Book Reviews

How Great Projects Inspire Mankind

by Marsha Freeman

Building Big
by David Macaulay
Boston: Houghton Mifflin, 2000
192 pages, hardbound, $30

For five consecutive weeks in October, the Public Broadcasting System aired a series produced by WGBH in Boston and hosted by accomplished technology writer David Macaulay. This book is a companion to the television series, "Building Big."

There could be no better time to relate the history of mankind's greatest accomplishments in reforming the natural environment around him, in order to enable the technological and economic progress that is the organizing principle for human civilization.

While epidemics of old and new diseases ravage the continent of Africa, as an expression of the decline in the basic standard of living of a significant percentage of the world's population, it is precisely the intervention of scientists and engineers, under the guidance of an economic policy based on carrying out the construction of great projects, that can reverse this decline into a New Dark Age. As in past periods of history, once that economic perspective becomes policy, it will be up to the visionaries who can imagine what nature transformed can accomplish, to make the breakthroughs to make it possible.

Art, Science, and Inspiration

Both the book and television series "Building Big" focus on the challenges that had to be overcome, and the perseverance required, to construct the bridges, tunnels, dams, skyscrapers, and domes that not only bring us our modern technological world, but inspire us to conquer the new challenges of great projects that lie ahead. As author David Macaulay states, it is not necessarily the size of a project that defines "building big." Rather, "what separates building big from building ordinary is that you are, in a way, doing something that's never been done before."

In introducing the television series, Macaulay states, in the first segment on bridges, that throughout the span of human history, "with cultures the world over contributing to the art and science of monumental engineering, humankind has mastered the contours of the Earth itself." These structures that we depend upon, he states, are "landmarks of human ingenuity [that] have evolved dramatically since the dawn of time, to advance the needs of civilization." Most great projects serve practical functions, but they are also beautiful, and are a constant reminder of the creative capabilities of man.

Throughout the series, the history of the successful and failed attempts to build big is told. We are provided with a 2,000-year visual tour through the technological breakthroughs required, as materials available to the builder, the understanding of principles of nature, and the needs of society, all changed. Macaulay provides us with the names, dates, and pictures from around the world where men made the attempt to tame the forces of nature, providing a look at the personal qualities and characters of these engineers.

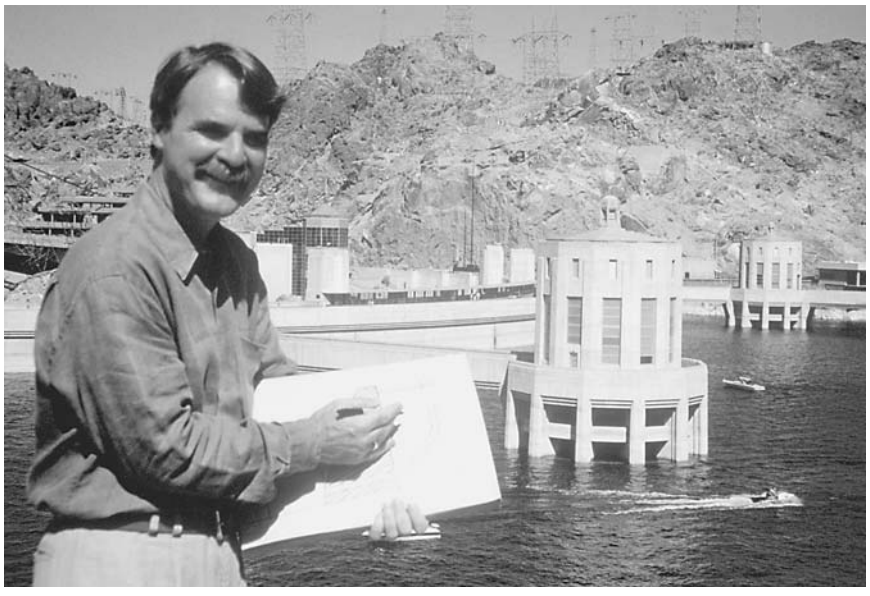
The television series presents spectacular vistas, with Macaulay on site, sketch pad in hand, explaining the basic physical principles that underlie the successful projects to span water, tame rivers, build upward toward the sky, place a dome atop an edifice, and create tunnels through mountains, underwater, or underground. The accompanying book allows the reader to more closely study the principles of these modern marvels.

At times, the successful completion of a big project, Macaulay reports, was as much a political as an engineering challenge. The beautiful dome atop the Capitol building in Washington, D.C., is such an example.

George Washington believed that a dome gracing the legislative house of the new Republic, based on the architectural masterpieces of Europe, would lend seriousness and grandeur to the new nation. As the country grew, and the government added new wings to the Capitol to accommodate a larger House and Senate, it was clear that a new dome was needed, to replace a small structure built in 1824.

In 1856, as Macaulay states, "under the watchful eyes of [designer Thomas] Walter and Captain Montgomery C. Meigs of the Army Corps of Engineers," construction began. But, by 1861, with the Civil War under way, all contracts for building the dome were suspended, and no new materials, now needed for the war, were delivered. "For the next year," Macaulay reports, "the few workers who remained assembled only those pieces of cast iron already on hand."

In 1862, President Abraham Lincoln decided, however, that the dome should be completed, as "a display of determination and of faith in the survival of a united land." In early December 1863, with the outcome of the war still undecided, the 19.5 foot bronze Statue of Freedom was placed on the top of the dome's lantern. With the exterior of the dome completed, work could begin on the interior, for which Italian artist Constantino Brumidi came to Washington. With Brumi-



"Building Big" series host David Macaulay sketches on location at the Hoover Dam.

di's magnificent artwork still to be completed, in April 1865, in fitting tribute to his commitment to keep the nation whole, and complete a symbolic representation of that fact, President Lincoln was laid in state in the Capitol rotunda, beneath the beautiful dome.

A Timeless Treasure

Unlike the U.S. Capitol dome, which was completed as a result of the political will of a dedicated President and his staff, some great projects have been held back for purely political considerations.

In 1954, German-American science writer Willy Ley, whose many contributions to engineering began as a founding member of the German Society for Space Travel in 1927, wrote a book, *Engineers' Dreams: Great Projects That Could Come True*. In the Foreword, Ley states that while engineers' dreams are things "that can be done," they are sometimes held back "because of political difficulties." The first chapter describes what he calls the "forbidden tunnel," in reference to the tunnel to span the English Channel, which was first proposed in 1802. While the engineering difficulties in building the Panama and Suez Canals could be overcome, Ley muses, the political difficulties in connecting Britain to France, apparently, could not.

In his description of the construction of the Channel Tunnel during 1987-94, Macaulay engages us in this historical battle, with humor. "After centuries of distrust punctuated by prolonged military confrontations," he writes, "the French and British were finally united by a mutual dislike of seasickness." He explains the innovative design of the "Chunnel," including its novel safety and maintenance features.

Humor is used throughout the book, *Building Big*. For example, Macaulay writes: "If bridges are the most forthcoming examples of engineering in this book, tunnels are their painfully shy cousins. They live to serve, and to serve, they must hide. Very few things about the way tunnels look as we pass through them are even likely to catch our attention. So while bridges, skyscrapers, domes, and even a few dams enjoy varying amounts of popularity, I think it's safe to say that only an engineer could love a tunnel."

It is safe to say that after watching this series, and reading Macaulay's book, few of us would be able to look at these great engineering works the same way again.

Building Big is a successful effort to educate and inspire because of the people behind it. Macaulay has also expressed his own talent and love of the creations of engineers and artists in several books he has previously written. They include topics such as building cathedrals, castles, pyramids, and cities, with titles such as *The Way Things Work* and *Great Moments in Architecture*. His enthusiasm and dedicated interest in "Building Big" fully engages the television audience in his travels through history and geography.

Larry Klein, producer and director of the television series, is as excited about the material as is Macaulay, which is evident in the effort that went into its production, and his remarks at a Capitol Hill reception just before the shows aired. WGBH sees it as one part of a continuing educational process. Part of that process is the present book; another is an Internet website, www.pbs.org/wgbh/buildingbig, which encourages young people in particular to discover great projects close to their homes, and to carry out their own experiments to discover the principles discussed in the series.

The sponsorship and contribution to the series by the American Society of Civil Engineers, added to the outreach program, to involve the Society's 123,000 members to help celebrate their organization's upcoming 150th anniversary by bringing "Building Big" to libraries, civic groups, and schools across the country.

While the book to accompany the television series is a fascinating step-by-step explanation of some of the most fascinating bridges, tunnels, domes, skyscrapers, and dams in the history of the world, it pales in comparison with the films. To make the series a timeless resource for education, WGBH is making it available in a set of videotapes, which is well worth owning. The set of five tapes is available for $69.95, or each individual tape—bridges, tunnels, domes, skyscrapers, or dams—is available for $19.95. They can be ordered at 1-800-949-8670.