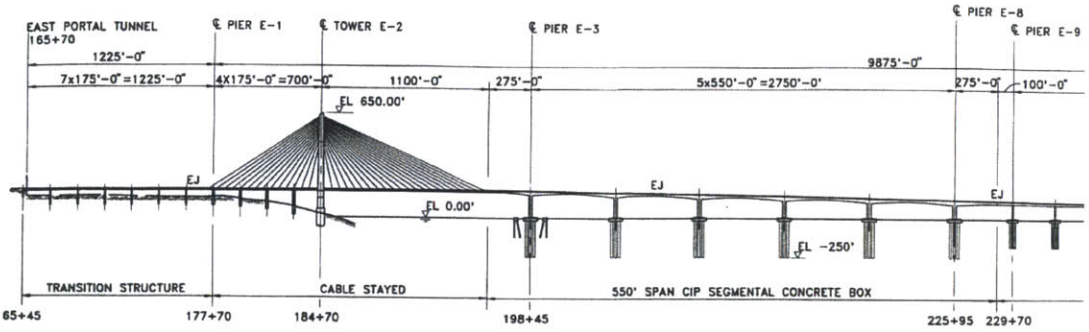

Figure 3.8 Asymmetrical Twin Tower Cable-Stay by *OPAC Consulting Engineers*; *Source:* (Frick 2005)

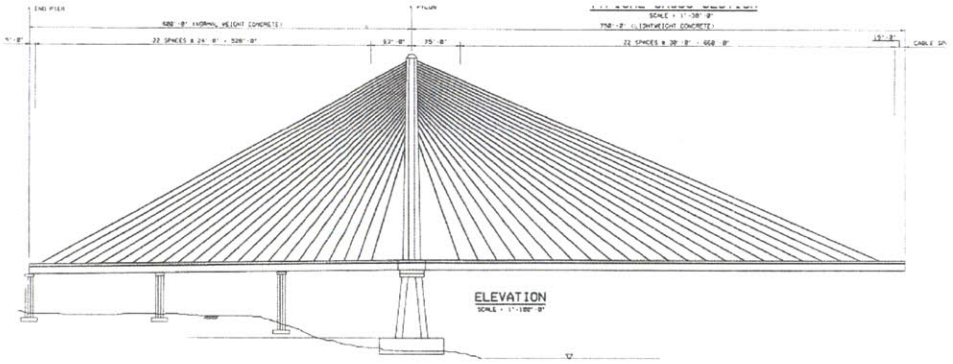

Figure 3.9 Single Tower Two-Span Cable-Stay by *Parsons Brinckerhoff/HNTB* and *SC Solutions, Inc.* and *Digital Structures, Inc.*; *Source:* (Frick 2005)

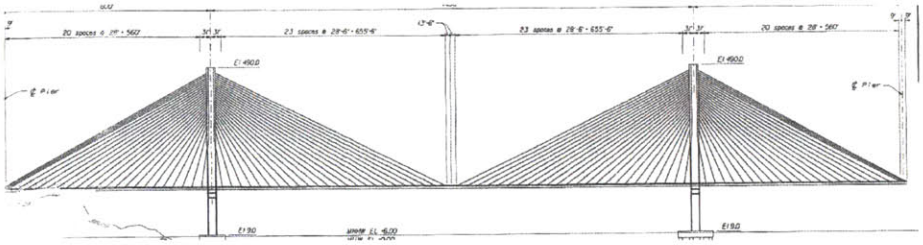

Figure 3.10 Double Diamond Tower Three-Span Cable-Stay by *PB/HNTB* and *SC Solutions, Inc.* and *Digital Structures, Inc.; Source:* (Frick 2005)

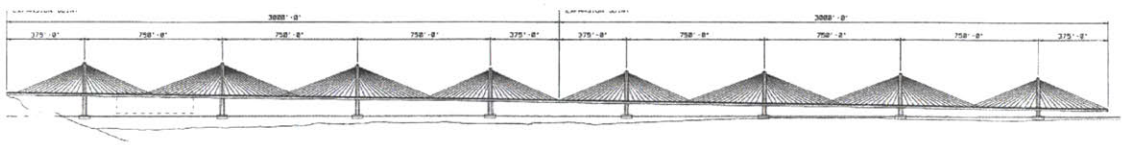

Figure 3.11 Cable-Stay Viaduct by *PB/HNTB* and *SC Solutions, Inc.* and *Digital Structures, Inc.; Source:* (Frick 2005)

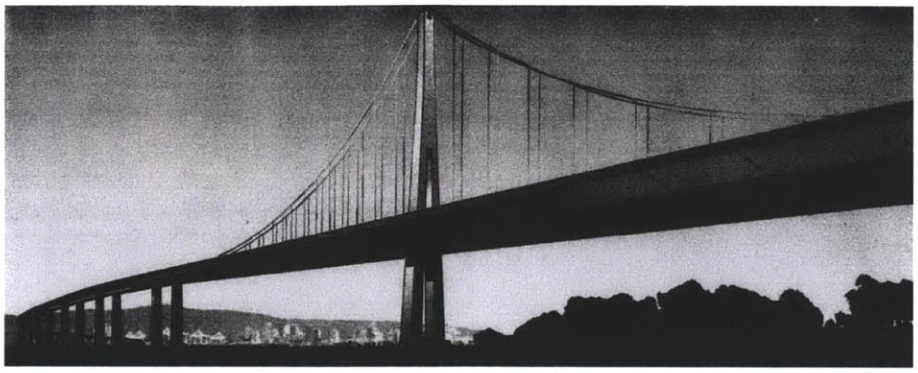

Figure 3.12 Self Anchored Suspension by *Gerwick/Sverdrup/DMJM* joint venture; *Source:* (Frick 2005)

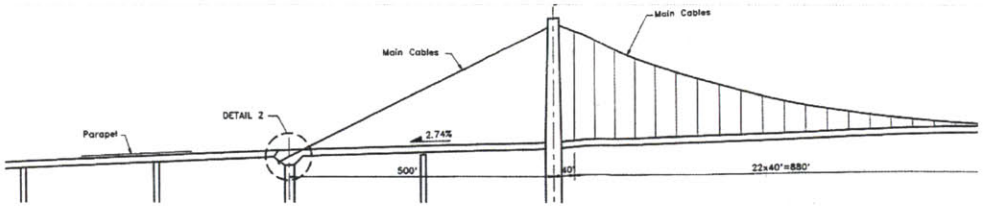

Figure 3.13 symmetrical Self-Anchored Suspension by *T.Y. Lin International; Source:* (Frick 2005)

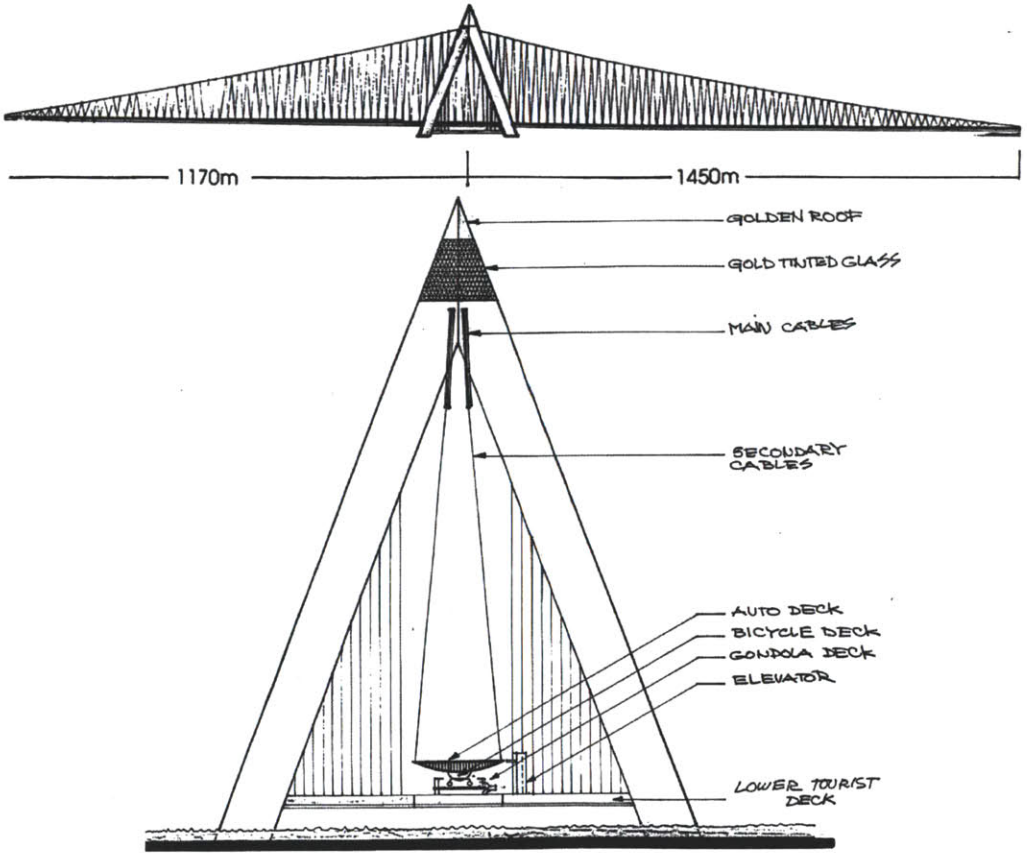

Figure 3.14 Tetrapod Suspension proposal (elevation and tower cross section) by *Coman Feher Associates; Source:* (Frick 2005)

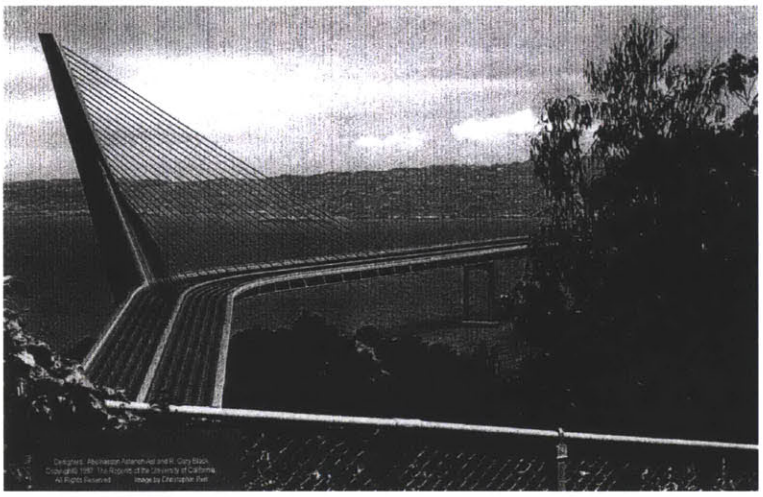

Figure 3.15 "Astaneh-Black" Steel Single Tower Curved Bridge by Professors Abolhassan Astenah-Asl and R. Gary Black of U.C. Berkeley; *Source:* (Frick 2005)

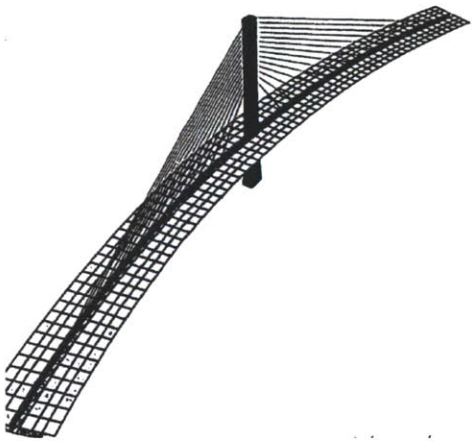

Figure 3.16 Steel Vertical Tower Curved Bridge Design by Professor Abolhassan Astenah-Asl of U.C. Berkeley; *Source:* (Frick 2005)

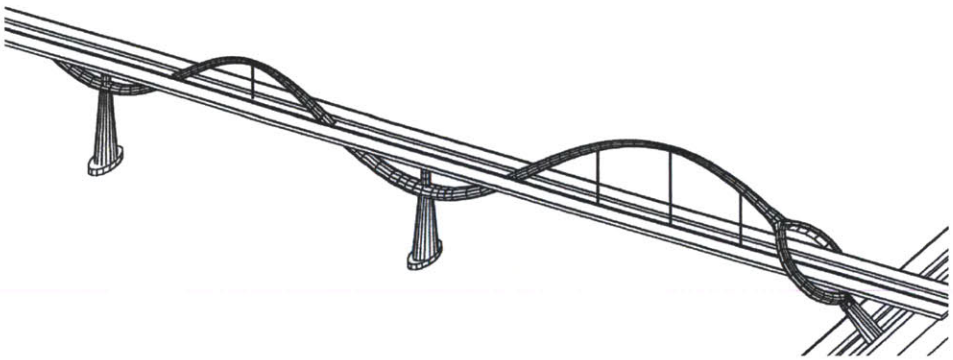

Figure 3.17 "Threading the Needle" by Professor David Morris, *DCM Studios LTD; Source:* (Frick 2005)

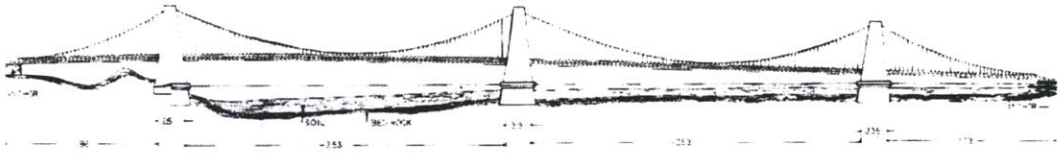

Figure 3.18 "Unity Towers" Suspension Bridge by Michael Longo; *Source:* (Frick 2005)

Figure 3.19 Art Deco Archway Bridge by Garrett Green, Fogwood; *Source:* (Frick 2005)

Shortlisted designs included the following: single-tower self-anchored suspension (SAS) bridge, single-tower cable-stayed bridge, single-tower curved cable-stayed bridge, and Caltrans's concrete skyway. Shortlisted designs recommended to continue through 30% design may be seen in Figure 3.20 through Figure 3.23 below.

Single Tower Self-Anchored Suspension (SAS) Bridge Figure 3.20
T.Y. Lin/Moffatt & Nichol + Weidlinger Associates/Donald MacDonald Architects
Conglomerate design team T.Y. Lin and Moffatt & Nichol managed 30% designs for the single-tower self anchored suspension (SAS) option. Though the Bay Area already boasts several typical suspension bridges, T.Y. Lin's new design would become the world's first single-tower self-anchored suspension bridge. Cables for the design would be strung over a single tower and anchored to the bridge deck; typical suspension bridges are constructed with two or more towers anchored into bedrock. Constructability constraints result in higher costs for the structure – SAS design was estimated to cost $1.435 billion in May 1998 estimates. (Yee and Mina 1998) (Barnum 1998) (Frick 2005) (Fang 1998).

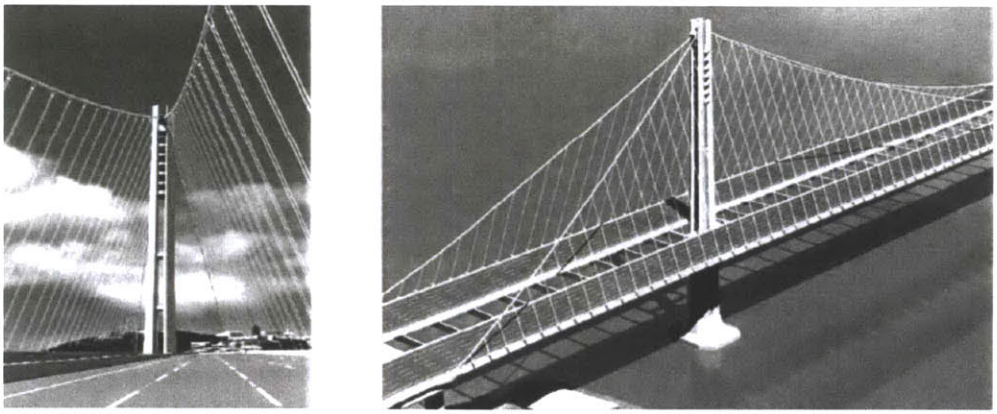

Figure 3.20 San Francisco- Oakland Bay Bridge Design Option, Single Tower Self-Anchored Suspension (SAS) Bridge design by *T.Y. Lin/Moffatt & Nichol/Weidlinger Associates/Donald MacDonald Architects*; *Source:* (Caltrans 1999)

Single Tower Cable-Stay Bridge Figure 3.21
T.Y. Lin/Moffatt & Nichol + H2L2 Architects
Joint venture design team T.Y. Lin and Moffatt & Nichol managed 30% designs for the single tower cable-stay bridge option. Similar to many new long-span bridges built today, the cable-stay design would be the first of its kind in California. Construction of the cable-stay proposal would be easier and more efficient than construction of an SAS; the deck is built out from the main tower allowing each new piece of roadway to be supported by a newly strung cable. Cost estimates for the cable-stay option hovered around $1.385 billion (estimates from May 1998), $50 million less than the SAS option (Yee and Mina 1998) (Barnum 1998) (Frick 2005) (Fang 1998).

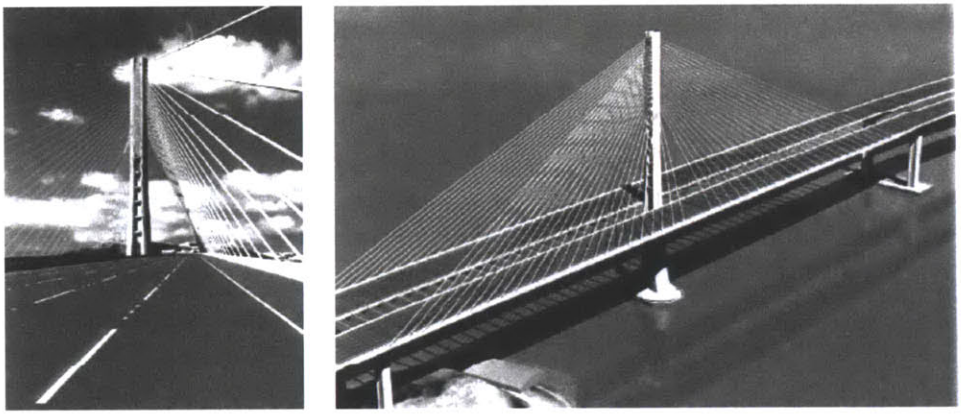

Figure 3.21 San Francisco- Oakland Bay Bridge Design Option, Single Tower Cable-Stay Bridge design by *T.Y. Lin/Moffatt & Nichol/H2L2 Architects; Source:* (Caltrans 1999)

Viaduct "Skyway" Figure 3.22 **and "Curved Skyway"** Figure 3.23
California Department of Transportation (Caltrans)
Caltrans developed two designs for consideration by MTC, a uniform skyway, and a haunched (slightly curved) skyway. Resembling the approaches for the other proposed designs above, the Skyways were dubbed "a freeway on stilts" by Bay Area residents. Caltrans "Skyway" designs were estimated to cost $909 million in Fall 1997, less expensive and less aesthetically appealing than T.Y. Lin's designs. (Yee and Mina 1998) (Barnum 1998) (Frick 2005) (Fang 1998).

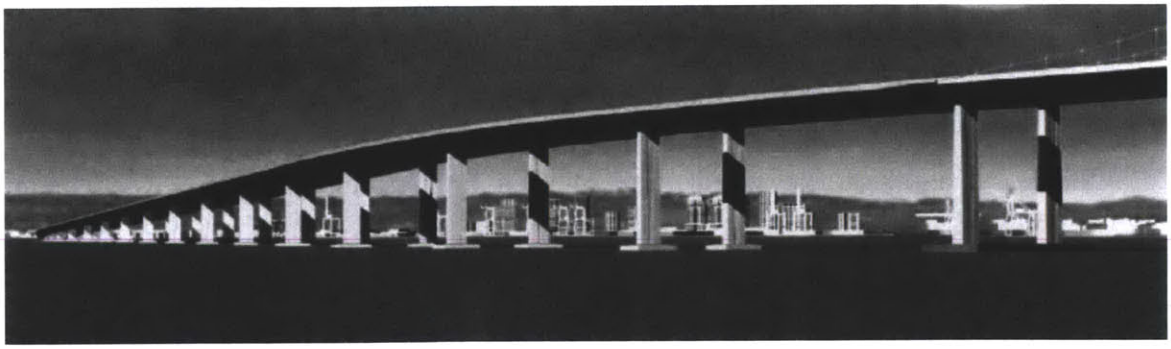

Figure 3.22 San Francisco- Oakland Bay Bridge Design Option, Uniform Viaduct "Skyway" design by *Caltrans*; *Source:* (Caltrans 1999)

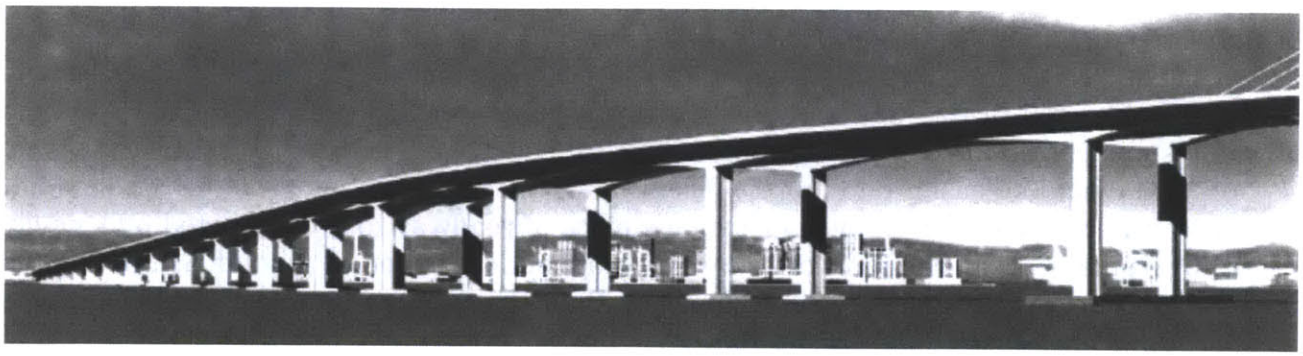

Figure 3.23 San Francisco- Oakland Bay Bridge Design Option, Haunched "Slightly Curved" Viaduct "Skyway" by *Caltrans*; *Source:* (Caltrans 1999)

Designs from each team were screened by EDAP and assessed based on technical and aesthetic merits. All designs included bicycle and pedestrian lanes separated from traffic and had the ability for future light rail inclusion. Design teams recommended discarding single tower designs due to increased associated costs. During the 18-month design process, thousands of citizens voiced their opinions in support and opposition of the proposed designs and the design process.

3.5 Judging

Discarding of various designs was not left to one final judgment day; rather EDAP chose to follow a screening process throughout the 18-month design period. Advancement or dismissal of designs occurred multiple times, beginning with EDAP's concept competition and workshop. Though participants without representation within EDAP felt deceived by the rather informal process, state officials claimed that the "bridge design community was not large enough to produce a jury and pool of qualified designers" (Coman and Feher 1999). Nonetheless, designs advanced during the concept competition phase had yet to face their own scrutiny in the months that followed. Mr. Rentschler described the selection process as

> It wasn't like a winner take all design, it was not like that, it was more like a negotiation . . . those that were allowed to proceed, they weren't chosen, they were just kind of screened through. And eventually what happened is you had two structures left—the cable-stay and the suspension—that were left through this kind of screening process (Rentschler 2012).

State officials recognized the need for an open and transparent process; Oakland's residents demanded a front-row seat during the design and judgment processes. Each vote held within EDAP, the Bay Bridge Task Force, and MTC was put to a majority rule vote, in which any vote with majority was recommended for final construction. Members of each committee represented technical experts, state leaders, and public representatives. EDAP's role during the design process was to act as a technical advisory panel to the Bay Bridge Task Force while the task force sought to develop a regional consensus on any proposed

designs. Both committees reported recommendations to MTC, who worked with Caltrans to determine the final outcome of each phase of the design process (Pollack 2004).

Late August 1997, prior to T.Y. Lin's charge as managing design team, Caltrans openly voiced interest and intent of making final design decisions behind closed doors and without consultation from EDAP and the public. Community representatives and area leaders voiced opposition claiming "the choice of design team is most important factor affecting look, shape, and function of the new bridge, which will be a Bay Area landmark for years to come" (Nolte 1997). Following the objections of the Oakland community, Caltrans rescinded its statements and authorized a transparent and open process.

Final voting within EDAP, the Bay Bridge Task Force, and MTC transpired from late May 1998 through late June 1998. EDAP's final vote on May 29, 1998 surprised Oakland's residents, MTC members, and other designers around the world; the Panel, only partially available for the vote (19 of 35 members voted), recommended that MTC ultimately choose a self-anchored suspension bridge rather than a cable-stayed bridge. MTC had expected EDAP to choose the cheaper and less technically elaborate alternative (D. Rosenbaum 1998). The Bay Bridge Task Force, second to vote on the proposed designs, considered the voice of the public through various for a including public hearing across four counties, hundreds of phone calls, and thousands of letters and emails. Following the Task Force's recommendation of developing the SAS, MTC voted similarly despite strong opposition from Bay Area leaders; one official threatened a lawsuit while another appealed for an international design competition (Diaz and Akizuki 1998).

Several years of arguments and disagreements between committees, state officials, and citizens ensued after MTC's final vote. Officials worked to secure funding amidst the controversy while estimates for construction of the new signature span continued to rise. Caltrans sought to re-address the SAS design in 2004, even going so far as to suggest a design switch; after scrapping the project more than once, urgings from the Governor and state officials, and additional toll hikes, construction of the signature span turned into a reality in 2006 (Pollack 2004) (California Department of Transortation n.d.).

3.6 Competition Outcome and Results

Caltrans's 18-month design process culminated with the decision to build a single-tower self-anchored suspension bridge (see Figure 3.24 below). T.Y. Lin's final design for the entire interchange was comprised of four distinct structures including a low-rise post-tensioned concrete box girder, a 1.5-mile segmental concrete box girder crossing (also known as the skyway), the SAS signature span, and a doubly post-tensioned concrete box girder. Features of the SAS signature span included a 1200-foot main span, a 525-foot tall tower comprised of four steel shafts connected by shear links, and a superstructure composed of hollow orthotropic steel boxes in compression opposed by large main cables acting in tension (Tang, et al. 2000). Unlike conventional suspension bridges, SAS main cables are secured to the bridge deck and do not require massive end anchorages; an advantage of SAS systems lies in their adaptability to sites that cannot easily accommodate

external anchorages (Ochsendorf and Billington 1999). The bridge, built to last for at least 150 years, expresses longevity within its girders in a configuration that includes "deadmen," or anchor blocks connected by cables, that can be tightened as the deck begins to sag. During an earthquake, damage will be limited to specific elements due to the design's overall flexibility; shear links within the single tower exist to absorb the brunt of an earthquake force so that other components of the bridge may remain intact. Additionally, the new design allows for the required "lifeline" criteria, which enables access by emergency personnel within hours of a seismic event (Fountain 2012). Dubbed "the longest of its type and the first asymmetrical one to be built in the U.S. . . . and the most expensive bridge in the world" the new San Francisco-Oakland Bay Bridge is one of only 20 self-anchored suspension bridges in existence (Petroski, The Bay Bridge 2005).

Figure 3.24 San Francisco-Oakland Bay Bridge, MTC Recommended Single Tower SAS design;
Source: SAS photo simulation from Caltrans/MTC

Various groups, including design professionals, members of the various committees, and the public, have voiced mixed reactions regarding the design. According to Henry Petroski's article, *The Bay Bridge*, world-renowned bridge designer, Christian Menn spoke of the bridge as "an 'architectural bridge,' one whose design is driven by form, as opposed to an engineering one, whose design should be driven by structural and construction considerations." Menn went on to admit that although "the appearance of the bridge is certainly very good, the costs will be much higher than originally planned" (Petroski, The Bay Bridge 2005). Disadvantages of the self-anchored suspension bridge design as include: construction difficulties of erecting a stiffening girder before the main cables, a lower degree of redundancy than conventional suspension bridges, and design challenges due to an unfamiliar form (Ochsendorf and Billington 1999). Craig Finley's article, *America Can Build Better Bridges*, suggests that the Bay Bridge design is proof that U.S. bridge professionals are deficient in their recent efforts. Finley recalls a statement made by Governor Jerry Brown, where he noted that the bridge design "speaks of mediocrity, not greatness." Finley's article also mentions Senator Tom McClintock's stance on the project, when he referred to the Bridge as "the biggest fiasco in California transportation history" (Finley 2006). During an interview with Caltrans's Bart Ney, he spoke of the reasons for choosing the SAS design:

> The SAS had architectural and engineering merit . . . a self-anchored suspension bridge's engineering merit comes from basically, the idea of not having to build an anchorage in the middle of the water . . . water-based anchorages are expensive and challenging to build. So that's why SAS made engineering sense. And then the other thing that it did aesthetically is, because that type of bridge has a main cable and then suspender cables that come down off of it—it sort of matched what's become to be known as the regional signature out here, it's a catenary curve that's created by a main cable that's draped off of the towers . . . so with those things together, that's sort of the reason why this design was able to outlast the others during the competition phase (Ney 2012).

Mr. Ney was referring to the drawn-out design process that resembled that of a panel discussion rather than a true design competition. Mr. David Billington, a proponent of design competitions, criticized the process:

> This was not a true competition, at all. It was done by a bunch of people, none of whom were engineers, who sat around looking at drawings. And they had a very pretty drawing by an architect and they decided that's what they're going to do. And then they have no idea how much is going to cost, they have no idea how it's going to work and there were engineers, then from the state and from the county, that got involved and made sure that the final design could be built but went ahead with this very flimsy basis . . . So it's an example of what happens when you don't have a competition, a proper competition, and when you get an architect to make the design. Those two things combine to ensure that you're going to get a poor result (Billington 2012).

Mr. Billington was not the only person to take issue with the process; in 1998 Mayor-elect Jerry Brown proclaimed the process of choosing a design was too closed-doors and the winning design was chosen out of self-interest (La Ganga 1998). Mr. Randy Rentschler, an employee of MTC, spoke on the significance of the design process:

> You've got to think about this as a completely unique situation—the bridge was unique, the setting was unique, the seismic is unique . . . So, again, there is nothing like it that's ever been done—as far as process, place, the whole thing was just completely unique (Rentschler 2012).

Despite a massive budget increase and mixed reactions from the public and the design community, the San Francisco-Oakland Bay Bridge design has received international recognition and acclaim for its innovative and record-breaking design. When asked if he felt whether the design process was effective at producing a better bridge for the public, Mr. Rentschler responded:

> Yes. Yes by like a thousand-million percent. So while this process was unconventional and appeared in many cases to be somewhat chaotic, it's going to produce a modern icon on the Bay, it will become world famous, it will become a

> public piece of infrastructure that is also iconic and a rallying point, culturally for the Bay area. It is going to be a big deal (Rentschler 2012).

Mr. Rentschler recognized that the process of designing the bridge was long, tedious, and not necessarily embraced by the public and when asked about the public's response to the design, he noted,

> Mixed. The public, I think now, 20 years on, I think the public is enormously excited about it. I mean, off the charts excited but I think the process itself was something they had to, kind of, tolerate (Rentschler 2012).

Further controversy surrounded the procurement of construction materials for the San Francisco-Oakland Bay Bridge – many California residents felt angered that the pre-fabricated bridge sections were being shipped from China during a U.S. recession. Despite ballooning costs, residents felt the $400 million savings from pre-fabricated sections were not worth outsourcing labor; quality and craftsmanship were questioned, forcing Caltrans to spend money on inspectors, who eventually approved the imported pieces for construction (Barboza 2011). Regardless of time extensions and budget increases, the design process for the Bay Bridge revolved around seismic concerns. Unlike many other large-scaled bridge designs across the country, the San Francisco Bay has unique seismic considerations that remain unparalleled within the United States. Though residents of the area and DOTs based in other states may not have fully understood the design procurement process Caltrans conducted to produce seismically safe structures.

3.7 Summary

Following nearly a decade of indecisiveness, squabbling, and committee meetings and reports, the new San Francisco-Oakland Bay Bridge design has excited and inflamed the design community and Bay Area residents. Caltrans's unique process resembled neither a competition nor traditional procurement methods, rather a long-winded screening and re-design process. Mr. Bart Ney considered the drawn-out process and remarked,

> I think in looking back we would have tried to find ways to streamline, and to make it go faster. We know that it's a strong need to get this bridge built before the next earthquake happens. So there might have been ways that we could have gotten the process to move a little bit faster (Ney 2012).

Caltrans's primary goals during the design process revolved around seismic safety concerns unique to the Bay Area. Mr. Randy Rentschler touched on the importance of the design process for MTC and the Bay Area residents:

> Well look, if you live in California, people are obsessed with process – process is often the product . . . the process is everything. If you're me, I would say, 'what we're going to have as an outcome is one of the most unique and incredible structures in America. And this process, while cumbersome, gave us that and there was really no

> real alternative.' Because the Bay Area is a very finicky place and there was no way, no way that we were going to have a traditional process where people could come in and an award could be given and that we would build the bridge that someone else wanted, a design firm or anyone else, we were going to nitpick it, we were going to tell them what to do. So we created kind of a process of negotiation versus a process of winner take all (Rentschler 2012).

Though Mr. Rentschler's discussion of the design process provides no apologies for the duration and cost of the project, he imparts the reasoning behind the procurement process. When questioned whether an alternative process would have produced a better result, both Ney and Rentschler responded doubtfully; specific constraints dictated the design process, and the end design suited the needs of Bay Area residents as well as the sponsoring agencies. Designs for the new bridge catalyzed dialogue in the design community and around the world. Without a drawn-out process and multiple budget increases, the bridge may not have received public recognition and input to the extent which we see today. When asking ourselves whether the process was effective at producing a better bridge for the public, we must recognize the primary motives prompting Caltrans's decisions:

- Seismic safety considerations were the primary goals and reasons for new design
    - "Lifeline" constraint – bridge must be accessible to emergency personnel immediately following seismic event
    - Minimal repairs following an earthquake
- Buy-in for new design needed from Bay Area residents and state officials
- Aesthetics of the new design, rather than the viaduct dubbed "a freeway on stilts"

Assessment of the effectiveness of the bridge design process must be based on guiding constraints from which the design evolved. Caltrans's drawn-out process transpired over the course of a decade, by which residents and state officials created a product that best suited their needs and interests. Though not a true competition, Caltrans's method was effective at producing a better bridge for the public in respect to safety, stakeholder buy-in, and aesthetics. Could Caltrans have designed a less expensive, yet visually appealing bridge in less time while still gaining public buy-in? Probably, but the bridge design evolved throughout the process; rather than speculate on a design that could have been, Caltrans and Bay Area residents are choosing to embrace their new bridge. Due to the large population of stakeholders, the new bridge design would have received opposition, regardless of outcome; Caltrans managed a long, expensive, and difficult process without losing site of the original justification for a new bridge, seismic safety.

Chapter 4 : Case Study 3 – Woodrow Wilson Bridge (1998)

4.1 Background and Context

Built between 1959 and 1961 to serve as a link between the Maryland and Virginia portions of Washington D.C.'s Beltway, the former Woodrow Wilson Bridge stood six lanes deep and, though designed for up to 75,000 cars per day, moved approximately only 19,000 vehicles per day (in 1960s). The bridge was built using design standards of the 1950s, which did not allow an anticipated change of traffic volumes and associated structural fatigue (image of the existing bridge may be found below in Figure 4.1). By the mid-1970s, the Woodrow Wilson Bridge served more than 108,000 cars per day; engineers recognized the need for a solution and developed a rehabilitation project that would widen the deck to allow more vehicles across. By the 1980s, officials accepted that the expanded deck served only as a temporary fix and a concept competition was held to explore future design alternatives. The chosen alternative, a new 14-lane bridge, was deemed unacceptable and the deteriorating bridge was once again left to carry increasing traffic volumes. By the early 1990s, the Woodrow Wilson Bridge carried more than 150,000 vehicles per day, an amount double its initial design capacity (Petroski, Drawing Bridges 1999). The existing drawbridge, only 50 feet above the water, opens more than 260 times per year to allow boats through (Samuel 1996). In addition to major congestion and daily traffic bottlenecks at its approaches, state officials estimated that by 2012, more than 300,000 vehicles per day would be crossing the Woodrow Wilson Bridge (Russell, Crossing the divide 2004).

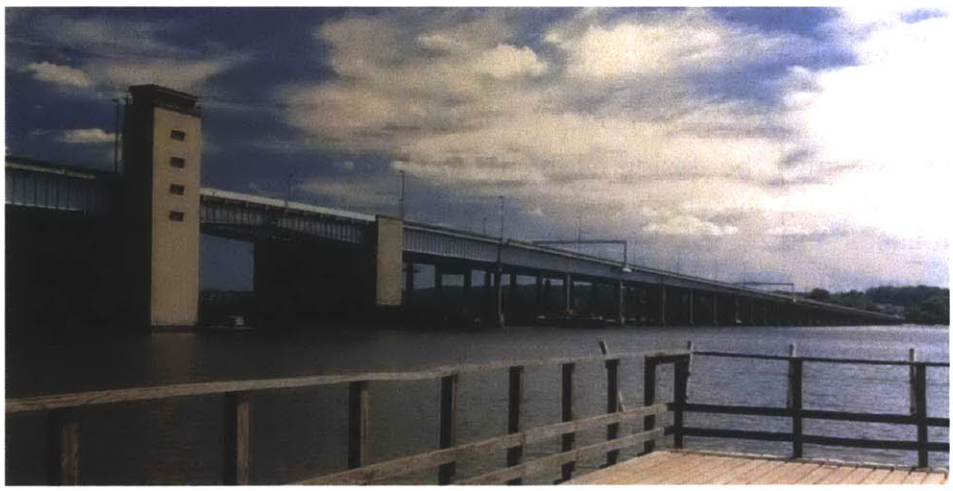

Figure 4.1 Existing Woodrow Wilson Bridge built in 1961; *Source:* (Selection Panel Renderings Booklet 1998)

State engineers stepped up to the challenge of finding a resolution to a three decades old problem, seeking a "solution, which enhances mobility while assuring that community and environmental concerns are addressed." Findings indicated that increased traffic from heavy-load vehicles, such as large trucks, would cause the bridge to reach the end of its useful life by 2004 (Samuel 1996) (Samuel 1996). An Environmental Impact Statement

(EIS) was set in motion and provided an avenue on which the FHWA could experiment with different alternatives for the new bridge configuration (Maryland DOT 1999). Deliberations continued through 1996 with suggested alternative options continually arising, including the construction of a new span 10 miles downriver; the proposed span was cast aside as it would only reduce traffic volume by 10%. Another concept considered, of which the city of Old Town Alexandria preferred, was moving the highway underground into a series of tunnels and tubes on the floor of the Potomac (Samuel 1996). In 1996, the committee chose to pursue a concept for a replacement bridge that consisted of two six-lane spans, of which the exact design would be determined through a design competition. A Record of Decision (ROD) accompanied the final EIS, published in November 1997; the two documents would serve as the basis for design proposals. Following publication of the EIS and ROD, the sponsoring agencies for the new bridge design hired Potomac Crossing Consultants to assist in managing the overall design process, including the design competition (Maryland DOT 1999).

Mr. Robert Healy, who acted as the state project manager during the Woodrow Wilson Bridge design competitions, said "there are two key reasons for holding a design competition: one is to get ideas from a diverse pool of engineers . . . and the second reason—if you do it properly it will get support and buy-in from all of your stakeholders" (Healy 2012). Mr. Healy also noted a disadvantage of a single designer, as "the ideas you get are restricted to the ideas you get from that one particular firm or team. By having a design competition, in our case, we got the ideas from multiple" (Healy 2012). Mr. Malcolm Kerley, Chief Engineer for the Virginia Department of Transportation, noted the high visibility of the project and its demand for a high quality firm and a high profile design. He exclaimed that competitions provide positive results because of a transparent process (for citizens seeking involvement) that aids acceptance of a design and educates stakeholders (Kerley 2012).

Maryland state engineers pushed the use of a design competition because of the success following the U.S. Naval Academy Bridge (Severn River Bridge) design competition 10 years earlier. The assumption of employing a design competition was that the competition might only account for 10% of the final design; the winning concept from a competition would become the basis of design for the new Woodrow Wilson Bridge (Petroski, Drawing Bridges 1999). Professor David Billington was, once again (also helped organize U.S. Naval Academy bridge competition), a major player in the decision to hold a design competition; together with Mr. Jock Freedman, the two men set out to adapt the competition structure from the framework used in the earlier U.S. Naval Academy Bridge competition. Mr. Billington admitted the need for an adapted competition framework arose because of a much larger and higher profile project than the U.S. Naval Academy Bridge; a more diverse mix of stakeholders held strong opinions, and thus needed to be satisfied with the new span design (Billington 2012).

Announced in 1998, the design competition was to be funded by a mix of Federal and state fuel taxes as well as money borrowed against prospective toll revenues (Samuel 1996). According to a *Bridge design & engineering* article from 2004, the cost of the total project, both approaches and bridge span, was estimated as $2.6 billion dollars. The Maryland

Department of Transportation State Highway Administration (MDSHA) would act as the primary owner and operator because the Potomac River was owned by the state of Maryland despite the Beltway spanning between both Virginia and Maryland. Additional sponsoring agencies included the Federal Highway Administration (FHA), Virginia Department of Transportation (VDOT), and the District of Columbia Department of Public Works (Russell, Crossing the divide 2004). The bridge site's proximity to Alexandria and large budget spurred a highly publicized project whose objective was "to produce a fittingly world class design" (Petroski, Drawing Bridges 1999).

As the search began for competition participants, advertisements for designers were published in newspapers around country and international participation and multi-firm teams were encouraged (Healy 2012). Mr. Bob Healy remembers receiving phone calls from many firms with interest in the project; advertising was almost unnecessary given the lightening speed of information dissemination in the engineering community (Healy 2012).

4.2 Design Constraints and Guidelines

Sponsoring agencies of the design competition drew from a decade-long cache of design goals and criteria for a new bridge. Various reports and conceptual proposals had spawned the EIS and ROD, which served as a basis for the guidelines, constraints, and goals of the project. Collectively, the sponsoring agencies agreed that:

> The intent of the design competition was to stimulate the creative abilities of the bridge design community to produce a structure which will be seen as a landmark bridge, sensitively designed to respect its environment, and able to unite the community in support of the project. The entries were expected to combine the best thinking about aesthetics, technology, economy and environmental sensitivity (Maryland DOT 1999).

The ROD supported the notions of the sponsoring agencies and set clear goals for the design of the bridge, which included (Maryland DOT 1999),

- The bridge will be located just south of the existing span and extend from Rosalie Island (Maryland shore) to Alexandria, Virginia with a length of approximately 6,300 feet
- The movable span of the bridge will provide at least 70' clearance above the water when closed, and 135' above the water when open for a main channel width of 175'
- The design will include 12 lanes of traffic plus shoulders and pedestrian/bicycling facilities
- Heavy rail provisions must be considered within future use of the bridge

Mr. Bob Healy referred to the designated constraints and recalls the guidelines:

> The thoughts that were put out in the Record Of Decision, the characteristics of the bridge they were looking for—they did sort of confine how far you could go with it,

> a little bit . . . it didn't specify an arch, but it had to be an arch-like bridge. So that really confined some of the creativity. And there was a whole series of things that you had to meet that perhaps, you know, restricted [the design]—you know you didn't have a complete blank canvas, you started with some basics that you had to meet . . . the criteria perhaps, reined you in a little bit on full creativity (Healy 2012).

Sponsoring agencies of the competition, including the Maryland DOT, Virginia DOT, DC Department of Public Works, and FHWA designated separate, more specific guidelines based on the subsequent Memorandum of Agreement (Maryland DOT 1999) (Petroski, Drawing Bridges 1999):

- The bridge design must have high aesthetic values and derive form from monumental Washington, D.C. while preserving feature appropriate to its status as a memorial to President Woodrow Wilson
- Bridge concepts must be based on an arch scheme as seen on other Potomac Bridges—the Key Bridge and the Memorial Bridge
- The number of piers in the viewshed of the Alexandria Historic District must be minimized by increasing span lengths
    - As seen in Figure [XX], the existing bridge contains 57 separate piers
- Pier placement must not disturb Jones Point Park and Rosalie Island Park
- Bridge design must enhance views along the river while respecting historic characteristics of nearby Alexandria
- Proposals must ensure an attempt at the shortest necessary construction period
- Environmental impacts on surrounding areas must be minimized

Based on initial estimates from the established design goals, the new bridge, not including the approaches, was expected to cost approximately $1.8 billion, a number roughly 60 times that of the U.S. Naval Academy Bridge. The project was deemed the "Biggest public works project in Middle Atlantic states" and would become an international topic of interest in the engineering community. Sponsoring agencies speculated that the new bridge would reduce the number of annual openings from 260 down to 65 in addition to decreasing the number of piers to a fraction of the number of 57 piers (Petroski, Drawing Bridges 1999). Officials employed aspects from both the EIS and ROD to serve as the basis for design guidelines and the overall competition process and structure were adapted from the U.S. Naval Academy Bridge Design Competition that took place nearly a decade earlier (Billington 2012) (Jenkins 1995) (Freedman 2012).

4.3 Competition Process

Sponsoring agencies for the new Woodrow Wilson Bridge chose to structure the design competition similarly to the widely successful U.S. Naval Academy Bridge design competition held in the late 1980s (reference Case Study #1). Proponents and key players from the U.S. Naval Academy Bridge design competition, including Professor David Billington, Mr. "Jock" Freedman, and Mr. Fred Gottemoeller, once again heavily participated in planning the Woodrow Wilson Bridge design competition. Following international

advertisements, Stage 1 of the competition asked interested firms to respond to a request for proposals in January 1998. Mr. Bob Healy spoke of the high profile, specific qualities of entrants and noted

> We knew were going to be limiting the competition to big bridge design firms and that was fine with us, that's what we wanted . . . the second feature that really limited the number of entries was the fact that there is a movable bridge in the Woodrow Wilson (Healy 2012).

Seven firms answered the call by submitting qualifications and expressions of interest; of these seven, four firms were chosen for the shortlist and asked to participate in Stage 2 of the competition beginning in April 1998 (Billington 2012) (Healy 2012). Participants asked to continue through Stage 2 were given a $100,000 stipend toward their design expenses and included the following firms:

- *Parsons Transportation Group* (formerly *Steinman/DeLeuw*)
- *HNTB Corporation*
- *Figg Engineering Group/Johnson, Mirmiran, & Thompson*
- *T.Y. Lin International*

Each entrant was given four months to prepare up to two concepts for consideration by the Selection Panel and each entry remained anonymous to the sponsoring agencies; entrants were assigned specific code letters for each of their final concept proposals. Anonymity of code letters ensured impartial evaluation of the entries despite any working relationships that may have existed between entrants and jury members. By August 1998 seven proposals had been submitted for consideration from the four shortlisted firms; each firm, excluding T.Y. Lin, entered two proposals in the competition (Maryland DOT 1999). Firms were given the opportunity within their second (alternate) design "to propose anything outside the constraining design requirements" including designs without the required arch-type structural system (Spreiregen 1999). Mr. Healy noted of having seven final designs, "So in the end we had a total of seven entries in the competition and I think anybody will tell you that's probably not a bad number, it gives you enough variety plus it makes it reasonable to evaluate" (Healy 2012).

Proposals included multiple drawings, CAD illustrations, general calculations, approximate cost estimates, and engineering and design reports. Submitted drawings were given to a CAD rendering team for final renders; the use of a rendering team assured design anonymity across the various proposals (Spreiregen 1999). Mr. Bob Healy recognized the importance of the illustrative process for understanding the many dimensions of each design and noted:

> The production of renderings of your entry is a critical thing because most people that are going to be evaluating these are not engineers. They may not have the visualization tools in their head to be able to see and visualize what this design will look like so we had to produce good quality renderings of what these entries are

> going to be. And we didn't want it to turn into a picture contest, you know, who can submit the prettiest picture will win. And the technical merits may not be fully addressed (Healy 2012).

Not all members of the advisory committees and Selection Panel had backgrounds in engineering or design, and as a result, leaned heavily on the CAD renderings during the assessment processes. A detailed list of the advisory committees and Selection Panel may be found in Appendix D. Mr. Healy and his colleagues understood that a fair selection could only be made if each design was assessed from similar vantage points with consistent detailing and coloring. Otherwise, each firm would certainly skew their designs to seem more attractive to the jurors. Mr. Healy stated:

> So, what we decided to do was, to take on the task ourselves of who can produce the renderings so that they would all be produce by the same team, they would all be sort of from the same vantage point and they would all be consistent in their appearance and detailing (Healy 2012).

Following submittal of renderings and proposals, a two-part judging process ensured that entries were both feasible and fully thought out while remaining anonymous to the Advisory Committees and final Selection Panel. Judging of the designs took place through mid-November, after which, the winning design was revealed to the public (Maryland DOT 1999). A simplified design process chronology may be found in Appendix D.

4.4 Designs Considered

Four firms submitted seven entries for consideration by the Advisory Committees and Selection Panel. Each proposal was assessed by the Advisory Committees and judged based on aesthetic and technical requirements prior to final review and consideration by the Selection Panel. Nine separate renderings were made from various vantage points for each design, which allowed jurors an untampered and unaltered illustration. Similarities across the seven designs included a series of arches beneath a low-lying deck, an apex at the channel point near Alexandria, the location of bascule[2] span at apex, and a main structure beneath the deck. The proposals varied in number of piers, number of arches, and main structural material (3 designs were comprised of structural steel) and may be seen in Figure 4.2 through Figure 4.8 below (Spreiregen 1999).

Entry A – *HNTB Corporation* (Figure 4.2)
HNTB designed a three-hinged arch bridge that touched down into the water on 16 piers. Intended to allow transparency, the structure enabled views of Washington D.C., Maryland, and Virginia from various vantage points. Pedestrian walkways and bike paths rose above the roadway and joined above the twin decks. Additional space was added between the twin decks and the bridge's bascule span was marked with substantial towers (Maryland

[2] Bascule: an apparatus or structure (as a drawbridge) in which one end is counterbalanced by the other on the principle of the seesaw or by weights

DOT 1999). Entry A construction costs were estimated at $358,344,051 (Engineering and Cost Estimate Reports 1998).

Figure 4.2 Woodrow Wilson Bridge Design Competition, Entry A - *HNTB Corporation; Source:* (Selection Panel Renderings Booklet 1998)

Entry B – *Parsons Transportation Group (formerly Steinman/DeLeuw)* ((Figure 4.3)
Parsons design was comprised of a box girder bridge atop V-shaped piers that resemble arches without being true arches; V-shaped piers allowed for smaller foundations. Uninterrupted concrete decks, containing pedestrian and bike paths, were supported by 18 piers. When closed, the bascule span was concealed within the structure to mimic the other spans and appear as a fluid design (Maryland DOT 1999). Entry B construction costs were estimated at $416,359,585 (Engineering and Cost Estimate Reports 1998).

(Figure 4.3 Woodrow Wilson Bridge Design Competition, Entry B - *Parsons Transportation Group; Source:* (Selection Panel Renderings Booklet 1998)

Entry C – *Figg Engineering Group/Johnson, Mirmiran & Thompson* (Figure 4.4)
Figg et al. proposed a recurring arch scheme, which contained slender supporting arches atop thrust blocks. The quantity and quality of viewsheds were decreased within the design as a result of 26 total piers. *Figg et al.'s* bascule span cautiously interrupted the flow of the bridge without dominating the design (Maryland DOT 1999). Entry A construction costs were estimated at $417,224,607 (Engineering and Cost Estimate Reports 1998).

Figure 4.4 Woodrow Wilson Bridge Design Competition, Entry C - *Figg Engineering Group/Johnson, Mirmiran & Thompson; Source:* (Selection Panel Renderings Booklet 1998)

Entry D – *T.Y. Lin International* (Figure 4.5)
T.Y. Lin's proposal was comprised of a prominent arch substructure which flared out at the base of each column; the design's superstructure was somewhat hidden behind the large arch scheme.
Arches sat atop 22 piers and the decks were spaced an additional 54' apart. Designers integrated the bascule span with the overall structure providing a sense of continuity (Maryland DOT 1999). Entry A construction costs were estimated at $387,410,000 (Engineering and Cost Estimate Reports 1998).

Figure 4.5 Woodrow Wilson Bridge Design Competition, Entry D - *T.Y. Lin International; Source:* (Selection Panel Renderings Booklet 1998)

Entry Q – *Figg Engineering Group/Johnson, Mirmiran & Thompson* (Figure 4.6)
Figg et al.'s second design proposal was comprised of box girders supported by hammerhead-shaped piers. Despite slightly haunched box girders, aesthetics of the design resembled a more traditional, vertically oriented structure, which lent increased viewsheds along the river. Long spans, interrupted by substantial bascule towers, sat atop 18 piers (Maryland DOT 1999). Entry A construction costs were estimated at $384,532,235 (Engineering and Cost Estimate Reports 1998).

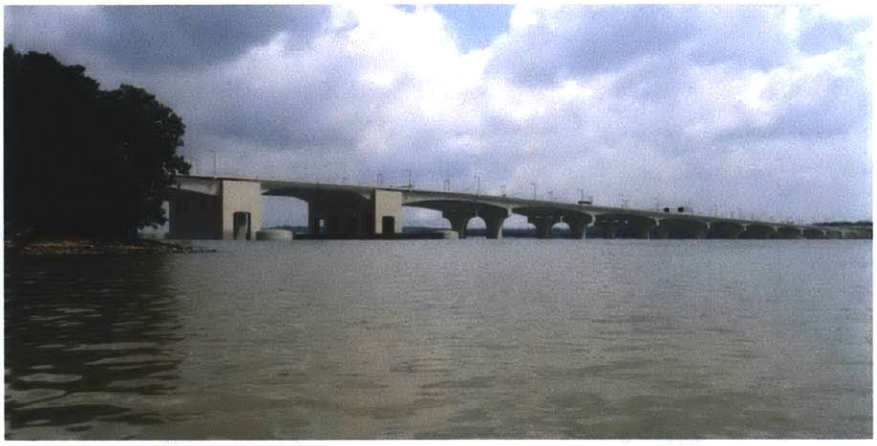

Figure 4.6 Woodrow Wilson Bridge Design Competition, Entry Q - *Figg Engineering Group/Johnson, Mirmiran & Thompson; Source:* (Selection Panel Renderings Booklet 1998)

Entry T – *HNTB Corporation* (Figure 4.7)
HNTB's second design proposal mimicked aspects of Washington D.C.'s Memorial Bridge. Though massive in dimension, long span lengths required only 10 piers. Pedestrian and bike paths were elevated above the roadway, similar to the design of Entry A. A proposed record-setting bascule span was to allow for an 800' width. (Maryland DOT 1999). Entry A construction costs were estimated at $432,181,692 (Engineering and Cost Estimate Reports 1998).

Figure 4.7 Woodrow Wilson Bridge Design Competition, Entry T - *HNTB Corporation; Source:* (Selection Panel Renderings Booklet 1998)

Entry X – *Parsons Transportation Group (formerly Steinman/DeLeuw)* (Figure 4.8)
Parsons's second design was comprised of 15 slender V-shaped piers beneath a continuous deck. Stainless steel clad girders and a cable-stay bascule design broke from the specified design guidelines. (Maryland DOT 1999). Entry A construction costs were estimated at $441,517,453 (Engineering and Cost Estimate Reports 1998).

Figure 4.8 Woodrow Wilson Bridge Design Competition, Entry X - *Parsons Transportation Group; Source:* (Selection Panel Renderings Booklet 1998)

4.5 Judging

Keen to include participation from all stakeholders, Potomac Crossing Consultants developed four advisory panels that would address the pros and cons of each proposal prior to submitting reports to the Selection Panel, or final jury. Advisory Committees were comprised of engineering experts and members from the diverse surrounding communities; each committee was formed to assess specific aspects of the proposals:

- *Citizen Advisory Committee:* Comprised of 7 members acting as community representatives assessed aesthetic design goals, placement of design within context, and scale relationship to surrounding communities (Citizen Advisory Committee 1998)
- *Constructability Advisory Committee:* Composed of 7 contractors and construction experts whose focus was to assess construction methods, sequencing, costs, and schedule (Constructability Advisory Committee 1998)
- *Technical Advisory Committee:* Made up of 7 bridge design engineers and technical experts that assessed technical merit, design criteria, movable span components, and maintainability (Technical Advisory Committee 1998)
- *Historic Advisory Committee:* Including 8 members whose focus was to assess overall cultural and historic impacts on surrounding communities (Historic Advisory Committee 1998)

Advisory Committees met for seven weeks to prepare final reports for the Selection Panel; committees worked to address advantages and disadvantages of each proposal, rather than using a ranking system. Comprised of 15 members with varying backgrounds, the Selection Panel's main goal was to choose the winning design by assessing committee reports and carefully evaluating each proposal's merits. Members of the Selection Panel included the former Governor of Maryland and twelve public officials of which there were six engineers, two architects, one landscape architect, and one planner; three notable members of the Panel included Mr. Malcolm Kerley, Mr. "Jock" Freedman, and Mr. David Billington, who

were interviewed for this thesis for their comments on the design competition process and results. For several days in mid-November 1998, the Selection Panel met to determine the winning design; bus tours of the site, committee reports, and Panel discussions were contributing factors in the Selection Panel's final judging (Maryland DOT 1999). Former Governor of Maryland, Harry H. Hughes, chaired and mediated the Selection Panel beginning Monday, November 16, and announced the Jury's decision to the public Wednesday, November 18 (Petroski, Drawing Bridges 1999) (Maryland DOT 1999).

4.6 Competition Outcome and Results

Following three days of jury activities, the Selection Panel chose a winning entry for the new Woodrow Wilson Bridge and announced their choice to the public November 19, 1998. Sponsoring agencies hosted Stakeholder Participation Panels one month after the competition ended; concerned citizens were given the chance to voice opposition and opinions of the selected design. Feedback from the Panel was expected and sponsoring agencies hoped to gain insight into additional issues with aesthetics, construction, logistics, and serviceability. Since its conception, the project was intended as a service to the community; Stakeholder Panels allowed concerned community members an integral part in the design and construction process (Petroski, Drawing Bridges 1999).

Winning the design competition, Parsons Transportation Group (Entry B) offered a box-girder bridge with concrete V-shaped arch-like piers (image of winning bridge in Figure 4.9 below). Replacement of true arches with V-shaped piers enabled smaller foundations that lent themselves unto a more open appearance. The design included an embedded bascule span that appears identical to the bridge's non-movable spans. Additionally, the chosen design requires only 18 piers as opposed to 57 of the existing bridge. One juror noted the piers as an "illusion of graceful arches spanning the waterway" (Petroski, Drawing Bridges 1999) (Maryland DOT 1999). Mr. David Billington recalls statements from Mr. Christian Menn, world-renowned bridge designer and member of the winning design team, during the design competition process regarding the constraints placed on proposals,

> They said this has to be arches because the other two are arches and that should be somehow related. And Christian Menn who was not on the board, he was competing this time now. And he told the committee, 'If you agree to make arches, I withdraw from the whole thing. It's stupid, they should not be arches.' But they said 'This is the requirement.' Then he said, 'Don't bother with stupid requirements if they are stupid, and this is a stupid requirement' . . . But he is -- I mean, he is the world's greatest bridge designer, mind you. And he speaks with a kind of authority that's surprising to American engineers. They're not familiar with people who speak like that. Then he just said, "Well, you do it and the world will laugh at you for a stupid design." So they agreed (Billington 2012).

Figure 4.9 Woodrow Wilson Bridge Design Competition, Winning Design by *Parsons Transportation Group* (Entry B); *Source:* (Selection Panel Renderings Booklet 1998)

Mr. David Billington deemed the bridge a success and stated "It's a good bridge, it's much better than they would have gotten if they had to put arches in . . . it turned out well and they're building it and they built it almost to the budget" (Billington 2012). Mr. Bob Healy, an integral player in the competition and employee of Potomac River Crossing, spoke of the competition outcome and winning entry:

> Now, was it 100% and everybody loved it and said it was the best? . . . Of course not—there were individuals that thought, that liked different things about some of the other entries . . . but in the end they all came together and the consensus was that this is the best entry and this is the one we are going to recommend and this is the one we are going to proceed with (Healy 2012).

HNTB Corporation (Entry A) placed a close second to Parsons Transportation Group's winning design with its 3-hinged arch design and transparent structure. HNTB's design also required only 16 piers and offered an elevated pedestrian/bike path between the twin spans. Reasons for the design ranking second rather than first included: undesirable elevated pedestrian path, interruption of graceful flow by large bascule towers, and an additional 44' width between the twin spans. Discarded designs were not chosen for various reasons and contained between 10 and 26 piers; one design included a cable-stayed bascule span and V-shaped piers considered by the jury as a "sharp contrast to the arch concept" (Maryland DOT 1999).

Additional refinements were advised prior to construction of the bridge including changing the proposed location of the operator's house, adjustment to the proposed traffic barriers and pedestrian railing, configuration of 4 bascule leaves to 8 bascule leaves, and the elimination of hammerhead piers at Virginia abutment (Maryland DOT 1999). Construction of the bridge was to begin with foundation installation in Fall 2000 with the first twin span of the bridge completed in 2004. Upon completion of the first twin, a traffic shift can be made and the existing span demolished followed by completion of the second twin span in 2006 (Maryland DOT 1999) (Petroski, Drawing Bridges 1999).

Community opposition remained predominantly at bay despite a minor court case by Alexandria activists arguing the potential pollution of a 12-lane highway (Petroski, Drawing Bridges 1999). Members of the Jury as well as sponsoring agencies provided

considerable positive feedback about the competition process and the chosen design. Mr. Healy commented on the public feedback by saying,

> I think it was very well received. I think everybody thought the process was good . . . nobody was out there saying 'this was terrible, this was the worst choice possible.' The idea was you didn't have people out there criticizing it or saying it wasn't fair or your process was done behind closed doors . . . we didn't get any of that . . . this was the outcome that was produced and let's move on (Healy 2012).

Potomac River Consultants structured and managed the competition upon the former U.S. Naval Academy Bridge Design Competition; among the lessons learned and adjustments made to the structure of the Woodrow Wilson Bridge Design Competition was the release of the winning design to the public. Mr. Tom Jenkins, a member of the Selection Panel, recalls the release of the winning entry to the public:

> The way that the announcement was made in that was shaped by what happened in the Severn River Bridge Competition in that they tried to prevent, sort of, a re-judging in the public by really focusing on the winner and not bringing a lot of publicity to the other entries (Jenkins 1995).

Sponsoring agencies protected the competition outcome from negative press by not publishing information and images of the losing designs. Apart from the Stakeholder Participation Panel, the public was never given the chance to outwardly judge the winning design compared to designs not chosen. Receiving national recognition and acclaim, the design competition process was awarded a Presidential Design Award on April 20, 2000. An excerpt from the awards pamphlet reads,

> This design competition represents a new approach to the process of achieving superior designs for major bridges in the United States. This process produced a variety of fine designs and a winning entry notable for its striking aesthetic appeal and economic construction plan. The contest also generated substantial public interest and professional praise. (Presidential Design Awards 2000)

Miguel Rosales, Principal of the firm that submitted the winning design commented on the outcome of the competition compared to traditional design procurement methods; Rosales's opinion alludes to some of the sub-par designs proposed in the competition, "the results for the Woodrow Wilson design competition definitely prove what they would have gotten if they had gone for the traditional manner" (Rosales 2012). Similar to other large public projects, the Woodrow Wilson Bridge design competition and the chosen design had many proponents and opponents.

4.7 Summary

Following in the footsteps of the U.S. Naval Academy Bridge design competition almost ten years earlier, the Woodrow Wilson design competition sought to produce a bridge design

that would be accepted and embraced by a diverse pool of stakeholders. Sponsoring agencies recognized that a main goal of the competition should be to gain stakeholder acceptance; without stakeholder buy-in, the new design would face scrutiny from those it was built to serve. Officials took steps to ensure fair representation for surrounding communities during the competition process and judging phases. Despite stakeholder acceptance, large controversial projects will always elicit opponents, and the Woodrow Wilson Bridge design competition is no exception. Mr. Ted Zoli spoke candidly of his thoughts on the competition and its outcome:

> Woodrow for me, which I was directly involved in and have a strong feeling about—Woodrow, in my view, did not end up with the best bridge. And it also had to be modified so much during its evolution to something that, in many was ways was more of a caricature of a similar looking but not similarly-designed structural system and a bridge that was, in my view, enormously more expensive than it should have been. It's, in my view, a failure of the design competition as a strategy for selecting a great bridge. It's not that the bridge is a failure, I think it's technically a well-designed bridge that's enormously complicated, but it's enormously complicated for not a great reason. (Zoli 2012)

Mr. Zoli's comments shed light on aspects of design competitions that must be considered when evaluating the effectiveness of the outcome. State officials should clearly define their goals when determining whether to hold a design competition, as sponsoring agencies of the Woodrow Wilson design competition proved. Mr. "Jock" Freedman spoke of situations in which design competitions are appropriate:

> It's an expensive process, the process itself; its an unbelievably time-consuming process, you have to have all that lead time, you have to have all the arrangements . . . if you do it right, it's a wonderful process, but you've got to have your special bridge to do it with, you can't just be doing it to every bridge that you put out. And this is like everything else in life—it has a place. I think that there is a place, as far as I'm concerned (Freedman 2012).

Similarly, Mr. Tom Jenkins noted that design competitions are held for specific reasons, including stakeholder acceptance:

> I think it is an approach that owners use for highly visible projects where there is a desire for the community to get an excellent design. And it's as much a tool for the owner to build community acceptance of the project itself . . . There was community resistance to building the Woodrow Wilson Bridge and there were those in Alexandria that wanted to have a tunnel. So a bridge competition was part of the process of getting public buy-in to the bridge itself (Jenkins 1995).

After recognizing of the primary goals for holding a competition, one can note that the Woodrow Wilson design competition achieved what it set out to do, provide a design that would be embraced by the community. Competition structure for the Woodrow Wilson Bridge was built upon a foundation set by the U.S. Naval Academy Bridge. Sponsoring

agencies of the design competition learned from its precedent and adjusted rules and guidelines to account for a larger and more diverse group of stakeholders with varying interests. One key difference between the two competitions was the dissemination of the winning design to the public—losing designs were not released; often opposition occurs only when interested parties recognize they could have had other options. When discussing whether the Woodrow Wilson design competition was effective at producing a better bridge for the public, we must consider opinions of the stakeholders, sponsoring agencies, and the design community. Four designers submitted a total of seven designs, allowing the advisory committees and jury multiple options for the final bridge design. Had sponsoring agencies chosen to employ traditional procurement methods, stakeholders would have been left with output generated from capabilities of one firm. Additionally, Jury "refinements" enabled committee members final say of adjustments made to the bridge design. Overall, the design competition was successful at providing multiple options from which the jury chose; the competition caused no substantial cost increases and fostered stakeholder buy-in and support.

Chapter 5 : Discussion

Bridge design competitions offer both advantages and disadvantages for constituents and stakeholders. Prior to determining whether design competitions are the best procurement method for a specific project, owners must consider both the positive and the negative aspects. While chapters 2-4 analyzed three bridge design competitions, providing an understanding of competition structure, stakeholder participation, and end results, this chapter seeks to address advantages and disadvantages and lessons learned from the viewpoint of interviewees, published literature on the competitions, and news sources. Mr. Angus Low addressed the lack of understanding that most owners have of their projects,

> Nowadays, with these clients, the world has changed. And I guess I refer to clients these days as budget holders, and budget holders don't know anything about what they're doing. But they know what they should do in order to get that and it always involves the help of others. And the competition is a way to sort of hide the inadequacies of the client behind a plethora of crazy looking designs (Low 2012).

5.1 Advantages of Bridge Design Competitions

Compared to other design procurement methods, bridge design competitions offer advantages that include increased designer participation, public engagement from a diverse pool of stakeholders, additional publicity surrounding the bridge and competition, and increased professional debate and discussion. Multiple interviewees commented on the merits of bridge design competitions and the inclusion of additional designers' concepts; Mr. "Jock" Freedman remarked on increased designer participation,

> The reason we didn't want to go to one consultant is because all you get out of one consultant are the ideas that are contained within their key people. But if you have a contest, you'd get seven or eight consultants and you're getting the ideas from seven times that many people and hopefully from that you wind up with what is the right thing to do (Freedman 2012).

Additional designer participation provides a competitive edge among designers while also providing a larger array of designs from which the jury may choose. Mr. Freedman's sentiments were echoed in several interviews, including that of Mr. Fred Gottemoeller when he referred to the U.S. Naval Academy Bridge design competition:

> If the designer is working by himself, he is only competing against himself. He's not going to necessarily take that big step into new territory [as he would] if he's competing against four other designers . . . So it's that kind of a psychological game you're playing to try to get the best out of the designers, get them to think new ways – and it worked. No other way to put it, it worked (Gottemoeller 2012).

An additional advantage, apart from an increased number of participants, is the notion of increased creativity and innovation catalyzed during a design competition. Design competitions allow entrants to flex their creative skill set and think outside of the box in order to beat the competition. As a result, participants propose innovative design solutions that otherwise would not have sprung from traditional methods and a sole designer. Mr. Ted Zoli spoke of that advantage of design competitions:

> I think design competitions demand a little more creativity, I would say, or are asking for a little more creativity. In which case I think you can present something that's somewhat more, let's say, cutting edge and that takes somewhat more innovation than a traditional procurement. (Zoli 2012)

Mr. Zoli's comments regarding increased creativity were echoed throughout many interviews. Increased creativity was demonstrated in the Woodrow Wilson Bridge design competition when designers were encouraged to submit a second concept outside of the given design constraints. Though none of the concepts outside of the constraints were chosen, designers were ultimately given a chance to re-direct the opinions of the jury and advisory committees. Had a secondary concept been chosen, constraints and guidelines applicable to other concepts would no longer apply, and stakeholders would be given bridge deemed more appropriate for the site.

Comprised of design professionals, state officials, and residents of surrounding communities, juries and advisory committees promote public engagement throughout the competition process. By including a diverse pool of stakeholders, design competitions increase public awareness of the project while also encouraging public buy-in; because members of the public feel included throughout the design process, competition results are more generally accepted. Professional and community acceptance is further bolstered through a unanimous final jury vote, as demonstrated in chapters 2 and 4. Unanimous voting ensures that no member of the jury, and none of the represented groups, disagrees with the chosen design. Gaining approval of all jury members meant gaining acceptance from all stakeholders, because the juries represented various stakeholder groups. Winning designs, as a result of public engagement and input, spur professional debate and conversation; the design profession benefits greatly from increased public and professional discussion as to the merits of constructed designs. Interest and discussion surrounding a design generates advancement and innovation within the design community, which spurs further publicity and recognition. Winning designers benefit from increased publicity for the project; designing the final bridge is the grand prize for winning a design competition. On large projects, winners receive international acclaim and recognition, the crowning jewel for their efforts.

5.2 Disadvantages of Bridge Design Competitions

Despite the many advantages of design competition, there are several palpable disadvantages. How one might prioritize these disadvantages is project-dependent, as owners may hold certain aspects of the design process above others. Among primary

disadvantages of design competitions, as compared to traditional procurement methods, are the need for increased time and money throughout the process, additional risk placed on participants and owners, and owner apprehensiveness at potentially losing the reins of control over a design. As evidenced by the case studies in chapters 2-4, design competitions can take months, or even years, to organize and complete. Tied up during the design competition process is money invested by both designers and sponsoring agencies; though reimbursed for some of their design expenses, designers often spend much more time and out-of-pocket money during a competition than they would otherwise. When choosing whether to participate, designers face the hard choice of risk versus reward, potentially spending large sums of time and money without triumphing in the end. Though sponsoring agencies often pay a stipend to participating firms, public money is at stake and officials must carefully consider and limit expenditures; Mr. Zoli discusses issues with spending public money on design competitions:

> . . . You're looking at public dollars and public investment. So in my sense of things, in bridges, we are doing public works projects, which means to say that we are spending other people's money to build these things . . . And design competitions that are not focused, at least in some measure, as to value for money, I think are ill-formed and I might argue that one of the challenges with the projects that have gone wrong has been not enough focus on value for money. And that doesn't mean you build the least expensive thing, in my view, but you build the best thing and we haven't done a good job of measuring best. And so that's where I think design competitions haven't been quite good enough (Zoli 2012).

Concern over money expenditure further adds to owner apprehensiveness revolving around design competitions; owners risk losing total control of the end product once the jury, or stakeholders, cast their votes. Mr. Zoli discusses owner consternation during the competition process:

> But in many cases, it's not the procurement that's the problem it's the traditional sensibilities [of] the owner. And the owners really, in many ways, dictate what they want. So part of the problem, if you will, from a design competition perspective is, are owners getting what they want when they sort of look over the reins? (Zoli 2012)

Echoing Zoli's sentiments, Mr. Miguel Rosales touches on the owner risks associated with losing control of the end product:

> I think some Departments of Transportation are wary of them because they see them as they lose the control of the result, and there's always a risk involved when you do a competition that you might not get a design at the end that you want to build, as an agency. So you have to take that risk (Rosales 2012).

Due to differing agendas and misaligned interests, government agencies are not always willing to consider stakeholder input during the design process. Sponsoring agencies also risk potentially divisive outcomes among stakeholders; not all parties agree on a process

and an end result. Disagreement among stakeholders is a risk that must be considered no matter the chosen procurement method. Subsequent to weighing the advantages and disadvantages of design methods, sponsoring agencies must determine the appropriate course of action that best suits their project.

5.3 Lessons Learned

Choosing the appropriate procurement method for a given project requires analysis of owner and stakeholder interests and goals, a diverse collection of constituents, and multiple sources of funding. Given a highly visible project with multiple stakeholders, a properly structured design competition enables sponsoring agencies to meet the needs of the project while also gaining public engagement, support, and buy-in. Chapters 2-4 outlined three design competition processes, participants, and outcomes that represent recent U.S. bridge design competitions between 1989 and 1998. Lessons learned from the case studies include the following points:

- Bridge design competitions may be deemed successful, if structured properly
    - Buy-in and engagement from multiple stakeholders is required
    - Secure sources of funding for the project are necessary
    - Competition process should include:
        - Company pre-qualifications
        - Diverse juries representing all stakeholders, including design professionals, state officials, and community representatives
        - Anonymous submittal process to remove jury biases
        - Stipends for participants to partially defer design costs
        - Unanimous jury vote that ensures stakeholder buy-in of final result
- Design competitions incite discussion and debate in the design community and generate publicity for the project
    - Field of bridge engineering benefits from professional discourse
- Dissemination of the winning design must be carefully considered in order to achieve acceptance from surrounding communities and design professionals
- Middle ground solutions may exist as an amalgamation of design competitions and traditional procurement methods or design/build projects

Though bridge design competitions are employed for various reasons, the three case studies— the U.S. Naval Academy Bridge design competition, the San Francisco-Oakland Bay Bridge design process, and the Woodrow Wilson Bridge design competition— summarize key takeaway lessons. Competition structure is crucial to the success of a design competition, as evidenced by both the U.S. Naval Academy Bridge and Woodrow Wilson Bridge competitions; overall organization of the competitions were built upon the Switzerland design competition framework. Dissemination of the winning design also plays a key role in public acceptance of the project. In response to lessons learned from the U.S. Naval Academy Bridge competition, organizers for the Woodrow Wilson Bridge design competition did not release losing designs to the public, and the design received little backlash. Discussion and debate from the design community surrounding the competitions

have given the projects increased publicity and incited engineering creativity and innovation. Mr. Angus Low, of Arup International's UK office, noted lessons he has learned throughout his career as bridge designer; Mr. Low seeks to continue learning and adapting with each new experience,

> When you spend a career as a designer, what you remember and look back on are the wonderful things that you build. And I find that I forget the ones that I don't build, and even [from] the ones that I don't build, there are lessons learned which sometimes got carried forward in details that appear later (Low 2012).

Following suit, the design community is in dire need of debate-worthy projects; without innovation and new ideas, the design profession will cease to grow and adapt to an ever-changing environment. Design must be in a state of flux to keep up with a constantly changing world, constantly ebbing and flowing with new projects that push the envelope and question the boundaries; design competitions perpetuate the learning cycle and encourage creativity. World-renowned bridge designers have recognized the importance of competition within the design community, and as engineers and architects, we must continue to better our products. Discussion and debate instigated by bridge design competitions encourages design professionals to take a side and express an opinion; professional debate is crucial to advancement of our profession.

Chapter 6 : Conclusions

Looking forward, the design community must incite innovation and creativity among engineers and architects; discussion and debate surrounding controversial projects is crucial to growth within the profession. Though few bridge design competitions have been held in the United States since the late 1990s, they remain a promising alternative to traditional design procurement methods. Chapters 2 through 4 described three major bridge design competitions in the United States between 1989 and 1998. Material for the case studies originated from multiple sources, including literature reviews, news articles, competition literature, and personal interviews. Each bridge competition case study detailed a specific bridge design competition and described and assessed the organizational structure, participation of stakeholders, effectiveness of the competition at producing better results, and the end results of the competition process. Chapter 5 sought to address the advantages and disadvantages of bridge design competitions as related to the specific case studies discussed.

Despite the disadvantages of design competitions, as discussed in Chapter 5, owners and sponsoring agencies could consider bridge design competitions as a feasible alternative to traditional procurement methods. Case studies discussed in Chapters 2 through 4 validate the advantages of design competitions, namely the advancement of engineering through innovation and creativity. Through multiple interviews with key participants and players in design competitions, we learn that a competitive process generates new ideas and designs. Competitions engage design professionals and public constituents throughout the process, ensuring acceptance and support for the chosen design. Additionally, new designs stimulate discussion and debate within the design community, which catalyze growth in the field of engineering.

Design competitions are a fitting alternative to traditional procurement methods, but only in appropriate circumstances; not every new bridge design benefits from a competition. Design competitions are appropriate and beneficial for large, highly visible, controversial projects with a diverse range of stakeholders and public funding; designs for a typical highway overpass do not call for a competition process. Further, competitions are only successful when structured properly, as discussed in Chapter 5. While guidelines and constraints are project-specific and tailored to the needs and desires of the owner and stakeholders, necessary aspects of competitions must include pre-screening for high quality designers, an open process that fosters professional and public input, anonymous submittals, a unanimous jury vote, and careful dissemination of the winning design.

Competition structure can be readily adaptable on a project-by-project basis, as evidenced by Chapter 4, the Woodrow Wilson Bridge design competition. Though the project was larger and more expensive than the U.S. Naval Academy Bridge, the competition process was adjusted to meet the differing needs of the sponsoring agencies and more diverse stakeholder pool. Additionally, the Woodrow Wilson Bridge competition benefitted from lessons learned during the earlier U.S. Naval Academy Bridge competition—additional advisory committees were incorporated, artist renderings were made in CAD software, and

announcement of the winning design was adjusted. Public engagement throughout the design process led to acceptance by stakeholders; professional input during the process catalyzed discussion and debate within the design community.

One solution for alternative procurement methods as suggested by Mr. Zoli involves the incorporation of competition principles with those of traditional methods:

> I would like to think that not only is there a place for them but the opportunity should be more integrating a design competition philosophy into what are typically, what we would call the normal procurement process, which would be a response to a proposal and an interview . . . Integrating aspects of design competition into procurement would be, I think, wonderfully valuable for our profession. And it's happening to some degree in some circumstances and I think it could actually be something, I think, that could evolve and become a more common place (Zoli 2012).

Mr. Zoli's comments further identify the importance of continual innovation and creativity within the design community; the profession, as a whole, will evolve when given opportunity to discuss, debate, and generate new ideas. Without dialogue the design community lacks motivation to enact change.

Professor David Billington suggested an additional outlet for integration of design competitions into the design procurement process. Every year, many states build at least one small-scale bridge, approximately the size of the U.S. Naval Academy Bridge. Professor Billington suggested that some of these bridges should be designed through competition. Billington noted that the U.S. Naval Academy Bridge competition serves as example of the results that we may achieve as a design community if we continue to foster growth and innovation through public engagement (Billington 2012). Owners and sponsoring agencies considering alternatives to traditional methods should explore design competitions or, alternatively, consider integrating aspects of competitions into the chosen procurement method. Without innovation and creativity, the design community could lose the ability to adapt to our changing environment. When determining the future of bridge design procurement methods, owners must keep in mind their desired goals and end results. Mr. Randy Rentschler, spokesman for the Metropolitan Transportation Commission, commented on the need for design professionals to take the lead on engineering projects in order to promote an innovative environment; the design community in the United States must act quickly, before aesthetics are forgotten:

> The way that life works that's hard for individuals to accept is that institutions matter. We like to think that great people show up and lead us into victory in war and all this other stuff. The reality is that day in and day out, the institutions rule . . . Don't take a poll and decide the public wants [a design], the public doesn't know what they want. The public knows when they see it. This notion that the public always knows is completely stupid. So, the key is to get [the decision] out of these institutions . . . and get [bridge design] out of this frame of reference that cheapest is best and start talking about value and start talking about what it means for a society to have significant public structures that can inspire us. If you can do that, if that can

> happen, and I don't care if it's a bid process or anything else, if you can do that, you're going to succeed. If you don't do that, then you're going to have a world full of concrete overpasses (Rentschler 2012).

Bridge design competitions provide a vehicle for design innovation, engineering advancement, and professional debate. Better bridges are born from innovation and creativity; design professionals must recognize the demand for both increased aesthetics and increased value within our built environment. As designers, we have the ability to create bridges that cost less, perform better, and appear more beautiful. Looking toward the future of bridge design, we must take note of the vast array of benefits offered by bridge design competitions— the public demands better bridges, and our duty as design professionals is to deliver a product that effectively achieves that task.

Appendix A: Interview Questions and Transcriptions

Interview Template - General

The below questions serve only as a general template as the interviews will likely change as new information is revealed. It is important to note that my thesis revolves around **U.S.** bridge competitions with only a glimpse into the international spectrum.

GENERAL:

- What was your role or various roles in the US Naval Academy competition?
- What were your motivations for holding and participating in the competition?
- **Do you feel that the US Naval Academy Bridge competition (or recent U.S. bridge competitions) was effective at producing a better bridge for the public? Why or why not?**
  - Do you believe that the competition advanced the field of Civil Engineering in the U.S. in any way? If so, how?
  - What was the public's response to the competition outcome?
- Was the winning design modified before construction? How so?
- Can you please tell me about the bridge design competition process in the U.S.?
  - Who are the typical clients?
  - Who are the typical applicants? Do most competitions allow international applicants?
  - How are the judges/jury chosen? And how do the judges choose a winner? What are the judging criteria?
  - How are the competitions financed?
  - How are the design competitions publicized? Newspaper, engineering journals, tv?
  - What design constraints and other information are given to the applicants prior to the competition? Are applicants ever given a conceptual design to work from?
  - Once a clear winner is announced, do they carry the design through to the end or do other firms submit bids to finish out the design?
- Based on your experience with U.S. competitions, how can future competitions be improved to produce better results?
- Have you seen an increasing amount of bridge design competitions in the U.S. over the past several years and do you foresee a future increase? Why or why not?
  - Do you feel that the United States should hold more design competitions for its bridges? Why or why not?
  - Why does the U.S. not hold more competitions (compared to European countries)?
- Comment on the differences between the traditional method of bridge design (client choosing one designer) versus bridge design competitions
  - Effectiveness of each in providing a better bridge for the public, why?
  - Time frame/schedule
  - Budget
- What is the most exciting part of these competitions?
- Is there anybody else that you would suggest I contact to learn more about the bridge design competition process and effectiveness?

David Billington Interview Transcription

Date of Transcription	:	**April 24, 2012**
Interviewer	:	**Brooke Goodman (BG)**
Interviewee	:	**Professor David Billington (DB)**
Duration	:	**01:00:46**

DB: What you asked me first is "What was your role in various competitions, right?" And you list three, the Woodrow Wilson Bridge, the U.S. Naval Academy Bridge and Oakland Bay Bridge. All right. So the U.S. Naval Academy Bridge, I was responsible for having that competition. I was a consultant to the Department of Transportation for bridges in Maryland. And as far of that effort, I suggested to them, to the Chief Engineer really that they hold a competition. And what I did was to get the Christian Menn over to there, you know that name? Anyway, so Menn came over and we had a symposium and we had an exhibition of Menn's bridges in Princeton and it had traveled. So we sent it down there and what happened was and what's important to know is that the Department of Transportation and the Chief Engineer, they insisted on having politicians involved right away. And so actually, the Governor of Maryland came to this symposium and sat at the dinner with Christian Menn and talked about competitions because my model was a design competition in Switzerland. And they held them there ever since 1900 and these competitions -- and since I had spent a lot of time in Switzerland working with Christian Menn and studying in Myar, you know some of those things?
And I had even sat in on one of the design competitions so I knew this how they worked. And so in doing this preliminary work, then we organized a -- The way it works is we organized a small committee with Gottemoeller and me and a couple of others and the Chief Engineer of Maryland and sent out an open invitation to anybody who wanted to enter this competition to send us their credentials. We didn't say, "Make a design" or anything. Just "What have you done recently in and so forth?" So we got about, I think about 25 responses from major bridge firms in this country. And then we decided to pick six out of those. So that was a decision made the small committee.

And those six were then invited to compete and then we wrote, I don't know, a ten page document which had the rules. Specific rules what was going to be used to judge the competition. And at the same time, the state itself -- I thought this is was a big mistake in the beginning but it turned out to be right. The state formed a committee and actually, who were going to be the judges of the competition and is about 15 people of which only five were engineers. The others were politicians of some sort or another, member of the cabinets, of the State of Maryland, and people who lived in this area around where this bridges is going to be built. So anyway, that was the committee that was to judge the competition.
And then what happened, I'm going through in some detail of this but it will be easier to talk about the others afterwards. Anyway, so having the set of rules, this document, we sent to these people and then we sent to them the plans to show the location of the bridge and various issues about that. So, all these stuff was done before anything was charged and then they were given, I think that was about three months, to prepare a design and with certain specific rules. But the group that we picked, we knew who the six were but they were to submit documents under a letter. So they were A, B, C or D and the names were withheld, we didn't know which was which. Only one person in the department knew that what A meant and who was B and who was C but that's all.

And so if they had any questions about the competition, they could call this person who was a trusted member of the Department of Transportation in Maryland but it was withheld from the committee that was going to judge it. We didn't know that who was who. So three months later, there were six entries and each one of them had to commit to putting up, I don't know, something like a $5,000 amount of money that would be withheld if they didn't enter. And we decided to put in one company, or one person at the company who didn't actually apply but who was well-known. In fact, the name is Calatrava, you know that name probably.

And so he agreed to be the six member of this group that would provide that. When he got all the rules and found out who was going to be on the judging committee, just before all the material was to be sent in by each competitor, he withdrew. And we were sure he withdrew because he knew that Christian Menn was on the committee and I was on the committee and he knew that he would not win, I think. That's what we assumed. So, he just left. He didn't want to enter the competition that he didn't win, the others all submitted. So then we met for three days and looked at all the information and then what the state did was they hired two people, two companies really. One company was structural engineering design firm and the other company was a building contractor.

And so the design firm actually reviewed all five of the entries from the point-of-view of its design and the construction people reviewed each of things and gave their view of how they would bid it, what was the estimate of cost they will give. And the people who submitted were required to submit a cost estimate anyway. And okay, so we had all this information and then these two committees reported to us. I was on the jury, Menn was on the jury, and then there were all these other people. And there were designs that were shown, there was a standard platform, a standard -- you might say a picture, on which was projected each of the five designs. So we have all this stuff and they had made models and it was very extensive because this is really from what I understand, from history was the first competition, the first engineering design competition ever held in United States. This was in 1989 or 1990 somewhere around there.

And so it was carefully done and very carefully argued then between the five designs. Remembering we don't know who these designers were. We knew who they were totally, we know who, what five engineers had competed but we didn't know which is which. Although we could some obviously guess. So we decided on the winners and were in agreed upon amount of money. I forget it but it's written down somewhere. That let's say the winner got a fee of $50,000 and the total cost estimate was about $33 million and most of the estimates for this designs were in that category, somewhere a little higher. So they each got a prize for where they stood in that group of five. Some got 50,000, some got 30, some got 20 and one got at the end got 10 or something like that.

And then once it has been done and we had written a report analyzing each one, then the man who knew which one was which, then gave us that information and we then put that in the report and then send it around to the competitors. And then there was an exhibition and the general public was invited to come in. It was in the Annapolis, which of course the capital of Maryland. And so I'm going at some detail with this because of the fact that it was new that it turned out that there was one more thing, nobody was fully satisfied with the winner. The winner was all right, it was not very dramatic. Some of them are quite dramatic designs but very, really very poor designs. But the winner that we finally agreed upon had a lot of defects visually; I think it was technically all right but visually not great. And so a small committee of this big committee, it was myself and Gottemoeller and Myron Goldsmith, you know that name? Well, Myron Goldsmith was an engineer and an architect who was one of the figures at Skidmore, Owings and Merrill, you know that company? It's a big company in Chicago. And Goldsmith, I had gotten to know on this committee because he was a wonderful person with a strong aesthetic sensitivity and then also good knowledge of structure. So anyway, the three of us were delegated to go through the design, the winning design, and improve it. And we did that, and it was improved quite a lot without changing the overall concept but it was still made – We made, I think really important improvements visually without changing much of the structure. And so that was then published as the winning design. And then there was big lawsuit immediately after that.

Some of the environmental people around there thought it was a dreadful design and that it was going to look awful and there was a big town meeting that was held in the Annapolis which I went to which was a very unpleasant experience. The way people attack each other, but that's part of our system, I guess. And that was what happened but fortunately, by having the Governor onboard right away, having him involved at every stage of this, there are lawsuits which actually went to I think are at now at Supreme Court or something but it didn't go anywhere. In other words, the choice of people on the jury was such just as long as they agreed on this; the it was tough for anybody else to challenge them because they were mostly people around the community or people who are like in highest political positions. Okay, I went some lengths about this because it was the first one. It was I think a success. The bridge itself is not a great bridge but it was a good one. And it won some aesthetic awards from the society and things like that but okay, you've got that.

BG: Do you feel that you achieved better results than if you were to have held just a traditional or had a traditional design method, do you think that you -- I guess, my kind of kicker question is, "Do you feel that it was effective at producing a better bridge for the public, that this competition in particular?"

DB: Yes. There's no doubt in my mind it was a better bridge. And there had been proposals before. This was a project that had been on the boards for the state for, I don't know, 20 years. Because there was an old bridge there, they knew it have to be replaced. So the work projects that were supposed to be designed by the state or by consultants from the state, so this bridge was better than any of those. It wasn't a great bridge but it's not a big long span. So unless you do something stupid, you can't really make a bridge that the span was actually a required span, I think was 200 feet. The main span. And we actually made it 300 feet to make it a little more interesting. But at that span, it's not too much you can without doing something foolish but the bridge is very nice and I think most people will look at it carefully would agree that it's a very nice bridge, it's not a dramatic one but for that span and for that view, I think it's much -- It's better, very much better than they would have gotten otherwise. So that's the answer to that question.

DB: All right. And now coming to the second one which is the Woodrow Wilson Bridge, this is again -- You say you've been to Washington, so you know where the Woodrow Wilson Bridge is, it's over the Potomac river? And it was a terrible traffic jam. It was a six-lane highway and the traffic count told them that they needed the twelve-lane highway and it's also the circle around the city, part of that one they call that --

BG: Beltway. The Beltway.

DB: The Beltway. Yeah, that's good for you. It's the Beltway, it's also Route 95 which comes all the way up down the East Coast. So it's a very important road or bridge and it was in terrible shape and was wearing out, they had been patching it up and all kinds of problems. Anyway, so again, they knew for a long time they'd had various design proposals and we talked them into having another competition. Run the same way the first one was but this is much more complicated because instead of being a $33 million bridge, this is a $3 billion bridge. And, so it goes through a beautiful park in Alexandria. Alexandria, you probably been there.

You know it's a lovely old colonial town but so much Minneapolis actually. But Alexandria is a lovely town, and this bridge goes screaming right through the middle of it. And on the other side, it's a very interesting cultural bridge because on that side, of course, it's mostly white people living, it's mostly a suburb in way of Washington and a very elite kind of a town whereas on the other side, it's all black people. It's quite a different ethnic mix. So that was part of the issue to have on a committee now, that was going to judge this. You had to have an equal representation or both sides of the river, which was very interesting to see this.
Anyway, it was run the same way except it was much bigger and in this case, it ended up -- I was this time again on the jury. And this is much more high profile because it was in the two states but if you know the Potomac River well, you'll know that the entire Potomac River is owned by Maryland, even though it's going through it's separating the two states. But Virginia has no role in the river itself, it's all Maryland. And a piece of the District of Columbia actually goes through the middle of the bridge. So it's very politically complicated to have these three, and of course a lot of the bridge does end up going through Alexandria, so it's in Virginia alright.

Anyway, so it's a much more complicated bridge than one in which everything is in Maryland and so we got actually -- They organized it, it was out of our control to organize it. But they did organize it the same way, in general rule, but they ended up inviting only four competitors. But they asked the competitors to do something which I didn't agree with, but they did it anyway and that was to have -- To make a design and as their design -- but also make a second design which would be just a pure concept. They're all conceptual anyway because they didn't were the final designs but they were supposed to be pretty well detailed out. The other was just a drawing and a statement of what they thought might be else so good. So we had really eight proposals to look at - four that were worked out, and four that were not, were just concepts, less than concepts.
Okay. So it was done the same way, there was this big committee, was much bigger committee now and more complex. And that judged it -- And there were requirements that the, actually, I think it was the City of DC that put forward certain requirements. And one of them was they had to be archers because you know Washington well enough to know that there's Arlington Memorial Bridge and then there's the Key Bridge and they are both arch bridges, a series of arches going across the river.

And so, they said this has to be arches because the other two are arches and that should be somehow related. And Christian Menn who was not on the board, he was competing this time now. And he told the committee, "Well and that if you agree to make arches, I withdraw from the whole thing. It's stupid, they should not be arches." But they said "This is the requirement." Then he said, "Don't bother with stupid requirements if they are stupid, and this is a stupid requirement." And Menn, I don't think you'd ever met him probably?

But he is -- I mean, he is the world's greatest bridge designer, mind you. And he speaks with a kind of authority that's surprising to American engineers. They're not familiar with people who speak like that. Then he just said, "Well, you do it and the world will laugh at you for a stupid design." So they agreed. This one group then decided and this was a group that Menn was working with anyway not to make arches, but to make, I don't know, whether you've seen that final bridge, it's mostly complete now. But it has an arch look about it but they are not arches at all. Anyway, so we proceeded with the design pretty much the same way I described the other one, I won't go through all that. And it was debated and I was part of the debate of course and it was finally decided upon which design to choose, the design actually, of course, that Menn had proposed.
But then two things happened. One was that in the design process, the idea that you needed an architect to mess around with it was very strong in American design nowadays and it's a terrible thing that's happened. It hurts this bridge, it took away from the design idea that Menn had and it's hard to judge when it happened

and I made the proposal to committee itself to please appoint now a small group, like we did with the Annapolis one. Appoint a small group to work on the final design and improve it visually, not to change the basis of it but they refused to do that, that was a mistake, but they did refuse to do that. So the bridge is, it's not a great bridge, it's a good bridge. It's much better than they would have gotten if they tried to put arches in. And anyway, it's a lot more complicated than I'm describing but it turned out well and they're building it and they built it almost to the budget. I mean, I think it's somewhere close to $3 billion and which is of course a lot.

Anyway, this is a very expensive bridge. But that's important to know because at the same time that this bridge was going through design process and getting the costs and getting ready to construct it, the bridge over the -- Oakland Bay Bridge was also beginning, almost the same time. And the budget for that was also a $3 billion but that was done entirely differently, I was involved with that. I was asked to be involved by some people out there but it never transpired. They never got me actually to do anything but this was done not by -- This was not a true competition at all. It was done by a bunch of people, none of whom were engineers, who sat around looking at drawings and they had a very pretty drawing by an architect and they decided that's what they're going to do.

And then they have no idea how much is going to cost, they have no idea how it's going to work and there were engineers then from the state and from the county that got involved and made sure that the final design could be built but they went ahead with this very flimsy basis.
And as far as I -- They reported now on the newspaper every now and then and the newspaper report, the last one I read was it's about $7 billion now. So you think about that, I mean, that's not 10 percent over or 50 percent over. It's two and a quarter times what they originally asked to manage, not finished yet, and it's a very poor design. So it's an example of what happens when you don't have a competition, a proper competition, and when you get an architect to make the design. Those two things combined to ensure that you're going to get a poor result. So that's my conclusion to point one.

BG: That was very helpful and -- To jump back to the Woodrow Wilson Bridge, a similar question. Do you feel that that design competition was effective at producing a better bridge for the public over, say, a traditional method of just choosing a designer?

DB: Oh, yes. Oh, yes. Because they would have chosen the arch or series of arches, which would have been stupid, really stupid, it's bad for the foundations underneath that are not appropriate for an arches. Could have been done but could have been more expensive and the other designs that were submitted, the other three designs were arches. And there was one which was a very appealing one to me because it look like a bunch of Miallart Bridges but it would not had been successful if it was the one that was chosen. So –

BG: So the competition really allowed you to have a better choice of bridges, a better end result?

DB: Yes. As long as you have a very constructed jury, that's the word I was seeking for. We're not a "committee," we were "jury." And that allowed us to have really long discussions about the whole thing. And to have the politicians on the committee listen to the engineers, they don't have to agree with them all the time but listen to them. Then we had aesthetic consultants – this was the one who was the one with huge number -- They didn't just have two committees, they had, I think, four or five different committees that we're doing detailed work to bring what they thought the cost would be, what they thought the difficulties in design would be, what the aesthetics were and so forth. Environmental look and all these questions were asked in different committees for this lieu of bridge.

So I think it was, yes, I think it could have been better if Menn had just -- If they had hired Menn and he'd done it, it would have been better. But this way, at least they got the result of Menn's overall conclusion but they tampered with it. They got an architect involved and he made the base of the bridge look more like arches, they aren't arches and if you look carefully, you know they're not but they have this look about them which is a mistake and makes it look much heavier than it really is. So it was tampered with in a wrong way but it basically didn't affect the cost, the cost is coming in very close to $3 billion. So with it, it's radically different than what was done in at Oakland Bay.

BG: All right. So I was hoping you might be able to comment on your primary motivations for holding competitions. I know you mentioned that when you said you worked with Christian Menn, you know, the Swiss competitions were really a motivation for you but is that why you urged Maryland to hold this or were there any other reasons?

DB: Oh, yes. Oh, I never would have done it if I hadn't had experience in Switzerland with the bridges over there with and particularly with the competitions because for instance, Menn has designed a series of bridges,

major bridges in Switzerland and most of them were competitions. And when he became a professor, most of his big bridges were built after he became a professor. And in Switzerland, you can't be professor and have a business. So he had to close down his firm and simply be a consultant to other people, which he was, but he was consultant in almost all the big bridges were design competitions. And he knew how to do the competitions well, and therefore he almost never lost, almost all of the competitions he entered, he won.

Even though they were anonymous, but the designs were clearly better than anybody else's and so that's what gave me the interest and the ability to argue that in Maryland in favor of these and with the results that I could show them and that Menn could show them what he got, what they got. Those bridges there that are -- there's nothing like it anywhere else in the world. So therefore, I think that's what led me to make those suggestions. I wouldn't have done it if I hadn't had that experience in Switzerland.

DB: So you can see my motivation. Of course my motivation was to get better bridges in this country and I'd been going on around the country and also with Gottemoeller, you've talked to him. He and I worked with to go to different Department of Transportation and lecture on bridge design. I don't think we have made a major impact but it was an important experience for us to do and I think -- And he's very connected here with the politicians and he's an engineer, he also has a degree in architecture. He was a very good ally with me and two of us were good. He was a much better organizer than I am. So that was the help.

BG: Unless you have, you know, compelling information on current design competition process in the U.S., I guess we don't really have to tough on this one. It sounds kind of like, these were, the ones you setup where the main ones that really had a clear organization and clear goals and as far as I know, there haven't been any other very large ones as like them.

DB: No. The closest thing is the I-35 Bridge in Minnesota that replaced the one that killed people and stuff, you know, it fell down.

And that was organized on a fast track basis and it was in fact a design competition but it was a design-build competition. In other words, the people who submitted their designs were ready to build it. And that was typical of many to the Swiss, they were like that. Where it was a design-build competition and so when the winner was chosen, the winner had already made a design and already made a cost and actually submitted a bid. And that was done for this one because they had to do it fast and so rather and have what we did which is a slower type of thing to find out a design and after the design to mess around with it somewhat perhaps, and then begin to take bids from other builders. And that's all a longer process than was taken in the I-35 Bridge and that was done very well, I think.

I think it was won a company that -- we don't have any design-build company is really for bridges in this country. So it was people who merged, the designer which was the -- what's his name? -- Figg. But anyway, it was a well-known designer from Florida and Figg is the company, you know that name?

DB: Probably not, it doesn't matter. But anyway, so it should be an important American company and they are good designers, not great designers, but good designers. And they got together with the Flatiron Company which are builders and they've worked together in the past and doing design build under one roof even though it's two different companies. And they did it very quickly and they got a good design, not a great design, but a good design. So that's a good example of a design-build competition and there had been a number of those done.

Maine had some, Florida had some where they have design-build. But instead of having one company do it all, they simply merge existing design companies with existing companies. And some are successful combinations and some aren't. It's not a great way to do it but it does work. It doesn't lead to very great bridges, unfortunately, but this one led to a good bridge. So it was good example of what you can do with the design-build competition. It would be better if we had companies that were both designers and builders but nevertheless, anyway, that's the answer to that.

So there has been that and there hve been a number of these competitions which are really cost competitions for the merging together of designers and builders. And they haven't produced in as far as I could tell anything willing worth holding up as great examples of the design but some of them are good and the one in Minneapolis is probably the best of those.

BG: Okay. So I guess, looking into the future, do you foresee an increase in bridge design competitions or design-build competitions or do either of those or are either of those becoming more popular?

DB: No, they're not. And what happened is when cities want to have a really fine bridge, they immediately turn to Calatrava and so Calatrava gives them a very dramatic bridge. It's badly designed and very difficult to build

but they -- until they've done it once, they think it's a great idea. But once they've done it, they regret it. But that hasn't stopped the possibility of having design competitions in these major cities. So the only one that's successful was the one in Boston which you must know, which is the say, Zakim Bridge.

DB: And that was not a -- It was Christian Menn's design, you probably know that or maybe you don't.

Okay. So that was a design which was not a competition. I mean, it was they had a competition and they had a lot of solutions and somebody heard Christian Menn give a lecture at Harvard and they asked them to come and look at the designs that they had made, and he did. And he has a way of talking that seems very modest but very powerful. He looked at it and he said, well, he said "All the designs are completely hong." There's a mispronunciation of 'wrong' but that it was despite. Completely "hong," now he didn't mean they were completely wrong, that's not English. What he meant was, they were lacking, they were not the right design. So what he did was he went back to Switzerland and he went to his model maker and on the way back, on the plane, he designed a bridge and because he's so skilled with these things and has done it for so long. He got his model maker the maker model and he brought back a suitcase and in the suitcase, he had this model.

And he took it to the commission that was going to decide what to do and he built the bridge right in front of them out of the pieces and the model that he brought back. And they thought, "We have to have this bridge." So that infuriated the American designers, they were really upset. They tried everything they could to stop that, but they couldn't stop that because the commission was filled with politicians and all. It wasn't really -- it wasn't a real competition. They just had a lot of engineers submit drawings, just a sketch of what they want to do and so they had all these and they had some cost estimates and everything. Anyway, they took Menn's design, it's a very nice design. And it's the only one in this country like that. It's not cheap. And it's design, well, if you must know, the city by now.

Okay, well the point is that this bridge sits in Boston and has become a kind of a symbol. It's used too often as an icon of the city and it is a very good design and it was well-built and it's an example of what you can do if you get a first rate designer to design it for you, you don't need a competition for that. But unfortunately, other cities, well the Oakland Bay Bridge is an example of that and there are other examples around. Those places that had tried to build the Calatrava Bridge, I mean, the one in Dallas. Is they tried -- they had three bridges they wanted to build and so Calatrava made designs and it turned out they were so expensive, they could only been one of the three.

And that's what you get into when you want somebody like that who was really not a bridge designer really. He's had some engineering background, of course, but he's a famous architect now and people think that's what you need to get a great bridge, which is a shame. So that kind of put a crimp. Those things, those kind of design competitions and some way. Either that or you hire a really great bridge designer. And I have never gotten involved with those. Once they asked for Calatrava, they wouldn't want to have me around. And you could imagine. I mean, I knew him very well when he is a young man but anyway, he decided he'd make a lot of money which he has done. So okay, what's next? Anything else?

BG: Let's see. You've been wonderful. Thank you. You hit on pretty much most of these. Another one that I kind of -- Let's see. So obviously your proponent of design competitions and I would assume, correct me if I'm wrong, that you feel the U.S. should hold more of these. How do you think future competitions should be changed to produce different or better results or should they follow the model that you've been following or that you followed?

DB: I think by looking at the -- not the Woodrow Wilson, that's a unique kind of bridge. It's a huge bridge and it's up where the -- and I don't think the result is quite as nice as it should had been. But the Annapolis Bridge is a good example of what you can do in a bridge which is not a dramatic span but which is still an important bridge, has important location and so forth. And every state has about one of those a year. And well, that's 50 designs. Now we're never going to have that many but if each state would hold a design competition once every ten years, that would mean that you would have five design competitions a year in the United States and that would really live in things up a lot. Now, I think that's not in the cards right now, people have to get away from this. The merely crucial thing is to get away from hiring architects for bridge design because that changes them, the focus and their -- You can hire an architect as a consultant.
There was one for the -- over the Wilson Bridge. I mean, yes, like for the other bridge too and they can make suggestions to the jury when there's a jury competition but they are not making the design. And Myron Goldsmith who was involved intimately with the Annapolis Bridge made several crucial comments about the bridge when we were a small committee and we were changing it. And one of which is to give it a horizontal curve instead going straight across, make it curve across and that's something Menn always does, all his bridges curve. Even though it's a straight crossing, he curves them in plan. And the reason is because that

makes a very dramatic view of the bridge from underneath. When you look at the bridge and you sense what this is, you'll have a visualization of it you can't get if it's all straight across.

So it's things like that and architects are good as consultants sometimes, if they really understand bridges but of course Goldsmith was also an engineer so he understood everything. But things like that are important and -- But it's very hard to get this across because American bridge designers hate the idea of competitions because they'll lose. In other words, if they enter and there are six people entering a competition and only one person is going to win, they're going to spend a lot of time making a design and they're not going to win it. Whereas if they go and talk to the officials at the Transportation Department, they can often, if they have a big business they can often talk them into just hiring them. And say, "See what we can do" and so forth. And if they really had a first rate designer doing it, that would be fine. But we don't have many of those in this country now so that's an issue and I think, you know, you write something nice about it, that'll help.

DB: I mean it is important because to write up these examples that I gave you, the two examples the successful ones, they need to be more publicize than they are now. So I think you –

BG: Let's see, I had another one. Just for your own curiosity sake, "What is the most exciting part for you about holding these competitions or about having these competitions?"

DB: Well, the most exciting part was to work with other engineers in convincing them to abandon certain designs and to focus on certain other ones. Because most of the engineers since they never get involved with the aesthetics of these bridges, even on the people on these commissions that were all on these juries. They have to be pointed up, they have to be educated really about how you can make a bridge more elegant without radically raising the cost. They all think that because they know that Calavatra's Bridge has cost two to three times, I mean he did one footbridge out in Redding in California which was seven times over the budget, a big long footbridge, seven times over the budget. Well, that's an amazing derivation of duty. And so that what you see is engrained in lots and lots of people that in order to get a beautiful bridge, you got take huge amount of money. And that's because they don't know what the tradition is of great bridges and I mean, I'll be going to the structures convention, I don't know, you know those things? That they held every year in ASCE?

Well, there's going to be one in Chicago, the end of this month and I'm going to give the key-note address which is going to be what you hear say now, some of it. But no, it's very important that the structural engineers realize that they have the potential to do much finer bridges that we get done now, and that they won't cost a fortune. Sometimes they may cost, if it's a big bridge, it might cost five or ten percent or 20 percent more than the simplest bridge would cost. But for bridge, a big bridge, that's acceptable but for a normal bridge or not a normal bridge, but I mean for bridge that's in unimportant location or something like that, you can get a much better bridge without very much increasing cost, if any.
And without going to some fancy architect designer and get something which is designed without any sense of how it's going to be built. So that's the kind of issue that -- And the people that, I mean, Maillart, you know the Maillart by now, I trust? And Maillart was the one I've written the most about and he was a builder. I mean, he built things that he designed. For the first half of his career, later on, he couldn't do that anymore but he designed things still with the builder's mentality. Well Candela, has done all his work in Mexico, he was Spanish and Candela was a builder and he built these things, they're all roof structures. Hyperbolic Paraboloid roof structures and they're wonderful. And he designed all these but he also built them.

Now, he is very important because he was a builder and Menn was not a builder but he was -- But when he made a design, he always figured out how to it's going to be built before he completed his design. So that was just as important as designing it and that's a crucial stage that's often missing from designers is a careful design, how you're going to build it. And particularly, if it's a new design or something that has some newness about it, you've got to figure out you're going to build it. Anyway, that's very important. So that's something we have to begin to inculcate and I'm inculcating it. You are already inculcated if you have John, John Ochsendorf as an adviser, because he knows all these things.

BG: All right. Last last thing I would hope you might comment on is "Why do you think Europe has been so successful on having these competitions and why the U.S. is dragging behind?" And you touched on that a little bit with some of which you said but why is Europe is so successful? Is there anything that we can learn from them?

DB: Well yes, you can learn from them for sure. And the best example is Switzerland it's very clear to me, let's see, I'm getting a message here. Oh, yes. Okay. It's just my daughter, calling me. I have daughters. You're somebody's daughter too.

Yeah. Well, I'll comment. The comment was about that design competitions in Europe and that's not a correct way to look at it. The design competitions in Switzerland are exemplary and they're studying. The design competition, I was involved in the biggest design competition in the world in France. Do you know that bridge the Millau *Viaduct Bridge.* It's a huge, huge bridge and I was part of that process. They didn't do the right bridge according to me but it's all right. It's still a good bridge. But it was not done properly and had they done it properly, they would have gotten some other designers and they will gotten a better bridge but it still was it an intent of a design competition but there's not really a strong tradition in France. Germany has somewhat of a tradition but there again the engineers invariably work with architects, collaborate with them closely, and therefore the bridges are less brilliant than they are in Switzerland because of that.

And they are the only places that I know about, the Germany, France and Switzerland. I don't know Italy and Spain, I don't know much about them, whether they have them. But I don't think they have great competitions or I think I would have heard about them. But the Swiss ones are worth studying and so I've written a lot about those and there's -- If you look a discussion of one of the bridges I didn't talked about here but called the Felsenau Bridge of Christian Menn's and I wrote an article on that in Civil Engineering. I think it's 1986 or something like that or '85 or 84, you can probably find it if you look up my name in my vitae or something, you'll find out when I wrote that. It appeared in the Civil Engineering magazine.

Earle "Jock" Freedman Interview Transcription

Date of Transcription	:	April 24, 2012
Interviewer	:	Brooke Goodman (BG)
Interviewee	:	Mr. "Jock" Freedman (JF)
Duration	:	00:47:36

BG: So, I know that you are pretty heavily involved in at least the U.S. Naval Academy.

JF: I guess to answer your latest question, we've had two competitions. One for the Severn River Bridge and one for the Woodrow Wilson and both created beautiful bridges and each I think Woodrow Wilson won the number Civil Engineering accomplishments and Severn River won two or three other national awards. So to say, they were successful, yes, very successful. At least, the two that we've conducted. Well. I was the bridge engineer for the State of Maryland and I still am. I've been with Maryland for 62 years in bridge development. So, to start out which we talk about the Severn for a little bit.

The Severn River Bridge. The Severn is an absolutely beautiful river and that's why the Naval Academy picked it to be established on it and in used as a sailing river and the Naval Academy even uses it to train their Plebes and they've got all Plebes at least tall may as the bridges boats to sail up and down the Severn. And we had a bridge that went across the Severn River where it took you right into the Naval Academy and the Severn River Bridge is now called the U.S. Naval Academy Bridge, that's the way it was named and that bridge was a literal level movable bridge. It was almost underwater like at 25 or 30 foot clearance.

And consequently, it was also a busy bridge because it was taking traffic into Annapolis area which is the State's capital. So, we were burdened with the bridge that was old. We're burdened with the bridge that was being all opened, much too often to satisfy motorist and maybe not enough to satisfy the sailing people. So, we decided, we definitely should be considering a bridge, a replacement. And while we were in that negotiating phrase, when we were thinking of what to do, we even had something else that made it mandatory.

One weekend, three or four spans on the existing bridge just saddled about 3 or 4 feet. So, we had to close the bridge and thank goodness no one got hurt and we were able to replace those speed. So, we now had a bridge that we knew had to be, that something had to be done. So, you start out with your normal reason on what can we put in here and we felt that we wanted to somehow make the opening taller than it is now and hopefully make it as high so we would not have to have opening swift bridge.

And so as we got involved in it and we started to gather data into that and everything, we've realized we're really serious with that and we started of getting all of these people that are going to tell us what the bridge should be like and what type of bridge we should have. All this input coming from little community groups and whatever. And the first thing we had to do was to sell the idea that the bridge needed replacement. And even though they knew that it's old and even though of it was experiencing problems with openings and whatever, there was a whole group that said "This bridge is still in acceptable shape and we don't want you to do anything."

So, I think that what starts to stimulate this whole process. It's better to be very careful what to do because we got all these different schools of thought of what should be here. Here in this case, should it be immovable bridge, should it be a full level immovable bridge or a fix bridge? We went through all of that and they even got to the point where they got to the governor and the governor was William Donald Schaefer that time, wonderful governor. And they said, "They happen to know these bridges" and there's been everybody's telling you that they're trying to just went replace that and all of that.

So, I can remember I was on a vacation and I got a phone call that I was actually out of town, "The governor wants you to meet him at the bridge tomorrow morning. He wants to see what the problems with the bridge are." So, I went down there early the next morning. It was a beautiful day in the summer and as I say it's a beautiful river. And we drove out. He brought boats for us to use and we went out and I

showed him the underside where the deterioration and everything was taking place and all of that. And when we left there, he said "I'm convinced now that what you're doing is right. We needed a bridge" and before it was all over, he said "I feel comfortable that when they come to see me now and they start giving me, you don't need one, this and that. I can handle that."

So, we went up on top of the existing bridge to look up the river and as I say, beautiful view of the river and I think there were some kind of catholic retreat building that you could see from a distance and the governor said to me, "You know, this would be a lovely spot for the young women that live in, these apartment houses. They could come down with carriages with their children and they should sit down and enjoy your beautiful summer day like we are and look up the river and really relax." So, I said "Governor, are you saying you want to have an overlook in this location? Is that what?" He said, "Could you do that when you build the bridge?" I said, "We can do whatever you want." So, I'm just trying to give you a feel for work led us to believe. As we weren't thinking competition when we start.

So, after that, then we started to get into it. So, once we've convinced everybody that we needed a new bridge, it was then, "What level do you want? Do you want like at the same level as existing, mid-level or full level where you a boat under it? So before it was all over, I developed a slideshow where I go to Rotary Clubs, Sunday morning breakfast in churches, everywhere, going around, showing the people what the problems were, trying to convince that it still had to be replaced and then we were starting to promote the low level one which was causing so many openings was not the way to go. So, then it got to be a question of maybe instead of making it really high, we'll only make it a fixed-span of 45 boarder on to clearance.

So, because the Naval Academy was near, we had to get the their permission, and the Coast Guard, you know this is connected with the Navy. So, they're the ones that issue the permits. So, we asked to see the people into the Naval Academy who could give us some input and we went down there and I know we were in trouble when they took me in this beautiful room and they had Admiral Terry's huge table that they've gotten from somewhere and they were serving me coffee not in Styrofoam cups, Brigadier China and teaspoons and then all the brass came in and they told us what we were going to do.

They said, "Look, we've got all these wonderful sailing ships that we use for our plebes and what we have to do, we have to take them up to Severn River and put them in Alcoves when the hurricanes and everything come up. So we need a minimum of 65 feet under clearance." So, that was what we had if we wanted to build a fixed bridge. So, we were in situation we here to build our 65 feet or we're going to have, we would have to build a movable bridge. And because this bridge was could be rather long, I think the bridge will went up being over 2,000 feet long. You could get a nice beautiful arch effect to the bridge.

So, we started to promote that that's we want to do. We want to build a high level bridge and this is before we involved any competition. As we got in to it, then we started getting feedback from the historic people. Even though the bridge was not in an historic area, the ruling is that if what you build will affect the historic viewpoint, if somebody in the historic area sees what you build and it doesn't conform, then they can do things to keep you from doing that. And they were convinced that if we put the 65 foot bridge in, then you could see it from all over Annapolis and it would just an eyesore, no matter what we put in.

So, we came up with the brilliant idea of what we were going to do was sort of going to go down to the existing bridge and we're going to get this huge balloons that we were going to have in this and tie to the existing bridge so that what to your flying at the latitude was or altitude was, it would be where the 65 foot bridge would be and we would position people all around Annapolis and we're to ask them "Could you see the balloons?" So, that's how desperate to get information, the things we'd come up with. But anyway, that didn't work out too well, a big windstorm came up and we had balloons sailing all over Annapolis. But the little time that we do have them up, if we were convinced that it could not be, even if you went to the State House which was the highest point in Annapolis that you went out on the balcony, you still couldn't even see the bridge and then the Naval caveat people in the Naval Academy because right on the Severn right where the bridge is.

So, before it was all over, where we had convinced ourselves that we had the right concept that it should be a high level bridge and it should at this location. And now, how we're going to go solving the problem

of satisfying all these communities, everybody having interest because Severn River, there's a lot of beautiful homes that are on here because the people had their own boats, they have docking areas and they like to sit down and look out in the river. So, you have that kind of people involved and the working people that go everyday to work, you had all these different people involved, we had the U.S. Naval Academy, we had the historic people and we had everything.

So, we started to get into it to maybe we should think about having a contest to-- idea that I thought would be generated would be that we would get representation from all of these different elements. We have elected officials, we have people that were in Annapolis and we have people that lived in that neighborhood and all that and they would form a big panel. And therefore, we would then let that panel get the winning presentation. And by doing that, we saw it. If they so thought and it really worked that, we would take away the opportunity for others, say, were you to include our people or if you don't listen to us and if everybody would have us saying at that.

But then, so once we came up with that concept and by that time we had started to get in the hump with Professor Billington because he'd written a book, I forget what it was called at that time. He was still considered the guru when aesthetics and he told us that nobody in the last hundred years had had a contest for a bridge where the winner got to design the bridge. That's what made this idea that we were going to have a contest and we wanted the winner to have that as the carrot. And the reason we didn't want to go to one consultant because all you get at one consultant are ideas that are contained within their key people. But if you have a contest, you'd get seven to eight consultants and you're getting the ideas from seven times that many people and hopefully from that you wind up with what is the right thing to do.

Then, what really concerned me then was if we got our presentations and then we go to the panels, how is this panel going to be able to know the advantages and disadvantages of each one. So, what I did, I have one fellow that was working for me and was a contractor and I had him gather. When we finally got the selections or the presentations from five or six firms and they told us what were the good things with the operation, what were the bad things, everything about it so divided into two sections. One would be construction, how hard would it be to construct and what did people think were knowledgeable with design think, how hard would it be to design? Would it be a real problem with that? Because all you are getting were sketches and you're just getting basic concepts but there were real numbers in there.

So, each of that those groups, they got this. We had one head designer, he got five or six designers together and they looked at each one of the presentations. Well, this is going to be very difficult design and you can't make it continuous or you could make it continuous and it's going to have a vertical and horizontal curve in it at the same time. So, if you're going to use any kind of box girders, something, that's going to be hard. And what we did, we had their two leaders of, these two factions go before the panel and they presented, the pros and cons of each one of the presentations. If you pick this one, this is what you're going to get and it's going to be very very difficult to build and it's going to be very very expensive, and we don't know what the maintenance is going to be, and all sorts of things so we tried to educate that panel to a point where they could make a good decision.

And that was the basic concept and idea that we came up with and we did get a firm and we did give them or award them the opportunity to design the bridge and then we advertised it for our construction and as I said, it was a prize winning bridge. And so, when we had the Woodrow Wilson Bridge where I'm familiar with that area but it's the bridge that goes over the Potomac River right between Maryland and Virginia and that too is a very sensitive area because it's actually part of the bridge seeking the District of Columbia out into the rural area if you extend the boundaries of the district of it.

So, we have the fine arts commission and we had every kind of historic person and every kind of interesting Maryland's people and in Virginia's people and in Federal Highway's people because they were involved in reporting the bill. But before it was all over, we created another panel which represented all of those different groups and sure enough, we came out with another beautiful bridge and I think the beauty of it is if the selections were made, for both of those of various bridge, I cannot remember any kind of effort or animosity or anything. It seemed to have taken all of the flare out of it.

This group and was represented and this is good and what they came up with, we can live with. So, that I found to be the real pleasant surprise from a contest standpoint here.

BG: So, I know you mentioned it having had seven or eight different applicants or I guess designers. It's kind of like having seven or eight consultants; do you feel that that's what makes a competition better in some senses than the traditional method of just picking a designer?

JF: Absolutely. I don't think you always get on the most of economical bridge and for big bridges, bridges are in the last 800 years and you want them to be something special. I think, it's worth whatever extra you got to pay. I don't say you want this wild additional cost and then that was why we included the contractors in there because the guy there was giving you the scheme, He had run some numbers and this is what he thought it would cost to build. But you got a little more realistic approach and then where you'd say, "These contractors were able to tell the product. We looked at it and boy, that is going to be a bear and it's got so many more supports and so many it is. And we believed that compared to be wise, this one is going to cost maybe 25% more or 50% more. When you start spending a lot of money like the Woodrow Wilson Bridge was like 800 million. So, when you start spending those numbers, you use the term 20% more and you got a really expensive structure and a lot of overwrite.

But so, I personally and I'm just not a proponent of design-build. We've been involved in it here and from the bridge standpoint, I know there's been some of these big super bridges and for those, maybe that's the only way to go. But for the ones that are 2100 feet long and the one's that we just went through, I think we did a lot better than if we had given it to somebody as a design-build or even if we would have given it to a firm whereas we normally do and they submit two or three schemes. Then we select the best and they'll build off, that they design of.

BG: Right. So, would you be open to having more of these in the future? Do you think that it's something you'd like to see? More designed competitions I mean.

JF: Well. It's an expensive process – the process itself. It's unbelievably time consuming process, you have to have all that lead time, you have to have all the arrangements. With what we actually did with the people doing, we took these panels and we put them on buses and we take them all around, let's say, Annapolis. That we had somebody that knew Annapolis and they were going up on one of the high spots and look down. And if you were looking down at the bridge this is what you're going to see. This is the historic significance.

Now, we tried to give them the flavor of the area, not just the bridge but we took them into the community and we did the same thing with the Woodrow Wilson. We took them in to Alexandria and we took them up in the Maryland area and let them see from all different viewpoints. So that even though they hadn't lived there or didn't live in the area, they hate became probably more knowledgeable than those people that did live there. So, it's a very -- if you do it right, it's a wonderful process but you got to have your special bridge to do it with. You can't just be doing it to every bridge that you put out. And so, just before like everything else and life it has its place, I think and there is a place for it as far as I'm concerned because I see what we came up with.

And I've seen some of the bridges and I'm no expert but I've seen it come from other parts of the country where they had little community groups around. They got to satisfy everywhere, everyone and I'll look at that and I said that is not a real special bridge. I know Professor Billington, he came to really buy into what we did and he was very helpful and supporting us and he was on the panel. He was helpful and getting people to serve on the panel. So, if anybody knew these bridges and he always says "You don't ever want an architect to design your bridge for you, you always want a bridge man to do it." But I think today, a bridge isn't something which is I'm going to dress it up to make it look special. I think its initial form, its shape, where it is, the setting, all of it, that's what makes the bridge and not the gargoyles that you put on instead of scaffolds or something.

BG: Okay. You mentioned that if it's done right, it has a place or bridges in competition, there is a time and a place and right setting for this, what would you say that right setting is or the right timing or is it always case specific?

JF: Well I think -- Usually, you got to start out with something that's going to be maybe controversial. In other words, if you're dealing with a location that a lot of different types of people and a lot of different

people that are going to be coming if they're from a different angle, it's going to be very difficult to satisfy. In other words, if you go out in the countryside and maybe you go to small town bridge happen to have a very big bridge that you're going to put in. I don't know whether that's a place that you need to contest. But where you're going to have to satisfy all these people and when you do finish whatever you create, not have a lot of commotion to do about it, that the Severn River Bridge, we were administered, we're so afraid.

I know what you seem to getting ready to finish the bridge. So, what you do is to go out there and just move the barricade, don't say anything. I said, "We killed ourselves to build this gorgeous bridge and you're not going to let us celebrate?" He said, "Well. If you can convince the governor's people that you should have a celebration, I'm all right. But I don't think it's going to work." So, I went down and we talked with the governor speak on it. He said, "Sure. If you want to do it, what do you want?" I said, "I want to do it right, you know."

Before it was all over, we had the governor giving a speech on the bridge. We had the governor coming there and on his own private yacht. We had fliers from David Planes. We had fire boats blowing water into the water. We had a big cake and we've had people's contractor contributed money to have a real beef. I mean, it was a celebration and after it was over, I said to the minister, "Did you see anybody that gave me a hard time, no way." We even had one of the astronaut. We happened to be at the Naval Academy at that time and he spoke at it. So, it turned into a real celebration. And when you saw that, you know, you'll say, "Well. Maybe we did it right and it's a good feeling."

BG: So, it sounds on those like the reason, correct me if I'm wrong, the reason that we don't have more is because they are expensive and they are time consuming. But have you seen any of these recently? Have you seen any increases in design competitions or do you think there might be any in the future?

JF: I don't know. I think what I see a lot of now, when they have these real special bridges, they seem to go for design build and they evidently turned some of the things that we did into an assignment maybe to the design builder. I think, he does go into the community and it does maybe out little in little meetings and with people within the area to get a feel for what they see and what they do. So maybe they need that as a little, as an outgrowth and that one can happen so much faster because dealing only with one consultant you know and once you get your approval, then you know you can go right into a design mode.

But, I am not sure I know many contests that aren't have going on. Especially, Professor Billington was correct, "It is very rare where the winning concept or that winning team makes the concept, gets to actually do the design, that's not the way it usually work." That's what he told us, we were the first one that as I said, no one in a hundred years. I really don't know what goes on in Europe I saw you were asking about that. But we have a little bad experience that we did that international -- Especially, I guess it was Naval Academy Bridge and we had to pick the famous designer for where is he, Switzerland?

BG: Christian Menn.

JF: No, no. Christian Menn was one of our speakers. We invited him in the beginning. Now, because before we go into this, we held what we called an "Aesthetic Bridge Conference" and we invited Christian Menn was our keynote speaker at there, we got others coming. No, it's the one that does all the stadiums and all this and now he's in the group, Calatrava. And he said he wanted to be in the competition and so, we had seven slots and we said, "Now, look if you got to really be in it because if you drop out, then you're going to deprive us of another opportunity for somebody else and you're going to deprive that individual. Somebody else from not being selected" and he did drop out right before the competition came to an end. So, I was little disheartened with that. But anyway, we tried it on an international level. Graphically, we had one firm England did put in a presentation but we had in our country, we had them from West Coast and we had them from New York and Mid-America. Yeah. It was good.

Well. What happened on the Woodrow Wilson Bridge? On the Woodrow Wilson Bridge, we put it out for bids and on that one, the design was such that the main girder members where all the approaches were going to be box beams, steel boxes in variable depth shaped and before it was all over, when the bid came in, it was way that we got one bidder and he was about 30% higher than what the rest of it was. So, the administrator said to me, "What are you going to do?" I said, "Well, I think one the things we can do

is we can break it down to three smaller contracts." So, we were going to make one set of approaches and another set of approaches and then had a huge movable span. It fact the Woodrow Wilson I think has the biggest area of movable span in the world right now unless they built some other one.

But anyway, I said, "What is causing the expense on this are these huge steel boxes." He said, "But that's what the designer recommended us." "That's true." He said, "And what's the people are going to expect to see" because if people go over to look at the bridge from land and went over to the beautiful park area and they said, "There are going in the park and they'll be able to look up and see that and you'll know it's not exactly what we thought we were going to get." I said, "But let me explain something to you." I said "What part is probably going to be seen by more than anybody else, that's going to be the movable bridge when that opens up or when you go under it." That's all regular huge girders, there's no boxes in that. I said "Sir. If you'll just let me convert the design all the way through the bridge back to girders and not boxes but when you look at it in a side view, the silhouette will be exactly the same" I said, "You're going to see a big reduction of price because they're a lot easier to fabricate, they're a lot easier to design, they're a lot cheaper to ship, they're a lot easy to store, contractors used to dealing with them. Believe me, I have a better shot." So we did that and it dropped right back into the price range that we we've only spent another million dollars to re-do the design but you paid off in hundreds of millions in the actual bidding.

So, that was the case where we did change where I consider a major change but it didn't affect this bridge and we never heard anything about that at all. So, you can't change it and I think that's the beauty there of having the designer do what was selected. It's his bridge and you deal with him and he still feels an ownership to it because he got to do the revised design and all that.

BG: Great. Okay. So it sounds like from your experiences with these competitions, you said, you thought they were great success and I just want to clarify or confirm that you do think that they were effective at producing a better bridge than you would have gotten in the other method that these are the best bridges that you could have gotten out of a design competition? Is that right? There are good bridges in the public accepted them well and it was good all around?

JF: Yes. Well, we had participation on the panel too. I mean, we didn't have enough votes to vote anything we were in favor of. But I think what it did, the competition got us to bring in people. I know we brought in some engineer from I think Illinois. I can't remember his name was, the elderly gentleman and he was so articulate. And so, keeping to -- what is this bridge going to look like when you're here? What is going to look like when you're here? Those kind of presentation to the pad up made everybody feel like they're being included in a thought process that was get everybody goodbye into. I guess it's like what you see in the election when it goes into your living rooms and people talk to him and before you know it, they get them to understand what they're trying to get across. But all I can keep saying, it's a lot of work and it takes a lot of time and energy. But in the long run, for the two that we did, the one from the Naval Academy Bridge is probably have been here since 62 years and all the bridge is -- and I'll never work on that. The one I got the most joy out of.

BG: I actually think you are, I believe it was an article that has a picture of you standing next to that bridge and I think the article kind of mentioned something like that. I don't know. I'm sure you've been written up in many articles but I think I saw that one just the other day.

JF: Oh, yeah. I remember that. Yeah. They took me down to the bridge. Yeah. Okay. If because I got involved with Professor Billington you know, when we were talking about things, he said "Do you have anything else that we can do to help you?" So, before he'll answer, "Yeah. I got some other ideas." I said, "What I'd like to do is I'd like for you to come down and let me go out and take pictures of five or six bridges that we've recently done or something. I want you to come down and I'll bring all my designers here and let them sit in. How I will like for you to critique what we did. What you thought we did right and what you thought we did wrong from the aesthetic standpoint from what your view point." He said, "I would love to do that." So, I said "I would love to have you." So we went through a whole I guess six months of it and then we've even got to the point where we would give assignments to different teams within our office and we give in, you know with GSNLS type size and their location?

Okay. So we would give a key of people and say, we want to put a bridge location and what do you think about you come up with some kind of a sketch or some kind of little model, whatever you want and we'll

bring it out and then we'll let the Professor Billington show it to the group and show what he liked about each one and went through that and it was a lot -- they loved it. Everybody liked it and got into it and it even got to the point where he said to me, "Jock, I wonder if you'd come down and talk to my people. One of my classes about how you come from your preliminary plans to your first concept or whatever, how you get to it."

So, I suggest, "Why don't you let me do this? Why don't you let me get you a set of whatever documents we have and we start out to put bridges in location? I can come up to your place and I can give it out to how many teams you got there and then we can tell them we want to bridge to be this one, we want this, we want that and give them all the basic things. And then watch turn of lose and see what they come up with." Well, he did that and then, he invited me back up and we had a little panel around and the kids would come in, make the presentation and some were really creative and innovative. It really was something that everybody had a lot of fun with.

So, there's a lot of offshoots that come from this and as I said, we held what we called an "Aesthetic Conference" where we created a book on aesthetics. So, what we give to our designers and consultants for us and I got even national award from last year on that. It's like we were the first ones to really say aesthetics are important and get rid of the cap and alms and things like that. Yes, there's the most economical and yes, they grow up to face this. But we're building things that are stay 80, 90 years.

BG: Yeah. Well. So do you think that obviously, you probably learned some lessons after doing the bridge on the Severn River that you used in that Woodrow Wilson Bridge?

JF: Yeah. It gave him a perfect pattern. No, I mean, they didn't do exactly what they were going to do but it might have been bigger, the people they invite would be different, this and that. But they knew they were going to take the people into the area, they knew they were going to make a panel that represented everybody that has any kind of interested in it they did all that because at the beginning they wanted to know who was in-charge on the overall Woodrow Wilson Project and its initiation, he was basically a road man. He said, "Well. Let me go get a road guy and we'll get this bridge started, we'll get an actually economical bridge in here." I said, "Wait. Wait a minute." It's bridge coming we must have something more than just an economical bridge. And then, so we looked back on with the sketch I think that they had originally, it's see that it's totally different when we finished. Totally.

Fred Gottemoeller Interview Transcription

Date of Transcription	:	April 26, 2012
Interviewer	:	Brooke Goodman (BG)
Interviewee	:	Mr. Fred Gottemoeller (FG)
Duration	:	01:00:10

BG: Sounds great. Okay. So generally, what was your role or what various roles have you played in the different bridge competitions? For example, the Woodrow Wilson Bridge or the U.S. Naval Academy Bridge? I believe you had some background of the Woodrow Wilson Bridge Competition, are there any other competitions that you've participated in?

FG: All right. I've done two formal competitions and had different roles in each. For the U.S. Naval Academy Bridge, I was working as an adviser to the Maryland State Highway Administration at the time and they were trying to improve the general look of their bridges. One of the things that they decided to do was to sponsor a design competition for that project and my colleague at that time for that particular work was David Billington, so he and I were working with them.

And he had suggested to them that they imitate the Swiss rules for competitions. So basically, we got a copy of those rules and I re-wrote them to cover Maryland conditions on that particular bridge and then we worked out a protocol for how to select the contestants and how to setup a competition basically using the Swiss rules as a model. And then I stayed on with the State working as the competition adviser which basically means I administered the competition notifying the contestants sending them information all that kind of stuff, receiving the entries, organizing the jury, all that stuff was what I was responsible for and then holding the jury's session and then writing a report afterwards. So that was my role in that competition, I was an adviser to the State and did all of the logistical work associated with it.

BG: Just to jump back and ask a quick question, why did you decide to hold a competition rather than go with the traditional, you know, choosing a designer and letting them go through the whole project?

FG: Well as I said, Maryland at that time had decided they wanted to improve the look of their bridges in general and Billington and I were advising them on doing that and he (Billington) strongly recommended that they sponsor a competition as a way of kind of raising the bar for bridge designers in Maryland and they take this particular bridge because it had been controversial and they'd had a hard time arriving at a design that everybody would agree on. And so they just put all that effort on hold and setup this competition. And it did a couple of things; for one thing, it did raise the bar. I mean, a lot of Maryland designers realized that they had to improve their game if they were going to get work in the State.

And the second thing was that it resolved the controversy about the bridge design because we basically put on a jury representatives of all the main groups that had been objecting to the previous designs and once they came to conclusion and the chairman of the jury was wise enough, and of course we picked the chairman of the jury, so that helped. The chairman of the jury was wise enough to insist that the judgment be unanimous and it was published it being unanimous. So then none of the groups that had participated on the jury could back out later and say, "Oh no, we didn't really like that one." So it basically had the effect of resolving a controversy that had been dragging on for several years in Annapolis.

BG: So in addition to resolving this controversy, you know, this is kind of like a big question, but do you feel that the competition an effective -- a better bridge? Was the competition effective at producing a better bridge for the public? So do you feel that because of the competition, you had this competition, you had a better bridge than if you were to just have a designer, if that had at all worked down?

FG: Yes, I think so. Because, and you have to realized I'm a little biased, but the thing about competition is that you get a chance to layout some fairly -- this isn't the best word but I'll call an "inspirational rules," that or, "aspirational rules" that say, "We really want a good job," you know, you say that with more specificity but that's what you're really saying, "We want a high quality bridge." And that gets you off, I guess the designers have at the mindset of thinking, "Well, this is Maryland and they always do a welded plate girders, we'll get them another welded plate girder." A few of the competitors put in second, no they didn't -- That was on the Woodrow Wilson, I'll come back when we talk about the Woodrow.

But the result of that was none of the competitors put in a welded plate girder design. They didn't want the steel box girders one case that kind of a hybrid arch design and all the bridges were much better than the

normal bridge Maryland would have built and the winner was, you know, a step above even that. So Maryland really got what they wanted, which is a first class bridge at what is a very attractive site. And I'm not sure they would have even able to do even if they gone and, you know, selected a designer in the normal way and gone to them and said, "Here's what we want" because, you know, if the designer is working by himself, he is only competing against himself. He's not going to necessarily take that big step in the new territory, but if he's competing against four other designers, and by the way, one of the people on a shortlist was Calatrava, I'm sure you know that name.

So he's one of the guys in the group who working which said, you know, it's like he's -- Calatrava is like the rabbit at the dog's back. He's the target that everybody shoots for, and he is the one that gets everybody else running. So it's that kind of a psychological game you're playing to try to get the best out of the designers, get them to think new ways – and it worked. No other way to put it, it worked. Did that help?

BG: Yes, it does. And then a couple of questions just about that whole process, did you solicit applicants and entrance or did you put advertisements out to get different designers to send in their interest in participating?

FG: We put out a general request for letters of interest and we also notified a couple of people just to try to make sure that people would otherwise maybe consider a project in Maryland would consider it and one of the people we notified was Calatrava.

And then there was a first jury which is not the same as the final jury. Our first jury which was more professional in nature, you know, some State highway people and Billington. And I think we had an architect in it or somebody from outside the department, I was not on the jury on that first year, created the shortlist. I think, we got 15 or so letters of interest and we narrowed it down to six. And then those six were formally invited to submit entries and I think we signed a contract with all of them which basically said if you submit an entry, we give you I think it was $25,000 a piece.

So that they could defray some of their expenses. They all spent I'm sure much more than that but that's part of the deal I think with the competition so you really have to face the fact that if you want good work from these guys, you got to give them something otherwise, it's just too big of risk for them. And Annapolis project was 25,000 and Woodrow Wilson, I think was a hundred thousand a piece.

BG: So you said there was a first year in -- so I'm assuming there was also a second jury when you actually came to judging the bridges. What criteria do they judge on?

FG: Yes. After they were formally invited to put in and prepare proposals and we were very formal about what they had to submit back. You know, we had a list of specific drawings required, we had a list of things that they were not allowed to submit and we also in that case and this is consistent with the Swiss rules required them to do some sufficient calculations to determine the sizes of the main members and we also required them to a cost estimate. And you know somewhere, I've got copies of that stuff and it would take me a bit of time to find them but the information on what the criteria were for the selection of that and kind of stuff, I have to go back and look it up. You know, if just going from memory, the sight.

Okay. It's right adjacent to the Naval Academy and you could see it from much of a Naval Academy grounds and it's also right next to City of Annapolis, which is a historic city. So there were a lot of people very concerned about what it looked like and so a lot of criteria were really aesthetic in nature. The one -- The other person we had working with this on this was Christian Menn, the Swiss bridge engineer.

And he had been brought in by Billington's recommendation to kind of help with this competition and with some other things. And Menn suggested that we arbitrarily make the main span a minimum of 300 feet and his point, you know, in so many words was "It's only when you get span over around 300 feet things start to get interesting." So that got our attention. So that was one of things that wasn't really a physical functional requirement but was a way of again setting the bar a little higher and making the designers work a little harder.

And then at the jury, I think, was as I recall of 13 to 15 people, something like that. A lot of them were -- this is the final jury. The first jury was only about five or six. And the only common member between one jury and the other was David Billington and Jock Freedman who was the Chief Bridge Engineer of Maryland.

And then the other people on the final jury were and there was some national experts engineering and architecture and landscape architecture and some local people, the head of the local Historical Society and the woman who was the chairman of the jury was head of the County Planning Department in – County, which is where Annapolis is. And you know I'd have to go back to a list to remember the rest of them but we had a

fairly wide-range, I think we had a representative of the County Executive's office and then mayor of Annapolis was represented.

BG: How is this bridge received by the public and by the engineering world? Was it positive, negative, was there a lot of commentary?

FG: It was various, we put it out with a press conference and then we published this report and for a long time, we didn't get any feedback negative at all from anybody and then at one point, a group that I -- can't remember what their objection was but it was fairly narrow objection about maybe the fact that we were replacing the old bridge at all. But they got barely any support from the elected officials because the elected officials realized that this jury was widely representative and had from doing unanimous conclusion. And they were like, I'm kind of assuming now, but I think they were probably glad to have a controversy behind them. So no elected official picked up on this group that was objecting and they just eventually fizzled out.

I don't recall any negatives from the reactions. It wasn't in the end all that ground breaking a design it was steel box girder that was haunched but other than having some, you know, being a little unusual for the fabricators to be with, I don't think there was anything particularly ground breaking about it which is just very elegantly designed. And it was designed by Tom Jenkins who was working for URS and he just did an excellent job and can't say anything, different than that, he did a really excellent job and it turned out very well.

BG: Okay. Then let's move on to your experience with the Woodrow Wilson Bridge and then after that I'll have some questions kind of comparing the two.

FG: All right. Well, there I was on the other side of the fence. I was by that time I was no longer working for the State Highway Administration directly and I had spent sometime in the land development business. So I was almost completely out of the bridge business for a few years and then I went to work for a company that was doing the environmental impact statements for the Woodrow Wilson Bridge and that came to conclusion I think in '96 or '97, something like that. And without any input from me, Maryland decided to hold another design competition for the design of the Woodrow Wilson Bridge. And just to give you to the background on this, they had tried right after they did the Annapolis Bridge, they tried to hold a design competition for the Woodrow Wilson Bridge before they had really identified a concept for by that is that at the stage where they were still in the middle of the environmental impact statement, they were still trying to decide the number of lands and what the interchanges should look like and all that stuff.

They tried to subject that study to a design competition and that turned out to be a bad idea. There were just too many variables and you couldn't get an apples to apples comparison between the entries. And I actually served on the jury of that competition but it basically didn't produce anything useful. At the end of the day, they decided they really hadn't solved the problem even though, you know, like a lot of ideas from the various consultants and so that's when they setup this environmental study that then I worked on for four or five years. And that study, you know, it's real very elaborate public information process eventually came to a conclusion about how there would be a draw bridge or higher level bridge and fixed bridge and that kind of thing. So by the time the design competition, the second design competition was announced, they had a very specific idea what they needed for the bridge and that's when they, you know, basically used the Annapolis Bridge as a model. Put that another reset of request for proposals or letters of interest and selected a shortlist and then I was on one of teams, it was shortlisted and we got all the information from State Highways and prepared a proposal and our proposal won.

So in that case, like I said, I was completely on a different side of the fence. And I was, you know, it's a very interesting experience of course to see it from the other side and to be the guy who's having to meet the deadlines and be under the guns, come up not only a concept but a way of presenting it so they would make a good impression on the jury. And it was, you know, frankly, it was helpful to have been on as an adviser for the Annapolis thing because I had a sense of what the dynamics of the jury it would be and I kind of was able to influence our presentations so that took advantage of that. And then we won and basically that's the bridge development there today. There's a lot of detail about how the State actually organized that competition that I don't know. You know, I could tell you what I saw from the competitors' point of view but I only saw the tip of the iceberg. And the guy that you probably want to talk to if you want to follow up on that would be Bob Healy.

BG: And then that's kind of my next question to you is "Do you feel that this competition was effective at producing a better bridge?" I mean, I know your team won so you might be a little biased in that regard, but do you feel that better designs were elicited because of this competition being on the side you were?

FG: Yeah. Let me give you some background on the Woodrow Wilson, it had been controversial over the need to replace it and how they replaced had been controversial for a good ten years. And this environmental impacts study went a long way towards resolving a lot of the issues but there was still issue of "Okay. What's the bridge actually going to look like?" And once the final design was announced, once the jury made its decision and that the jury, chairman on that case was an ex-governor of Maryland, Harry Hughes and he again was sensible enough to require that the jury make their decision unanimously which they did. And it weren't any objections to the design, none, zero that I'm aware of. And so you know a controversy of by that time 14 years was resolved and they went for the construction. Now at that particular time, there were a lot of -- as they went forward for the construction, they had a lot of problems with the contracting issues which you may have maybe aware of.

But they weren't really necessarily a function of the design per say. The biggest issue with that was we had proposed at the whole thing be made out of steel box girders. They were good size for a box girder and it turned out only few fabricators in the country could make them and that particular bridge went to bid at about the same time as the Ravenel Bridge went to there in Charleston and two of them were competing for the same set of fabricators and the result of all that was that steel box girders turned out to be more expensive than they wanted to put into it and so they went to steel plate girders on the same basic plan that instead of a box girder whereas they have two plate girders on the same spacing. And so the bridge from underneath is not quite as elegant as I would have like but it's close enough and I did at this job with the cross-bracing and stuff.

So nobody but probably me and a couple of a bridge engineers would notice the difference, but otherwise, the bridge turn out pretty much the way we anticipated it would. And I don't know if we had any reviews of it that it was reviewed, it was published a few years back by Benjamin Forgey, who was very complimentary about it and he used to be the architecture critic for the Washington Post and if you're interested, I could probably find that and send that to you.

BG: I was just wondering, why do you think the United States doesn't hold more design competitions if these two seemed to go well, they seem to be effective, the public seemed to take them or accept them in a good manner. Why doesn't have the U.S. have more for other bridges?

FG: That's a good question. I think I've got a couple of theories but of course, I have no proof but these are just opinions. But I think one reason is that this fear in the part of the consulting firms that they'll be asked to do a lot of work with no compensation. And that's why I think it's so important to have a descent statement for all the competitors whether they win or not because for the Woodrow Wilson, they probably put half million dollars into those and you know a hundred thousand was helpful but it certainly didn't pay for how much they spent. And they would have spent something anyway in marketing cost to get that project, a project that size. But you've got to make it approximately fair, otherwise, it just won't compete and a hundred thousand dollars seemed to do the trick at the Woodrow Wilson and these days you'd probably have spend even more on bridge that size because that was back in the mid-90s or late-90s. So that's one big thing and I think a lot agencies kind of choke at that because a lot of it ended up like we had four contestants for Woodrow Wilson or five. Anyway, either $400,000 or $500,000 right off the cuff and in my opinion, that's a good value for the State because they were getting five good ideas that they could choose from -- anyone one of which is probably better than what would have come out on a normal process. But selling that to the governor, to the State legislature could have been difficult, it wasn't in Maryland's case but I can see why that might be something that they'd be reluctant to try. So that's one issue.

The second issue is the perception, I think by the consultants that it wasn't going to be fairly judged because there's so much consultant selection that goes on in this country is based on political connections or favoritism. So the obvious conclusion of someone being approached to do this was, "Wait a minute. I know my friend Charles, he gets all the Maryland's work and he'll just get this then why should I bother?" I'm using Maryland is a hypothetical example but I don't think that goes on in Maryland at all but a lot of States does and so they don't want to participate. In that way, we got around that, in a way the Swiss get around it. Is that they require that all the entries be submitted anonymously, that is a slight -- all of the drawings were in both cases identified by a letter code. None of them had any indications on them of who did the drawings and that made it possible for the jury to approach the judging with no biases because they had no clue as to who did which bridge. And if you can credibly do that, make the contestants believe this is going to be completely objective and anonymous, then I think, it makes it easier for them to participate.

BG: So now that you've been on both sides of the fence and if you've also done designing in the traditional method, do you feel that competitions are more effective? Do you feel that you as a designer produced better results through competition or through being chosen as a designer or is that even something you can compare?

FG: The third reason that I think and this might be the most important reason the consultants don't want to participate in the competition is the consultants invest a lot of money and time developing relationships with clients, you know, State Bridge Engineers, State DOT's, State Project Engineers. You know and sometimes that even extends in but the political grounds and they build those up over a period of years and invest a lot of money and making sure that bridges are good so they get to know the project and that kind of stuff. And competitions negate of all that, you know, after judging anonymously, your 20 years of relationship building goes out the window and your judged only on the quality of your submission.

So that's a tough to swallow for a lot of consultants. Now that they don't pick, they can compete on quality assets but all that other work that they've done is basically wasted. And the other variation of that is on the architectural side, architects often do the design competitions, but it's the selection of the contestants and then the selection of the final solution is often based on the architect's reputation and if they don't judge it anonymously, it becomes a big deal. You know that, yeah we selected the Frank Gehry design because he's Frank Gehry and if you're not Frank Gehry you're just going to say, why bother holding a competition if you want Gehry, go get him and don't waste my time. So I'm very skeptical about architectural side. I was just involved in one in Pittsburg about four years ago where they -- It was a bridge but they use architectural competition rules and I was very upset at the way that turned out. Because I don't think they got a buildable design and it was as far as I could tell is almost the influenced by the reputations of the designer it's not by the quality of the design. Anyway, that's my rant on that. But the point is these things hadn't kind of thrown you out about unanimity and the other thing that was very important is the jury that selected the shortlist. The first jury was not the same as the jury that selected the final. So again, you don't have any possibility of crossover of someone deciding they wanted Frank Gehry in the list, in the shortlist and then knowing Gehry's work pushing that in the final design. You really have to work hard to keep it objective and let everybody know that it's objective.

BG: So if in future competitions those would be kind of be three rules of them, the ones that you just said about different jury's, anonymity, objectivity.

FG: Right. Well I know you asked a couple of questions about what I thought about the results. And why don't you ask me again just so like I make sure I answer them correctly.

BG: So given your different experiences being a designer in traditional bridge design versus competitions and also being on both sides of the fence during competitions, do you feel that competitions are more effective non-traditional method or do you think that's not even a question that can be answered because they're applied in different circumstances?

FG: I think for certain kinds of bridges, they can be more effective. You know, I wouldn't say that every time it going to be more effective but I think eight times out of ten are going to be more effective in my opinion. Presuming at they're did administered the way I've just described, because you make everybody think not just the designers you make the clients think and you make the community think about. You know what's really important is what should we do with kind of opportunities, the importance of the bridge in everybody's mind and in terms of these things going to be here on the earth, why do we want them? What are we going to build here that we'll going to be comfortable living with for hundred years? And I think we get better talent from four people who are probably going to come up with a better idea than one person working on it. And as you can attract the really talented bridge designers -- but you know just only half or maybe twenty or so talented bridge designers around the world. If you can attract a couple of them, that helps too.

So I think that's in general for really prominent important bridges, I think they are good answer and particularly if they're and if you're in a controversial situation because it allows you to pull community groups and other interest groups into the actual decision making process through membership on the jury. And then once they're in that it's hard for them to get back out again, object whatever the final result is.

What's happening in the bridge world right now is there's a lot more owners, transportation agencies using this design-build method of procurement are usually with that at all. Well basically, it's a contractor and an engineer get together and usually three or four teams of contractors and engineers are put on a shortlist and then they do a proposal and then they put in a price and then a selection is made for the project. And a lot of times, that's done on very ordinary types of scopes of work where they just want a bridge to get from a bid, they don't say much about what it looked like or anything else but there have been a few bridges down in the

recent years where there's been a very specific and detailed aesthetic and urban design component to those and then they've used the scoring system setup where that kind of stuff is scored.

And then that they had a discounted what the various scores are so it's potentially possible that a bridge that is more expensive gets picked because it has a better score and you're getting close in that case to a design competition. They don't call it that but in fact that's what it is and I just participated bridge in Hastings in Minnesota where I've been want to design-build with both. I was on this, helped prepare the RFP in that case and the RFP had some very specific and detailed requirements about what the bridge will look like and then the proposals were scored based on that. And that had the effect of getting a very different design than they otherwise might have gotten – a better design in my opinion. And if you kind of step back and look at it, you'd be hard pressed to see much difference between it in a design competition.

The I-35W Bridge replacement in Minneapolis was also done that way and that bridge, the bid price was like half again as much as the low bid but they selected that design based on basically on aesthetic grounds. So there is this global interest developing in certain cases with design-build. They would be really interesting, to kind of to reach out. Although it's the bridge in Kansas City -- one more there that was done that way recently and it's gotten a lot of publicity and the Cable-Stayed Bridge that was completed in the last couple of years. It was design-build but they had that kind of an aesthetic scoring system in its part of it. And the design that was built I think was based pretty much on its appearance and quality of its appearance compared with the other.

BG: So then looking toward the future, what do you see? More competitions being held or do you see design-build kind of becoming the winning method or just the traditional method of choosing a designer and going with that? What seems to be pulling ahead, if any?

FG: I think, design-build will become -- is likely to become the more important with this kind of all over characteristic to it. It's just because I don't think anybody out there advocating for design competitions . . . I do think that I've been involved in a couple of competitions where they kind of just through the doors open and said, "Hey, you all come." And that doesn't work too well. You got to get a pre-qualifying list and you got to get I think a shortlist that makes sense that where you know the people on and they're qualified and all that kind of stuff. But anyhow, four or five is enough -- more than that's pushing it, but if you picked the right ones, that should be plenty, you would get a bunch of good designs out of that.

Bob Healy Interview Transcription

Date of Transcription	:	April 25, 2012
Interviewer	:	Brooke Goodman (BG)
Interviewee	:	Mr. Robert Healy (RH)
Duration	:	01:04:50

RH: I've had experience with three design competitions, formal ones, let's say, that you know, were actually publicized and announced and actually carried out. I've also had limited experience internally in my old department. We would do occasionally, years ago, in terms of design competitions for a specific project where you have a couple of design groups that would produce alternatives for a certain crossing. Those weren't publicized, they were just strictly in-house, using design teams of in-house engineers and so you know, nobody knows about that. They are long lost in history, you know. But anyway, the formal ones I did. The two other more involving the Woodrow Wilson Bridge and one was the U.S. Naval Academy Bridge. I can kind of gave you some brief information about those and some e-mails.

The older one, the Naval Academy Bridge which took place in the late 80's, I was not directly involved with. The reason I'm all over about it is because my supervisor, at the time, was the project manager for the Naval Academy Competition and I was just able to observe a lot what were going on and limited opportunity to participate in helping them out. And of course, as I moved ten years later into the Woodrow Wilson Competitions, of course we've studied what we've done previously at the Naval Academy as a kind of source of information for how to do it. So, it came through -- very familiar with it later on just because of researching it. So, the second of the two competitions, of course we have the Woodrow Wilson, I was the State's project manager for there. So, those were done directly under my supervision. So, I know quite a bit about them.

In the mid—, I'm going to say in early 90's, I guess it was, at Woodrow Wilson. They were just starting to look at replacing that bridge. The problem was with the bridge for one thing -- the more critical problem was the whole region there, and what was necessary was not just to replace the bridge but make the whole highway system work better. So, they held what they called a concept competition. Wasn't strictly a bridge design competition, but the bridge was part of it but it was more looking at, you know, how can we solve this whole big regional problem that's going on. So, we had people come in and give ideas on whole corridor-long solutions. And like I said, the bridge was part of that, but it was definitely not a bridge design competition. That competition was held -- I forget, we had four or five whatever entries and they were evaluated.

So, it was held and it was a successful to a point and that we reached a point we've reached to a point where entries were submitted and they were judged. The problem with that was none of the solutions was deemed to be a good solution. Everybody chose basically the same solution which was to push the whole highway like half a mile South and re-route the whole I-95 and it was just a mess. And the thought was the competition was flawed. The way the criteria were established, it punished certain things and didn't reward other things and so in the end, nothing came out of it. Except that it became the driving force for the effort that followed to produce an environmental document and get us to the point where we could actually design a new bridge. So it was successful in that regard in that highlighted the problem and the need for a much better analysis of the whole situation there and the bridge got replaced as a result of that. It took a long time before that could take place but it definitely it was definitely the entities towards getting the project moving and getting it completed.

So, then that lead -- once the whole environmental process was conducted through like the middle part of the 90's, they reached the point where they had chosen a solution, just to hold NEPA process took place and we were ready to. You know, they're going to an EIS and a record of decision by the federal government and it was all ready to turn over to be designed. And right about that point, you know, the owners, or in this case, the stakeholders, I guess we called it the sponsoring agencies, which was Maryland, Virginia, District of Columbia and the Federal Highway Administration. We were the ones that were kind of running the show. We were ready to start thinking about how we're going to procure the design of the new bridge.

The whole environmental process had come up with some guidelines and criteria for what the new bridge was supposed to be and then they are listed very specifically in a dozen or so ideas that were supposed to be captured in the design. And so the sponsoring agencies, we were left with how to take those and turn them

into a design. We could procure somebody to design it and then turn it over to be built. A very daunting task for a huge project. So, because of the successful competition that Maryland ran in Annapolis 10 years before, Maryland proposed a design competition to the other agencies. And in all honesty, the other agencies I think didn't really much care one way or the other, I suppose. As long as Maryland willing to take it on and run it, they were going to participate. They were okay with it. And so, that's what happened. This was started in the – up to 1997. We started to put it together; I think through most of '98. We conducted the competition and I think by the Fall of '98, we concluded a competition.

BG: So, Maryland was the main driving force and the reason that the competition was used?

RH: Yes. Maryland definitely was the driving force behind it. I don't believe that the other agencies would have done that if Maryland hadn't suggested it and pushed for it.

BG: So, in the followed -- Sorry, keep going. I was just catching up.

RH: And so, that's the brief history of competitions that I've been involved with. Like I said, two of them were sort of related to the same location. Although as I mentioned one was not strictly a bridge design competition. The follow up was strictly bridge design and let's see, just to say at the top in 1998 we concluded the competition. The prize for the competition if you will, the winning entry, the reward was that they would get a contract to design the bridge and that's exactly what happened. So, when the entry was -- so, on the contract, we made a contract with them and early part of '99 – they began their design work and then it was just turned into construction. So, it became a normal design construction project process after that. The most unusual thing about it was the method of procurement which was the design competition.

BG: After of all of a said and done, do you believe it was successful at gaining lot of entrants and having a successful bridge?

RH: Yes, I think it was highly successful. I mean, if you take a look at the end product and the attention and the acclaim that it's won, anybody would have to say it was successful. I think everybody has been very very pleased with the outcome. Got this brand new bridge, it's very functional, it meets all the requirements that were necessary for traffic conditions and I think most people believe it's that actually quite a beautiful bridge. So, I think in the end, again from all the words just gotten, all the positive notice it's gotten to media, I think you can conclude that it was very successful. Now, far as the number of entrants, we were fine with it. The sponsoring agencies, the owners -- I don't really remember what our expectations were that time. But when we first advertised for the Wilson Bridge Competition, we got 17 that entered. That sent in qualifications and it was a two-stage process. First, you had to send your qualifications and experience. They were evaluated by a panel and a short list of teams was made from that list out of the seven.

So, from the original seven, it went down to four finalists. The four finalists were then given all the information about the rules of the competition and what is expected, the deliverables and all that. They were each allowed to submit up to two entries, which was a little unusual. You didn't have to just submit one, you could submit two if you wanted. So, out of the four teams, three of them chose to submit two entries. So in the end we had a total basically of seven entries in the competition. And you know, I think anybody will tell you that that's probably not a bad number. It gives you enough variety, plus it makes it reasonable to evaluate. Some of these competitions where you might 50 or whatever large number of entries, I'm not sure how you could even begin to evaluate and compare them to pick a winner.

Now the thing about the number of entries, and I said, we were pleased with the number. Some people might look at it and say, only seven – doesn't seem like a whole lot. But there were some things that were limiting. You know, obviously weren't interested in people who could design big bridges. We weren't interested in some casual drawings from some citizens in the area. That wasn't going to work for us. We needed something that we could be fairly certain that could be designed and built, you know, reasonably and economically and not just some wild idea from somebody. So, we got those, believe me, people who didn't meet the criteria and just submitted whatever. On the back of an envelope, in some cases.

So, we knew we were going to be limiting the competition to big bridge design firms and that was fine with us, that's what we wanted. We wanted to have somebody that we could work with and get a good design at it. The second feature that really limited the number of entries was the fact that there is a movable bridge in the Woodrow Wilson. That's kind of a very specialized design item, there's not a whole lot of firms in this country or in around the world. And in order to be considered to the final design, you had to have a pretty good movable bridge firm on your team. So, those been scarce, it sort of limited the field. But again, from the owner's perspective, we were perfectly fine with the number of entries we got -- who they were and their

qualifications and experience. We felt that after evaluating the seven teams and especially once we shortlisted them before, that we were going to get a good a good team and a good design.

BG: How did you initially for a different entrants? Did you put it on the newspaper and the radio? Did you say that you were only interested in big design firms, or how did just these seven come to you?

RH: Yeah. There was an advertisement we prepared. It was posted in some of newspapers in the area and may even around the country now that I think about it. Some of the trade publications, etcetera and frankly in engineering world, people follow these kind of projects for a long time. So, the engineering community, the bridge engineering community knew this was a project that was on horizon and so they're aware of it. They know perfectly well that once the formal environmental process for the project was concluding that it was then going to then turn out as procurement for designers. So, we almost didn't have to advertise. They all knew about it and certainly once word got out amongst the big people, it was out all together. So the advertising, it was not a huge concern. We had plenty of interest. So, we didn't have to go begging for people to come in and participate. We had plenty of people that were calling us and that we were reasonably sure we were going to get a good number of entries. But in general, you would want to advertise it through whatever your normal process is and every owner has a process for advertising projects and usually that includes advertising in some local media, plus like I said in the engineering trade publications, etcetera, ENR, things like that. I think we did that. But frankly, I can say it, I just don't think that. I don't think anybody casually reading an issue of ENR just going to say, "Oh, my God. Woodrow Wilson Bridge Competition, we have to look at that." They probably already knew it.

BG: Did you have any international applicants or were you interested in that, or were you trying to avoid that or did you care?

RH: We certainly didn't preclude it and I believe if I had to think back in the original seven, I definitely recall an international team or firm that was leading a team. But I know that there were at least several teams that have international components too. In other words, you know, these were not just teams of one firm, they were generally like teams of multiple firms usually led by one big firm or maybe a joint venture of a couple of firms. But they had a whole list of sub-consultants usually on their teams for specialized items, etcetera and the most of them had a local component, you know, a local firm on your team just to cover that. So yeah, there were some international firms on the teams. In fact the winning firm – the team that actually won it had a movable bridge firm, from I think from the Netherlands I think. That didn't work but that's a whole different story. I can to tell you that if you want me to. But there was international interest and there was international participation on some of the teams.

BG: What kind of designs or what kind of information was given at the beginning versus what you gave to finalists? Did you give any type of pre-design for the original ones, or was it just kind of submit whatever you want and we'll take it from there?

RH: There was a list of criteria that was going to be necessary for you to meet in your entries. A lot of it came right from the environmental impact statement and the record of decision. I think I listed -- like I mentioned before, the criteria for the bridge that were developed to our next time. So, those were definitely highlighted and they had to be sure that you're actually are going to meet that. But the first stage of the criteria was mostly based on your experience and your qualifications as supposed to what you were going to submit. We certainly gave a description of where the project was going and this is what we expect as an entry. But to make the first cut, it was all dependent on who is your key staff. Who were your firm from the team? What was their experience? Who was the movable bridge designer? What have they done? So, you had to submit all of that information first and that's the criteria upon of which we developed the shortlist after that. So, the initial submittal had nothing to do with show us how you design this bridge or what you would propose here. It was more like show us what you've done in the past, what your qualifications, what major bridges have you design, etcetera. And then we'll decide who would go to the next round and at the end we'll develop an entry.

BG: Right and you made those decisions based off their qualifications and their experience?

RH: Yes.

BG: Did you have any type of tangible judging for that or is it just who you all as a group felt confident about?

RH: Yeah. There was a criteria listed. That's how we're going to evaluate your qualifications on this list of criteria and we had a team assembled, representing the sponsoring agencies who evaluated those and scored them and developed a short list. I think there were two representatives from each of the four spots in their agencies that did evaluations.

BG: After you have these four shortlisted groups and you've given them, like you said, kind of all the information they need to design the bridges. How did you end up judging their entries for the final design for the winner?

RH: Yeah. That's a very very complicated and involved process, at least was in our case. What we wanted to do -- I didn't talk about this, but it's one of the key reasons for having a design competition. I'd say there were two key reasons for holding a design competition. One is to get ideas from a diverse pool of engineers. The typical way you do a project is you select the designer and then they come and they turn them loose on the design and they come up with the ideas.

And so, the ideas you get are restricted to whatever you have from that one particular firm or team. By having a design competition in our case, we got the ideas from multiple teams. In other words, now we have four teams and they can each submit two entries. So, you can imagine there's a wide range of ideas and options and designs that you can pick from. So it really the spurred the creativity of the community, engineering community and it gives me others like a wide range of things that they can think about. That's one reason for holding it.

The second one that I was about to cover was, if you do it properly, you'll get support and buy-in from all of your stakeholders. So, in this case, in the Woodrow Wilson there's three states. The federal government, you have all these communities on both sides of the river with their interest in mind. We had our environmental, archeological, historical, cultural, technical, whatever. People that have these thoughts about what the bridge should be and what the project should accomplish and it's frequently hard to get them to agree on what the best solution is. So, if you're careful about it with your design competition, you can bring all those folks to the table and in the end, they pick the concept.

So, it's not the owner saying whose idea, presenting it to all these groups and saying "What do you think of it?" It turns out to be the opposite. It's like, "Here's all these ideas. You guys sit down and look at these and you decide which one is the best." And hopefully, while the owner is happy with the options that are out there, then you've got all these people who look at it and they say, "Yeah. I participated in that" and that's all it shows and yeah, we're happy with it. Let's move ahead with it." So, like I said, it's difficult and it's a long process. But if you can get that accomplished, then you have support across the board.

And that's maybe one of main reasons for having a competition is to get everybody on board with it and nobody can sit back and throw stones at it because they were involved. We chose, we want you to help us choose it. You sit at the table and you go to the meetings and you discuss it with your other colleagues and have it out. Decide what you think what's good and what's bad about this and hopefully in the end, everybody can come together and just think a good solution. Now, like I said, that's a difficult and long process.

BG: You mentioned it has to be done properly and I kind of wanted to know what you meant by that.

RH: Yes. So here's the thing. Now, in our case, what we did and this mirrors what we did sort of at the Naval Academy Bridge but a little bit more expanded. We have a jury, we didn't call them a jury, we called them a Selection Panel, let's say. That's the kind of term we used. And that was going to be I think in the end we had 15 people represented on there and they were diverse group. Like I said, there were some bridge engineers and there were some environmental engineers and there were some politicians and there were some agency folks and so you know. It was people that brought in diverse group of interest.

So, they were going to be the ones that looked at these and made the final selections. But because none of them were -- well, most of them were not technical experts in that in particular field, they had to be advised on certain things. You know, how did this particular design need the criteria? What were the technical aspects of it? Is it a good bridge? Is it a good design? How does it meet the environmental constraints? How does it meet the historical constraints? Is it buildable? You know, is it constructible or is the estimate reasonable? All these things that they can't know themselves because they don't have the background.

So in order to advise them properly, we formed I think was three advisory groups. Three, or was it four, I forgot now. One was a strictly technical. In other words, they looked at the design of the bridge and was it a good design. One with the constructability group, they looked at how buildable it was and what was the cost expected to be. We had the third group that was, I think they were called "historical" but they might have covered more of the environmental aspects of the project. And then the fourth group, I think it was four. It was purely a "citizens group." In other words, nobody that had any particular expertise but they were the ones that were living in the area, let's say. They lived on both sides of the river and they came together and formed a working group who develop their own thoughts on the entries. So, those four groups had a period of time after the designs were submitted. They had a period of a couple of months let's say, something like that to get together and really hash out what was going on in their own particular groups. They each had a leader

and they had a team of people who either signed or volunteered to be on there and they put it many hours and evaluated these and they produced these reports that documented what they talked about or what they thought.

And then following that period of activity, when the selection panel finally got together, each of these 4 groups made a report, literally, you know, came to the meeting and had an hour or two whatever it was, to talk to the panel, to the people, to go over the entries, tell them what they thought. You know, they had the written document and then they had a chance right in front of them to make a presentation right in front of the group, the panel to tell them what they thought. That took place on a day and then the selection panel the following day. They debated, deliberated about the project in the entry and they ultimately made a choice. So, in a nutshell, that was the process.

So like I said, if you conduct this competition correctly, I think you'd get those things out. You get buy-in from all those stakeholders and you get a wide variety of entries that you could say you looked at a lot of different things. So, it took a year and it cost a million dollars or whatever it cost, I don't even know to get through it.

But in the end we had an entry or a winning entry that we presented to the media at that time. It was actually, we had a media event and the chairman of the selection panel made a speech, you know. He talked about the competition and the entries and the process. He had one of the members of the panel there who happened to be a renowned architect who talked about it, you know. He presented all the great ideas and all the great things about it and ended up in a lot of positive response out of it.

Now, was it 100% and everybody loved it and decided it was the best and that was how to proceed? No of course not. There were people that thought, individuals that thought you know liked different things of that some of the other entries and you know, maybe they thought that entry C was better than entry A, whatever. But in the end they all came together on a consensus that this was the best entry. And this is the one we're going to recommend and this is the one we're going to proceed with and that's the way it happened.

BG: So, how was this received when it was announced, you know, in the public and in kind of like the engineering world? Was there backlash? Was there a lot of talk about the bridge design? Was it positive, negative, just a general feeling?

RH: No. I think it was just the opposite. I think it was very well received. I think everybody saw the process was good. I think, like I said, not everybody would agree. I'm not even sure I necessarily agreed with the winning entry, you know. I thought it was okay and I thought it was perfectly fine. I was happy to proceed with it. But I might have liked one of the other one is a little better, I don't remember.

So any bridge engineer or anybody in any field that was looking at this might say, "Well, I would have chosen that one or this one is a little better because of this or that" but nobody was out there saying, "This was terrible. This is the worst choice of all." Like I said, the idea was you didn't have people out there criticizing it or saying, "You didn't -- it wasn't fair or your process was – it was done behind closed doors and nobody knows why you pick this firm, whatever." You know, just imagine what people could say and we didn't get any of that. Everybody thought, okay, you know, you did what you said you were going to do. This is the outcome that was produced and let's move on. So, I think that's what we got.

RH: I can recall one newspaper article. It's still kind of grates on me a little bit to this day. It said, "It was a good design but it wasn't, what's the word they used, something like it was some kind of a lofty kind of awe inspiring kind of design." They thought it was good but it wasn't like a world class kind of thing. So, that wasn't exactly criticizing but it wasn't really blessing it either necessarily. Interestingly the same reporter that wrote that article years later now after the thing was built Came back and wrote a much more glowing article about the bridge so that made us feel good.

BG: So, I know that you'd mentioned that one of the great aspects of holding this competition is to kind of generate more ideas and get ideas from a more diverse pool, I know that obviously happened, but do you feel that better ideas came out of all of this and or do you think you kind of got similar ideas but you had a chance to at least to look at more ideas?

RH: The thing about the Wilson Competition was that the thoughts that were put out by in the record of decision, what di I call them -- The characteristics of the bridge that they were looking for, they did sort of confine how far you could go with it a little bit. You know, they specify for instance that the bridge had to be -- how did they put it -- an arch type bridge in the character of other Potomac River Bridges. So, if you were to go upstream into Washington, there's a couple of very nice historic arch bridges that people seem to like.

So I said, "Okay, the theme of Potomac River Bridge is in Washington is arches. So, the bridge has to be have an arch." It didn't specify an arch but had the arch-like bridge. Something like that. And so that really confined some of the creativity. And there was a whole series of things that you had to meet and perhaps in a restricted, you know, you don't have a complete blank canvass, you started with some basics that you had to meet. And so, if you were to look at the entry, I'll probably be able to send you something that will show all the entries. But I can probably pull out some stuff that you can start to see, so as you cross the Potomac River into it's a mile wide where the bridge is. It crosses in a series of arches. All of the entries basically do that. Let's say six out of seven. So yeah, you know, there's no cable-stay bridges in there, there's no suspension bridges and no long spans and none of that stuff because the site just didn't call for that and the criteria perhaps reins you in a little bit on full creativity.

But I don't think in the end -- I think there was enough diversity in the entries that you could distinguish between them. There was enough differences that you could evaluate them. Evaluate the differences if they were positive, negative, whatever and make a selection that you know, to differentiate in between.

BG: So, in looking back on the two that you had contact with -- the Woodrow Wilson and the US Naval Academy Bridge, do you feel that there should be any changes in that process or do you think that those were both done properly and that's how future bridge design competitions, if there are to be some, should be done? Any major flaws that, you know, you think could be changed for there is a better result?

RH: Yeah. I mean, there's always to improve it. The things that I would do differently if I could recall them now. But if I was going to conduct a design competition and especially a design competition where I was going to award the design of the bridge to the winner, I would probably follow it pretty closely to that kind of a process. I would definitely want to make sure I had somebody that knew what they were doing. The worst thing is somebody would submit a pretty picture of a bridge and then you try to turn it over to somebody to design and they'd say it can't be done. You know or it can't look like this or it's going to cost too much. If you follow some of the international bridge competitions that I've been reading about over the years where they open it up to anybody that can submit a drawing, that's frequently happens.

That's a beautiful picture, you know, somebody had some fanciful kind of an idea for a bridge crossing and everybody loves it and I could picked the winner and then go and design it and you know, the technical requirements are too severe and you can't design it in the way it shown or it's going to cost two times as much or three times or more as much as what you have budgeted and therefore it's no good either. So, you know, my point is I would definitely want somebody designing it who knows what they're doing and has done it before. So, that's the first thing I would make sure happened.

The second thing is you know, I would set it up so that, you know, with a very open process and that the people who are stakeholders were involved in the process. And so that they would feel ownership of what the final entry was. You could take all these entries and you could take a group of people and put them behind closed doors and they could pick something. And maybe it's a great bridge and maybe not, but if you don't involve the folks who are most affected by it who care about it, then what's the point of doing the competition? I think if you're going to have a competition, a key would be to make sure you involve all the major stakeholders. Find out who they are and what they care about and make sure that they feel like they're part of the process, because as soon as you shut them out. you know, you might have held the thing in the first place

BG: So why do you think more competitions aren't done or do you think we should more of these?

RH: I think there are plenty of places where they could do a lot of good and over the years, I've had people call me and say, you know, I represent this agency, this owner. We're thinking about putting a new bridge in across river, whatever and you know you have a design competition and we're thinking about holding one ourselves, can you tell me about it. I must have done these five or six times over the years. Somebody would call and ask for that information. So, I'd run through pretty much what I went through with you and tell them all about it, what we did and it's a daunting process. It took us over a year to do and like I said, it probably cost a million dollars or more given all the effort from the owner's side and from – paying these designers, we actually had stipend for submitting an entry. Might have been as much as $200,000 let's say which if you submit your entry, we would pay for that. That's a whole another topic on design competition. That you pay anybody to do – That stipend. That's probably should be part of your thesis by the way, the whole issue about stipends. But yeah, you got to pay these folks, you know.

And so you got to decide are you going to limit it to just a few and pay them a reasonable amount that might partially covered expenses or do you open it up to everybody and pay nobody and see what you get out of

that. So, it's a whole lot of pros and cons either way. So anyway, what I'm saying is it's a long arduous process. I know, that year me and the small staff, I had available to do this. We worked long hours to get it done and pulling it altogether in the end especially when you have somebody outside -- folks involved with all these selection panels and with the evaluation groups, you know. It involves a lot of people and you got to coordinate all that and you got to make sure they're holding their meetings, that you got to document their process and you got to do all this stuff. It's a lot of work.

It's rewarding in the end but in the middle of it, it's difficult and you get a lot of questions too while you're doing it, all these teams. They all want to win and you know, so they're asking a million questions and they want to make sure that their entries are submitted properly and that they're evaluated properly and everybody were in equal basis. You know, that's something as detailed as producing renderings of the entries. You can now -- this was 12 years ago now or 13 years ago. But at that time, the whole process for producing renderings. You know what I mean when I say renderings, right?

So the production of renderings of your entry is a critical thing because most of the people are going to be evaluating it are not and engineers. They may not have the visualization tools in their heads or be able to see and visualize what this design will look like. So we had to produce good quality renderings of what the entries are going to be and we didn't want it to turn into a picture contest. You know, like who can submit the prettiest picture will win with these people and the technical merit may not be fully addressed. So, what we decided to do was to take on ourselves, the task of producing the renderings. So that they would all be produced by the same team, they would all be sort of from the same vantage point and they would all be consistent in their appearance are detailing.

Well that, you can imagine, what that created with the teams, the entries, they of course wanted to be sure that the renderings were capturing what was produced or what was in their submittals. And so we ended up doing this process where we produced a series of renderings. I think we had 10 vantage points for each entry times seven entries. So, we had these 70, I guess 70 renderings that we took them and as we're developing them we would send it back to the team and say "Take a look these. Tell us that you think this is capturing your entry correctly or how would you, you know, tell us how to fix it." You know, so I think we had two or three cycles with that and here's the latest rendering. Tell us what you think and a lot of them were happier with them, you know, and they would criticize and Oh my god.

BG: That's interesting to know because that allowed them to look at how you are rendering team, view their work and that allowed them to make changes if they wanted to or something they need to.

RH: Yeah. We didn't want that again, you know, we didn't want it to be a picture contest. We didn't want it to be somebody to pick an entry to be the winner because they like the picture better than the other ones and you know how this is rendering if you've got the background you say. Doing renderings is kind of an art. The better you are, the better you can make the picture look. So, you know, a lot of these firms either have that capability internally or they would hire people to produce great looking pictures.

BG: So, at any point in this process, did any of the designers see the other designer's designs?

RH: No. It was completely anonymous. In fact, nobody knew the identity of the entries. We did know who the teams were of course because we picked them but once they were selected, the four teams became -- were given a letter designation. So, we had Team A, B, C, D and then if they wanted the second entry, then they got a second number. So, from the point after we selected, we only knew them by team name -- A, B, C, D. Only one person in our office of procurement knew who the identity of the entries was.

So, from that point on any correspondents that went back and forth between the entrants and the agency went through this one person, or his office and we would give him letters to mail back or comments or whatever. And he would send them out through them, you know, so that the Team A, got Team A's comments, etcetera. And so, nobody knew, it was completely anonymous, nobody knew who the teams were and they didn't know who each other were and in fact when we took the winner, you know, all I knew it was Entry B. Entry B was the winner. I have no idea who Entry B was. I walked into a room. I actually walked into a room where all four teams, representatives of all four teams were sitting around the table and I knew all the people but I told them, I said "The winner is Entry B" and looking around the room, it was literally like one person was ecstatic and the other three were all disappointed and that's the first time I knew who they were. So, that's the process I highly recommend as well because – I think anonymity is important. I think you can't have any bias or favoritism because here think they are or your experience with them or something you know like that or you can't have anybody having a chance to, you know, the lobby for their entry or something like that.

It has to be kept. The people who are doing evaluation have to be kept at arms-length like from the people who are doing -- preparing the entries. I think that's critical.

BG: Do you think that the winning design advanced engineering in any way or was it just a great product but kind of things that everybody seen before? Was it something that spurred changes in the engineering world?

RH: I think there were lot of advances in the design of the winning bridge ultimately. We may not have known them at the time when we got the materials were submitted for the entry. I don't think necessarily that -- I mean, there was no envelope-pushing design. You know, we didn't have any record of span lengths. We didn't have any -- you know, it wasn't that kind of a bridge, you know. So, you know, on the surface there was nothing that said, this is ground breaking here. This is -- nothing like that anyway. In the end, after we got into it and started doing the design between the owners and the designers and our representatives. You know, I think we put a lot of stuff into the designs that were technical advances both in design, engineering and construction that you know, we're important advances for us as owners. But I'm not sure you could necessarily see them in all into the time of the competition.

BG: So then once this winning -- firm won where they had -- did they make changes to the design or the engineering after they won or did you mandate that they made any changes or was it kind of they finish out the designs and they just went to construction with what they had?

RH: No, the evaluation process during the competition produced a lot of thoughts and ideas about here's ways that is to be improved, you know. Change this or change that, these were not substantial changes necessarily, they were refinements I think we called them. This could be better, we'd like it better if you could do this. I think we had a list of those probably for each of them but definitely for the winner and I think then, once they were selected, they were informed of these ideas and they evaluated them and for the most part, they were implemented.

They didn't change the overall character of the winning entry, you know. They didn't take concepts from somebody else's entry and incorporate them into this one, even though we had the right to do that. They were just more of ideas of this could be done a little better or we didn't necessarily like this feature and so we did the refinements and those were probably made all throughout the period of the design. The design took another two years let's say just to complete. All during that process, we were working with the designers to complete the design and a lot of interactions and a lot of choices were made and in the end, you know, it wasn't a 100% reflective of the one we submitted but it was far close, you know, in the untrained eye, it looks the same but there were refinements made.

BG: Well, I think we've also kind of covered a lot of the end part, you know, I just want to just to retouch. You do feel that this produces at least with your experience in Woodrow Wilson and US Naval Academy -- that these produce good bridges for the public -- do you think that if they've been done by a typical bid process, it would have been better? And I know that's a complete opinion question.

RH: Yeah. Who could say ultimately, you know, we certainly would have worked as hard as we could to come up with good designs that met the approval of everybody if we had just used the more traditional process. You know, that's just what you would do. So, I have confidence that we could have created good designs in either case without the design competition. That's what we're paid to do. So you know, we certainly would have -- that would have been our goal. How they would have been different who can say? They might have been completely different, they might have ended up being the same, it's hard to say. I think we could have produced the designs either way.

BG: So, given, you know, the proper resources, would you hold one of these again if you were kind of put back in those shoes?

RH: Wow. I would consider it, sure. I think the benefits we got from it were very very positive and I think the project moved ahead much more reasonably than it might have without a competition. I think it would have been a much harder sell to all of the affected stakeholders if we had just come in with one design and said, here's what it is, tell us what you think. I think the reaction in that case would have been much more of a -- I'm going to take shots at it and tell you what I don't like about it. As supposed to the way it actually worked where they got to participate and pick. So, I think that benefit is -- definitely worth it if you got a project that's large and controversial. So, yeah. I would definitely consider it again. What I would hope to do is to assign it to some project manager other than me to run.

BG: So, if you didn't run it, would you suggest this, would you push this as you know, a good way of designing big bridge?

RH: I would recommend it to any owner that was looking at putting out a large controversial project and needed to gain support for it. I mean, sometimes we have a project that everybody wants and they're not that concerned about some of the issues about how the bridge looks or what's the impact is going to be. They just want it so badly that it almost doesn't matter what you pick. So, there are projects like that, fairly rare these days I guess. But if you got a location where there's contentious stakeholders and believe me, in this area of Washington D.C., these are pretty savvy people. They know how the process works and they know how to be obstructionists, if you will. Yeah. If you don't get those folks on your side, you've got a headache all throughout. So, the best way to do that is bring them in, let them participate. Let them make decisions. So, I think that goes a the long way towards getting your project support and being able to move ahead. So yeah, I would definitely recommend to an owner in that situation. Yeah. Think about it. And then you have time and money, you know. Then you know you can do it.

Tom Jenkins Interview Transcription

Date of Transcription	:	April 30, 2012
Interviewer	:	Brooke Goodman (BG)
Interviewee	:	Mr. Tom Jenkins (TJ)
Duration	:	00:39:24

BG: So what was your role or what various roles have you played or did you play on the US Naval Academy Bridge or any bridges?

TJ: I was the in-charge of the entry that the jury before, the Greiner Engineering made. And we put together a team and I led the team that put the entry together. And then I subsequently was managed and let the design of the bridge itself through instruction.

TJ: It was the -- Originally, the JE Greiner Company found in 1908.

BG: So what were your motivations for participating in this competition, for Greiner that participating this competition?

TJ: So Greiner was sort of the -- probably the most well-known bridge designer in Maryland at that time. The JE Greiner Company has been responsible for all of the major tall bridges that were constructed in Maryland in just a firm. Had been doing business in Maryland for a very long time and when they -- competition came, it was no question that they would be submitting their credentials to be selected as a finalist.

BG: Do you feel that the US Naval Academy Bridge competition was effective at producing a better bridge for the public?

TJ: Well, I think that -- It certainly, gave them a bridge that they otherwise probably would not have gotten and it was an opportunity for designers to put forth technically good work to be judged but I think that the rationale for the competition was really to gain public acceptance for the structure. And I think that the competition succeeded in doing that as well. In other words, it was a contentious circumstance because of the high visibility of the bridge and the public sort of apprehensive of change and usually, there's say the old bridge kind of. There was a strong public sentiment not to really replace the bridge, just to maintain what was already there. And this was my understanding with design competition was with because of the particular site and the desire maintain a good relationship with the communities there. So that they would do something special in the selection process for the bridge. I think it's a motivational factor there on side of the owners.

BG: Do you believe that the advanced the field of Civil Engineering in the U.S. in anyway?

TJ: Yeah. I think that it challenges the design community to do better.

BG: Were there any particular features of the bridge design that were innovative and different. That you know we're spurred because of this kind of competition aspect?

TJ: Well, I think in order to achieve a good-looking result, we maybe need bridge competitions which normally would not had been done that allow for the structure to be unchanging as we went through the entire life of the bridge. So we worked very hard to make it sort of good appearance as well as a bridge that is very maintainable and it was modern in a sense that it was doing what we've considered very good practices for producing a well-maintenance type of structure.

And there were also other motivations that are in the design that for example, I wanted to keep the bridge as low as possible because one of the criticisms that they were getting was that it was a high bridge. And so we didn't really want to put a high lawn out in the middle of the river, something that was to necessarily going to draw any more attention to it as sort of an icon sitting on a river. We want to be, to keep as well as possible and to have a clean solution for crossing the river, which ultimately lead to some later criticism of the result and what they said –

BG: And what kind of criticism?

TJ: Well, there were criticisms. I guess there are magazines that were dissatisfied with the result because it wasn't a monumental tower or cable-stayed type structure or something. It was very unusual looking and that would lead to some criticisms that were leveled.

BG: So once the competition was complete, how did the public respond I guess before -- Was the public responsible what you had just mentioned about that this satisfaction with that in not being a monumental bridge or was a public, you know, were they of accepting the design. Was everybody excited about this?

TJ: Yeah. I don't know if I'm the best judge of whether the public, you know. There were some who were still opposed to the bridge so the public reaction was mixed. And the result of the competition that was sort of publicity of the competition and people worry with a look at what the different contestants renderings look like. And the public was not necessarily in agreement with the jury selection. I would say it was mixed. My impression though being -- living in Maryland and knowing people in the community, is that I would say over time, the public have been -- have grown to very much appreciate the bridge. But I would not say that immediately, after the competition it was, "Oh boy, this is wonderful." It was mixed, quite frankly.

BG: Which I'd assumed to be as expected after any, you know, large project.

TJ: Yeah. Well, that was -- It was noted in the results, since it was put forth the local news paper, the capital in Maryland sort of re-ran the competition in a sense and asked the readers to vote on what they would pick. Yeah. It was not necessarily everybody was uniform in their acceptance of the result.

. . . And that later on, I played a different role in the Woodrow Wilson Bridge competition sort of managing the competition and the way that the announcement was made in that was altered as a result as the way the -- or was not altered, it was shaped by what happened in there in the Severn River Bridge competition. And that they've tried to prevent, sort of a re-judging in the public by really focusing on the winner and not bringing a lot of publicity to the other entries. Well, there was a very -- It was a different bridge and a different process was employed there.

BG: So it sounds in some senses there actually, you know, fairly similar since from what I understand the Woodrow Wilson Bridge competition was built on the U.S. Naval Academy Bridge competition. From what I understand, the Woodrow Wilson Bridge competition was built upon the US Naval Academy Bridge competition, kind of the structure.

TJ: Structure was derived from that. By the structure also was adapted from lessons learned from the Severn River Bridge competitions.

BG: So, I guess stepping out of the sequence of whatever I wrote over there. What other changes were made that you can think of. You know, significant differences between the two competitions, what else was learned from the U.S. Naval Academy?

TJ: Well, the biggest difference I think was in that the technology had changed significantly in that time and that when we did the Severn River Bridge competition as an entrant, you have to submit renderings. We actually have an artist do renderings and those were really artistic renderings of the design. When the Woodrow Wilson Bridge came around, the production of the images was done by the general engineering consultant so that all the contestants submitted their plans and then the renderings were done all by the same graphic team using 3-D studio software from all standardized views of the structure.

And those views were generated. In other words, you went and took photographs of the site and those that the coordinates of where the photographs were taken from were all recorded and then the 3-D imaging was done. Sort of first imaging, the existing bridge and then putting this and then calibrating the images or that the image space to show that it fit the existing bridge and then all of the contestants bridges were then exchanged in the same 3-D space and the images of the bridges were all generated by single group and those images were then sent out. Each contestant's images were sent to the contestants for them to review and they could provide commentary as to whether the energies were properly done.

So it was very different in that regard as to what the images that were judged were not those submitted by the designers. They were separately generated and it was done in a manner to make sure that a party did not win would be -- the process was well-documented so that if there was a challenge of the images then the administration of how they were generated was available. So that the technology had change to allow that to be done and the result I thought of that was very good.

BG: Of having the standardized system?

TJ: Yeah, exactly. Because one of the problems is that if the images are distorted, they can make something look better or worst. So having truthful images was felt to be a very important aspect of fairly judging everything and then in the case of Woodrow Wilson Bridge, because the two parallel structures are so wide, there had been images created before that, in fact, did distort what the end result was likely to look like. So you have to be very careful. And that was the significant difference between the Severn River Bridge competition and the Woodrow Wilson Bridge competition.

BG: So then just to clarify for me. The Severn River Bridge competition, I thought there were, you know, all the renderings were done by one artist or they just weren't on the computer?

TJ: It was the Woodrow Wilson Bridge. Each contestant generated their own images for the Severn River Bridge. And that, in reviewing what the images were as well as the change of the technology of generating images that have happened in the intervening years, the process was quite different for Woodrow Wilson Bridge.

BG: And you feel that that was more effective that putting everyone on a common playing field I guess.

TJ: It took control of generating the images and moved it to a third party.

BG: Well, looking toward the future, do you feel that if you were to use -- would you use a similar structure for the competition or would you, you know, structure competition in a different way. And if so, what would be different about a competition that you would hold or that would be held.

TJ: I think that I would say that if another were to be done for the same reasons, I think the Wilson Bridge competition was very successfully run and it had a very successful result. So I would say that it was -- in manner in which was conducted was improved over what the Severn River Bridge had.

BG: Have you or do you foresee a future increase in bridge design competitions or would you like to? Do you feel that they are effective in their -- They usually accomplish what they're trying to accomplish or do you feel that it's kind of just a lost cause in that we don't need to have more bridge design competitions.

TJ: Well, I wouldn't say it's a lost cause. I think it is an approach that an owner is used for highly visible projects where there is a desire for the community to get an excellent design and it's as much a tool for the owner to build community acceptance of the project itself. And that was the circumstance in both cases. There were -- It was community resistance to building the Woodrow Wilson Bridge and then community, there were those in Alexandria who wanted to have a tunnel. So that the bridge competition was -- It was part of the process of getting public buy-in to the bridge itself.

BG: So do you feel that the U.S. should hold more competitions or only in instances where you need public buy-in and where you need, you know, kind of all the stakeholders to sign off on it?

TJ: Well at you know, yes, the major bridge business has sort of evolved into more of a design-build approach and the -- There hasn't been another competition that I'm aware of which was similar to Woodrow Wilson Bridge competition. It seems that happens. So I think the combination of the sort of the change in the manner of which the projects are being funded is influencing how these elections were occurring or as its more of a design-build proposal where there maybe some of the technical requirements and there maybe some points awarded for different -- or for a technical or visual basis but primarily the selections are driven by cost. At the end of design-build arena. And I think that that's more similar to what happened elsewhere around the world.

BG: Including, you know, I've -- I also was kind of under the impression that a lot of European countries use a lot of competitions but those mainly would be more along the line of design-build.

TJ: They are. They are. I have participated in putting together design-build proposals outside of the United States and basically they are engineers working with contractors in putting forth the whole package of design-build proposal. In that, there is a desire to have an attractive structure but the structure is driven, is more driven by cost considerations. They are very important so that the design follows evaluation of what the cost of various types of structure would be.

BG: I'm still a little bit intrigued by the differences that you were mentioning between the U.S. Naval Academy Bridge competition and the Woodrow Wilson Bridge competition. Are there any other, you know, big differences or any other lessons learned that you feel, you know, really shaped the Woodrow Wilson Bridge competition?

TJ: Well, I think. Okay. Their format was similar but the scale of the Wilson Bridge was so much larger than the Severn Bridge. It's difficult to, you know, I really don't know how to describe it. It's just that they were very different structures. So, I don't know.

BG: So back to the U.S. Naval Academy Bridge, other than the refinements, I know that the jury kind of suggested a few refinements, other than that was the design changed at all before construction or you know, did you just go ahead and continue with your design process and then the bridge was built?

TJ: Well, there were changes that occurred to the design and when the selection was made, the design we submitted was deemed the winner or they came with a series of sort of jury generated comments or changes to the design and basically worked with I guess -- I guess, Professor Billington was highly involved at that time. We've got a series of meetings where the design is discussed and we tried to incorporate the suggestions or probably the most significant changes were and the arrangements of the main pier. The design we had submitted had posture of columns underneath for each main piers. And that was reconfigured into more conventional arrangement. So there was that change as well as the columns where we shaped somewhat to be more remodeled in appearance. There were changes that were incorporated that you could I guess, you characterized on this ultimately, they were owner requested refinements. And you know as a designer, you want to satisfy the wishes of the owner.

BG: For you, what was the most exciting of this competition in any other competitions that you've participated in?

TJ: Well, they are kind of exhausting if you really want to do your best and do them as good as you can. And I guess, if I were to look to it, I would say, probably just winning. And you know, when your design is not selected, it's something of a let down. So –

BG: If there were to be more of this, would you want to participate another competitions? I know as we said it's a lot of work but would you feel that it's worth participating in for any other large -- They say, there was a competition for a large infrastructure project, you know, would you want to participate in this?

TJ: Well, I tell you, for a company, it's a business decision and they really have to assess. A business makes a decision as to whether they're going to pursue something and design competitions require a lot of effort and cost. And a company needs to assess what their probability of success is going to be. And then make a judgment as to whether the costs that they were going to incur in participating in the competition are worth the potential reward to winning it. And that's a difficult decision to make because sometimes, you get a stipend but usually, the stipend is far short of covering what the cost of generating the entry are. And I think a lot of -- there's been concern among the design community that the costs are out of line with what they should be for a selection process.

So from a business standpoint, a design competition is not necessarily the most desirable way for a company to proceed. And those costs in the design-build competition, those costs are more closely associated with a normal cost of preparing a proposal for a major infrastructure project on a design-build basis. So you know, I think that one reason that you don't have more design competitions today is because the industry has moved to design-build as well as the not true in the design community, let's assume you have five competitors, there's only one winner and four companies have gone through extraordinary cost to prepare proposal and they put forth very complete submission and they incurred something of a high cost of a company, a high marketing cost of the company which is something that has to be considered and all of this.

BG: Well, you know, now that you've participated in kind of two of this or you know, a lot about both of the two we've had. Do you feel that compared to the traditional methods of choosing a designer, do you feel that you've achieved or the competition overall achieved a more effective result or a better result or a better bridge than you know traditional method would have?

TJ: Oh, I think that I definitely did achieve a better result. And I've achieved the goal of persuading public opinion about the project itself.

Malcolm Kerley Interview Transcription

Date of Transcription	:	**April 29, 2012**
Interviewer	:	**Brooke Goodman (BG)**
Interviewee	:	**Mr. Malcolm Kerley (MK)**
Duration	:	**00:49:19**

MK: I guess I have one question for you – when do you mean by "a better bridge?"

BG: You know, that's a good question and the reason I left it kind of lose and undefined was just to see what I elicited from it.

MK: Yeah. I mean, when I read that, you know, the question. That's the first thing I did is define a better bridge and I would have to think some of these design competitions are to get acceptable bridges from a public acceptance view point. And that doesn't necessarily mean it's a better designed bridge or this or that. It's acceptable to the public. So that was one thing when I looked at your question there as what, you know, whether you design a better bridge, would be my question, and I define that is an acceptable bridge to the public. Because I think you're not talking necessarily engineering, you're talking about acceptance of these structure or whatever this coming here. Does that make any sense?

BG: That does make sense and you know and I really appreciate you having actually called me out on that. I know that I left a lot of things vague and I did that for reason and a lot of these interviews I get answers, so it's great that you have your own. I'm very happy you did that.

MK: I was a state bridge engineer in Virginia for 10 years. My background is in structural engineering obviously. I was a designer for 20 years and producing plans for about 20 years. I was a state bridge engineer for 10 years. I've been the Chief Engineer for about 10 years and I chair the sub-committee on Bridges and Structures which is the 50 state bridge engineers that set specifications for all the bridges. So that's my background. The first question though, I didn't have much to do with the U.S. Naval Academy Bridge. That was Jock Freedman, my good friend in Maryland. I assume, you've talked to him. I'll be happy to give you his contact information, telephone number. He is the state bridge engineer of Maryland. He's been with Maryland for about 60 years. He's in his 80's. He is what I would say, if you would ask me, one of the leading proponents of design competitions I would say. Jock Freedman, that is the first name would come out of my thoughts if you'd ask me that question. And he did the U.S. Naval Academy Bridge.

Obviously him being in Maryland and me in Virginia, I've known him. I would have to say my involvement in the Woodrow Wilson Bridge ever since was I was the state bridge engineer at the time. I represented Virginia and dealing with the contractor support, and the commissioner at that time would hold various public involvement meetings, etcetera and then, I was the VDOT's representative on the design competition that was put up for the Woodrow Wilson Bridge. Now, the Woodrow Wilson Bridge, you're familiar as where that's located? That's between Maryland and Virginia. It's actually – the original Woodrow Wilson Bridge also went through parts of DC where it comes out on a point right there in the river. So, it's managed by the three entities that it was owned -- It was the only bridge owned by the federal government.

And that's a very controversial thing. So, one of the reasons of the design competition on that particular job had to do with acceptance. There are a lot of public involvements, stakeholder's meetings. If you come into Virginia from the North, you come in the City of Alexandria and that area there, highly urbanized. If you go across in the Maryland, it's not really, you know, a city is not right there. A little bit more open. So, there's a lot of public involvement in that. So one of the reasons Maryland took the lead on the Woodrow Wilson Bridge because Potomac River is in Maryland, not in Virginia.

And so we setup a competition where we set some parameters. It was actually very distinguished group I'm just fortunate to be on it at the time and that had the architect of the capital there, they had Professor Billington from Princeton, I don't know if you've heard of him. He's a well respected gentleman now in that arena, and myself. We had the Mayor of Alexandria, Jock was there for Maryland, we had a few citizens group leaders. I think we might have wanted elected officials in there. And basically, it's because of the location of that bridge, the nation's capital, they set some criteria that set out the arch design that you see that was required for that bridge by the competition.

So, you know and I believe the biggest thing on that was the acceptance of the bridge. Not necessarily to think we're looking for cutting edge design or anything. As a matter of fact, the biggest cutting edge design on that particular bridge was like -- it was a cast in place concrete. I think it was like 300 foot span and in the middle of that span, they want to put a movable bridge. I didn't really care for that too much. They have the job because there's a difference between, well, the beauty of a design competition like that, everybody got to leave but Jock and me at the end because we're just really responsible to build the bridge and maintain the bridge.

So, you know, the competition I thought was pretty effective, we had 7 or 8 different proposals. I think we ended up with five proposals and seven different designs. I think it's what it came in. And they were interesting designs. Some were more conventional than others and there was a good discussion talking about being on the leading edge or the cutting edge and some stuff. Obviously, the cost of responsibility to Jock and myself we were concerned that whatever we had at the end was a serviceable bridge that you could maintain it, that it would serve the function of what we wanted and obviously, both of us wanted it to look as good as possible. So, you know, I thought on that particular project that went very well. I think it helped the acceptance on that particular project and it got into taking into account the input from various stakeholders' groups and they come up with various things they were looking for in there. So and we ended up, I think with a bridge that was, you know, pretty good design and probably put between cutting edge and normal stuff, let's just put it that way. That particular design, yeah, I do hear questions here and there,

Do you believe competition the competition advanced the field of engineering? "Field of engineering" is a very broad topic. I think on that particular one, you have to remember the time that I don't know if you're familiar with the AASHTO adapting of LRFD specifications, the new bridge specifications, they were adapted in about 1994, I think it was. That bridge is being designed about that time. There was a push from the federal government that we would design the Woodrow Wilson Bridge using the new specifications. I opposed that. I think Jock opposed it also and we opposed it because the Woodrow Wilson Bridge was not necessarily the correct bridge to test drive a brand new specification and find out where all the problems in the specifications were.

There was a lot of oversight from the federal government, and there were a lot of expectations that came out of there. There were a lot of different people trying to do different things. So, we did not, it was not designed with the new -- it was not designed with the new code. Mainly because the new code just came out and we wanted some years in that before you use it on a bridge like that. I think that design was fairly well. If on that particular project, there's something in here wasn't modified before construction and whatever – it was modified during construction. Jock and I also served after the competition was over. We were involved in the over site panel that, you know, answered any construction related questions and whatever. The one that I thought was that number was the sidewalks on that particular bridge and there are -- they wanted to put lighting that would reflect on the sidewalk. But not reflect upwards so they were recessing it in the parapet. And actually, I remember going to a meeting where they had a full scale model, you know, about 8 feet on what this thing would like and I remember the comment at the time. You know, the cost was -- that job was about of $2.1 billion job and they were concerned about the cost and I asked how much it was to put these recessed in there as opposed to have kind of standard thing and it was -- I thought was pretty good. It's about $400,000 so I told them I wouldn't support that because I think we do have to consider some costs and stuff. So, they changed some things like that.

The biggest thing that I remember they changed during construction was -- those arches. I think there's two arches that come out to hold up the structure and I remember my person who oversaw our movable bridge stuff came in and told me there were concerns because we have these arches that were going to put a movable bridge on it and there were some stability issues. And I said, "Well, why don't we just add another arch?" and I was told well, we can't do that for the aesthetics of it. And that's what Jock and I talked and that quite frankly brought in another consultant to help these consultant we had -- traditional -- I'll call a more traditional old school well-respected consultant and we added the extra two arches in there because we wanted to make sure that it was serviceable and did what is was functioned to do. A hundred bridge engineers road pass that bridge 30 times that you probably wouldn't pick up that there's an extra one on those in there. You know, but somebody thought, you know, some could notice, so we didn't do that.

So, I thought the bridge design competition went very very well. I was involved after the fact, but if you look in there, you'll see a little house where the bridge tender is in. That was a big thing looking at the aesthetics of that. But getting back to competition, the competition I thought brought -- you know, this is a competition where the people responded to it. It came with their plans or maybe 30%, maybe a little bit less. But I had

enough drawings to figure out what they were going to do that you could see and from that, you know, the winning thing was selected, the design. So, the competition selected the design-build with a little bit, probably a little bit more openness or whatever because of the significance of the particular structure.

You got a question here that talks about the design build competition process in the United States. You know, I'm not, Virginia doesn't do a lot of design-build bridge design competitions. You know, we do design-build, we do public or private partnerships, we have projects that are smart road projects, I don't know if you've seen the picture of the smart bridge down in Blacksburg, coming out of Blacksburg. That was one rather -- I did the design charette with local citizens on picking what kind of treatments we would have on that particular structure and what type of pier we would have in the pier and what kind of pier pits we'd have on it. That bridge is the tallest bridge in Virginia. At this time, we have one other construction that's going to be taller. The tallest bridge in Virginia and I remember at that meeting, a very nice lady probably about 70 years old represented a group suggested that we put a color coating on the bridge. She suggested that we make it green so it would blend into the hillside. And this is a very big bridge. I remember telling her, "You know, the sight, whether you're going to have the bridge or not, is there. We're trying to figure out, we did the best we can and if you paint it green, it would stand out so much, you wouldn't want it." So, we did the same color, we did beige or something from the Virginia Tech and we used some open parapet that we had an effect. So, I'm trying to think I'm sure that some States, you know, the new bridge on the Grand Canyon out there at the Hoover Dam, that bridge, I don't know if that was a design competition or not.

I don't think it was. So, you know, there may be a lot but I don't think people call them design competitions, you know, they probably blend in with what you know, the context sensitive solutions, you know, that kind of area. And you're probably having citizens input, working with DOT's or working with bridge owners that type of stuff. But I don't know. I don't recall very many major design competition-type things that I would see. In your stuff and you came across a lot in the country?

I think, you know I think it's kind of gotten -- you have to understand also the development of design-build in the country that kind of parallels that time where you might have start the design competition and so, where you know, a lot of states still don't have the legislative authority to do design-build. Virginia got that in about 2002 and so, with design-build and you'd see radically, you can do some kind of competition but the competition is laid out from a scoring view point, what you're going to do, how you're going to look at things and then a price proposals as you know, a least 30% design and 70% price to come up with one is selected and then every time the low bid hasn't been selected, we get sued by somebody. So, I don't think design competitions have caught on the United States. If somebody would ask me that, I think that in special cases such as the U.S. Naval Academy Bridge and I've got the article in there that Jock was involved and I think there's a lot of controversy in what was going there because of its location, Naval Academy, etcetera and that's why they went to the competition. I also believe same thing happened at Woodrow Wilson.

So, I don't really think it's called on these sites and maybe if it has, it's been integrated into design-build and things like that. Increasing amount in like I said, you know, it also falls in that context sensitive solutions you'll hear a lot about that and its people, actually I was talking with one of our board members on this. We're going to get another little committee to look at this, and you know, I believe there are four simple things we did: you respect the input from citizens and stakeholders, you respect the environment where you put the thing, you respect and do good engineering, and you respect the budget you got. Those are four simples things that I kind of think that people should think about because normally, when you get into this, you have advocates who want certain things and they don't care what it cost and so that's why you always say, you know, you got to respect the budget down. You had some people that want to do things that fall in engineering viewpoint from a liability viewpoint, those types of things, the professional and the engineering category so as you know. We can't do it, you know.

Everybody forces something until something goes wrong and there's an accident or something and nobody remembers that we did this because we were had a historic building we were trying to save, you know, those types of things. So, those are tough decisions you have to make and obviously in respect to the environment, try to make sure your bridges blend in with the setting that there in and then obviously input from the citizens.

BG: So, those four things that you just mentioned, you think those are general points to remember during bridge design?

MK: Yeah, I think they're general points during bridge design and also when you look at them, you know, when you read all this context sensitivity stuff, that's what it boils down to. That's four particular things. And my discussion with our board member earlier today -- from a state DOT and I've been with the department for 40

years now -- you have to understand that the least experienced people that we have do the bulk of our design. Because what happens is you come in and then you become a supervisor and oversee some people doing design, then you become, well, you're senior engineer, then you become a supervisor and then you're this and you're getting more away from it even though you oversee that work. So, it's a constant training thing you do because you're always training new people coming in because they're doing the bulk of design. Does that make sense? And then that's why I always, I support what we called in the past, is "dual career path." In other words, I believe any bridge designer comes in or any engineer, no matter what, you need to be grounded in something. You need to have that core thing that they would look at you and say "Brooke. She's a bridge person." you know. The core thing and then after you're in that, you're in your career and you're in your career 10 years, 15 or whatever, you know, 7 to 15 years. At some point in your career, you have to make a decision and that decision is "Am I going to be a pure engineer?" -- Of which we need those desperately or "Am I going to be hybrid engineer?" And a hybrid engineer is somebody who goes into the management side and has to deal with that other stuff associated with there and you need to be able to develop your people to be able to do that. At the same token, you need the specialist people and you need to develop those people and reward them, etcetera, you know, I call that, "Dual career path," you do that. So, it's necessary that you're always doing that.

Compare the traditional type design versus design competitions. Normally, when you're looking at selecting a designer to do something, when you do it in a normal job, you're probably talking a higher level about the project. You're not into particulars of the project. When you're in a design competition, you're actually asking people to -- when they come in, I want to see exactly what they're going to do with this particular one, this particular bridge. So you're probably asking them to do more front and that's why I can't and I think, I'm pretty sure that we have a stipend on Woodrow Wilson. I can't remember what it was where you know, consultant would have spent a lot of money, paying or to spend a lot of money coming in and so, they would have to, we reimburse on a part of that. In a normal design, you don't do that. You're selecting them based on quality base selection on certain criteria. But you're not basically, necessarily basing them on what they're going to do right on that particular one because they haven't spent a time to look at it, to come with different proposals, etcetera.

Just glancing through your notes here, you know, obviously if you're a bridge person and you're on a design competition like the Woodrow Wilson Bridge, one there is who's high profile. That's pretty cool. It brought some people like Professor Billington. That's first time I had met him and few of the other people where, I think, we don't meet everyday. And the firms you had, these are not the nickel and dime firms, these are quality firms, all of them and so each of them had their interesting things that they wanted to do. You mentioned I think, Fred Gottemoeller gave you my name?

And Fred was working at the Woodrow Wilson and he was working for a consultant who was providing information to the design competition selection committee or whatever they call this and you know, they were analyzing some of the things that were being proposed and you know, that was -- it was just to say for an engineer and a bridge engineer on that type of job is just exciting that they treat you very well with a nice sit down and it was about 4 or 5 days and it was just -- And obviously winning the thing is the highlight, talking with the people that lost later on back at your office is the lowlight because they're all people that you know and you respect in the field and you know, you can only select one particular consultant.

BG: Would you be open to having more of these? Do you think that there would be a reason to have more design competitions or design-build competitions? Do you think that they're worth having?

MK: Well, first off, sure I'll be open to it. I think, you know, you have to -- there's a lot going on in DOT's right now. There's a lot of push on time on budget. Move things along especially in our particular administration here in Virginia. So sometimes as far as hopping to a line between the engineering and other factors of the department I'll say. But I believe if you're -- if you have a particular bridge you're looking at and there's a controversial and there's a lot of citizen involvement and there's a lot of this and that of that. That design competition makes it more transparent, I think for the citizens, that you lay out some stuff so they know what's going on. You know, part of the thing is trying to educate people on what you're doing when you're doing this. And a lot of things is acceptance now.

And so, I think it's good for that particular reason and I think quite, you know, it is a form of design-build and you know, the State -- More states are believing in design-build. More states are moving into public-private partnerships or you're looking for the private sector to do more than what's some other done in the past with the state who has taken a lot of lead on things. I think the one of concerns I have with design-build and some of the concerns I have with public-private partnerships have to do with cost and you know, these are

competitive things and especially when you're talking about public/private partnerships where you're looking for the private sector to help finance a project or something. That cost thing gets in there and doing things cheaply and it's not necessarily doing a better bridge if you know what I mean.

And so, that's the challenge I think in the next generation of engineers are going to have to face from the view point of -- There's going to be very few types of things coming out -- there's going to be, you know, how do you maintain the existing stuff, how do you replace the existing stuff and maintain traffic. So, I think there's a place for them. I think each DOT would make that decision and I know there are going to be more design-build, I see that coming. I think more and more states are going to get the authority to do that from their legislatures. And so, you're going to see stuff in there. It's going to be -- and that's going to -- when you make selections based on quality and price, then it's probably, it's not a design competition but kind of moving the standard thing more in that direction.

BG: So then, jumping back to the Woodrow Wilson Bridge just one more question is you know -- were you as a bridge designer or bridge engineer satisfied with the outcome? Do you think that it would have been better off without holding this competition, you know, barring the acceptance of the public -- do you think that they bridge itself could have been better?

MK: I thought they got a nice little bridge out there. Now, I will tell you also that when -- and you have to remember, Maryland on that particular one, the Woodrow -- when you talk about the Woodrow Wilson Bridge, it actually was five different areas. Two interchanges on the Virginia side, the bridge itself and two interchanges on the Maryland side, that whole thing was the Woodrow Wilson Bridge. Maryland, because Potomac River and the high water on the Virginia side, the Potomac River is in Maryland, it's not in the middle of the river. The State line is on the Virginia side. So, we are now, because of the arrangements of the Federal government and the special money that we got on that particular, we are now -- Virginia is now 50% owners of the Woodrow Wilson Bridge with Maryland.

When that bridge first came in, the price, it was 70% over their estimate. So, they redesigned the super-structure from what originally proposed to bring the cost down. I mentioned that we changed one of the piers because of the bascule span. I remember it was only because Jock is, what I call an old-fashioned bridge engineer. Of all the proposals that came in, there was one that I would call standard type, you know, they're working for 50 years and has going to work for another 100 type thing. That was the one he jokingly said he want to vote for. He was kidding though. There were too many piers in the water, etcetera. So now, I think the bridge is, if you've seen the picture of the bridge, I think it was pretty good. It is kind of after the, you know, we're looking at some things now. Come back in 50 years and I'll tell you whether it performed like we thought it would -- You know, what was interesting, Fred Gottemoeller by the way, he wrote a book, I don't know if you'd, this kind of book that, yeah there it is. I think it's called Bridgescape.

Yeah. It is called Bridgescape and he asked me -- he had a book signing thing or book opening and he asked me if I would comment, you know, speak and at the signing. And I read the book, it's a very good, I think introductory or more as guidance for people about look of what to do to make bridges more aesthetic, more pleasing, that kind of stuff. And I read for him -- I read for him an article out of ENR. Yes, ENR and it was talking about the Woodrow Wilson Bridge and how it was aesthetically pleasing the piers were picked from whatever and this is I closed my little talk I got and that from an ENR in 1962 that was talking about the old bridge that everybody now was criticizing as being ugly and whatever.

Back in '62, they were talking about how aesthetically pleasing that was. So, time has changed. Different perspectives changed of what you're going to do. But I thought, I enjoyed my experience on the Woodrow Wilson Bridge. I remember Mayor Donnelly up there, the Mayor of Alexandria who was pushing for, you know, he wanted a signature span. He wanted a signature, and he wanted something, whatever. And I'd say that he did look to Jock and myself on the committee where I could tell him, I said, "Sir, you're on the cutting edge with this one or you're on the bleeding edge with this one" and that he wanted to stay away from the bleeding edge. And he didn't mind, you know, doing what you know, things here but he didn't want to get too far because he did have to have something you know, it's kind of a high degree of success. Let's just put that way. A degree of success.

You know, I view that and you're trying to buy acceptance. But you're getting acceptance of what you're going to do. You also have, you know, when you look at Woodrow Wilson's and you'll look at the Naval Academy Bridge. That's on a different plateau or then some smaller ones. So, you could have some small. You know, for instance, the I-35 Bridge that fell in the replacement bridge that was built from that, that was I think a design-build or it was a competition type thing. I think it's more design-build or whatever. And you know, I know that the winning one and the one that was built, they were sued on that because a local contractor probably

shouldn't gotten any job because he's not -- you know, something he proposed should have been worth more than somebody evaluated went along. Like some kind of stuff. So, a lot went in there but also major stuff from whatever, you know, I'm making a recommendation to the condition -- through saying that we have to do some design competition or whatever.

BG: Is that how that these come about or how do you usually get designers for a competition? You said, you kind of look at their qualifications and their price. But how would you put even set a competition in motion?

MK: How to set the motion? Well first, the DOT that determines, they're going to do a certain job by it and they're going to step to the criteria of what you're looking for, what needs to be in there, what has to be done? And then you know, you would just put out the RFP and you would, you know -- a normal way when you put out an RFP, you outline everything that needs to be done and you outline how the selection process is going to work. Our dealings with the industry and the state is they want to be in a lot of -- they want everybody to be on a level plain field and they want you to tell them the rules before you start and don't change the rules after you start.

You know, we went to design-build many years ago. Our industry was concerned that the state would cherry-pick who they wanted because it was part quality and part price. And they were afraid that they would be, you know how "I like Brooke's team so I'm going to hire her" -- that kind of stuff. And we've laid out, you know, I totally worked against doing that. We were going to say what the rules are, and we were going to follow rules, and so that's what the state would do. I mean, you'd make the decision, you're going to go that route, you set the criteria of how you're going to do it, you lay out the rules, you can lay out what you want. The minimum people to have. You advertise it, you know, you come in, you have a selling, probably, you know, people submit their initial qualifications. You have some criteria that you know, depending on how many you want the shortlist or how many you wanted to deal with.

You make this selection, you follow your criteria and then they go back and they come look with this on -- in the price and you make a selection. The way we make selection is that once we've gone to the -- we judge your design on whatever else and that's 30% of your score and then, we open the price -- everybody submit the threshold of being qualified to do it. Everybody is been judged with the quality of what they've done and that whatever and then there's the prize. And then we factored in and then there's a number that comes out. And if you're the load number you're in. I mean, it's simple as that.

. . . Price is 70% of the score. Like I said, so the design-build -- every time a low-priced person has that one bid, we get two. You know. Contractors are used to low bid. Consultants are used to quality based selection and when you do design-build, you have a quality based selection and a low bid segment in there. And so, you know, that's the learning term that the industries going under right now.

Angus Low Interview Transcription

Date	:	April 26, 2012
Interviewer	:	Brooke Goodman (BG)
Interviewee	:	Mr. Angus Low (AL)
Duration	:	00:42:45

BG: What was your role, or what various roles have you played in bridge design competition in the UK and then Europe?

AL: Well. I mean, I've been a participant in a lot and I've never tried to count. I mean it might depress me if I can even. But I've scribbled down 30 or 40. It might be a tied 50. It's lots anyway, lots.

BG: Do any of those stand out in your mind as the best to talk about?

AL: Well. I mean I feel they got built and the wonderful things and the answer, you know, when you spend a career as a designer, what you remember and look back on are the wonderful things that you build and I find I forget the ones that I don't build. And even the ones that I don't build, there are lessons learned which sometimes got carried forward in details that appear later.

BG: Do you feel that the bridge design competitions in the UK and in Europe are effective at producing better bridge for the public?

AL: Yes. They can do, but in general, I would not encourage a client to go towards a bridge design competition. The reason to getting through the bridge design competition, there are two reasons, as I see it. One is to get a crowd a lot of publicity for a project and sometimes, when the whole project is all part of some major redevelopment of some city or whatever, it can give a lot of publicity and it can be very effective in that way. And the outcome is the publicity and you get a reasonable design as well.

The other one, is that the best form -- I think best designs come from a client who knows what they want and a designer who is keen to understand what the clients want and playing each other off and finding what's really appropriate in the particular context. My own belief is that in the old days, there used to be clients like that. Nowadays, these clients, the world has changed, and I guess I refer to clients these days as budget holders. And budget holders don't know anything about what they're doing. But they know what they should do in order to get that and it always involves the help of others. And the competition is a way to sort of hide the inadequacies to the client behind a plethora of crazy looking designs and they can be seem to have done their best for the situation. Slightly cynical, but I think that's the reason for that.

BG: Okay. So, it almost sounds like, you know, these competitions aren't really held for making better bridges just, you know, for the client, for publicity and for their own getting self out there.

AL: Yeah. I mean, the like, you know. You can get good design in competitions but I didn't believe it's the best way to get a good designer. I think the best way to get a good design is to employ a good designer and have a good relationship between the client and the designer.

BG: From the bridges that you've participated in or worked on, are there any you feel of a advanced the field of civil engineering? Or have, you know, have intriguing or interesting new structural advancements come from these or are they all just kind of -- you know, you go through the design and they're pretty cut and dry? You come out with a design on the end and that's it.

AL: Yes. I'd like to think. In general, no. I mean, these become almost -- I think all the competitions, just about all the competitions that I've done I've been working with architects. And a lot of the fun of working on competitions is -- that it's good having a good relationship with architects is you learn about the architect. You learn about them, they learn about you and one of the reasons to do competitions is building up that personal relationship with firms of architects.

And as a consulting engineering in general, not just in bridges, the commercial success also depends on having good relationships with architects because that's where work is coming from. So, that is the feeder into the whole part of the background of the whole system. And a definite plus is architects happen to be delightful people and just sort of, the relaxed situations happen on the table in front of you when you all meet so could have different ideas. It's just great. What's the question you asked? Wonderful, does it stretch the engineering? Sometimes it does, yes.

One that really stretched to the extent that the client didn't let us build it the end. We though it was okay, it was a competition we did in Greece for a suspension bridge with no towers. It was a very steep side of the valley and we just hung the cables on the hillsides above the road. The road went from the tunnel through space and then into a tunnel again which is very steep side of valley and it was actually stunning and the images of it looked fantastic.

AL: It was called Letviticus (?). And it failed because we realized that there a big problem improving the strength of the rock and we did all the work. But it had to be approved by a Greek geological professor. I was suspected that he didn't have the professional insurance that would have let him say, "yes." So he have to say, "no."

BG: Okay. I guess I'll touch back on that point you were talking about working with architects. Just I hadn't even thought of that. So, do you find that doing these design competition with architects, do you produce different designs than if it were just as engineers and do you feel that working with the architect betters the project?

AL: Yes. With a good architect, your throwing ideas back and forth. Bad architects, and I have worked with bad architects – they think that the architect shall tell you what the bridge is like. A good architect discusses what the problem is. And you start with sort of doing that inadequate sketches and then they have a habit of coming up and then doing much more adequate sketches and you know, you move forward. And it's great.

BG: Okay. Well, I guess getting on to the process, the bridge design competition process. Just sort off with who are the typical good clients and how do you are the typical clients got.

AL: The one common factor between all bridge design competitions in Europe and elsewhere, because I've been involved all around the world. I think, I had only done one in the States, yes, I did one in New York a couple of years ago. Yes. We didn't win.

The common feature is that there is no common feature. And the reason for this and I think I did say it in those guidelines that we wrote, it is that I refer to it as new version of the dual situation. You are the student and you are used to being set down by your teachers. Your teachers could know a lot and the students are learning. So the people don't know anything taking orders and instructions from the people who know a lot. In the bridge design competition, it's the other way around, because if you are a local authority being responsible for some small town or across on a river, you're going to need a new bridge once every hundred years and you may not have had a competition last time anyway. So, it's an interesting business. In business terms because in business everyone tells you, you should always beware for repeat business. And what we called "boutique bridges," special bridges. The reason I repeat at this because each town only needs one, once every hundred or 200 years.

Each town has no idea how to setup a competition. So, they just give the job to someone who dreams it up from scratch and get it all wrong. Meanwhile, the people who are competing know all the problems because the rules of that we went always said that. The most experienced competitors knows that the best way to win is normally to -- if you ignore the rules and break the rules and that usually works in – you've usually got a best by the chance of winning if you break the rules but sometimes, and also to do with culture, you'll end up with some countries that get really picky and they say "No, no, no. Actually be fair." And the world is getting more legalistic. And so that rules doesn't work so much now because suddenly get lawyers. No, it's a very strange business and there is no -- the only way to win a competition is to enter lots of them. There was an architect who is an interesting character and he's name is Cheteri Berndarski (?) he's a Polish. I think he originated in Poland but he also worked in London. I think he won 19 bridge design competitions. Mostly for flashing little footbridges and none of them have been built. More recently some of these have been built but it's part of the culture because he had good hands for showing some of dramatic things which all sort of stretched things beyond reason and busted the budget and everything. And inexperienced juries loved them and would always make them win and then they wouldn't have the money or couldn't solve the problems or something. The history of bridge design competitions is a very high level of failure.

BG: And why is that?

AL: Exactly the reason I'm telling you that the people running the competitions don't have the experience to setup the right rules which is why we then have the idea that the competitors should write the rules because clients are hopeless at it. So, that's what the guidelines are that you've got and it's going to be, they were never published. They were about to be published when the international version that I also involve in suddenly got brought forward. And the international rules were going to be sort of published within six months of opting range about this event and I thought that's stupid and of course what happened is there's been a delay on the international one. But I think any day now, the international rules will be published.

BG: Okay. And for what countries will those be used in?

AL: Planet earth, mainly.

BG: So, could you tell me a little bit about the typical clients and applicants and judges in the UK or European spectrum?

AL: Okay. But I do emphasize the fact that there isn't a typical. Although if anything is typical, it is probably a local authority for some town that crosses a river and they need a new bridge across the river.

BG: So and then in terms of judging in journeying in each of these small towns, you know, kind of just goes as they go and they make up their panel or how do you -- okay.

AL: Yes. And the panel, I had once been the judge and someone who decided that for the local politics of it, it would be good to have two judges from the general public and but then, that the way that it worked, they held the competition. They put the contestants, pictures of contestants up in the local library. They got local people to make comments and then there were two, which came out in sort of the – the top number of comments. So, they chose one man for the public who would gone for one and then one man of the public who gone for the other because they are terrified that the public would sway the outcomes and they had to make sure that they cancel the each other at.

BG: So, with your experience as a judge or, you know, even participating in these -- I know they're not typical but do at these local authorities recognize that they should have engineers on the panel or other engineers looking at the applications?

AL: Yes. I believe the question is to what engineer's role should be because one of the designs that was presented to me. I was amazed because it came from respectable firm of engineers and an engineer that I know and have gotten a better since. And I couldn't see how it could stand up. And I had to say this at the end of the presentation. But I had no formal details but I think I'd be able to steer the rest of the jury away from it because it would scare to me, there would be many problems if that have been chosen.

BG: Okay. So, do these small local authorities typically finance bridges, or not even typically, but do they or do you ever see the government, your national government financing different bridge competitions?

AL: There is only, there's a very limited experience. I think there maybe two bridges. The first one certainly wasn't built but the second one has been. Yes, I have to say at this point that there's a very wide range. You have to actually define quite clearly as to what you mean by bridge design competition because you and I probably know any what you mean by design competition. Alongside that and increasingly common, what is common now, are design and build competitions where the designer, both an engineer and an architect, are working with the contractor. And then you'll end up with a bid, which has the firm price. And you have to have clear policy as to how you select. It is the judging process that determines who wins. That's becoming quite common. Another version which is a competitive interview, where you invite a number of designers to make a presentation to the client's team and the presentation is more about their approach the design and their understanding of the problems at particular bridge site rather than a specific solution. And that's quite interesting and I've done that once on my own without an architect and won it. And that was quite interesting.

BG: Do you find that those are more successful than design/build or just the competition . .

AL: Yes because well, I think in terms of abstract design quality. I think the competitive abstract design quality is a good relationship between designer and client and I think that happens best in a conventional design relationship. But it can be a competitive. I think its competitive interview is good because actually that is the best way to get the relationship between the designer and the client. I was about to say something else as well but you have something about to say?

And then in some projects, the price is important. And then the only way you can get firm on price is to design and build that you have a contractor. Now, the interesting idea to my mind, which I've never seen happen because the basic premise of a design and build is that here is the problem, and we want you to come up with an affordable price and really good design. But I would love to see a bold client actually say "Here's the price I'm going to pay for the bridge and it's for you as bidders to come up with the best designs for that price" but I've never seen that happen. So, the client fixes the price and the contractor and the contractor designers come up with the design. You can see that that's only possible if the client has already commissioned quite a lot of the design studies to get a feel for what they can afford with a different sum of money.

BG: So, in design and build, I would guess that the client typically gives some type of preliminary design to whoever is participating.

AL: It's fairly, it's a quite long way more than -- the designer in particular is in a difficult position because if the designer draws something and gives quantities and then later, they were wrong in their quantities, they can get sued by the contractor. So in the design and build, the designer will have made sure that they have actually followed the calculations analysis through a pretty detailed level. So they feel confident on the quantity they've given.

BG: What are the different ways that you've seen these competitions publicized or do you learn about them through air or do you learn about them through the newspaper, through engineering journals, TV?

AL: In Europe it's easy because there is -- I do both mistake it sometimes, I get quite amazed as to how colloquial things are in Europe. Anything of any size at all, and any bridge needs to be, there's a set way in which you get an opportunity to design or build anything gets published right across all 27 countries of Europe and there's a big volume that gets published every day of contracts, anything and everything. And this just comes out electronically and so you search, search into it and each day, you know, whatever projects there are in Europe. In the field you're interested in. So the publicity works very well within, you know, the European Union and it works out well. Otherwise, we get involved in this some sort of bigger bridges and there's a relatively small number of consultants who get involved in a really big bridges. And so, the potential clients know who we are and we all get direct invitations.

BG: In these various types of competitions we've talked about design and build, the competition interview and then anything that falls under what I would call bridge design competition here.

AL: It's all conventional competitions which is you know, please present semi-drawing, semi-scaled designs. Together with supporting calculations and your cost estimate, etcetera, etcetera and then the jury then sit down and all of that.

BG: With all three types of these, especially with the conventional, like I guess I would probably focus on. The design that wins, are they -- does the designer get any type of compensation for winning and if so what is that and the is this design usually carried through construction?

AL: I mean, literally, there are no rules and literally, there are not two competitions which are the same. In general, the main prize that the winner wins is that they get, it's with that design they built and they then get the design fees for building it. That's the normal. Sometimes, unusually -- Stonecutters Bridge in Hong Kong, for various reasons, the Hong Kong Government couldn't offer the full design there were some legal reasons or something. I don't know. So, they gave quite a large sum of money. So the only thing that the winners won was quite a large sum of money and then they didn't have any further involvement in the projects and that's unusual. You name anything that might happen and it has happened. I can sort of think back and remember where it happened when.

I mean, I quite like the way the French do their competitions and I've competed in some French competitions and one got built, I enjoy working in France. France is they regimented in the way they do things, they have very formal ways of doing things. And there maybe 4 or 5 stages in the design process, design and construction process of the bridge. And the first stage is called the avant-progee, the pre-design. And what they do, there's a set fee that you get paid for doing the pre-design, for doing each phase. And what they I instead of letting the pre-design to one firm, they let that to three firms. And each firm gets paid with standard fees for doing the work and one of them is chosen to do, to carry on.

BG: So, what I find interesting about you know, the European Union. It sounds like each country, correct me if I'm wrong, each country hold each competition but then they -- you announce them to the entire European Union where anybody, almost anybody can reply?

AL: Yes. And the competition rules are very strict in the EU. So that once you announced them you have to make sure that you are choosing the best that got presented to you. So, you will get them from all countries.

BG: So then, do certain countries, it sounds like France kind of sticks to their set of rules for every competition. Is that not right?

AL: It's been some years since I've worked in France and I'm guessing that EU probably doesn't allow them to do it that way now.

BG: So it sounds like even local government. So, my next question was, you know, are most bridges designed through competition and it sounds like they are.

AL: No. That's not true. I mean, certainly not most bridges. If you talk about boutique bridges, special bridges, landmark bridges, then a proportion of landmark bridges are designed by competition and increasingly, landmark bridges now would be designed by design and build contract.

BG: Do you see conventional competitions increasing in the future or design/build and competition interviews increasing in the future. Which is something coming out more pre-dominant?

AL: I think that the design, the competition interview I think is good. But it hasn't really taken off, it is that design and build is the way things are moving and there are problems to be sorted out. And their mainly legal problems to do with sharing responsibility when you're taking the design risk upfront.

BG: And so, it's great that you've participated in a US competition. Could you touch on, you know, what was -- was there anything that stood out? What was different about that or interesting about that?

AL: Yeah. Yeah, it was. The competition I did a couple of years ago was for a footbridge. It is called Squid Park but it's all part of the Brooklyn Park under the Brooklyn Bridge in Manhattan and the briefing was very very much making it clear that they wanted a high emphasis on durability and simplicity and things have been -- it didn't want anything complicated and very low maintenance. I went for a steel design which was weathering steel and I didn't have any bottom flanges on my main steel. I think it was flat places where angles were cut by us or curved so that there was no way that water could catch and, I mean, I don't think I – and the thing that won was not a million miles away from ours. But it's quite a lot of timber in it, which surprised me. But there was the heavy emphasis on green issues on that one.

BG: So, did they give you any type of preliminary design or materials before you started?

AL: No, I mean there was preliminary design showing you the route. But then you had freedom to -- someone had done the previous designs which hadn't been accepted. I can't quite remember why it hadn't been accepted. So, but –

BG: How did you find out about this?

AL: Well, we have a New York office. Actually, no, I mean I have a friend who used to work back to New York and he's a great guy and I don't know where you are on your career but I mean, if you have a cross powers with Guy Nordenson then he's a good guy to work for. And he now in his own firm and I think that I can get to him directly. But he advises the City of New York on architectural matters and I think he probably suggested my name.

BG: I've heard of him and I've actually, I've looked up his firm based on my thesis adviser but I haven't talked with Guy Nordenson yet. That's interesting. So, when you competed in this, did you recall how many applicants there were in this competition?

AL: I think there are probably five. I think there are five. Five is quite a common number to have on these sort of things.

BG: Do you know of any significance of that or is that five were chosen?

AL: No, five or six. You don't have too many because there are some open competitions and I have known a couple of open competitions with more than 220 entrants. And it all got through quite political. The Millennium Bridge in London had 221 entrants and politically, someone asked, "so we've seen what the winner was, you know, what were the others like?" So they rented a big space and they put up lots of display board and displayed 221 designs. I've seen that done again. I've seen that that is, that also happened not with a bridge, but with the extension to the -- to an art gallery in London and they had to put up a big marquee and they released 150 or something designs -- The competition, the whole sort of the legal side of competitions. In the old days, you entered a competition for the fun of it and if didn't win, you didn't win. That's the way I see it. Nowadays, we live in a more litigious world. Where you enter a competition and if you think you are the smartest designer on the block, then if you don't win, you think someone's made a mistake so you then start suing someone and it all gets unpleasant.

BG: So, to avoid having those 221 entrants, is it that you're sometimes invited into these and they only invite a certain amount.

AL: The reasons of having 221 entries was to get a high awareness of the project and it worked.

BG: Do you think that having that number helped to get a better product or do you think that, you know, having fewer actually makes things better?

AL: I mean, it's an absolute nightmare. It's a nightmare receiving that number of designs and necessarily, after you've gone to that effort, you have to come up with a design which is unusual, straight, it always have to be crazily unusual in some way to justify the process. Because you can't win the competition like that if you got the most simple minimal beautifully executed design. When I'm involved in competitions, there's one clue which I say to the people working, you know, all sitting on the table together. What do I know about the winning design? And I'd say that it has to have some characteristic which can be described in a single phrase. So, when the member of a jury goes home at night and his wife says to him or her husband to her, "So, which one won?" You can say, "It was the red one." Just to win, you have to have a characteristic, which can be summed up in a phrase. Otherwise, why have you chosen it? No, that doesn't quite makes sense. But you have -- when you go home at night, you have to be able to encapsulate in simple phrase which one it was. It has to be distinctive in some way.

BG: I like that. So, when you were a judge or on this panel, how did you decide a winner? What were your criteria, did you have any or you given any?

AL: Yes. Okay. I mean, my preferences are for subtle simplicity and I rather like subtle curves rather than graduated curves. I like underplaying things and I'm a minimalist. But I love a bit of curvature and very gentle sweeping curves and things. You can do a lot with that. And I respond to things which are going in my direction in that way. Otherwise, I just have a feel. In the competition that I was -- Yes, the one that won -- Yes, I forgot some of the details how it worked. But the one that one actually had a building on it. There's going to be a sort of a bar or something and so the whole building swings out the way and so, the bridge was more than a bridge.

BG: Interesting. So, then on the flip side, when you compete in these, have you received -- do they tell you what they'll be judging your bridges on or you know, I know it's different every time.

AL: Yes. I mean, you have to have a thick skin to compete because quite a common situation is you get a very detailed brief and you read the brief and you could see a way into the minds of a person who wrote the brief and then, months or a year later or whatever when the whole process has run through and design has been selected and you see the design, you realize the design doesn't necessarily meet the brief except what the jury liked. But what you'll discover is that the person who wrote the brief is also not the jury and the jury are not very good at reading the brief themselves. So, it is a complete lottery. In those guidelines, I have recommended that the jury are included in the process of writing the brief. The juries in general are not paid or if they're paid, they're paid by small amounts. The client never wants to bring the jury together on more than one occasion. So, that is why you get that problem.

BG: Well, this is great. You've been uncovered so much that I haven't even thought about yet. So, then I guess kind of another wrap up question I would have is do you feel that, you know, that ones that you competed in the UK, do you think that the United States should start having more conventional bridge design competitions or even design-build or any type. Do you think that it would benefit us or do you think that we're just too behind at this point?

AL: Well, I mean, you already have design and build on the big bridges, that is quite common and I think the best need to find good format for design and build which -- and solving out the legal -- solving the legal problems and all the legal problems we have in Europe are much worse in America. So, but if those can be solved, that's that best way forward. And clients like competitions because it gives them a lot of publicity but I think as clients I would encourage. If you are talking to a client, I think I would encourage the competitive interview because what the clients get out of a full competition is that they get lots of images of possible structures and I think what I might recommend is the competitive interview which has the slightly artificial design problem put into it which is not the final design problem. Because at the time you're still finding out the nature of the whole problem. It doesn't -- you get a simple problem so that each competitor has to submit some image of some form and everyone could produce images quickly these days. So, the clients will end up with publicity period. They'll up with 5 different images. The is always a problem when the client -- when the public fall in love with one of the images and then when you get to find out the real problems in that, it solves a different problem.

BG: Thank you so much for your input. Is there anything else that you think I should be asking right now?

AL: No. It's a big topic and it's been a lot of fun as far as I'm concerned because I've got thick skin and I never believe that the best design gets built. So, when my design don't get built, I don't feel bad about it. But then again, enough of them have been built for me to fill quite chapped anyway.

BG: So, when yours are built, is that when you feel the best ones have been built?

AL: Absolutely. There's nothing quite, you know, there's nothing quite like the opening day of something. After you've been through all of these layers of problems and everything and then you got -- you know, there you are. It's fantastic.

BG: So what's your favorite part? Is your favorite part opening day or is your favorite part designing the bridge?

AL: The design process – with a good design team. And I said, I enjoyed doing them in France. I discovered some time ago, I learned that when I invited across to do the competition in France I stuff a lot of pens in my pocket. Because what would normally happen, if you get there as soon as you could, you get in mid-morning, or something, you meet and discuss briefly and then sometime around 12, someone says "Oh, must be about lunch time. "Which means you then go down to the local brasserie and you don't go to a big, expensive brasserie, you go the cheap ones which have the paper tablecloths. But then you sit around these big tables with enormous paper tablecloth and everyone -- that's when if you haven't got a felt one, you've lost because you then rise between courses and during courses, you're all drawing on the tablecloth and then after you have your long French lunch, you get yourself in ask "You don't mind if we take the tablecloth home, do you." So, you then take tablecloth back to the architect's office and put it on the wall and carry on. And I've always though that's a rather civilized way to earn a living.

BG: So, the ones that you've competed in France, so, you go and you kind of do the -- I guess back of the envelop design at these restaurants?

AL: And often, you're bringing together people, situations like that, you might only actually have one or two meetings and then you're on the phone and emails and things.

BG: So you've done your preliminary design there in France and you haven't done it?

AL: Because, yeah. You got to feel for all sort of things which are possible. So, you feed them as the engineers, it's your job to feed the architect with the ideas. And it's your job at the end -- to find. I mean, an interesting point which many people don't realize with engineers working with architects, particularly on bridges is I remember once I was working with an architect and I sent him an idea. And you could see the requirements exactly and he's drew back and he felt slightly uncomfortable and then he suddenly said that I couldn't go that way because it had a look of another well-known architect and I suddenly realized and I subsequently learned to realize that as an engineer working with an architect, it's your job to go to their website, and understand what their design style is and then as the engineer, your job is to feed them engineering designs in their own styles and what they hell does the architect do?

BG: I guess it's what my own stereotype is that architects typically work with you know, more buildings than with bridges.

AL: Absolutely and one thing that has happened in UK recently is that there are 2 or 3 firms of architects who have teams that specialize in bridges. So, that I work -- Now, most of the architects I work with because, I've been selective or they can be selective, or someone can. Architects who work only on bridge projects or mostly on bridge projects and that is quite unusual and that's only happened in the last 10 or 15 years.

Paul Matys Interview Transcription

Date of Transcription	:	April 29, 2012
Interviewer	:	Brooke Goodman (BG)
Interviewee	:	Mr. Paul Matys (PM)
Duration	:	00:38:18

BG: What was your role or what various roles have you played on the U.S. Naval Academy Bridge and/or the Woodrow Wilson Bridge competition?

PM: I'll make it easy on the Woodrow Wilson Bridge. I wasn't involved at all in that project. I was the project manager for the bridge office for the U.S. Naval Academy Bridge and I think, you know, that was used more as a learning experience. And a lot of the lessons learned from that were used in the Woodrow Wilson design competition. I think you had mentioned you had spoken with Bob Healy -- he was the big person on the Woodrow Wilson. Occasionally, he asked me for some info or opinion on things going on the Woodrow Wilson but that was kind of my extent of involvement on the Woodrow Wilson. On the U.S. Naval Academy Bridge, I was the project manager for structures. I took the project when it was still in the planning stages and acted as a liaison to our planning area and once it was complete and passed to design, I took over and was in the project manager role during design and I was involved with construction.

We did have a construction engineer but on this particular job, since it was fairly close to our main office during the construction phase. We had meetings every month and possibly, even more frequently than that depending on, you know, any questions that came up. So, I was kind of involved with not only the design competition but the actual design and then some of the construction issues that came up later on.

BG: So why did you, or what are your motivations for holding the competition at the U.S. Naval Academy Bridge competition as opposed to a traditional method?

PM: Well, I guess it was a program that Maryland State Highway was involved with concerning the aesthetic bridges. We held a conference I believe it was in 1988 or '87, that time frame. It was called "Bridgescape" and at that particular conference, you know, local engineers, bridge engineers were invited to attend this conference. I think it was a 2 day affair and, you know, we looked at different aspects of what makes a bridge look good in a particular setting. You know, the aesthetics, the structural characteristics, you know, efficiency of the members. You know and that was kind of co-sponsored by the Governor's Office along with Maryland State Highway.

So, the Governor's Office of Art and culture was one of the co-sponsors. And I think, as an off shoot of that particular conference, it was decided to hold a bridge competition with the U.S. Naval Academy Bridge and in addition to this competition. There was also a series of seminars that were put on by Professor Billington, I believe you also talked with him. I don't know if he mentioned any of those conferences where he gave, you know, a little presentation to a group of bridge engineers and then, we had picked out current projects and broke this large group up into teams and asked each one of the teams to develop a concept for the bridge. So those were kind of mini competitions that I think they kind of happened during the time frame of U.S. Naval Academy Bridge Competition. Those were for, you know, more of the workhorse, two span bridges or road-over-road, or possibly small water crossings – no major bridges. But you know, that was the type of program we were getting into at the time and I guess because of the Bridgescape Conference and you know, the awareness of the aesthetics. You know, that's how we kind of got involved with the design competition.

BG: Do you feel that the bridge competition was effective at producing a better bridge of the public?

PM: Well, me personally, yes. I do. There was a little bit of history that went on with this bridge, you know, from what I understand you talked to Mr. Freedman a couple of days ago. So he probably gave you the company line. But the Severn River Bridge, the bridge that was to be replaced was a low level movable bridge and you know, we went through all the planning process and you know, because of the amount of traffic traveling on 450 and the amount of boat traffic on Severn, it's a beautiful sailing river. It was decided that the best thing to do would be to create a high level fixed bridge and of course, the neighborhood groups thought the opposite – that we have a beautiful bridge that fits in wonderfully in our environment, you know, next to the Naval

Academy. And better than replacing that, you know, we should somehow rehabilitate it and so, there was quite a bit of opposition to replacing the bridge.

And I think, you know, this group sponsored things like hands across the bridge where you know, people, they were not residents but, you know, they form the line across the bridge, probably on both sidewalks, and you know, the bridge is over a thousand feet, probably 1500 feet long and you know, there was quite a bit of opposition. We also had to go to court because of the challenge of what people again felt that a movable bridge is what should be at the location and rehabilitating that existing bridge were definitely a doable thing. I believe they hired the -- trying to think of the gentleman's name but he's involved with historic restoration of bridges. Unusual name, I think it's Ava Lichtenstein, I believe.

And you know, he prepared a report saying, you know, this bridge could be saved and you know, he kind of encouraged the people, you know, the local community groups to keep up the fight. Well, the decision came down that you know, the State was within its right to create the high level bridge and replace the movable span and I guess that was -- you know, there was so much public involvement that you know, that might have been one of the factors that played into deciding to go with the bridge competition that you know, to satisfy everybody that you know, we put in a lot of thought, you know, tried to provide what would be the best crossing of the Naval Academy at the Severn. So that was, you know, maybe one of the emphasis of holding a competition.

You know as far as the community groups though, we did have considerable opposition and I guess one of their objections was that, you know, going with this high level bridge, you have all these view sheds from different positions in historic Annapolis and you know, the view sheds will be changed forever by a high level bridge. So, the State then, really smart, we decided we're going to have a goal on a bridge with a bunch of helium balloons and station -- we must have had maybe 10 to 15 people at different vantage points. You know, we had somebody at the state capital, people at different vantage points on the U.S. Naval Academy grounds. There was an important church that we have, It was all over the city of Annapolis. And you know, what we didn't plan for was if you get there a little late, you know the wind kind of gets up when the sun starts beating on the water. So, we got there and the winds were kind of calm, but by the time we got everything else setup and you know, we had these balloons, they must been like 5 foot diameter balloons. Let them up and it's going to go up. They were kind of almost horizontal. So, we're just trying to demonstrate what you would be seeing from the different vantage points. So we took it one step further.

We decided, well, how about if we tie these balloons to the bascule span and open the bascule span and that's going to be how we figured out how much time that we needed for the balloons and you know, we raised the bascule and the wind just got even worse. So that didn't work either. So that was one of our attempts to, you know, to demonstrate that it's not going to be a total destruction to view sheds. But yeah, it didn't work well.

BG: Do you believe that the competition advanced the field of civil engineering in any way? Or the bridge or the result of the competition, I should say?

PM: Well, I think, you know, looking at the history of bridge competitions in U.S. You know, we really haven't' seen any or you know, I guess what we've been told that there haven't been a bridge competition in the U.S. for probably about a hundred years prior to the Severn River Bridge Competition. So, in a way, we advanced engineering by kind of opening up and reminding people that there is another option out there for say a signature bridge or bridge that has certain characteristics, or a statement bridge or whatever the location is. That you know, the reason and the owner then just go on with the traditional and hire an engineer, you know, let them develop 2 or 3 different schemes and you pick one of the schemes and you know. Competitions, I think always kind of get some of the creative juices flowing.

And you know, for engineers that's, you know, maybe a little bit different because you know, usually would kind of build box girders and you know, have that type of thing in mind as supposed to maybe a little bit less on a creativity side. So, I think it did advance it in that aspect of -- I'm not, you know, I'm not too familiar with many other competitions that have been running the U.S. since the Woodrow Wilson Bridge. I don't know with your research whether you run across many or any.

BG: I've run across a few. They're usually smaller pedestrian bridges. There's nothing large scale, like the Woodrow Wilson. I mean, obviously the Oakland Bay Bridge was an attempt at a competition but it wasn't really a competition. It was more the traditional root. So, you know, part of this thesis is looking at whether the ones that we've had, the very few that we've had that I'm studying, have been effective. But yeah, I've come across some pedestrian ones here and there and just some smaller ones. Nothing, I don't think anything even close to the 34 million that the U.S. Naval Academy Bridge was.

PM: I know that still was one of your questions and you know, I just haven't seen anything. You know, I'm active in looking on any of the trade publications that come by or whatever. But you know, I just haven't been aware of anything outside of Woodrow Wilson.

BG: Right. Well, you know, after your experience with this U.S. Naval Academy Bridge, would you be, would you want to have other competitions? Do you think it was effective enough or do you think that, you know, there's a place for competitions in the future bridge design? Or do you think that other options are better? Do you think that other options, you know, the traditional method or the design-build method, you think those are better than a competition would be?

PM: Well, I'm not sold on design-build because design-build, I think it's more of a production type thing and I don't think you're really thinking about aesthetics and that type of thing as much how can I get this particular structure built in economical fashion as quick as I can and make money. You know, we haven't had a lot of luck in Maryland with design-build. We've had a couple fairly significant projects of that kind.

But what we did with the bridge is was we gave them basically a 30% set of plans and said "This is what we want the bridge to look like" because we were afraid that unless we got exact type of detail, we could kind of leave it up to the design-build team and you know, we weren't quite sure what we were going to get. So, we gave them 30% plans, which you know, type, size, location type thing and basically, let them turn the numbers and do all of design. There might be, you know, a couple of little refinements or whatever. But you know, I guess in Maryland, we're not, you know, at least the bridge office is not totally sold on design-build.

BG: So then I guess the follow-up is would you be willing to have more design competitions? Do you think there's something you'd want to see more of?

PM: I think that it has its place, it could be useful, you know, for special locations, I think it would be. You know there was, you know, an awful lot that went into the competition, you know, you got involved with the program rules and you know, getting different committees together to review plans and you know, we had a constructability committee at this, you know, design committee, getting this a little blue ribbon panel together. And it was fairly lightly process and I think it, you know, certainly is suitable for a special bridge. But you know, for the more routine things, I'm not sure if the way we do it with you know, just hiring a consultant or having developed a couple concept plans, you know, that would certainly be appropriate for most crossings. You know, competitions, you know, for signature bridges, you know, I'd be okay with that.

BG: So, you know, I did talk to Mr. Freedman. He told me about the competition process. So, I have information on that. I won't make you reiterate that. But in your opinion, based on this competition, do you feel that future competitions could be improved? Should they be run into different way? What aspect should be different about them?

PM: Well, one thing I'd be interested in, you know, we kind of, you know, we went at this by hiring a consultant to help us with this competition and you know, set it up and I think Fred Gottemoeller is someone you talked to. But one thing I would be interested in if we did a future competition is to, you know, do a little more research on how it's done in Europe. Because it seems like, you know, they have viewed this process and continually using this process. And I think one thing that you know, I'd get into is sitting down and seeing what's made, you know, their process such that, you know, it's a tool they use a lot more than they do in U.S. I guess that would be one thing I'd be doing.

BG: I did do some research on European competitions and it seems like a lot of bridges there and buildings are won through design competitions and they're often published to a lot of the European Union. So, you now, 27 counties will see that this bridge design competition is open. So, whoever wants to at least try the prequal round, they can. So, it's crazy that we've only had a couple and they have so many.

PM: Right. And yeah, I think some of our, you know, procurement things that we have to go through the State, it's not setup for this type of method of constructing a bridge. You know, we have to go and you know, get some, you know, it's within a few procurement but because it was a little different, we have to get some special approvals to proceed that way as opposed to a more traditional higher consultant, with them design it.

BG: So, in the U.S. Naval Academy Bridge Competition do you feel that you got a better bridge of the competition than you would have if you had just hired a consultant? Do you think the end result was better?

PM: Yes. I do. I think we would have ended up with a steel girder bridge. I'm not going to say, you know, it might not have been a trapezoid or box but I think we would end up with some type of a steel girder bridge and I think what we ended up with here, you know, would be far superior as to what we would came up with. I think it would probably would have been, you know, multi-girder bridge and you know, we have all the

bracing underneath the diaphragms and the underside of this bridge, you know, it's so clean. You have the boxed diaphragms at the piers and beyond that, externally there's really nothing other than, you know, the main structural numbers. So, you know you got such active, you know, number of boats going underneath there. I mean, that's constantly under scrutiny.

BG: So after this bridge was, you know, designed and built, did you have any public outcry or anger or was the public happy with it? What was kind of their response?

PM: No outcry. Everything we heard after was compliments. There might have been, you know, maybe, the type of thing you can't please everyone. But these groups that were, you know, fighting the bridge. You know, we've heard compliments instead of "Oh, you should have know, you know, you guys made a mistake, you should put a movable bridge back." We didn't' hear any of that. I think the surrounding communities, you know, all of different people that were involved or fought against us I think for the most part, you know, everyone was satisfied.

BG: And what was for you, what was the most exciting part of this competition? What did you like the best?

PM: Getting it done. No, I actually, it was so different, you know, just kind of I wasn't involved in the judging itself but you know, a few of us were able to, you know, kind of sit in and listen to the comments from the different jury members. You know, we weren't able to influence any of them but, you know, we just kind of sat there. And that was pretty neat. I kind of enjoyed that because, you know, you had these presentations from the design committee and you have a presentation from the constructability committee, so you know, you're heard. You know, the different back and forth between the jury and these committees and then, the discussions afterwards, you know, talking about the, you know, features and the structural elements and the appearance. That to me was pretty exciting. I enjoyed the end part of it.

Well, I'm not sure if anybody else did talked about, you know, what's in this, you know the jury report but the images in there, we required that all the consultants that entered provide us renderings and then, what we did was we had our own artist take their renderings and create a series of renderings from a particular vantage point to be used, you know, for the jury to review as opposed to a given, you know, the renderings of what the consultants prepared.

And our thought process there was that, you know, you might have somebody who went out and hired, you know, the best artist or some type of company that you know, specializes in renderings and you know, made this fantastic presentation. And what we tried to do is kind of normalize everything by having the same artist create all the renderings that were proposed so bridges that were proposed. So, what's in a book was something that the state generated. So there are two different series of renderings. There's what's in this book and then their renderings that were presented by the consultants. I think if I look around, I might be able to find copies of those pictures of the renderings. The renderings, I think have disappeared over 20 some years. Well, there's a couple of them. There's a couple of them floating around in the office. But no, I don't have them all. I don't think I have enough room in here.

Bart Ney Interview Transcription

Date of Transcription	:	April 28, 2012
Interviewer	:	Brooke Goodman (BG)
Interviewee	:	Mr. Bart Ney (BN)
Duration	:	00:18:00

BG: I'm interested in the process and how the competition came about. What happened in it. You know, whether or not you think it was an effective competition. You know, my main thrust is figuring out whether bridge design competitions are effective at producing better bridges and you know, if there should be more in the future, or not.

BN: Okay. So, my role is continuing and I'm the Senior Communications Manager for the toll bridge program which means 90% of my time is focused on the Bay Bridge Project. But the competition was held several years ago. Way back in the 90's and construction started in 2002. Back then I wasn't working on the Bay Bridge. I was working on another bridge, the Carquinez. So I wasn't active at the time that the actual process was going through. I came on board in 2004 when we were attempting to award the self-anchored suspension bridge and I've been working on the project since then. But I can definitely talk to you about the competition. It's part of our district.

BG: But actually, you know, I'm studying three. I'm studying the Woodrow Wilson, the Oakland Bay Bridge and the U.S. Naval Academy Bridge. The Oakland Bay Bridge is the one that I do not have enough information on. So, this is perfect.

BN: Okay. So, yeah. I can see how this is sort of a general thing now. Maybe I can give you some background that we can just have a discourse. So what happened here is that I'm with the Department of Transportation, CalTrans, the DOT for this state and there was a back and forth a little bit between the state and the regional entities out here on what the bridge would be. Now after the Loma Prieta Earthquake in 1989, and most of this is on our website baybridgeinfo.org. We had a structural failure there at Pier E9 on the Eastern span of the Bay Bridge, which is a steel truss structure foundation on or set upon a foundation of wood piles. So, what we determined in the process is that it will be better to replace that part of the bridge, the Eastern span. The Bay Bridge part is about 8 miles long, the Eastern span is 2.2 of those miles. So, once we had determined that we wanted to build a new bridge, CalTrans designers went to work and set about designing a concrete bypass or skyway type of structure but we had to go through public process to do that.

The aesthetic was based on the Bay itself because this would be an open structure that people and automobiles and bikes and pedestrians would be able to view in the Bay. It's a structure without the impediments like what you have with the steel truss structure with steel above you. When we went through the public process, the design was not embraced by the local community, local decision makers and politicians, or local press. The design was ridiculed, I think they called it, "a freeway on stilts," and it was not accepted basically going through the public environmental process. So at that point, the Governor, Steve Wilson, was involved and working directly with the local agencies – in particular, the Metropolitan Transportation Commission, which was the regional transportation body here in the Bay Area. So they set about a process of them leading what the competition would be. So, it's actually the MTC that put the competition together.

And what the MTC did is they developed two advisory commissions, the engineering design and advisory panel, which were several renowned architects and bridge engineers coming together to help advise a decision committee. The decision-making committee that held regular meetings to determine what the type of selection would be. So, it was the MTC that actually ran this process and probably a good one for you to get in touch with since they physically carried it out. But during the process, a number of different types were put forward. There were four that were in a final run off. It came down to a cable-stayed type of bridge, which is really popular now around the world and what we are building, the self-anchored suspension bridge.

Aesthetics was a big part of the decision making here. A lot of those bridges could be designed so that they are seismically safe giving the criteria we were going for. Of course, the number one criteria in this decision-making process was seismic safety. And we actually created a new criteria that we called "lifeline" for the design of this bridge. So that was sort of an extra thing that was part of the process. The design would have to not only -- not fall down in an earthquake, but be immediately reusable after the quake for emergency

services and then be able to be put back into public service without being rebuilt. So, that's what the new criteria that everyone had to take into consideration when they were putting together a design for it.

And so, that actually got rid of some of some firms that were a little bit more extreme. But then, in the final run off, the self-anchored suspension bridge had architectural and engineering merit. Few people know this, but when the original Bay Bridge was designed in the 19 -- in early 1930's, the self-anchored suspension bridge was proposed for the East Span at almost exactly the same place that we're building on now. But their decision back then was to go with the steel truss type of bridge. The self-anchored suspension bridge's engineering merits comes from basically the idea of not having to build an anchorage in the middle of the water. There's not too many bridges around the world that have done this. The Western span of the Bay Bridge actually has an anchorage that connects those two very large suspension bridges, I think they're number 32 and 33 as far as the largest suspension bridges in the world. The anchorage that connects them has got more concrete in it than the Empire State Building in New York. So, water based anchorages are expensive and challenging to build.

So, that's why a self-anchored suspension bridge made engineering sense and then the other thing that it did aesthetically. Because that type of bridge has a main cable and then suspender cable that comes down off of it. It sort of matched what's become to be known as the regional signature out here. It's a catenary curve that's created by a main cable that's strung off the tower. So the world renowned, you know, Golden Gate Bridge here which is viewable right through the structure and of course the bridge has two suspension bridges with the same type of architectural design. So with those things together, that's sort of the reason why this design was able to outlast the others during the competition phase.

BG: Okay. Just a quick question, how did you, you know, how did you solicit people to design the bridge? How did you get the word out there that you're having this competition?

BN: You know that detail is one that you should probably take up with MTC because I'm not sure how they did the advertising for it.

BG: Okay. So, they would know about the process and okay. Okay. So do you feel that, you know, this design was a better bridge than you would have gotten if you would gone with the more traditional method of picking a designer?

BN: Honestly. I think that question becomes very personal. I do think so. I do think it's better because it's made for the criteria that not only we need from an engineering stand point but also from a regional buy-in standpoint. There was no way that we could do something else. The people would not have it. So, like going through the process, we're able to arrive at something that everyone embraced.

BG: So then, you know, were members of the public part of the -- I think you had said they were on this advisory panel, did you have people representing the different public sectors.

BN: Yeah. It was quite a spectacle, I guess could be a good word. There was a superhero in tights, Transportation Man, I remember him and lot of different people, you know, putting their -- getting their input there in the early days. It was this commission that had to make a decision using input from this EDAP to make a final decision.

BG: Right. So, would you be open to holding more of these competitions in the future? Do you think they're beneficial? Do you think they're helpful enough to hold more of?

BN: Well, I think in our region you would say that because aesthetics is a high priority in San Francisco Bay and also because we have extreme needs from our mega-structures out here because of our earthquakes, our seismic vulnerability.

BG: Right. Is there anything that you think should have been changed about the competition that you would change in any future competitions?

BN: Well, I think in looking back, we would have tried to find ways to streamline it, to make a go faster. We know that it's a strong need for us to get those bridge built before the next earthquake happens. So, there might have been ways that we could have gotten the process to move a little bit faster. But that's really the only part of it that I can say at this point.

BG: Right. Okay. Let's see what else do I have on here. So, the winning design, the self-anchored suspension, was that -- did the design change at all before the actual construction of the bridge or was it, you know, they just went along with that design and you all didn't change any of the aesthetics or any of the structural components of it.

BN: Well, in general, not much was change. But obviously, when you go from a 30% architectural design to finished engineering design, there are a number of changes that take place within the bridge. But basically, it's very similar to the one that was proposed.

BG: Right. So then, what is CalTrans, or what has CalTrans role exactly been in the whole process of the competition?

BN: First and foremost, we are the owner and operator of the bridge. Our role in constructing is sort of the day-to-day overseer of the construction. We are in partnership with the toll bridge oversite committee, which consists of ourselves obviously, the Bay Area Toll Authority, which is a subset of MTC. It probably is the MTC and the California Transportation Commission. So, those 3 bodies together managed the oversight of the project.

BG: . . . competitions are great, why don't we have more of them? And there are a lot of competitions in Europe and I'm kind of looking at the differences between the two and kind of reflecting on why we don't have more competitions.

BN: Yeah. Well, if I'd put my two cents in there unofficially, I think every region is different. Everyone has their different priorities. I think you'll see competitions continue in ours because they're high priority. But in some other areas like even in California, it's not big of a deal.

BG: Have you seen any -- I mean, this was obviously a major one in California, have you seen any other ones recently or any, you know, types of competitions, I know design-build is becoming a little bit more popular but –

BN: Yeah. You're starting to see that a lot more. Boy, I can think of competitions for architecture, there's quite a few to happen in San Francisco. But as far as a public structures, probably that doesn't happen too often. And honestly, the design competition was an important part of getting this bridge right and that's something that everybody will debate for a long time. But I can tell you that this is been a long project and we have had many challenges and at the time when we were visited by 60 Minutes and they investigated us for over two months, what they came up with in their story was a story about design and it's probably worth your time to go online and watch that piece because they still have it online.

Randy Rentschler Interview Transcription

Date of Transcription	:	**April 26, 2012**
Interviewer	:	**Brooke Goodman (BG)**
Interviewee	:	**Mr. Randy Rentschler (RR)**
Duration	:	**00:51:04**

RR: So, what was my role at all this? -- Look, I was here. So, what I do here is I'm the agency's legislative guy. I'm the guy that passes laws and lobbies and does things like that. Also, during this time I was the spokesman for the agency, as well. So, when you are the spokesman for someone, you tend to know a lot about what's going on. So, I was here when it happened but I wasn't the person doing it. Okay? My boss was. I think the first thing you got to understand here is that the Bay Bridge, the Eastern span of the Bay Bridge is unique in almost every facet, including how the design was chosen. Okay? So, I'm sure that your knowledge of this is pretty limited, right?

So, let me just kind of describe a little bit about what happened and then you can kind of fit that into what you're trying to do there. Does that make sense? Okay. So the first thing is that we have a State where the department, Caltrans, proposed to build essentially like a freeway over the Bay and how familiar are you with the Bay in the Bay Area. Okay. So, you know what the Bay Bridge connects and where it is, have you ever seen it before?

So, we're talking always about the Eastern span of the Bay Bridge that goes from the island to Oakland, and never about the Western piece that goes from the island to the city, right? And that's Caltrans who -- The one thing you really have to understand and I know it's weird, okay? But you got to get this. So, I'm going to do it in a metaphorical way. All right?

Organizations are often dominated by what they can do, their expertise, okay? So Caltrans and Departments of Transportation across America are often experts in one single thing. They know concrete. Does that make sense to you? So, it's like if you went to a restaurant and the only thing they could do is scramble eggs, okay? Like they can't even do fried eggs, let alone anything else, they can do one thing. Departments of Transportation can do concrete. Does that make sense to you? You really have to understand this.

So, if you ask the California Department of Transportation and I want to be clear. Look, I've been on the record, kicking the shit out of them for my entire career. So, let's not do that now. It's just the way for you as a young person to understand how institutions work. If you ask a bunch of designers and engineers and architects, which there are very few. Anyway, they're all concrete engineers, it's what they went to school for, it's what they understand. They don't understand anything else. Okay, if you ask them to design you a structure, what's that structure going to be? It's going to be a concrete overpass. That is what it's going to be, and of course, that's what they proposed to build. It's just so obvious when you think about it.

So, when somebody talks about a bridge design competition and all this kind of stuff, the most important policy issue is to remove it from an organization that can only do one thing and put it into a venue where creative thinking can take place by people who are good at all sorts of things. Does this make sense? That's the most important thing to understand. So, let's move on from there.

So, Caltrans proposed to put a skyway across the Bay, and the Bay Area, who worships the Bay because we're kind of pagans here and we don't want to believe in religion, we believe in other things. It was completely sacrilegious. You know, it's like taking a crap in a church. We're not going to do that. So, then what happened is that a very significant public process began of which my agency led it. Of which all sorts of ideas, and there was a huge display in the Oakland, California Museum about all these different designs. It appeared to, let's say an "observer," that this was just going to be chaotic, anything goes kind of thing, right? But the reality of it is that it was much more constrained than any sort of a public competition like a normal person could understand.

And so, what we have here wasn't just the bridge that people wanted to make beautiful on the bay but we have a big seismic problem here. And so that really restricted down the design options and in fact who could do the design, and in fact, because we had created this panel of 25 experts who volunteered to participate, we

essentially had the world's expertise already sitting on a panel. And so, the people who really, at the end of it all were involved in the real competition, they were also the judge and the jury as well. Isn't that odd?

So again, you've got to think about this as being completely a unique situation. The bridge was unique, the setting is unique, the seismic is unique and the process as well wasn't like anything that's comparable -- I vow to anything you ever seen before. So, let's get down to bridge types real quick, okay?

So, the one bridge type that's on the table is the Caltrans bridge type, which of course is a skyway. A concrete structure that stretches across the Bay and then, the next thing that happened was engineers and architects and seismic experts kind of began to team up with a few basic ideas about what could be built on the Bay given the incredibly complicated geology that's underneath the Bay and what could be built physically. So, let me just go off little tangent here. The Bay is not really building a bridge across the water. It isn't. It's completely deceptive. What it really is, is building a bridge across a giant canyon. So, hold that idea, right?

I know this is always bizarre, but going back 20 thousand years, back when Moses came down with the tablets -- The Bay, you know the ocean was 20 miles away and the Bay was a canyon that had been gouged out by a couple of rivers and then that next period of time when the water came in and canyon was filled with mud, soft mud which will not hold a structure, which is why it collapsed during the earthquake.

So there's no rock to get to in many places along this canyon. So the island, if you go look on the maps, is one of the ledges of the canyon and the rest of the Bay is a really shallow water. In some cases, you know, 7 to 10 feet in most cases across the Bay, of which below that water is just mud, layers and layers of mud. It goes down like 300 feet. So, the bridge is not a bridge over water. The water is a disguise. The bridge is a bridge over a canyon. Make sense? A canyon filled with mud, that's right.

So the exact engineering, how you build the structure, became the most important thing. And so the designers were totally restricted by a panel of seismic experts who had to determine if any design was seismically safe. So again, there's just nothing like it that's never been done. You know, as far as process, place, the whole thing was just completely unique. All right. That's a good place to start.

Let's kind of go through -- you're asking me what was my role. I guess you have some sense of it. I'm a legislative guy. I'm here to raise money, I'm here to lobby, I'm here to communicate about all these kind of stuff. That was my role.

BG: All right. Do you have any background in any type of designer at all, or just law and politics?

RR: No, I was an investment banker. So, our motivations, look, I passed the law with my boss in order to make sure that us, not the State, not Caltrans, but my organization was the focal point of the design. You see, we can't give the cafe that only serves scrambled eggs the power to take the orders. You see what I'm saying? Really important.

BG: So, even though they were the ones that only do the concrete and they said that you need to have this concrete bridge, you wanted to be the ones that were kind of in charge of –

RR: Yeah. We said, "no." We said "no, we're not building concrete bridge. Have you guys lost your minds? You know, no, the answer is no. Forget it. Not just no, hell no. And in fact not just no, but you can't do it. We're going to do it and we're going to build what we want" and they said, "okay." This is the thing that always scares us. When you look at DOT's, you know, they're heavily – they're multi-layered organizations. They're organizations that are predominantly male, they're organizations are predominantly engineering oriented, they're organizations that are profoundly conservative in every way. Resisting to change in any form and it's not all that. I mean, you know, they're out there trying to provide an access for cars.

You can't have a lot of creative thinking that often doesn't break down in the chaos like a lot organizations that are profoundly resistant. Just go across America and just look at all the structures. Drive on a freeway and look at them. There was no way an architect was involved in any way or form. There were engineers. Does that make sense?

Yeah. So you know. Again, if you get on I4, if you begin to get an I4, you'll look at all public structures from transit to highways to everything and say "Wow, you know, all the architects must have been killed and we were left with engineers." So let's keep going, do you feel the competition was effective at producing? Yes, by like a thousand million percent. So while this process was unconventional and it would appear in many cases to be somewhat chaotic, it's going to produce a modern icon on the Bay. It'll become world famous, it will become a piece of public -- a public piece of infrastructure that is also iconic and a rallying point culturally for the Bay Area. It is going to be a big deal.

BG: Well I guess I still don't completely understand the whole process. Maybe we'll get to that as in terms of you know, one designer versus several designers that battled that out or that they all work together . . .

RR: It's a little bit of both. So listen, it's a good point. But let me get to it. So let me read to your questions and I'm going to get to a few important critical moments where hopefully you will get your questions answered in that form. Is that okay? Okay. So that was the competition good? "Yes, I mean it's not even close."

Do you believe that the competition events furthered the field of civil engineering? "Yes, it did." I mean, the Bay Bridge -- if you take an organization like Caltrans that had not built their bridge over water since like the 1950's, so then 50 years. Like two generations of people coming in and retiring had never constructed a bridge over water of any significance. They did freeway overpasses. That's all they could do. And so, what we have at Caltrans after, you know, the Bay Bridge was part of a multiple bridge, seismic retrofit and construction program here and it caused the whole gamut I mean, you know. That would get you a stupid concrete structure that have would never been built because that's all they know how to do, instead we got bridge which is unique to the world and made of steel.

And so, what has occurred is Caltrans now has some of the finest knowledge of civil engineering in seismic construction in the world as the result. So, this is advance the field, the civil engineering. And so you know, I have people who come here, you know, engineers and finance people who weep over this opportunity to do this thing. It is by far the most exciting thing in their entire careers -- by far. Nothing is even close. It's such a -- it's like, I don't know what the right word is but it is an enormously emotional thing for these people to have a chance to work on this project. They love it. They go crazy about work and then we take photographs of these guys work and then working in their helmets, they just go crazy. They love it. So, what's the public response for the competitions outcome look? "Mixed." Okay? The public I think, now 20 years on, I think the public is enormously excited about it. I mean, off the chart excited. But I think the process itself was something they had to kind of tolerate.

Again. I'm just kind of going through these things and the goal here is to give you enough understanding where you can ask questions when we're done. Okay. Was winning design modified before the construction? Well, yeah. In form, but the winning design was so unique and unconventional that there were no significant real design changes to a layperson. If you talk to the engineers they probably would tell you about every nut and bolt and this and that and constructability issues and they will probably, they could spend a week with you, I'm sure.

So, can you tell me about the bridge design competition, the judging criteria and all this kind of stuff? "Yes. So let's do that." So, what we created was a group of architects and engineers. The group had a name. It was called "EDAC." The Engineering and Design Advisory Committee and that committee was a volunteer organization that people who wanted to do it that we created to advise the commission who was a public body that I work for. So, a bunch of elected officials on what design should be used to construct the Bay Bridge. You got that?

Okay and these people were the preeminent architects and seismic safety engineers in the world and because we lived here in the Bay Area just like you live in a major Metropolitan Area, they live here. Okay? So, it's not like we're in De Moines, Iowa. All of these people were profoundly interested in this project, so these same people also work at firms who eventually wanted to build the bridge.

As you could imagine, we had to take some steps in order to insulate decision making process from those who were on the panel, right? And we did so because we're a public entity. So, what eventually happened is a series of consortiums that formed. And these consortiums consisted of in some cases, academics, engineers, construction firms, designers, architects, engineers, etcetera, etcetera and it really came down to two proposals when we're all done. So the one that was always out there that was kind of the standard to hate was the concrete overpass across the Bay, right?

So that was the standard that we all hated and we're not going to do that but it was always there in the background as the standard. And so two construction designs emerged and it was close. So, one of them was a Cable-Stay Bridge. You know what that is? And one of them was the Suspension Bridge that we eventually decided to build. And it really came down to the very last moment. So, did you have a second? Okay. So, let's talk about the Cable-Stay versus the Suspension Bridge.

So, this is going to sound sexist, but it's just the way that it is. So, the Bay is filled with suspension bridges. The Western span of the Bay Bridge is a 4-tower suspension bridge. The Golden Gate Bridge is a suspension bridge, half of the distance that you can achieve about the new bridge. And there's the Carquinez Strait Bridge,

which was also a suspension bridge. The bay doesn't have a cable-stay bridge on it. So, you know what a cable-stay bridge looks like, right?

A Cable-Stay Bridge is rigid with tight wires that go from the road deck to the tower. A Suspension Bridge is a bridge of which the road deck is suspended by cables that attached to a tower. Right? A suspension has curves and it's considered female. A cable-stay bridge is rigid and firm and considered male. Isn't that wild? But look at the classic suspension bridge, like the Golden Gate Bridge, it has beautiful curves like a woman, right? You see what I mean? All these weird things we never think of, right? There was no way they're going to put a guy on the Bay. You see what I mean? You see what I'm getting out?

The architects were absolutely focused on this. They were saying they would have these beautiful pictures of which I can show you on our web pages of what the Bay looks like from an airplane with this new bridge modeled in it and you want this beautiful curved suspension bridge showing up next to the Bay Bridge, Western side. Sitting next to the Golden Gate as three beautiful curved structures on the bay and putting in rigid male structure on the bay was completely unacceptable. Isn't that wild?

But it's true. Okay? So, it was a design aesthetic. Now there were other issues involved as well but this was the predominant one. This is the main that one could -- I wish I was smart enough to make this stuff up. I'm actually telling you exactly how it was talked about. So, the other thing that mattered because of the geology was to only do one tower. They could not economically put a second tower in like a normal suspension or cable-stay bridge. It wasn't possible. Without spending an enormous amount of money to get down to 300 feet full of mud toward the Oakland side. The only accessible firm place to put a tower was nearest the island. So at the last minute, to make the bridge stand out, they made asymmetrical. So that means that one side is longer in it's suspension reach than the other. So, important moment. That was a really important moment for the designers and the architects.

BG: Why is that, just because it was kind of defining as the final shape?

RR: Yeah, I think so. Remember we had a design panel, both architects and engineers and it was very interesting to watch it on the first meeting. I mean, they actually sat on different sides of a table of 25 people. I mean, they divided themselves like boy or girl. It was just amazing to watch. And they had to string each other along. The engineers were focused like engineers are, I mean, "We need seismic safety. We need a bridge that that's constructible," and the architect had gone - "You know you guys only have the coolest site in America and we're going to make sure that we beautify this site and not do anything to harm it." I mean, it was like Mars and Venus right there. It was very fascinating to watch. It is incredible actually.

So, based on your -- I'm just reading your things here. So, a lot of this client and applicant in starting criteria, financing, all that stuff was handled internally. Okay? You know, we did these ourselves. Based on your experience with US competition, do think you had better results? I don't know how to answer that. I think the key for me is to think about it institutionally. The best thing you can do is to have civilians, not engineers and not departments of transportation determine the design. They're institutionally unable to have an open-minded result. They just can't do it and it's not that they're bad people, you know, they just do scrambled eggs, that's what they do. Okay?

Do you believe the States - "Yes we should." So let me kind of go off on a tangent about this. Okay. So your question is "Should the U.S. hold more design competition for bridges?" The answer is, in fact, "Oh my God, yes." Okay. I can't believe we've been asking the question. Honestly, yes. All right? And this is the reason why -- There's a beautiful courthouse in Oakland, California that was built as part of the WPA process in the 1930's. It's a gorgeous beautiful mission-style building.

And then right across the street is it Annex, which is built in the 1960, which is a concrete bunker. I mean, it literally looks like a bomb shelter. And so it certainly makes one feel as though the concept, the progress has been arrested in America, right? But it also speaks to a larger issue and that is that one time public structures and buildings were designed in order to imbue a sense of civic pride and to reflect the importance of governance and to inspire our residents to have confidence in the government.

And now it appears that the ethic is, you know, put the government workers in somewhere or have some place in some suburban location like a post office because that's all they require. So, the focus has come about the people who worked there and what they need instead of what the society needs to inspire themselves and to be proud of the place that they work and live. See what I'm getting at?

We live in this country with public structures, with an engineering design ethic of practicality and least cost. That's the ethic in this country. And when you drive around America and you really look at our physical

assets, they all reek of this. Instead with just a little bit money, we could have in America, for everyone to see every day as they use it beautiful, practical, inspiring architectural features that make people feel good every single day. Like going to a museum, going to an art show, going to a small place and feeling like you're really connected to the community. Does that make sense? This is the most important reason. You cannot give a bunch of engineering organizations decision-making power over essentially public structures. They will make a wreck of it. They will.

You can tell I don't have an opinion about this. There's so much more to bridge design, clients using one design versus bridges in competitions. Like, ours was more kind of a traditional method, frankly. In a form versus bridge, I mean, we kind of had a competition but we kind of didn't. You know there was no way -- I'll give an example. There was no way that we were going to allow an open process. I know that sounds terrible for government agencies but there's no way we're going to allow an open process to come in and someone to be awarded a design in this instance because of the seismic issues. It was much more constrained than that.

So, it was as though the seismic requirements were imposed on the designers to kind of sequentially work through and as soon as they passed some sort of reasonable design by this advisory group that they were not allowed to kind of continue in the process, is the way to think about it. I don't know if that makes it clear or not. But it wasn't like winner take all design. It was not like that. It was more like a negotiation.

BG: So, did you have like multiple designers that were up in this?

RR: Yes.

RR: Yes and things would fall off like beautiful structures would come in and they would be up for review by this panel and the panel would say, "God. It's beautiful and it's great and it's not going to work seismically, we're sorry." And they didn't allowed to proceed any further. But those that were allowed to proceed further, they're weren't chosen, they were just kind of screened through and eventually what happened is you had two structures left, the cable-stay and the suspension. That was the last through this kind of screening process.

RR: But it wasn't as though like on day one, you know, proposals are due, you know. And then on day, like 150, proposals opened. And on another, day 200, proposals reviewed and awarded. You see what I mean? It wasn't like that.

BG: So, then how long did this kind of review process take?

RR: 18 months. Yeah. That took a long time. Now, there's a lot of reasons why it took a long time, which we can get into if you want. So, what happened is that building the Bay Bridge, there've been two movies done about it. There've been all sorts of PhD doctoral dissertations done about it. I mean, it was just an amazing effort. And so, the original statute gave us six months to pick a design and then as we did that, what would happen is that we would have these design teams. And engineers and architects work through ideas and we would cost them out because we only have so much money at the time. The money was way beyond the budget by like a thousand percent, twice over. So, it didn't matter. And so, what we do is we would advance them for design, not to advance them through certain percentages of design. So, you've heard like 30% design and terms like that, right?

So, we eventually advanced two designs through 30% design, the cable-stay and the suspension. And cost them out, these bridges as compared to the standard, which was always a concrete skyway across the way. And of course, we costed that up act as kind of the mark. Like, okay, here's what Caltrans would do and then here's what everyone else wants to do. And so by advancing two bridges through that process and like kind of grinding it through with the department and others, it took us a long time because they didn't want to pick a design that they can't afford. It turned out we took the design that was incredibly expensive but that's a different story all together.

BG: I saw, now that it's a $6 billion bridge or whatever.

RR: Yeah, it is. But look at, you know, it was going to be a mess no matter what. I mean, a lot of people go through this process and I say, "You guys, you Bay Area froo-froo people pick this crazy expensive bridge," and it's like, "Oh, you guys. It would have cost a mint." If we would build something ugly and we cost the same amount. It's hard for people to accept that. But it's true.

BG: So, it sounds like in your whole process, the seismic condition was kind of the entire driver in all of the decisions that were made and all of the designs that were advanced.

RR: Yeah. Look, it was but there were other things driving it too. So, you know, one aspect of it is that we were never going to put out something like a traditional bid process like I just described a minute ago. It was always going to be a form of a negotiation between teams. And because of non-traditional side, because of the politics involved, because of the need to raise money, it wasn't like, you know, a normal thing you had the bridge over a river that needs to be replaced. It needed to be replaced. Let's have of design competition for that bridge, the physical aspects are widely known by engineers. It's conventional and the question is really, you know, cost and how much do you want to spend if you want to get something, beside something ugly which is kind of a simple set of decisions that people have to make.

Now, if I'm king for the day and I have any place to put a structure, you know, cost for me doesn't matter. Like I just don't think it matters almost at all. I know that's something irresponsible to a lot of people. But it just doesn't matter. When you amortized cost differences over 30 years, it's miniscule. It's so small. It just doesn't matter. And so, often what we do in contests is to award things to the most, you know, the cheapest thing. And so, having a design where you offer to the cheapest thing is like, well, okay, well, we all know what that's going to be because it's just easy amount. You see what I mean? You know, if you were, as a person, to go out and every day have a cost competition for your dinner, you'd be living on noodles, right?

You see what I mean? I mean, the notion -- that look at, you can tell I just run about this. The notion that this is a good idea to go out and work things based on cost is like the dumbest thing in the world. You know, how about a working on what we want. So, you don't want noodles every night. Okay? Sometimes you want to have good meal with friends. You want to have a decent bottle of wine. You know, you don't want to just have fries and so, in our public side, we tend to think we want noodles every night. It's completely stupid. So that what you get every day. You look around and you get noodles every day. Your eyes get noodles every day. It's all you get. Pretty dumb.

BG: Yes. You have great metaphors for everything.

RR: That's why they made me the spokesman.

BG: So, you're obviously an advocate of having this competition, or you know, something more competition-like. So you have more options and things like that.

RR: You've got to break out of it. And the way that life works that's hard for individuals to accept is that institutions matter. We like to think that great people show up and lead us into victory in war and all this other stuff. The reality is that day in and day out, the institution's rule, they do and the key for significant structures is to get them out of the institutions in an organized form where insightful people who have a sense of authority, but also a sense of healthy design that can "represent the public." As far as that goes to lead the public. Don't take a poll and decide the public wants this. The public doesn't know what they want. The public knows when they see it. This notion that the public always knows is completely stupid.

So, the key is to get it out of these institutions, like Caltrans, and I'm just picking on them because they're here. And get it out of this frame of reference that cheapest is best and start talking about value and start talking about what it means for a society to have significant public structures that can inspire us. If you can do that, if that can happen and I don't care if it's a bid process or anything else, if you can do that, you're going to succeed. If you don't do that, then you're going to have a world full of concrete overpasses.

BG: . . . It's the end product and that's the most important part.

RR: Yeah. And it all fits together. So any event. Well look, I've been rambling for awhile. So, why don't I just let go and you decide what else you're interested in?

BG: I kind of want to jump back to just the process a little bit more. I feel like I have a pretty good understanding of how it all happened. But when you took over this project from Caltrans, and you brought on these panels of engineers and architects -- so those engineers and architects were the ones that were also making the designs, the ones that sat on this panel? So the engineers and architects or the engineers that gave you the designs for the bridges. I guess what I would call the "competitors," the different designers, were they also on this panel that worked through this?

RR: Yes.

BG: Okay. So they were just kind of like a big process that they all saw each other's designs the whole time?

RR: Yes, that's correct. Look, I think one of the hard -- I worked in the public's here, I work in politics and shaping messages and dealing with people who look at things, right? So, one of the hardest things was to explain all this and to look at folks and say there wasn't really a conflict of interest. All right? But we were accused. We

were accused often of this process of having a conflict of interest, particularly by people whose designs did not proceed.

BG: But those people whose designs did not proceed, they were on the panel, right?

RR: Not in all cases. So let's say that you and your colleagues at school, you have a class, right? Okay. So, let's say how many of you in the class? 25? Okay. So, let's say that those people, those physical real people are the most prominent, seismic experts in the world, let's just say and bridge designers. All right? And then we had this unusual project and we want all of you guys to be on this advisory panel so we can make the right decision. So, that entire class becomes the advisory panel. And then they say, "Okay, well now, we've got to pick a bridge, who's going to design the bridge?" Well, we're all here. Okay. Right?

So, how do we participate, is the question. Okay? How can we, the best in the world, help you design the thing that you need to build and so we have to figure that out. So, what we did is that we allowed them to put a proposal together, and of course they can't to vote on their own proposals. But they were competing against each other as they were people from the outside who wanted to have their bridges considered too. So, there was clearly a venue for conflict to take place. You know, people from the outside who did proposals in almost all the cases, their proposals were judged to be inferior by the people who were on the panel who were also proposing, right?

I mean, when you look at this, what you is this sound like, you know, what do we do when we want all the seismic experts to be the judges, like how do you deal with that? So, it was a bit of a struggle process-wise. It just was. There's nothing we could about it.

BG: So, I mean, I guess looking back in retrospect, is there anything you would have change, is there anything you could have changed about that process or do you think that this process gave you the best result that you would have gotten in any way?

RR: Well look, if you live in California, people are obsessed with process. I mean, process is often the product. I think if you live in other places like Chicago, the product is the product and the process is they don't give a shit about it. You know, things there Chicago is an example versus what we have out here, which is just a mess. So, I think for some people, they can't make a distinction in that question, the process is everything.

If you're me, I would say, what we're going to have as an outcome, one of the most unique and incredible structures in America and this process, while cumbersome, gave us that and there was really no real alternative because the Bay Area is a very finicky place and there was no way, no way that we were going to have a traditional process where people could come in and an award would be given and that we would build the bridge that someone else wanted, designed from anyone else. We were going to nitpick it. We were going to tell them what to do. So, we created kind of process of negotiation versus a process of winner-take-all. Does that make sense to you?

So, you know, like I took to a metaphor. If you wanted a car and you know, all these people go "Buy my car, here's one, here's that" you know and you'd say "Well, look. I like this car and all the stuff in it but I hate that color." Right? So eventually, what you would find yourself doing is ordering the car exactly how you wanted it. And so you kind of would expect the car maker to say "Look. I want exactly all of this" and because we could get exactly what we wanted, we don't have to worry about the brand of the car. So you could get like Toyota quality but there's other design that you wanted and these seats and this color that Toyota doesn't offer. You know what I mean? It was completely a negotiation.

BG: So, do you think that this method could be applied elsewhere? Do you think that this is specific because of everything that surrounds the Bay Area and the people in the Bay Area and just kind of the environment of not only the actual site, but also just the way that everybody in -- as you say, the process is the product, do you think that this process would work anywhere else?

RR: Well, look. It's a really good question. You know, we in the Bay Area takes ourselves way too seriously. You know, we had votes on this bridge. We had referendums in four cities. This went to the White House. It was quite a show, let me assure you. I think that Bay Area's experience can be instructive to a lot of people who are seeking to build a structure that either resides in or becomes a public icon. So, in this case it resides on the Bay. The bay is the public icon. So what do you do with that? It's like a church, like you know, how do we deal with the issue of the church?

In other circumstances, the situation is so unique here that it doesn't really apply. I do think there are a couple of lessons that should apply everywhere and I think those lessons are you want to get the design process outside of the traditional institutions of the state that the departments of transportation. You want to get it in

some form outside of their traditional processes. Now, it's not that these people are bad. You've got to really understand this. I'm not saying they're horrible people. I'm saying that they need outsiders in order to influence their designs. They just have to because they don't have good enough people inside, they don't.

I think we need to get it away from bean counters who talk about the cheapest possible structure on a square foot basis. You got to get away from them too. You need to allow the public to participate, so that the big counterpart of the public of which there are ones that hate taxes, not on everything but the public workers in the warehouses, we don't want to spend extra time on them, that's part of the public. But you need to inspire the public too and talk about "We're going to be seeing this every day and we need something to inspire ourselves." This is really a piece of public art, just disguised as a bridge. If you want art let's make it reflect that. And then what happens is that that conversation will lead people down a path where you can get a different kind of structure. At least to have the chance to do this different kind of structure. You see what I mean? So, I think to that part of it is completely transferrable to anywhere in the country, completely transferrable.

BG: Right. So, one more question about this panel that you know, had public input, architecture input, engineering input but did you also have like contractor input or was there anybody there that was kind of doing almost what I would call "value engineering" and looking out for a better way to do specific aspects of it or a cheaper way?

RR: Yeah. I'm going to say "yes" to that but in part, what we had was the whole Department of Transportation and their entire engineering force at our disposal to advise the panel about things like cost, constructability and what they could do and things like that. Now, often what you got was a very traditionalist view but I'll give you an example. So, if you were to look at the Eastern span of the Bay Bridge from Oakland all the way to the island. Originally, the architects wanted it to be completely made of steel and the engineers did too. So, steel performs a lot better in earthquakes than concrete does. But the department hates steel. They absolutely hate it. Now, part of it is because culturally it's different from them. They were concrete engineers, that are what they went to school for and that's what they understand. But part of it is really life experience.

I mean, concrete is a lot cheaper to maintain than steel. They don't have to maintain it as much. It has certain qualities that the department likes because remember, they're going to live with it, they're going to own it and we're not. You see what I mean? So they have different, completely different view about things. Like "Don't build me the cool stuff, build me the stuff that's easy for me to maintain." I got the workforce, the workforce I got is what I got, you know.

I don't have a bunch of geniuses. I got a bunch of high school graduates who hate their job. All they care about is that they want to fish on the weekends, they can barely show up to work, you know. They don't want try to view to anything. They can do one thing, that's it, they make it concrete. You see what I mean? It's not like they're kind of totally unimaginative. It's just that they're stuck in the world that they're stuck in, you know. So that structure was suppose to be steel, it turned out to be a concrete. It was made of concrete, not steel.

BG: So, does Caltrans maintain the bridge now? So, it's theirs after the process is done?

RR: Yeah

Miguel Rosales Interview Transcription

Date of Transcription	:	April 29, 2012
Interviewer	:	Ms. Brooke Goodman (BG)
Interviewee	:	Mr. Miguel Rosales (MR)
Duration	:	00:23:31

MR: Well, let you know, in the US there are very few bridge design competitions. I would say that, you know, only one comes every three years, if any. And it never gets established as procurement. Today, designing in the U.S. is something that sometimes the agencies will do at the request of the community or because you'll say, you know, it's a lot of pressure to do a better design. But it's not really a normal way of doing it. Like you know, countries like in Germany or Switzerland, you know, there's a lot of competitions there.

I think that, you know, the main competition I participated in was the Woodrow Wilson Bridge and that was a pretty well-organized competition because the Maryland Department of Transportation had done one before for the U.S. Naval Academy Bridge and, you know, they'd had experience at least doing that one. And the result for the Woodrow Wilson Bridge Competition -- I think that it definitely improved what they would have gotten if they would have gone, you know, for the traditional manner and it was well organized.

They had jury and the competition was blind so that you didn't know who had submitted the designs and it was pre-qualified. So you know, they have an example there, and whether they're going to say competition was capable, at you know, continuing with the final design and doing a good job with the implementation of the design. I think there were like five participants and then, you know, you could submit two entries per participant and we submitted two and one of them won and it was with an engineering company called Parsons Transportation Group. They are -- you know, they were located locally in their office in New York. You know after the competition was won then we stayed and helped during the final design. I think our role was not -- as I would have liked it to be and it was a big large engineering project and there was many many participants and I think the end result is pretty good. But it's not the best, if you look -- you've seen that bridge? Have you been there in DC?

I think that you see from a distance, I think their main concept is it was preserved and you know, a good idea that it kind of – it followed a competition winning design. But when you go up close, then it looks not that good and they would change this, they bid the project once and it came too high. It came in as $800 million or something like that, and then they reviewed it again and then they had to change some things to lower the cost. You know, like this main -- I don't know, how much do you know about bridges?

So you know, I would say the main change in the design was that the super-structure, you know, where the support the deck was changed from the steel boxes that was simpler, to I-girders and were, you know, more complicated and then the piers had to become wider at the top. So it lost a little bit of elegance I would say. But I think, in general it seemed that people liked the bridge. I mean, I think it won many awards and you know, I would say that Washington, DC benefited definitely from the competition.

Then you mentioned -- okay, so the two here. The U.S. Naval Academy Bridge, it doesn't seem that competition was that successful. The bridge that won, it's okay. I would say, it's not very innovative. It's probably better than when they have gotten, but I think that the Woodrow Wilson was a better result in general. It's always important in competitions that you have a good jury and to have an expert in the jury that you know, something about bridges and you know, had done bridge designs and there has to be probably a well-known bridge engineer in the jury and you know, for the Naval Academy Bridge, I think they have Christian Menn, the Swiss Engineer and for the Woodrow Wilson, they didn't have a -- nobody famous -- but they had a professor from Princeton named David Billington in the jury, and he knows a lot about bridges. He's not a designer but he's been studying bridge designs and you know, he's very well informed. So I've seen that, you know, that actually in the Naval Academy Bridge. I remember that Christian Menn was very disappointed, so he actually submitted another design which, of course was not accepted because you know, he was not part of the competition. But I think it's because he thought the results were not very good. And the Oakland Bay Bridge, I think the Oakland Bay Bridge was not really a competition. I don't see that you know, the jury or a design competition like the other two. What do you know about the Oakland Bay Bridge?

It wasn't really, you know, I've seen that through the procurement process, they wanted, when the consultant was selected, I think they wanted to have two options to study: a cable-stay and a suspension bridge. But you know the same people did both so you know, it's kind of hard to be impartial when they are doing two options and that's kind of from the same group. I think they had a different architect in each of the options and I won't say that was truly a real competition.

BG: So from your experiences with competitions, would you feel that these are something you'd want to continue to participate in if there are more or, you know, do they help you as a designer?

MR: Yes, but the problem is that you know the last two that I had participated in, they've been disappointing because it took a little effort and then the projects have kind of stopped as it was, and they haven't really continued. So you know, one was in Washington DC. It was a pedestrian bridge called -- you know, that one wasn't real competition. It was pre-qualified, they had a jury. You know it's always important to have a price like a minimum price because, you know, then it becomes more official and the problem with that wanting to see that you know, after the competition once you need is the client was kind of abolished and they changed client. It was called the Park Side Pedestrian Bridge. You know once they changed the client, the new client that was the Department of Transportation, the district Department of Transportation in DC. They really want to do the bridge that was selected. So they didn't do the feasibility study and then the design, this was too expensive. And then afterwards, I never heard if they really did the bridge or not. It's been on hold since then.

And that one, we won. That one, you know the Swiss prize. Then I heard of another one in DC, I don't know why they're all in DC. It seems like -- they seemed to have some tradition there but this is what's called the 4-Mile Run Bridge Competition and that one also was a well-organized competition. I think the problem with that when they had the jury, it was not a blind competition. So you know, that means that they are a little bit biased because before they made affiliations, they meet the consultants and I don't know. It's just not. I think for a competition to be fair in this peak line and you know, you need to submit all the documents and they need to base it on the design. Not on a preference of the jury that they like this company or that company. You know what I mean?

And that's how the Woodrow Wilson was done. That's how, you know, the Naval Academy Competition was done. But this 4-Mile Run, you know, they have three competitors and we were one of them and we then get the first prize but then the person that got the first prize, they never followed up the project and the project also disappeared. So, it seemed like the client was not really organized they didn't have enough funding or didn't have the capability to take the competition design and make it into reality and there is one of the problems, you know, there is no -- they didn't have a budget or they don't have the power, you know, they're on the land or they don't have the capability of continuing the design and it's just a bit of effort wasted.

You know it never becomes a reality. And definitely there will be more competitions, you know, well organized and you know, there's many examples in Europe. They could use as a way to organizing. I think some departments of transportation are worried of them because you know they see them as they lose the control of the result and you know, there's always been risk involved when you do a competition and you might not get a design that at the end, you want to build with an agency. So, they have to take that risk.

BG: Yes, I was going to ask you, it kind of sounds like as a designer you do like competing in these -- you know, do you also feel that they are more effective at producing better bridges or more interesting bridges or they're better in any way than traditional, I guess the traditional of just choosing a designer?

MR: Yes, definitely. Yeah. There is no question about that. You know, it advances the designs. It makes you think harder. I don't know. I think that they're effective and there are just very few, you know, we did one in Columbus, Ohio. It wasn't really a competition, it was kind of like pseudo-competition. You have to, you know, show designs during the interview. But again, they never continued with the project and kind of disappear.

BG: Well, so do you obviously -- they don't seem to be -- the amount of them don't seem to be increasing but you know, what's kind of your favorite part about participating, is it doing the designs?

MR: When you have a competition, you know, you are free to propose a design as you see it will fit you know, get requirements on the context and what you think is best for the site and I think that's interesting because you know, you put your best forward. And when you're already hired by a client there's either a constraint or another issue and you know, a lot of competitions in United States did have to have extensive community participation because the government provides a lot of the funding and sometimes it's just, you know, too many people are involved and I don't know if the result gets better, you know, you try to please everybody.

So I think doing a competition is more pure in a way and I think that that's good. You know because it gives you some freedom to think about the project and you know how bad to complete it. Of course you know you always have to talk you know, have to worry with these stakeholders and the agencies. But at least if your initial concept is good and people have accepted it, then you know that's a big step forward and then you can take it to the completion.

BG: Have you competed in any international competitions or have you only competed in onces in the U.S.?

MR: Yes, I have. They are harder because, you know, of course you have small competitions and a lot of the competitions abroad, usually the local designers and engineers are the ones that win them. You know like if you look for example in England you know like the Royal Institute of British architects -- I think that's there, RIBA. They organize competitions and I think some agencies in England organize, especially pedestrian bridges, you know, they do competitions. But as far as I know, always the British company wins if you do a research online. So that's discouraging you know, if you try to design from abroad.

And you know I think in Germany and Switzerland again, you know there are local companies who win and a lot of there are really geared to native engineers to compete. You know they are not advertised nationally or internationally, there are many views for their own country. Which is ,fair in a way because you know, they know the regulations and the codes and you know, they're pretty comfortable with engineers that have worked in their own country. But I joined a few international -- I mean, they're always interesting to me and I think it's a challenge you know, you'll learn always doing a competition. There is no way not to learn something. And it forces you to think quickly and find a solution that is effective and it also trains you to communicate your ideas and you know, how present them. So you know it really is a good exercise.

BG: I haven't heard from any designer who's competed in these yet and I'm glad to hear that you like competing in these and you think that these create better and more interesting results. I've spoken to a couple of other people who are, you know, more on the jury end or they, you know, helped organized a competition and of course they're huge proponents but I like hearing that you know, you have similar opinion or at least that you had a good experience competing in these. So, I guess looking toward future once, I think you were saying that to make these –

MR: Well, I don't know of any competitions coming up. I haven't read about any in the U.S. Do you know of any that they're trying to organize?

BG: No, I don't think they're coming up but I have spoken to actually -- spoke to Mr. Billington. I spoke to Bob Healy, who also worked on these and you know, they're both hoping for more. So I think that the more they push, the more they're hoping that more competitions will come up. Who knows if they actually will.

MR: Well, you know right now we are in a very difficult time in terms with the funding because you know, Congress is being limiting in their funding for bridges and you know, there are difficulties to find a new transportation bill and I don't, it's not -- it seems not to be the most conducive time to hold competitions. Considering funding and, you know, a lot of projects that are going design-build.

You know what that method of procurement or what the other contracts involve. And they tend to be very cost oriented because the contractors had been in charge of the project and you know, they want to minimize cost all the time and that's really difficult if you want to do competitions, you know, it's just not very conducive in design. You know I'm involved now in at least two projects here in Boston and they're going to go design-build because their client is the Massachusetts Department of Transportation, they want to do it fast. They want, you know, finish them soon. And you know, I've been trying to find a way. So the initial concept and design doesn't get lost once it goes into the design-build process and it's difficult. You know it's not easy. I mean, when that had been successfully, you know, we're doing a pedestrian bridge for the DTA that's going to connect the [??] Station to the Riviera Beach. It's a nice pedestrian bridge. It should be a big, historic bridge and it's not very much utilized. People don't really go there and it's kind of hard to get to it. But once you're there it's very nice beach. They want to make a new connection and you know, they got a grant from the Federal government and we're doing a design there and that's a design-build project and it's going well and I think that, you know, that should open this year. And that wasn't a competition, that was a traditional method. But you can look into the internet. You might be interested in looking at that one.

Ted Zoli Interview Transcription

Date of Transcription	:	April 28, 2012
Interviewer	:	Brooke Goodman (BG)
Interviewee	:	Mr. Ted Zoli (TZ)
Duration	:	00:42:05

TZ: Yeah. Good way to start. I mean, this is that kind of using the anecdotal approach, I guess, in terms of research, which is fine. In terms of bridge competitions that I've been involved with directly – certainly Woodrow Wilson, but US Naval Academy was before my time. The Bay Bridge really wasn't a competition in -- It was really more of a typical procurement that we did. We did share different ideas at the presentation. So there was a competition element to it and I think that's generally true for more significant projects but I'll come back to that. Now, the Stonecutters Bridge was an international design competition that we were involved in.

We've recently won a design competition of sorts for a pedestrian bridge in Brooklyn Bridge Park called the Squibb Park Bridge and we won an international design competition for a wildlife crossing, sort of new typology of bridging highways to protect wildlife. And those are competitions that come to mind. In the ones that we've participated and I've typically led the design of those as projects and that would include Woodrow. From a perspective low of motivation I think, for me, design competitions -- and little bit in Jock's is similar to what's done in Europe, design competitions in the US are relatively few.

The challenges associated with some design competitions are whether to judge or to participate on juries -- I've served on a jury for a design competition for a bridge in Rome. And I've been asked to serve on juries here but I' m less -- Let's say, I'm amused. I was anxious to serve on the jury and more anxious to enter the competition. And that was the case with the wildlife crossing. You know, I think the motivation to enter a design competition, and hopefully to win is obviously to lead the troops, so to speak. Maybe first and foremost, but more that it's an opportunity, I think, to explore some ideas. Design competitions tend to be few and far between and in the US, tend to be more looking for something that's out of the ordinary. And I would say in our practice we are sometimes, there's more than opportunity to do an unusual bridge if you do a design competition than there might otherwise be.

So it does suggest that the owner is open-minded or entrusted in an unusual structural system or unusual typology. And so I think that's maybe is more of a motivation than it might otherwise be and that's in contrast to what there are, one particularly sorts through one on some other places seem to generally do design competitions. Now, not to put too hot a point on it, but in many circumstances, one where, let's say, either proposing or interviewing for a project. Nowadays, in the last ten years or so, we're more likely to present some of our conceptual ideas for design then we would have in the past. And so, in some ways, even in normal procurement process in the US for consulting services, involves in some degree a de facto design competition of sorts. Yeah. And the simple, it's almost to me realistic in terms of asking for proposals if you simply ask a consultant who served the engineering community for their ideas about what a crossing might be as part of their submission, as part of their response to a proposal or as part of their interview for a project that I think more or less you have a design competition of sorts.

And it's not such a leap from what truly is a design competition, in let's say, European model. One of the challenges design competitions face is that its selection of winner is often at the behest of usually fairly narrowly focused jury, or in the case of what I'm calling is "de facto competitions," where you present your ideas to an owner. Naturally, the owners sensibilities about things and design competitions, the ones in the past in the US, are in some cases troubled because, you're let's say, more pitching an idea to a specific audience as opposed to let's say, necessarily developing the best idea for the project. And it depends quite a bit on who's judging, and so this also begs the question of who's on the jury and whether you want to serve on the jury versus participate. I'll stop there and ask am I making sense?

. . . I'm a former student of Professor Billington and I think about this a lot relative to the value of design competitions and I'm a little wary of -- It's almost a Victorian sensibility about the wonderfulness of Europe and let's say that the design competitions by their very nature produced better engineers and better designs. I'm afraid that that is only true in as much as the competitions are well-run and the jury is highly capable, and if neither of those are true or either one isn't true, then I think it can be troublesome. And point of fact, I think

the US Naval Academy Bridge, which we did not win, but the team did win, we saw it was not in compliance with the criteria.

I know this was before my time but I know we were pretty disappointed at the outcome and we were also quite frankly a little disappointed with the jury and Billington was on the jury, and in fact, we felt Billington's analysis of our submission was wrong. And so it's a shame in a way, because not that Professor Billington is not highly qualified as a juror, but his qualifications to render judgments on the technical merits of a fairly complex designs, and that he is not practiced bridge engineering as a profession would be somewhat wrong. And I think he could render judgments about many aspects of it, but not so much the technical merits, especially detailed technical merits of one design versus another. And this is where you get like an edge because that's exactly the sort of fatal flaw with our submission as I understand. But then I don't know a lot of the details, but I understand that he regarded ours as flawed and his analysis, his technical analysis wasn't quite correct.

So you know, such things happen in design competitions and I think, we left disappointed from that one. Woodrow for me, which I was directly involved in and have a strong feeling about. Woodrow, in my view did not end up with the best bridge and it also had to be modified so much during its evolution to something that in many ways was more of a caricature of similar looking, but not similarly designed structural system. And a bridge that was in my view enormously more expensive than it should have been, is in my view, a failure of the design competition as a strategy for selecting a great bridge. It's not that the bridge is a failure. I think it's technically designed, well-designed bridge that's enormously complicated, but it's enormously complicated for not a great reason and it needed to be modified rather substantially. And we were involved in value engineering in trying to make the bridge less expensive than in its design in order to try to get the bridge back on budget. So that's not a healthy example.

The Oakland Bay Bridge, in my view, where the selection of the preferred bridge type was unduly influenced by an architecturally led panel. That, in my view, was the result and then I think it's T.Y. Lin who has been quoted about this and it's just sort of the silliest of bridge types. And it's probably an abject failure, of let's say, the bridge engineering community coming up with an effective bridge solution that's very unusual and complicated. And so that's not the great example I think either. I'm guessing that Billington, and I don't know about Fred, but David certainly probably didn't have nice things to say about the Bay Bridge.

And I think Menn was involved in some advisory panel and ultimately quit because he was so aghast at the way things were moving. There comes a moment in engineering in design competitions, anyway, where in my view, the challenge with a primary aesthetic evaluation does not necessarily yield great exemplary work of engineering. And there we need, I think, an enormous emphasis on cost and that's probably what's missing in design competitions generally in the U.S. and the reason these have not gone remarkably well is that cost wasn't really at the forefront of the decision-making. And if it was, let's say, the cost evaluations were highly suspect at the time of the decision-making, at the time of critical decision-making. And I think that would be true of both Woodrow Wilson and the Oakland Bay and ours, I was involved in HNTB's conceptual design that we had for the Bay Bridge and our logic there was that it shouldn't be a signature span -- a concrete viaduct for the approaches given half or so the conditions were, in our view, a concrete super structure. It was probably the least efficient for such pursue of conditions and a high seismic span.

Our logic was that it should be a signature bridge, meaning that it should be a multiple span bridge across the entire East Bay span. And it's very similar to what the West Bay Spans are, if you're familiar with them, right, it serves multiple spans, suspension bridges, so multiple long spans and we felt that logic should absolutely be the same. And I can tell you, we did those two stupid things when we interviewed for the job. And even though we felt we were technically right, and it was worth the risk, and the problem was that Caltrans really wanted to be very much involved in designing the approaches and that took them out of designing the approaches. So we didn't make any friends with Caltrans, and of course, there are all these political issues and larger let's say, architectural issues with doing anything that supports -- sort of Oakland's equalness in the sort of hierarchy between Oakland and San Francisco. And so a series of signature spans, if you will, across the Bay, would take some of the hierarchical importance of San Francisco out of it.

So the big span being as close to San Francisco is possible like the East Bay spans, in my view, sort of upset that larger architectural idea and we had been warned about it. So we went in with eyes open. In a way, I think it's an absolute shame because the bridge, a modern multi-span bridge, and I'm thinking if you're familiar with something like a Rian Imperian, multiple-span cable-stayed bridge, but maybe not such extreme spans as Rian across the bay would be quite a remarkable work of engineering. And I think what we end up with is, and you know something that's four or five times the budget, and twice the duration in terms of

something being constructed. And an enormously silly experiment, if you will, in terms of a work of engineering. It's somewhere in the neighborhood of half a billion dollars spent in what I call lost dollars spent in temporary work, that are later removed and used for something else. You know, this is a measure, I would say, some maybe ineffectiveness or something wrong-headed about selecting an alternative. In fact, I think even if you're going to go single signature span, the cable-stayed bridge was a much more logical and efficient structure than the self-anchored suspension bridge. So even after selecting the consultant, the selection of the bridge type is even, you know, it's a mistake made over and over again, I supposed. But you end up with really something wrong at it at such as it is.

The more recent competitions that I was describing one is Squid Park Bridge which involves essentially three European firms and us was kind of a little de facto competition put together by the Arts Commission in New York City, who were unhappy with the fairly routine bridge that was planned for this park. And the competition was with Arup and Buro Happold if memory serves me and end us. So I feel a little bit sheepish that, you know, it's sort of us and the Europeans, in one sense in terms of the design competition. The other thing, I feel a little bit what we did was something -- what our solution was to really take from the, let's say, our design was based on using timber, a very specific timber in a very unusual way. And that's a good example of a design competition that pushed us to do something quite different and it's good fun but we used the rot resistant hardwood, that's a North American hardwood called black locust that I'm very enthusiastic about it that's used on bridges of all sorts.

And so that's I think is an example of a design competition pushing us to do something quite unusual, developing a new material, a material which doesn't as yet have have engineering properties. So that's part of what we're doing with the design now. I think we designed a bridge with some assumed engineering properties. We're trying to characterize the engineering properties so that it can be used in the future by other engineers. We think it has so much potential. But that's a good example of ideas being pushed. That's under construction right now. I think we're doing the material characterization as we speak right now.

BG: Then what was different about that competition that made it, you know, more effective or better for you to participate in?

TZ: Well, I think, part of it is that the -- It was a fairly limited competition and a limited -- it had a really a wide open opportunity in terms of you could do pretty well whatever you wanted, so there were no – it was not a very constrained problem, so that I think it offered some opportunities to be very creative. It's pedestrian bridge so you're not dealing with some of the more traditional limitations with vehicular bridges, but I think more so that it offered a space to explore more than maybe one of these competitions for a large scale project offers. Does that make sense? That if the scale is small and the spans aren't very aggressive and so on you can then use your creativity to play within that space. But for me, maybe what's more successful about it is that we could explore a new material and using it in a new way and that's not easy to do even on a conventional design, for a pedestrian bridge, for typical owner. An owner is not going to look too enthusiastically at that. In a design competition, when you're comparing one idea with another, I think you start to see the relative value of one bridge type versus another.

I can make you some more information. There has been some bit business written about the *Popular Mechanics* did an article on. It's published Squibb Park Bridge, that's one. This wildlife crossing is maybe more of an interesting international design competition and if you wanted to talk to somebody about a very effective design competition, you should talk to Nina-Marie Lister, who's a Chief at Harvard. But she organized the competition and got 36 entries from all over the world, a hundred different consulting firms, shortlisted to five. And the design competition is the competition entries have traveled all over the United States.

It was very very interesting as a means of generating not only interesting designs but also a lot of awareness about this problem of vehicle animal interaction essentially to the cost and the negative ramifications of getting in your car and running over wildlife and -- It's been a very successful, I think, endeavor from the -- I mean the competition is been covered in the Wall Street Journal and hundreds of really hundreds of publications. We've had a Chinese Publication, a South Korean Publication do a 50-page book on the competition and it has been, I've never had so much press on a bridge project as I've gotten on that design competition so I think –

Yeah. So that's probably interesting as a means of an outreach in getting also some traction from this fundamental problem to have design competitions for new typologies or solving your problems. So you know and I kind of -- that covers that's probably as much interesting as I have to say about all of the big picture competitions. And your question is "Does it produce a better bridge for the public?" You know, it depends how you measure better, and I'm always very interested in what constitutes goodness in a bridge, and I think

there are tends to be, as I've stated a little bit before, this focus on aesthetics and not to focus on cost or performance. And for me, performance is also sort of a keen aspect that's little bit hard to characterize but it clearly has value. And for me, that's a measure of safety and the other aspects that I think are important but are not characterized well are service life and under service life I would say sort of maintainability. And I think that that becomes crucially important when you're looking at public dollars and public investment.

So in my sense of things, in bridges, we are doing public works projects, which means to say that we are spending other people's money to build these things. And that means tax payers money and that to me requires a certain sort of austerity particularly in these times when we don't have enough tax revenues to do many things what we should be doing and design competitions that are not focused, at least in some measure as to value for money, I think are ill-formed and I might argue that one of the challenges with the projects that have gone wrong has not enough focus on value for money. And that doesn't mean you build the least expensive thing, in my view, but you build the best thing and we haven't done a good job of measuring best. And so that's where, I think, design competitions haven't been quite good enough.

BG: Do you think that there's a place for them in the future of the U.S. bridge design? Do you think that design competitions could survive?

TZ: Yeah. Yeah. I would like to think that not only is there a place for them but the opportunity should be more integrating a design competition philosophy into what are typically, what we would call the normal procurement process which would be a response to a proposal and an interview. You know, that could be, integrating aspects of design competition into procurement would be, I think, wonderfully valuable for our profession. And it's happening to some degree in some circumstances and I think it could actually be something we think, that could evolve and become a more common place. One strategy that was used for a Bob Kerrey Pedestrian Bridge in Omaha, Nebraska was something that, a format that I quite like. Which is essentially a design/build procurement, where you procure the bridge, but you set the cost of the bridge. So the owners that I have $22 million, give me the best bridge what you can for that $22 million and three teams submitted quite different alternatives.

And the bridge we built there, I think is quite special, and I think was influenced by the strategy of designing to cost, but designing the best bridge you can and let the owner. So all of the three submissions all submitted a bridge that was consistent with the $22 million cost but then you see what you get for that money and in a way it's sort of fixing the value and choosing what's best. And I think that's a design-build where you have to -- you're actually procuring the bridge in that environment is very interesting modification of the design competition philosophy.

BG: In looking at and at what you've designed in both traditional and design competitions, do you feel that the design competitions you've competed and your designs were better when they were in competitions or do you think that when you're picked in a traditional method, you'd often can produce a better design than if it were to be a competition? Sorry, that's jumbled question.

TZ: Yeah, I understand. I think design competitions demand a little more creativity, I would say, or are asking for a little more creativity. In which case I think you can present something that's somewhat more, let's say, cutting edge that takes somewhat more innovation than a traditional procurement. But in many cases, it's not the procurement that's the problem – it's the traditional sensibilities about the owner. And owners really, in many ways, dictate what they want. So part of the problem, if you will, from a design competition perspective is, are owners getting what they want when they sort of look over the reins? And I think in the case of Bob Kerrey in Omaha, I would tell you that the owner was thrilled. He wasn't expecting to get so much bridge for so little money. He had bid the project, he had done a conventional design and it had bid it twice the budget and so he was happy to get basically 95% of the bridge or half the budget, is the way the design competition ended up.

So I think that there are, let's say, great success stories. On the other hand, a lot of, let's say, the lack of creativity that you might as ascribe to a conventional process. It's not the process, but the owner's reticence to explore new ideas. And you know, with some justification, I mean new ideas often have budgetary and technical risks associated with them. And in a public sector environment, very often there is only risk and no reward for, let's say, design innovation and you know, I think that's probably a barrier to some of the design competition methodologies bleeding into everyday life, if you will, every design procurements. But I think there's a way to do that. If you were to ask me how would I, if you were to say, "Ted. Okay, great. But tell me how to get there from here." If I were to play -- Let's argue that design competitions are "better" the way to get there would be to sneak in design competition type strategies into the normal procurement process.

So let's say, I want a bridge over the Charles River in your backyard. One thing I could do is, you know, the usual suspects in designing in Massachusetts or you know there's maybe five or six guys, five or six consulting firms that would have the chops to do a bridge like that. You invite them and you say, look this is not going to be, we don't want to see what your qualifications are and so you're all qualified. You might have to go through a screening process to qualify those five or six teams and then you say, look, "Present to us your ideas for the crossing and the ideas we like the best. And those ideas should have a cost associated with them and a schedule and some discussion of risks with anything you're doing innovative and then we'll choose the solution we like. Not the people we like the best but the bridge type we like the best." -- I think that's the way to get competitions more and more into everyday, let's say, engineering and I think it that's of course not the case for every bridge, but a bridge that has some enhanced, either visibility or importance to a region or to a community I think, those will be candidates for such a strategy.

It's a good challenge and, you know, the point I sometimes make is just that if you needed to have gall bladder surgery, would you think that the public would -- Would be appropriate reach out to the public to weigh in on the preferred gall bladder surgery technique? And it's not to say that the public doesn't have input to all of that, and of course, in the case of gall bladder surgery if it's covered by Medicare, you know, the public would be paying for and so on. But there it has seems to be a perceived expertise with the medical procedure that would preclude the public's over-involvement in that decision-making. And I think, there's some truth to decision-making of a bridge design is really not in necessary in the public wield house from an expertise perspective.

So for the public to render a decision as to what's best, I think is probably dangerous. For the public to participate into what lives up to the opportunity that site has or how it would impacts the community, absolutely is of course the public is not only paying for it but the public has to live with the bridge, in which case some participation of the public, I think, is vital. So to me, it's both necessary but needs to be focused and too often, I think we have the public thrust in the position to play bridge engineer and I think where that goes horribly wrong is sort of adopted from architecture, some architecture strategies that maybe more planning strategies in the so called charette process where you -- the public is offered, or a representative, the public are offered sort of a Chinese menu and the public ways in which -- I think in the grand scheme of the public weighing on typologies or forms, you know, the larger sense of what the bridge is and how that sits within the environment, I think that's fine. That the idea public weighs in on some of the details of, you know, what shape or what color and so on. I think these are really, in a way, an abdication of design responsibility by our community. And it's, in a way, a shame because I think it makes some mistakes that are oftentimes hard to cover and there are many examples of that going wildly wrong and the public likes this and then of course, what the public likes the public gets. Maybe the best example of this whole business was about choosing the material for the stays on a bridge in Toledo, Ohio -- the Maumee River Bridge. I think they call they the Veterans Glass Memorial Skyway or something like that. And, you know, the stay-cable system they chose, they'd like the best was a burnished, not polished, but sort of rougher textured stainless steel pipe, but of course it had never been used before. The stainless steel pipe was enormously expensive and then it happens to be remarkably effective and icing up and holding the ice until it forms relatively big chunks and then falls on to traffic. And this is not an area that should be very prone to icing, but in fact, it's been a problem right since the opening of the bridge. And here, you argue none of the technical merits of one system versus the other were properly weighed. And public making such a decision is fraught was all kind of selling us. Yeah, is that helpful?

Yeah. Well, I mean if there's anything else, you can just give me a call if there's some follow up on this. But you know, I do feel that there's an enormous value and competitions in lots of ways. I'm not sure in exactly the sort of everyday way that seems to be the -- I think the sensibility that David brings back from Europe and I'm not sure that I -- the other question that I might have is that "Do you drive around Europe and see a quality of bridges that's much better?" And I think in David's mind, there is and I'm not quite so sure, to be honest. So I think even that is sort of -- You know, the measure of what's good in even in European practice would be interesting.

Anil Agrawal Interview Transcription

Date of Transcription	:	April 30, 2012
Interviewer	:	Brooke Goodman (BG)
Interviewee	:	Professor Anil Agrawal (AA)
Duration	:	00:30:39

This transcription has NOT been edited.

AA: Well, I have your questions. But there is one thing. When you say bridge design competition, what do you mean? You mean the bidding by the companies to get the big project?

BG: Yeah. The kind of a general bridge design competition where somebody will put on the competition and then they ask for applicants and then engineers and architects design a bridge and kind of try to get, try to win the bridge and then you know the judging process and things like that. Do you have --

AA: About the – you're talking about the RFP's and you know, generally, agencies, the whole issue an RFP which will be request for proposals and you know, the companies in various architects, they will put a proposal to get the contract and then they will work on the project. That's what you mean by bridge design competition, right?

BG: Right. You know, where the engineer designs the whole thing or they are engineer and architect design it and then they have to win the design. So, rather than being given a design that they cost up or that they price up, they also the design itself.

AA: It's not always like that. It's always, I will say the lodge. Every agency has what you call this equal opportunity clause. If you go to the state of federal level everywhere that what you call is the fair competition or equal opportunity clause. So you know, that means that you know, if any company has to be the part of the business, it has to be fairly but you know, it has to be -- everybody can -- you know, people openly bid for it and then they choose the one which is a technical by stand you know, the cost wise is that's what the goal. So, I'll just [02:51] the country because then those big engineers won the bridge design competition, I think they will get confused. Although we have the same -- you have to use the one like bidding which really means of how the company did solve the project and did the project.

BG: Right. I mean, where's the design side of it? If there's, if a bridge needs to be built –

AA: Design side is always bid. You know it's not like the eventually, they invite the companies to -- or they just give the companies to work on the project. All the design projects, they have bids by identities. At least in the big -- what you call public money involved. The companies are paid almost like 10% to 15% of the cost of the bridge construction. If you're looking a bridge that is going to cost $25 million which is not a very big bridge, the $25 million means the company which is working on the design will probably be paid close to like $2.5 million which is not lot of money.

So, sometimes to tell you, that you know, the bridge design competition, you have to probably do just like the defense would for people to understand that. In other bridge design competition because kind of like more economic that you know, in the -- you know, sometimes we had these student competitions, the assurance of the design that they still have the best profile of the bridge or like that. That's just something I'll come and back it off.

BG: I'm not interested ones that people offer money for. So, does my definition make sense or does my interest makes sense?

AA: I'm not talking about the ones to where people offer money.

BG: I'm talking about the couple that we've had in the United States are the Woodrow Wilson Bridge, the United States Naval Academy Bridge. There've been a couple of others that I've –

AA: So some of these competitions, you know, just like -- I mean, they'll be general call to submit the bid design and then somebody will be ordered to. I mean, I have not been involved in lot of those. I'm not really familiar with lot of those. I mean, I would love a company that would, you know, the company, they compete to get the bid of the projects, you know, they actually had lot of bigger projects. So, when the company/agency they want to do something in the bids, you know, they will have the open RFP. Under this is they will select the

company and the company will get paid to do the work, you know, design or you know, whether that should be done. So, that's what I've been involved in mostly. So then and I know that they are coming from that, you know, it's bit a, you know, you [06:19] historical really big bridges, so you know.

BG: Right.

AA: If they open all for the public to submit, you know, what you call the active view of the bridge.

BG: Right.

AA: Then, I'm not really familiar with those things.

BG: Okay. Well, I guess. Do you have any suggestions for anybody that I might try to contact that would have information about those?

AA: Yeah, you know. I'm still not sure, you know, what exactly is your goal. There are not too many competitions like that. So you know, they really don't add lot to the new knowledge in the bridge engineering because you know, the general fact is, you know, the agencies hire companies to do the design and this company is selected based on that. The reason they have, you know, like the proposed and you know, even just how the company to propose, the identity itself has sometimes the town hall meetings, sometimes within the all group. They feel that okay, this kind of bridge will be good and then they go for it. But then, most of the time there are hire company to do the design and the company, they hire just the company with comes out with the type of bridge which is sort the low cost on, that's also an engineering decision. They will, you know and then once they decide, okay. It has to be a cable-stayed bridge or suspension bridge or you know, one of these bridges. Then the agency will, you know, glad with the technical part. So, are you focusing on the architectural body or you are more interested in engineering part.

BG: Honestly, I'm kind of interested in the intersection between the two where you know, in the cases where the architect, maybe they'll pair up with an -- the engineer maybe will pair up with an architect to design and then you have, you know, 6 or 10 or however, many applicants will apply and then there's a jury and I know there have been very few of those contest in the United States.

AA: There are not too many like that and I don't think you know, even those projects, you know, projects like that come, you know, what you're trying to find is whether it's, you know, whether this combination have been effective at producing better bridges for the public, you know. Maybe for those particular bids. The fund they choose maybe the bid gets among the bridges you have. But we have many selected bridges like that. That's number one and second think, you know, whatever we learn or whatever we do, it's all under the context to, you know, that particular bridge.

BG: Do you feel that our current method is effective, you know this method you're talking about where contractors and engineers, they kind of did bid for the process or do you think that other methods would be more effective in producing better bridges?

AA: Well, you know, the bridge engineer, let me compromise between what you have, technically what the committee wants and you know, how much money you have and you know and although the process may look simple but all the time it's involvement of all. You know, the involvement, there's always involvement on the company or communities and you know, they work with the -- I think the process is that the fairly good because you know, it's very competitive.

You know, the companies are forced to think out of the box to invest interest, you know. How to get the business and you know, to get the business, I've been involved in lot of these biddings and I work with some big companies and I see that in all. That to put a lot of focus, they go, you know, they go into lot of details to, you know highlight the unique points. Sometimes, that you want to propose to come -- it is something which is may not be aware but the selling point, they offer to business is -- I think, you know, in a whole process where you want to have a successful base, you know, given the timeline you have, given the budget you have, the process is very good.

BG: Do you think the process, you know, helps establish better relationships between the designer and the client or do you think that it's strained because now, everybody is kind of dealing with cost?

AA: No, no, no. I mean, I'll tell you the process is quite friendly. Let me tell you how well it works, you know. And this is in case you run the big projects or the small projects. So you know and I didn't see well, advertise the request for proposal (RFP) which would particularly highlight the needs, what they -- you think to do and that you know, what are the requirement. Technical requirements without spilling out the budget or whatever is you know, involved. So, these companies, you know, from the public and media or from the agency over site

for other sources that get this RFP and then, typically an agency before even requesting a proposal. They will require something called -- it's once again, let me see. I'm just forgetting the term.

Basically, they go for the proposal. They want the companies to submit what they call is the letter of interest. So, you know, what exactly their, you know, what is this, you know, before going for the full proposal, they were asking them to submit you know, what are their proposal or what is their interest, whether they are interested because they're going to be, you know -- but if you didn't get a lot of proposal, so what they will do is they'll tell the companies, okay, you'll submit your, you know, bridge or technical expertise and you'll submit your anticipated cost hour. You know, without going into the technical part and once they are, you know, there is even, they might actually receive this from lot of people. Okay?

And then you say, I totally come -- I just [14:32] because they have so many thoughts with the EOI, expression of interest. So, this is just so we did knock not really the technical proposals. It is essentially what you call is the companies to express interest. But you know, by expressing interest, they'll see that they have a team which is a technically competent. You know, they have express work available and then they'll go some [14:58] to get that desirable part also, you know. This are the moment of hours that we probably think will take. This helps agency to also while doing the EOI, it has the initiative also looking at the budget because once you know the [15:15] or they have some kind of [15:16] idea that how much cost it, so going to be.

BG: Just for the design?

AA: Design, including a lot of budget. They are reporting a lot of budget on the companies to actually write the proposal. Then they'll also see from this EOI that which companies are technically competent.

BG: So, are these EOI's. Sorry, these are just for the design or also for the construction?

AA: I would go for both I think. You know. It's a technical part, it will go from both. This is the process to shortlist the company. So, you know, once that the EOI, probably the EOI will be shortlisted by 15 to 20 companies. And then those party list on that business, 405. I think, you know, it depends on you know, the type of proposal we receive. But those I think, these are 4, 5 or 6 companies, party list which do think very good, technically competent to do the work and they have adequate man hours, you know, it's tough and it's copies of the work And also we'll be able to do the work. And once that's there, then what we'll do is, they'll remind theses companies to send me the full cost proposal. And once they had submitted the cost proposal and also the technical proposal, then the parties will inform or will remind these companies to come in and give an interview up within this on the whole product.

And then they'll sit down with agencies and they'll give them whole discussion, you know, whole in that orientation. Then they'll be discussing, you know, agencies are free to ask questions about each and every articles, the project and then the agencies input totally, they'll look at the cost proposal, they'll look at the technical proposal, they will look at the interview or the orientation. Because a lot of people can write good things on paper but when you go for interviews, that's where they really sold out.

You know, what exactly you have. You know, what kind of qualification you have. How you bid certain things. So, they then the agency look at the whole picture and then they will select the person or the company which will give them the best product, documents in terms of with the level design. Design, you have to understand. You know, when we design a bridge, you also play with people's lives. If the bridge collapses, then people die. And you know, I think company tries to take the business but among them, the company make mistake and then we had collapses like what happened in Minnesota.

So, and then it always hunts the agencies, you know, hold to select, you know. Technical part becomes very important but the cost of it becomes important. So, they will -- based on the technical reliability of the people who are going to be involved with the product, the company, you know, passing straight. What is the cost of their thing? I know that this is that business, the company which will give them the best product and you know the best possible price.

It may not be the cheapest one among all the bids they received. But if fact in the technical part, tackle in the, you know, all those things, then probably that's the best. Now, what this company selected? Then you know, they will be invited to, you know, sit down with the client, with the agency, you know. Go more detailed into the scope. Spill out the scope each and every item in the scope. It will become a contract and it will start working.

BG: So what's your role usually during this process?

AA: Well, because I am not directly a designer but my role usually is what you call is higher level technical consultant. My idea is done makes at quick engineering or you know, blast impact or you know, all these areas you know, for bridges and buildings. So, every bids, you know, middle bids have a risk of damage during in the middle of earthquake. You know part of every project. So you know, the companies had their team which can do that with great design. But you know, I think anything has become very complex, the course have become very complex, you know, that every agency understands the complexity of the course, of the courts. So that's what my role is actually that they will hire me to what they call is not to actually do the work on the quick engineering but are the criteria they're adapting.

You know what they were, you know, what you call it, input they're trying to they meet for the design related to process quick engineering or what are the type of, you know, design they're going to do. What kind of analysis they're going to do. All these things, you know, before they actually do it, they will submit to me for we will to see if it is collectively appropriate to be something. It's in the -- this is what you're supposed to do. If they are on, then I'll tell them to say what you're supposed to do. So, I'm involved at what you call the senior technical advisor to some of these major projects.

BG: And just to jump back quickly to what you are, you know, the letter of interest in the RFP, do those go to engineers or do those go to architects or a combination of the two?

AA: A combination, you know, if you look at the bridge engineer and done that bridge engineering with all engineer, so there are very few architect involved. So, you know, if it is -- if they're back on the bridges, then you know it's all of the engineers. Now, I can just maybe involve. If the agency said yes, we wanted to also think about to follow the bridge. But in a lot of time, before they go to the other preface, they already decide the type of bridge they want to build. So, they might, maybe another step before they actually go to the engineering companies. They actually might go to an architect fund. Let's say, there's a community and they want to uplift the community. So, there's a major bridge construction in there or they want to do something for the community.

So they did a nice bridge. So you know, it will lift the look and you know, impress some of the community. So then, those talking -- this is a community the bridge, we are going to build the bridge. You know, let's do something through the community. So you know, they'll still get me -- I'll build a bridge which would make the community fell off. The before actually going to the designs, they might actually just hire architect to get some prepare what they call is the rendering. Capital rendering of the bridge. How it will trust from the community and all the thing. And once that's done, then they will come back to the engineers. Okay. We would decide we're going to have this bridge, so please build this.

So, most of them is hard to work. That you bid the architect involved. They will be involved before even the bridge went to the, you know, the engineer because the engineering part that -- the technical part, you know, can be anywhere depending on the type of bridge. So, the agency cannot have a technical contract unless they know what they're going to build. If it is a cable-stay bridge, the cost is XYZ. If this is suspension bridge, the cost would be something completely different. Yes. That's why you don't -- they cannot have the engineering contract unless they have -- they had to go through the architect first and they had to know that bridge cost.

BG: Okay. So, do you ever see that you know, these designs that win or get to the end that are given the project, do they change a lot before construction happens or you know, will the designer ever win a bridge and then get to the final round and then, their designer is just be handed off to somebody else to build or to finish?

AA: Yeah. Once it go through the design -- for the design it was design, it's mostly technically design and they will go to agency then see which will basically hire construction from which will be just like it. Most of the time it's like this, they are at least some changes, you know, but those changes are more on the budget side. I think technically, generally it's still very common to have a lot of changes in the design, particularly the safe or the form of the bridge because the time the designer was from it, that's all it wide it in.

But you know, the contract that could not finish it time, it will have extension. If the fault of the agency, then it will have a lot for more money for they'll be changes, but not in the design itself, there are also project that you call it a design-build. What happens on the design-build project is that they bid the two together means design firm and the construction firm, they pair up together. And then they go for the contract.

So in that thing, what happens is they then design firm where you know, they will say, okay, you know. XYZ company will do the design and then some other company will do the bridge, you know, the construction. But they do the one contract for the agency. For example, we have a bridge in New York City, the Tappan Zee Bridge. So Tappan Zee Bridge is not the bridge, they're going to rebuild, you know. The budget is going to be probably more $6 billion. This time, the project is very going to be design-build. In the design-build product,

they will have one package. That will be the partners of both the companies just take their responsibility for everything.

So, then they sign the contract that will give them the contract with design. For the agency, will tell them what kind of bridge they want. So then, in the initial agency would tell them. "Okay, we want suspension bridge" and this will be the specs of the suspension bridge. So, I want to [26:08] that all these things. So then we tell the agency that this is what I want in the bridge. And then, you'll get a design build then the partner company will come and they will estimate their cost that you know. "Okay, this is what will the design cost and the construction cost and then they will add it together then they'll bid. And they would go for the target.

So for very last project is well common to add what they call the design-build contract. For the smaller contracts, you know, a lot of time, you know, agency may design the bridge itself or they might have hire. You know, smaller companies have to do the design and then they will hire some other companies to build it. Because you know, if it is a small contract, that doesn't makes sense for the big companies to get involved and take the design-build contract. That is not that profitable. But when they have a project in the billions, like $5 or $6 billion, then it's really for the big companies to build for it or bid for it. And then what do the end form and design and then control the cost and everything.

So, bring that phase. Might do also optimize and to minimize their cost. Because you know, they have a fixed contract now that they'll get $6 billion to build a bridge. And as long as they can meet the -- what do you call it, the requirements of the client, you know, the technical specs from the client or you know, what should be the type of bridge the agency wants, as long as they can meet. So, this is design will form jointly or they might actually do, you know, optimizes and so they might do some, you know, smart things which makes them money. So then this is another kind of contract which goes -- which is the design contract.

BG: What was the example you talked about in New York that 6th?

AA: Tappan Zee Bridge. That's you know, in New York City.

BG: Okay. I will look into that one. Well, thank you so much for talking to me about design-build and just the typical process I think. I think that will be great to add into my thesis. It's something I hadn't even looked into yet. So I really appreciate that.

AA: And you can talk to Hilary. She has been writing a book on one of colleagues. The architecture of the bridge and you know, the type of form you know. Like a bridge may satisfy many different purposes. I'm editor of the, you know, chief editor of the ASC Bridge Engineering. So, I get varieties of proposals that from people to publish. You know, somebody made a proposal that when we build a bridge, why can't you build an apartment building on top of the bridge?

So, it's very [29:10]. You have this space, you know, we could actually build apartment type of thing on top of your apartment and in the bottom is the bridge. If it is a massive project like, you know, billions of dollar project and if it is in very expensive real estate area. Well, it would make sense. That money will actually come from the rent. But then there are many other factors which come into play. You know, the [29:42] and sometimes there maybe impact by price or you know, how you access with all those things but you know people had different concept. Hilary has been working on a book which is you know, looking at, you know, what different forms in states and contents a bridge can serve or in some like this. And I've seen one set, I haven't seen if it was a full book. But you can send her an e-mail and you know, then send my name that I recommended.

Appendix B: U.S. Naval Academy Bridge Design Competition Supplementary

Project Timeline – Design Competition Chronology

- Mid-1980s – Bridge recognized as in need of repair
- Early 1989 – Requests for qualifications advertised
- April 1989 – 21 firms submit qualifications for consideration
- May 1989 – Selection Panel shortlists six firms to submit concepts
- August 1989 – Five of the six firms submit anonymous design proposals for consideration by technical committees and jury
- August 1989 – Two technical committees assess technical and aesthetic merits of proposals, each firm awarded $20,000 stipend
- November 1989 – Jury meets for three days to determine unanimous winner, *Grenier, Inc* of Towson, Maryland

Jury Members (Maryland State Highway Administration 1990)

- *Florence B. Kurdle*, Chair, Representing the Anne Arundel County Executive
- *John Arason*, Representing the Mayor of Annapolis
- *David P. Billington*, Professor, Civil Engineering, Princeton University
- *Torrey Brown*, Secretary, Maryland Department of Natural Resources
- *Earle S. Freedman*, Deputy Chief Engineer, Bridges, Maryland State Highway Administration
- *Jackie Ferrara*, Sculptor, New York, New York
- *Myron Goldsmith*, Architect, Professional Engineer and Professor, Architecure, Illinois Institute of Technology, Chicago, Illinois
- *Carol R. Johnson*, Landscape Architect, Cambridge, Massachusetts
- *Rodney Little*, Maryland State Historic Preservation Officer
- *Christian Menn*, Bridge Engineer and Professor, Civil Engineering, E.T. H., Zurich, Switzerland
- *Frank D. Sears*, Retired Bridge Engineer, Federal Highway Administration, Front Royal, Virginia
- *A.L. "Red" Waldron*, Chairman, Severn River Commission
- *Thomas P. Ward*, Representing Pendennis Mount and Ferry Farms Cummunity Associations
- *Mrs. St. Clair Wright*, Historic Annapolis Foundation

Severn River Bridge Screening Committee

- *John A. Argo, Jr.*, Maryland State Highway Administration
- *Earle S. Freedman*, Maryland State Highway Administration
- *Jody Albright*, Governor's Office/Art and Culture
- *James Miller*, Maryland Department of Transportation
- *Professor David Billington*, Princeton University, New Jersey

Construction Panel

- *Mr. William H. Schwarz*, Chairman
- *Mr. Victor B. Hertslet*
- *Mr. Alfred Muscari*
- *Mr. William A. Edwards*

Design Panel

- *Mr. Charles Driver*, Chairman, Diver Brothers
- *Mr. Joseph Policelli*, Federal Highway Administration
- *Dr. John M. Kulicki*, Modjeski & Masters
- *Commander Chris Schlehr*, U.S. Naval Academy
- *Professor David Schelling*, Department of Civil Engineering

Appendix C: San Francisco-Oakland Bay Bridge Design Process Supplementary

Project Timeline – Design Competition Chronology

- October 1989 – Loma Prieta earthquake causes East Span collapse, Caltrsns issues bridge study to determine best solution for future bridge
- January 1997 – Caltrans recommends that California build a new bridge; seismic retrofit estimated to be $909 million
- March 1997 – Metropolitan Transportation Commission (MTC) forms Bay Bridge Design Task Force and Engineering Design Advisory Panel (EDAP) to manage process to find the best solution for new bridge; new bridge estimated to cost approximately $1.3 billion
- May 1997 – "Concept Competition" held by EDAP, ten firms and members from EDAP submit designs; EDAP board member designs pushed forward
- November 1997 – EDAP hires *T.Y. Lin/Moffatt & Nichol* to manage 30% design process, *T.Y. Lin* hires both *Weidlinger Associates/Donald MacDonald Architects* and *H2L2 Architects* to work on designs
- March 1998 – *T.Y. Lin* design teams propose variations to 30% designs including multi-tower designs
- May 1998 – *T.Y. Lin* teams present finalized 30% design documents to EDAP; EDAP recommends that MTC choose the single tower SAS design
- Late May 1998 – MTC recommends single tower SAS as chosen design
- January 2002 – Groundbreaking for SAS signature span, estimates for total cost approximately $2.6 billion

Appendix D: Woodrow Wilson Bridge Design Competition Supplementary

Project Timeline – Design Competition Chronology (Virginia Department of Transportation 1998)

- 1988 – Original Environmental Impact Statement (EIS) initiated
- September 1997 – Final EIS published
- October 1997 – Record of Decision released, included guidelines for desired bridge
- January 1998 – Requests for proposals, seven teams respond with submittals
- April 1998 – Four finalists shortlisted, each permitted to submit two concepts
- August 1998 – Final design teams submit seven design concepts, anonymous entries
- September to November 1998 – Four advisory panels consider advantages/disadvantages of each design and prepare reports for Selection Panel
- November 1998 – Selection Panel meets for three days for a series of events surrounding final vote
- November 18, 1998 – Jury unanimously selects Entry B, Parsons Transportation Group, as winner

Technical Advisory Committee (Technical Advisory Committee 1998)

- *Tom Jenkins*
- *Jim Phillips*
- *Mike Abrahams*
- *Stan Gordon*
- *Glenn Vaughn*
- *Fawaz Saraf*
- *Claude Napier*

Constructability Advisory Committee (Constructability Advisory Committee 1998)

- *Paul Silvestri*
- *John Macrae*
- *Tom Lovett*
- *Brad Hollingsworth*
- *Bill Schwartz*
- *Bill McDowall*
- *Joe Policelli*

Citizen Advisory Committee (Citizen Advisory Committee 1998)

- *W. Kent Cooper*, Architect, District of Columbia
- *Karen Gourdine*, Environmental Engineer, Prince Georges County
- *Bob Grow*, Planner, Regional Perspective, TBG/MWCOG-Transportation Planning Board of Metropolitan Washington Council of Governments
- *Ray Lewis*, Architect/Planner, Fairfax County
- *Mike Little*, CEO, Human Resources Firm, Prince Georges County

- *Lee Scoenecker*, Planner, Regional Perspective, TPB/MWCOG
- *Charles Trozzo*, Economist, City of Alexandria

Selection Panel (Selection Panel Renderings Booklet 1998)

- *Harry R. Hughes*, Chairman, Former Governor of Maryland and DOT Secretary
- *Frank Sears*, Former Chief Bridge Engineer, Federal Highway Administration
- *Malcolm Kerley*, State Structure and Bridge Engineer, Virginia DDOT
- *Nelson Castellanos*, Division Administrator, Maryland Division, Federal Highway Administration
- *Earle Freedman*, Deputy Chief Engineer, Office of Bridge Development, Maryland State Highway Administration
- *Harry Robinson*, Vice Chairman, The Commission of Fine Arts
- *Alan Hantman*, Architect of the Capitol
- *Reginald Griffith*, Executive Director, National Capital City Planning Commission
- *John Pasons*, National Park Service
- *David Billington*, Professor of Civil Engineering, Princeton University
- *Anthony H. Griffin*, Deputy County Executive, County of Fairfax, VA
- *Betty Hager Francis*, Director of Public Works and Transportation, Prince Georges County, Maryland
- *Fern Piret*, Director of Planning, Maryland National Capital Park & Planning Commission
- *Kerry Donley*, City of Alexandria, VA
- *Donald Cooney*, District of Columbia Department of Public Works

Selection Panel Facilitators

- *Robert Healy*
- *Thomas Mohler*
- *Norine Walker*

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