

Incorporating Financial Sustainability Considerations into the Planning and Design of New Facilities in the National Park Service

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Abstract: The Park Service can better ensure the financial sustainability of parks and the preservation of mission critical assets by requiring comprehensive lifecycle cost estimates for construction and rehabilitation projects during the general management planning process. The Park Facility Management Division, working with community planners from the Denver Service Center, recently generated a comprehensive set of cost estimates in support of the Golden Gate National Recreation Area General Management Plan. Cost estimates were produced for all facility projects contemplated within the three management alternatives considered during a Choosing By Advantages workshop. The estimates were used to help identify and improve the preferred alternative. A review of this engagement yielded a number of insights. Foremost among these insights is the conclusion that comprehensive evaluations of financial sustainability for facility projects can be economically and efficiently incorporated into General Management Plans. This would help NPS reduce deferred maintenance and calibrate the size of its asset portfolio in keeping with available operating and maintenance funding.

It is intended that this paper will support the goals of Track Three, Design Imperatives, *Constrained budgets, changing funding expectations, and management realities.*

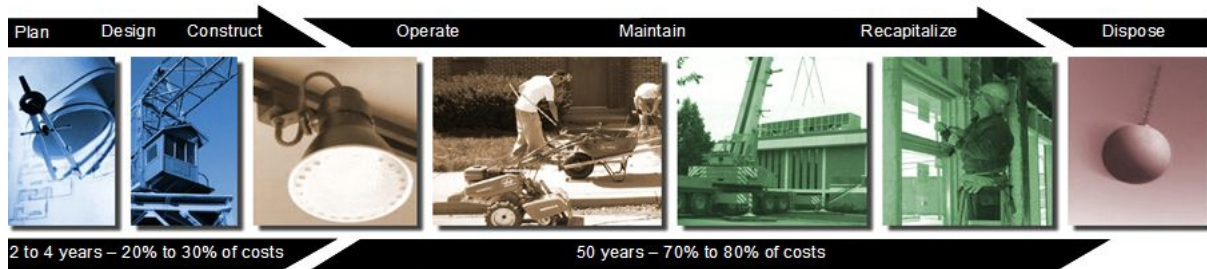
Overview

The National Park Service (NPS) has reason to be proud of its environmental sustainability guidelines for new construction in the parks. Examples include the construction of LEED (Leadership in Energy & Environmental Design) certified visitor centers in Denali, Mt. Ranier, and Lassen National Parks. But NPS has not enjoyed the same success in requiring that new construction is financially sustainable—that parks have the necessary operations and maintenance (O&M) funds for the proper upkeep of new capital assets.

The maintenance backlog in the parks is reaching crisis proportions—estimated at \$9 to \$10 billion in 2008. This problem has worsened in recent years despite a concerted effort to combat it. NPS cannot hope to limit and reduce DM without significant increases or new alternatives to its budgets for Repair & Rehabilitation and Line Item Construction, which combined provide less than \$100 million annually to address DM. Faced with this crisis, park planners should heed the maxim, “First, do no harm.” In other words, parks should guarantee that sufficient O&M funding is available for all planned assets *before construction begins*.

New assets can accumulate DM rapidly if not adequately maintained. The seven assets comprising the World War II Memorial have accumulated \$725,000 in DM since construction in 2004. It is surprising that design and construction costs constitute an average of only five to ten percent of total lifecycle costs for new buildings.¹ Perhaps because lifecycle costs are so unexpectedly high, park stakeholders, typically cooperating associations and member of congress, often advocate and provide funding for new construction without providing adequate O&M funding.

¹ National Research Council. 1998. *Stewardship of Federal Facilities: A Proactive Strategy for Managing the Nation's Public Assets*. Washington, D.C.: National Academy Press. "Design and construction expenditures, the so-called 'first costs' of a facility, typically account for 5 to 10 percent of the total life-cycle costs. However, decisions made during design and construction about how much to invest in a building's materials and systems can significantly impact its operating and "exit" or disposal costs. Operation and maintenance costs typically are 60 to 85 percent of the total life-cycle costs, with land acquisition, programming, conceptual planning, renewal or revitalization, and disposal accounting for the remaining 5 to 35 percent."



Consider the example of the planned Pearl Harbor Museum and Visitor Center at the USS Arizona National Memorial, which is expected to earn LEED Silver certification. This much-needed asset is slated for completion in 2010. Total acquisition costs are projected at \$52 million. \$7 million will be provided by NPS, with the balance paid by the Arizona Memorial Museum Association. Early in the planning process there was reported discussion of establishing an O&M endowment for the center, but it is unclear what progress has been made. The park completed a Park Asset Management Plan (PAMP) in September 2008 but the anticipated O&M costs for the center were not factored into overall park O&M requirements in the PAMP². Meanwhile the park has a \$35.2 million maintenance backlog³ but an annual base budget of only \$2.9 million. It is unclear how the park will meet the visitor center O&M requirements or what those requirements are. This is not to suggest the project shouldn't proceed. The existing visitor center is in dire need of replacement. It has \$32.1 million in DM alone. This case simply demonstrates the importance of planning for the financial sustainability of new assets during project scoping.

Cost Estimating for the Golden Gate NRA General Management Plan

In July 2008 NPS undertook the generation of comprehensive cost estimates in support of an update to the General Management Plan (GMP) of Golden Gate National Recreation Area (GOGA). The GMP outlined potential park initiatives grouped under three main alternatives. Within each alternative hundreds of project options were evaluated, some involving the construction of new facilities, some the rehabilitation of existing assets, and others the disposal of underutilized and excess assets. In considering the requirements for effective and rigorous project selection the planning team identified a need for comprehensive, quality cost estimates to help choose the preferred alternative. This coincided with the interest of Park Facility Management Division leaders in promoting financial sustainability principles in planning.

The estimates captured three cost components for each project: 1) the initial cost of the project, 2) annual O&M costs, and 3) the amount of DM eliminated, if any, by implementing the project. The initial cost of the project was categorized as either new construction, rehabilitation, or disposition. New construction estimates were generated using the NPS Current Replacement Value Calculator, which computes the current replacement value of a various asset types based on industry standards. Working from assumptions provided by the park planning team, individual cost estimates were created for each proposed asset. Estimates for rehabilitation projects were derived using the aggregate cost of deficiency work orders listed in the Facility Maintenance Software System (FMSS). It was assumed that all rehabilitation projects addressed 100 percent of an asset's required repair work. To create disposition estimates the Demolition Cost Model was employed. This tool uses industry standard data to compute the cost of demolishing an asset and hauling the debris, including the cost of hazardous material abatement and removal.

O&M cost estimates identify the annual requirements for routine operational activities and preventive and recurring maintenance activities. These costs were generated using specialized

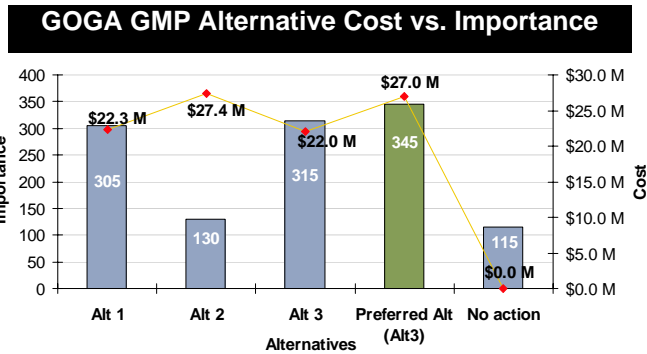
² Park Asset Management Plans are not yet structured to enable parks to factor long-term lifecycle costs of existing and planned assets within the constraints of anticipated O&M funding.

³ Total park DM is \$35.2 million, but \$32.1 million of that amount is attributable to the existing visitor center, which will be eliminated through demolition and new construction. The remaining \$3.14 million in DM is shared among eight other park assets.

NPS O&M requirement models that rely on industry standard data sources. These models can also be used to assist in workforce planning for an organization’s maintenance staff. For the GOGA GMP the O&M models were used to calculate the annual requirements for all proposed construction and rehabilitation projects involving assets other than buildings.

The Total Cost of Facility Ownership (TCFO) Calculator was utilized to calculate O&M requirements for buildings. The calculator is a spreadsheet tool that identifies lifecycle costs other than planning, design, and disposition. Lifecycle costs generated by the calculator encompass both O&M requirements and equipment component replacement costs. DM savings were calculated for all assets targeted in rehabilitation and disposal projects, relying on DM work orders found in FMSS.⁴

The GMP cost estimates provided the park with both initial costs and annual costs per project. Summing all project cost estimates for a given alternative yielded the total cost of the alternative. The total cost of the alternative was used in comparing the advantage of the alternative against the estimated cost of implementation.



Once the preferred alternative was identified the planning team opted to strengthen it by incorporating favorable aspects of the other alternatives. For example, the planning team selected alternative 3 as the preferred alternative, and then incorporated selected projects from alternatives 1 and 2, including a year-round shuttle service to Muir Woods. The cost of the shuttle project was added to the total cost of the preferred alternative.

There were limitations in the use of the cost data that could be addressed in subsequent applications. The comparison of alternative cost against alternative importance only included initial project costs. During the Choosing By Advantage (CBA) workshop certain project assumptions were modified, resulting in a change of project scope and unaccounted costs. Most importantly, the O&M estimates were not incorporated into the PAMP. A new methodology and tools are needed to enable parks to determine the impact of new construction lifecycle requirements on future O&M budgets.⁵

Nonetheless, the engagement demonstrated that comprehensive cost estimating can be done quickly and economically during GMP updates. Roughly 269 separate projects were evaluated for the GOGA GMP at a cost of approximately \$20,000. A review of the exercise identified substantial efficiencies that could be realized for subsequent engagements. It seems reasonable that GMP cost estimating could be provided at a cost of approximately \$10,000 to \$15,000 per park, or roughly \$770,000 to \$1.15 million total for the 77 GMPs currently being updated. Considering the \$725,000 maintenance backlog accumulated at the World War II Memorial in four years, the cost to ensure that parks do not undertake facility projects that cannot be maintained seems modest, and might be cost neutral or negative.

A new emphasis on environmental and financial sustainability would significantly change the NPS planning process, including ways that might initially frustrate planners. As parks seek to incorporate environmental and financial sustainability considerations into GMPs, planning prescriptions, and the analyses used to generate them, will necessarily become more detailed

⁴ The reliability of this approach is dependent on the comprehensive documentation of DM in park work orders.

⁵ This could be enabled by an enhancement to the TCFO calculator in conjunction with modifications to the PAMP.

and specific. Visions for park development will be constrained by the acknowledgement of the financial and environmental costs of traditional development.

And yet therein lies an opportunity for innovation. With creativity, park managers can imagine new types of development that are not only financially sustainable but help improve the natural and human environment. In the near future parks will build visitor centers with green roofs, living walls, rain water collection systems, and reverse-metering capacity. Parking lots will be paved with pervious materials that significantly reduce storm water runoff. And aging waste water treatment systems will be replaced with living machines that rely on fish, snails, and microbes to produce clean water that can be recycled into park ecosystems. Park planners have the opportunity to embrace a new paradigm, one in which they can be the leaders in helping imagine and design a sustainable revolution in the parks that provides powerful examples to the visiting public. A tremendous opportunity awaits to begin working with informed partners of NPS to replace the crumbling infrastructure of the Mission 66 era, and the vast amounts of associated DM, with a generation of new facilities that improve the environment, save sizeable sums in lifecycle costs, and even generate income. With sound and careful cost estimating during the planning process, environmental and financial sustainability can be the hallmark of new construction in NPS.

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