PRESERVING HISTORICAL STRUCTURES TO MAXIMIZE CULTURAL, LIFE SAFETY & ECONOMIC VALUE USING VALUE BASED DESIGN DECISION-MAKING METHODS

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BIOGRAPHY



Stephen J. Kirk is President of Kirk Associates, which specializes in value analysis, choosing by advantages, life cycle costing, sustainability, facility economics, and strategic value planning services. He has over 25 years experience in applying value based design decision-making techniques to historic structures, national parks, educational buildings, corporate offices, airports, court houses, and research facilities. He is an instructor at the Harvard Graduate School of Design. Dr. Kirk is a registered architect, a Fellow of the AIA, a CVS-Life, and is a "LEED Accredited Professional." Steve is a Senior Fulbright Scholar in architecture and received his doctorate degree at the University of Michigan. He served as president of SAVE International in 1998-99, is Director and Vice President of Education for the Miles Value Foundation, and is a Fellow of SAVE. Currently Dr. Kirk serves on the Industry Advisory Panel of the US State Dept. Overseas Building Office. He is the author/co-author of seven books related to value analysis.



Richard G. Turk has pioneered the use of value methods and Choosing by Advantages as a required part of the National Park Service planning and design program. Richard is a graduate of the University of Michigan. He is a registered architect with experience throughout the National Park Service. He was project architect/ project manager on several rehabilitation projects through out the country. He served as the planning team captain for the Comprehensive Design Plan for the White House. Richard has presented material on value analysis and sustainability to several national venues including the U.S. Green Building Council.

ABSTRACT

Value based methods are ideal for managing historical structures & landscapes to preserve the cultural heritage of America and throughout the world. This paper utilizes a number of U.S. National Park Service historical structures & landscapes as case studies to illustrate how value based design decision-making methods were used to maximize value. The presenters have years of first hand experience in applying the techniques of FAST, creativity, choosing by advantages (CBA) and life cycle costing (LCC) to preserve some of America's finest historical jewels. The audience will become familiar with preservation terminology, key preservation issues such as protection of architectural fabric, fire & life safety, accessibility, and historic protection, as well as the life cycle cost implications. Several case studies will help illustrate key points. Historic Savannah is an ideal setting to discuss value analysis (VA) applied to historic structures & landscapes.

VALUE BASED DESIGN DECISION-MAKING

Done correctly, value based design decision-making^{1, 2, 3, 4, 5} is about value over the lifetime of the historical structure or landscape being analyzed. Value analysis (VA) is not simply about money, it is, as the name suggests, about value, which includes important preservation issues such as culture resource protection, fabric protection, cultural landscapes; as well as more general issues such as universal accessibility, life safety, fire protection, space conditioning, removal of hazardous materials, and even terrorist threats to national icons such as the Statue of Liberty. It also can be used to assess the visual impact on an historical scene or the degree of fabric loss due to changes in the structure by adding fire protection systems, etc.

The power of value based design decision-making is in the methodology. The seven step problem-solving process focuses on increasing value in the all-powerful triad of cost, quality, and performance. The steps of decision-making are:

- Information gathering and benchmarking, for example creating cost and quality models
- Function analysis, which is the exercise of stating the project purpose in a verb/noun form
- Creativity phase, which does not stop with the first workable idea
- Evaluation of ideas generated using life cycle cost analysis and using benefit cost comparisons
- Development of those ideas into a workable preferred alternative using "choosing by advantages"
- Recommendations to the decision-makers balancing benefits and costs
- Implementation of the changes through the planning and design process

While this methodology has been used frequently in conventional facility design, it is only now being used in historic preservation and treatment of heritage assets. It fosters the consideration of true alternatives when making decisions about whether to stabilize, preserve or restore a heritage asset and it will benefit any field of consultation, including historic architects, every kind of engineer, and business managers. Moreover, it is a service that can be provided even when another historic architect is doing the design and documentation phases. The value specialist works closely with the historic architect to develop a variety of options from which to choose. This role works best with repeat clients, where the trust and rapport are already established. An option for providing these services to a first-time client is to come into a project as part of the design or construction management team.

Holistic Design Team Involvement

Part of the strength of value-based decision-making is the holistic approach to design is-achieved by involving all the stakeholders. Multi-disciplined team includes participants from the owner, user, facility manager and constructor, the design team of historic architect and engineers, and may include the State Historic Preservation Officer. The owner, ultimately the decision-maker, must be involved from the beginning to assist in defining their value expectations for the project and in setting priorities. A value specialist or a design team are not the decision-makers, they can only facilitate or support sound decision-making.

Preservation Workshop Setting for Real Time Decision-Making

Real time decisions are reached using value based methods in a team "preservation workshop" setting. Many of these workshops have now evolved into "value based design Charrettes" to more fully explore a variety of ideas. Paramount to the success is the skills of the historic architect/value specialist to <u>facilitate</u> decision-making in these team-oriented sessions. Value methods used by the facilitator to help <u>communicate</u> to the team include: function analysis, quality modeling, group creativity/ innovation techniques, life cycle costing, design/cost simulation modeling, and Choosing By Advantages (CBA).

Apply VA Early in Historic Preservation Process

In its history, value analysis was once applied late in the design process, when all the construction documents were finished. More information was known, however it was too late to make design changes if new ideas were identified which would improve project performance or lower life cycle costs. Value analysis has moved closer to the crucial formative stage of historic preservation decisions, the point where treatment decisions are made for the historic property or cultural landscape. At its best, value analysis is a process of coordinating and integrating interdisciplinary preservation teams.

In the process of recommending ideas, the importance of starting early is a matter of how changes become more expensive as project development progresses. A great idea for adding value to a project is not so great when it requires the whole team to back up and start over again on some of the basic assumptions. So some great ideas never get used. The over-arching mindset of the value analysis process is the integration of the whole for the benefit of the project life cycle, regardless of where the value management team came into the project. Naturally, a large part of the value specialist's skill set is team building acumen and understanding of group dynamics in the facilitation of the team.

TERMINOLOGY

The field of historic preservation is guided by organizations such as the AIA Historic Resources Committee, The National Trust for Historic Preservation, and the National Park Service's Heritage Preservation Services. References for more information are contained at the end of this paper. The Secretary of the Interior's 1992 "Standards for the Treatment of Historic Properties"⁶ establishes the framework and definitions for this kind of work in the United States. Options set forth in this document for the preservation of historic structures include a range of interventions from Preservation, which is a baseline in stewardship for any intervention, to more intensive Restoration or Reconstruction and also to Rehabilitation, which addresses current uses while carrying out preservation treatment.

Preservation

"Preservation is defined as the act or process of applying measures necessary to sustain the existing form, integrity, and materials of an historic property. Work, including preliminary measures to protect and stabilize the property, generally focuses upon the ongoing maintenance and repair of historic materials and features rather than extensive replacement and new construction."⁷

An example of this type of work includes the replacement of the Old Court House roof at the **Jefferson National Expansion Memorial** in St. Louis. The functions inside remain the same but to prevent loss of the building and its contents, the NPS is replacing the roof with a new copper roof. A VA workshop was held to explore various roofing alternatives such as copper, lead-coated copper, tin/zinc-coated copper, and galvalume (a proprietary zinc/aluminum steel material). Copper provides for better replication of the original material and fits the original method of construction. It also better matches the existing exterior color and roof texture of the building and is the most sustainable of all the alternatives. In the value analysis study, copper was the preferred alternative based on both "choosing by advantages" and life cycle cost analysis.



Old Court House Roof, Jefferson National Expansion Memorial

Restoration

"Restoration is defined as the act or process of accurately depicting the form, features, and character of a property as it appeared at a particular period of time, by means of the removal of features from other periods in its history and reconstruction of missing features from the restoration period."⁸

The Lockwood House is the "Crown Jewel," of **Harpers Ferry National Historical Park**. It is an exemplary piece of the Park's 19th Century Greek revival Armory architecture. Built in 1848 and enlarged upward in 1858, the building was the largest pre-Civil War historic building in the Park. The objective for this project was: "to restore Lockwood House and surrounding landscape in order to arrest historic fabric decay/loss, provide structural protection, and to attract visitation to the historic landscape and cultural resources of Camp Hill, above Harpers Ferry Lower Town." A variety of methods for restoration were explored using value based decisionmaking methods.



Lockwood House, Harpers Ferry National Historical Park

Rehabilitation

"Rehabilitation is defined as the act or process of making possible a compatible use for a property through repair, alteration, and additions while preserving those portions or features that convey its historical, cultural, or architectural values."⁹

The Noland Home, a contributing structure in the **Harry S Truman National Historic Landmark District**, has seriously deteriorated and deficient mechanical, electrical, and structural systems. These deficiencies have created a significant safety hazard for both employees and the public. It is currently closed to the public and has only limited employee access for security inspections. Failure to provide treatment for the structure would allow continued deterioration and result in the loss of historic fabric, and the eventual loss of the structure itself. Rehabilitation will result in the elimination of a public safety hazard, preservation of an important associative structure that would support visitor services, serve as a visitor area for expanded interpretation, and provide additional office space to meet park operational needs. The VA team identified a number of compatible uses for the facility and used CBA and LCC techniques to determine the best value rehabilitation approach.



Noland Home, Harry S Truman National Historic Landmark District

Reconstruction

"Reconstruction is defined as the act or process of depicting, by means of new construction, the form, features, and detailing of a non-surviving site, landscape, building structure, or object for the purpose of replicating its appearance at a specific period of time and its historic location."⁵

An example of this is the **Lincoln Home National Historic Site** (NHS) in Springfield, IL. The Lincoln home itself is just as it was when Abraham Lincoln was president from 1860 to 1865. However over the past century neighboring houses were raised by their owners. Reconstruction of the Burch and Carrigan Houses and outbuildings, provide a more complete view of the environment in which Abraham Lincoln emerged to lead the nation through its most trying time. VA was used successfully to explore options for the new construction to meet the budget.



Burch House, Reconstruction



Carrigan House, Reconstruction



Existing Lincoln House

BENEFITS AND IMPORTANCE OF PRESERVATION

The use of Choosing by Advantages (CBA) in the Evaluation Phase of a value study allows the study team to quantify non-monetary importance of advantage (or benefit), without converting all benefits to dollars which can be difficult if not impossible. For Example, What is the dollar value of watching a sunset on the rim of the Grand Canyon or the dollar value of viewing a restored historic property? CBA establishes a scale of non-monetary benefit which can be used to make benefit to cost comparisons when making decisions.

What is the function of restoring and preserving historic properties? What factors would you use to evaluate benefit? Stephen J. Farneth, FAIA of the Architectural Resources Group, recently gave the following ten reasons for reusing existing buildings¹⁰:

- 1. Saves and interprets the cultural heritage of a society
- 2. Gives our society its identity and sense of place
- 3. Maintains continuity in our communities and creates the reference points from which we take possession of our environment
- 4. Establishes communities that are highly prized for their livability
- 5. Often the cost of rehabilitating existing buildings is less than providing a similar level of quality in new construction
- 6. Sustains the intellectual life of our repositories of learning
- 7. Creates a positive dialogue between new and old, with the existing fabric being preserved
- 8. Saves the embodied energy and does not waste it
- 9. Many existing buildings were designed with climate factors and energy conservation in mind
- 10. Save the cost of demolition, transportation of debris, deposition of material in a landfill, and the environmental costs accommodating the volume of waste.

The National Park Service's answer to what factors to use to evaluate a project grew out of the NPS mission set forth in the Organic Act, 1916: "The service thus established shall promote and regulate the use of the Federal areas known as national parks, monuments, and reservations ... by such means and measures as conform to the fundamental purpose of the said parks, monuments, and reservations, which purpose is to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations." ¹³

The NPS has identified the following factors for prioritizing the line-item construction program for evaluating alternatives on NPS projects, including ones dealing with an endangered historic structure/landscape:

Provide Safe Visits and Working Conditions

How will this project **protect public health**, **safety**, **and welfare**? How will this project **protect employee health**, **safety**, **and welfare**?

Protect Cultural and Natural Resources

How will this project **prevent the loss of resources**? How will this project **maintain or improve the condition of resources**?

Improve Visitor Enjoyment through Better Services and Educational and Recreational Opportunities

How will this project improve visitor services and educational and recreational opportunities?

Improve Operational Efficiency, Reliability, and Sustainability How will this project **improve the efficiency, reliability, and sustainability of park operations**?

Provide Cost-Effective, Environmentally Responsible, and Otherwise Beneficial Development for the National Park System

How will this project provide other advantages to the national park system?

The following is a discussion of the factors, their relationship to historic assets, examples of projects within each factor and the role of value-based decision-making:

Provide Safe Visits and Working Conditions

One of the largest impacts comes from creating universal accessibility within and throughout the structure. Elevators and ramps are used for movement, but can cause significant loss of fabric as well as impact the architectural design. Hamilton Grange VA workshop explored a number of different layouts and locations for the elevator before deciding not to allow the public to visit the second floor because of the severity of potential damage.

Adding additional fire exiting means can also cause a big impact on the facility. The Ahwahnee hotel needed an additional exit. Adding a stair would have been a large visual impact to the exterior architectural image of the building. Adding stairs to the interior would have caused the loss of several guest rooms and the loss of income. The VA solution was to recommend use of an elevator as an acceptable second means of exiting as long as special conditions were done according to the new life safety code.

Removal of hazardous materials such as asbestos and lead based paint is necessary for the continued use of historic structures. VA can sometimes identify less costly ways to achieve the function of "reducing impact" at lower cost.

Fire is always a big concern for historic structures and may result in the complete loss of the facility. Adding fire protection systems and life safety measures can be very costly both in terms of cost and the impact they have on the historic structure and loss of fabric. VA methods were used to "Correct Fire Safety Deficiencies" for the Ahwahnee Hotel at Yosemite National Park in

Yosemite, CA. The VA workshop was used as a forum to discuss what life safety upgrades are required. The main building does not meet the minimum life safety requirements that would be applied to existing operating hotel buildings. The deficiencies associated with this building include inadequate separation between floors (unprotected shafts), inadequate number of exists in some areas, substandard corridor protection and substandard exit configuration. In addition, the existing fire alarm system is unreliable and obsolete without parts available for repair.

Allowances can be made for historic structures if an appropriate level of life safety can be maintained. However, this hotel has several constraints working against it including its high rise classification, remote location, woodland environment, and overnight sleeping occupants that increase occupancy hazards. Also, the NPS has established life safety goals for their properties (complete automatic sprinkler protection and automatic smoke detection). Benefits included: improved egress, life safety, minimum impact on historic fabric, sustainability, and improved response time. Most significant actions included:

- 1. Replacing the existing fire alarm with a complete detection system in accordance with NFPA 101
- 2. Fully sprinkler the hotel
- 3. Make immediate improvements for the 5th and 6th floors for egress. This involves fire separation with kitchen, improved exiting at dock area, removal of the safe haven at the 6th floor, and improved walkout areas.



Ahwahnee Hotel at Yosemite National Park

Earthquakes are yet another issue that can cause the complete loss of a historic structure. Adding additional lateral support can be significant both visually and physically.

Terrorism is the latest concern of certain "icons" in the United States. The Washington Monument, Statue of Liberty and the Jefferson Arch in St. Louis are examples. Improved security to reduce the potential loss is an added responsibility of the preservationist. The VA team assists in helping assure all security alternatives are explored and the preferred alternative is selected.

Protect Cultural and Natural Resources

Real estate markets in some areas drive the value of existing buildings to the point that it is more cost effective to demolish the property than to retain it. The preservation strategy is to identify a new compatible use for the historic structure that will make the property economically viable again. The use of VA is helpful in identifying cost effective solutions that will minimize the loss of fabric in the structure during the rehabilitation process. The success of the VA could mean the difference between retention and the wrecking ball. Thanks to the National Park Service, many historic structures such as **Alexander Hamilton's House**, is protected as a historic site.



Hamilton Grange, Alexander Hamilton's Home in NYC

Another loss may be due to deterioration of the building structure or simply to roof which protects the rest of the structure. An example is **Kennecott Mines National Historic Landmark** at Wrangell – St. Elias National Park and Preserve Kennecott, Alaska. The VA workshop focused on review of alternatives for stabilizing the historic Kennecott Mine structures, site utility infrastructure, construction management as well as improving visitor services.



Kennecott Mines NHL, Wrangell - St. Elias National Park and Preserve, Alaska

Discovering new compatible uses for historical structures creates the economics that allows for the funding of repair and improvement of the resources. The NPS uses historic structures for offices, visitor services, archives, park headquarters, and housing. Adding heating to the facilities improves the longevity and preserves the structure. Water damage can create significant concern for both the structure and the contents. As mentioned earlier, replacement of the roofing of the old courthouse in St. Louis improved the condition of the resource and extended the life of the structure. Restoring lost architectural/ cultural features is another part of historic preservation. The removal of non-historic features also improves the condition of resources.

Maintaining/ improving the condition of resources applies to cultural landscapes such as the Cedar Pass Developed Area, at Badlands National Park in South Dakota.

The objectives for the Cultural Landscape Report (CLR) included:

- 1. Provide baseline data for future Section 106 and NEPA compliance
- 2. Organize various new construction projects into holistic "framework"
- 3. Consider environmental impacts of the CLR alternatives according to NEPA
- 4. Perform Value Analysis on CLR for enhancements
- 5. Focus on period of significance: 1928-1966
- 6. Offer guidelines for future development
- 7. Identify best management approach for historic built and landscape features

A value analysis workshop initiated by the NPS was held at Badlands National Park to review the following three cultural landscape treatment alternatives:

<u>Alternative A, No Action</u> This alternative provides a baseline for analyzing the impacts of the action alternatives. It assumes development will continue as needed.

<u>Alternative B, Preservation</u> This action alternative assumes historic functions of facilities will continue and land use would continue. Contributing historic and cultural landscape features would be identified, retained and preserved. Those features that do not contribute would be removed. New development would not occur in the Cedar Pass area.

<u>Alternative C, Rehabilitation</u> This action alternative assumes contributing features would be identified, retained, and preserved. Historic features and materials would be maintained and repaired when necessary. Cultural landscape and site features that have acquired historic significance would be retained and maintained. Those features that do not contribute would be removed. New development in Cedar Pass would be limited to meeting critical park needs and would be sited and designed to complement the historic built and landscape features.

VA objectives in the review of these alternatives included:

- Assuring that treatment alternatives for the Cedar Pass Developed Area are achieved in a cost effective manner
- Seeking best balance of life cycle cost, sustainability, low maintenance, environmental sensitivity, operational flexibility, and partnerships

VA methodology was used to enhance each of these alternatives during the workshop. The final alternative selection was left to the public as part of NEPA compliance review process.



Cultural Landscape Plan, Cedar Pass Developed Area, Badlands National Park, South Dakota

Improve Visitor Enjoyment through Better Services and Educational and Recreational Opportunities

Once the decision is made to continue use or re-use of an historic structure, many life safety issues must be considered. Adding features or correcting for deficiencies can be quite expensive and have a big impact.

Other needs of occupants include: toilets, ADA toilets, HVAC systems, acoustics, lighting, and space layout changes. Each of these modifications must be assessed by the VA team and balanced against the impact it will have on the historic structures.

The **Chateau at Oregon Caves** is a National Historic Landmark (NHL). This historic hotel became the property of the National Park Service in 2003. The building is presently equipped with both fire detection and fire suppression systems, but it is constructed of flammable materials that provide very little fire resistance. The means of egress from the building do not meet current life safety requirements. Furthermore this is the only building in the Monument where food service and public accommodations are available to the visiting public and even the public spaces in the building are not accessible to individuals with mobility impairments.

The heating, plumbing, and wiring systems running throughout the building are mostly original and have exceeded their service lives. In addition to its vulnerability to damage from failures in these existing systems (i.e. burst plumbing or heating pipes, electrical fires, etcetera), the structure is susceptible to impacts from landslides and its ability to resist the forces of an earthquake are presently unknown.





The Chateau at Oregon Caves, Oregon

Improve Operational Efficiency, Reliability, and Sustainability

Re-use of an historic structure is the savior to many facilities. Unfortunately, it can also be the devil in disguise. For example, in order to attract tenants or be useful to the NPS the facility must meet some level of operational effectiveness. Walls may need to be modified, acoustical control added and appropriate finishes installed. The building will require comfort levels suitable to meet the work required. Office functions are one popular use. Appropriate temperature and lighting is a must. In many historical structures, additional structural report may be required in order to meet the new live loads required for people, furnishings and file cabinets. IT requirements are also necessary. Life safety issues must also be met including proper exiting, handicap accessibility, ADA toilets, and removal of hazardous materials.

New demands from owners include sustainability. The U.S. Green Building Council has developed a sustainability checklist called LEED^{11,12} (Leadership in Energy & Environmental Design). A key approach to sustainability is the re-use of existing structures and materials from other facilities. In this case, preserving historic structures is already following sustainable methods. In addition, historic facilities can use the LEED checklist to incorporate other sustainable practices including reduced water use, energy savings, improved indoor air quality for occupants to name a few. VA workshops are an excellent time to review the LEED to help identify ways to make the historic structure my sustainable. For NPS projects, every VA session includes review of LEED.

SUMMARY

Value-based methods are ideal for managing historical structures & landscapes to preserve the cultural heritage of America and throughout the world. The techniques of FAST, creativity, choosing by advantages (CBA) and life cycle costing (LCC) have proved useful in preserving some of America's finest historical jewels. Following is a FAST diagram (Figure 1) which

summarizes many of the functions of historic preservation which were just discussed. Key preservation issues such as protection of architectural fabric, fire & life safety, accessibility, and historic structure protection, as well as the life cycle cost implications are just as important to managing heritage assets and cultural landscapes, as they are for more conventional projects. Pursuing alternatives and balancing benefits and cost are the strengths of value specialists which make them a strong addition to any team dealing with our nation's cultural treasures.



* These functions may be required even without re-using the facility

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12. LEED Reference Package Version 2.2, U.S. Green Building Council, Washington, DC, 2005.

13. The National Park Service Organic Act (16 U.S.C. 1 2 3, and 4), as set forth herein, consists of the Act of Aug. 25 1916 (39 Stat. 535) and amendments thereto.

FURTHER INFORMATION ON HISTORIC PRESERVATION

Historic Resources Committee, (oldest standing committee), American Institute of Architects, 1735 New York Avenue, Washington, DC 20006

The National Trust for Historic Preservation, <u>www.nationaltrust.org</u> (provides resources for saving historic places)

The Heritage Preservation Services, National Park Service, <u>www.cr.nps.gov/hps</u> (evaluates and preserves historic properties)