

Book Review
BIG DAMS OF THE NEW DEAL ERA
A Confluence of Engineering and Politics
HIST 380

Peter CHINETTI

December 5, 2014

Instructor: Professor Czaplicki

Mega projects always excite the imagination. The whole world learns about the pyramids, or the Great Wall, or the Moon missions. The Hoover Dam occupies the same esteem as those famous projects. *BIG DAMS* scratches the itch many people have about the history of the Dam: it tells the complex story of how the marvel of American Engineering came to be.

The book first covers the beginnings of the U.S. Reclamation Service. The service was started to assist the settlement of the west. Sections of the west are arid and inhospitable without irrigation, so it was essential to build systems to channel water to farms. Unfortunately, the costs in building a privately funded dam are too high for settlers to reasonably afford, so the government began funding the construction, originally with the expectation that the farmers using the water would eventually pay for the construction with the proceeds from their farms.

The book then transitions into a fascinating discussion of the history of dam design. There have been two major design styles for large dams: the massive style and the structural style.

The massive style is designed to resist water pressure by simply weighing so much the water held behind it cannot move it. It is extremely expensive to build, as it requires massive amounts of masonry or concrete to be placed at the dam site. It was the first dam design suitable for large dams, as it could be designed without advanced mathematics or understanding of mechanics of materials.

The massive style was first codified by the French engineer J. Augustine De Sazilly, then improved upon by another Frenchman, F. Emile Delocre. The dam design required no calculus, simply the addition of vectors (an algebraic operation). In fact, a civil engineer of the era actually published an article making fun of more advanced models for dams.

As you might guess, the massive style dam can be improved. It's entire attractiveness to the engineers of the time was how straightforward and solid it seemed. It seems immediately obvious that more stone = better dam, and because a dam must never fail or risk killing hundreds of people, the engineers did not want to trust a less intuitive design. Perversely however, the massive style of dam has a significant flaw: water can seep under the foundation and 'float' the dam downstream. This problem caused the major dam failure at the St. Francis Dam.

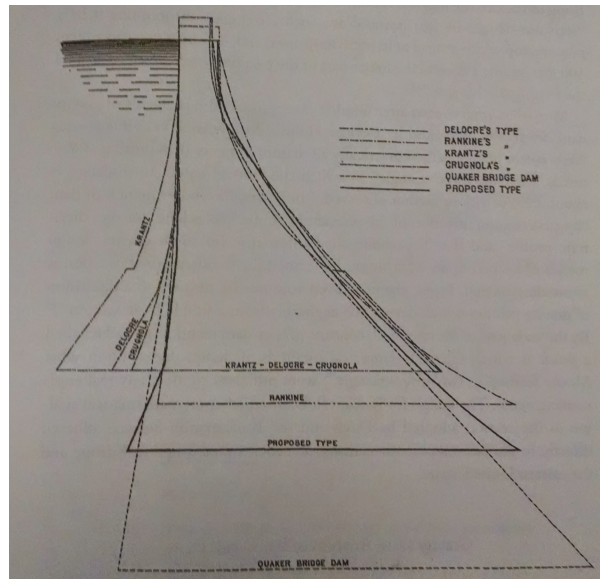


Figure 1: A cross section of a massive style dam

The competing dam style is the 'structural' type. This style uses the geometry of the dam, specifically an arch pointing at the reservoir to brace against the surrounding canyon walls and hold back the water with a much thinner cross section and less material used.

Design of a structural dam requires calculus, and it seems like it is less stable design because of its thinner walls. Unsurprisingly, when private companies

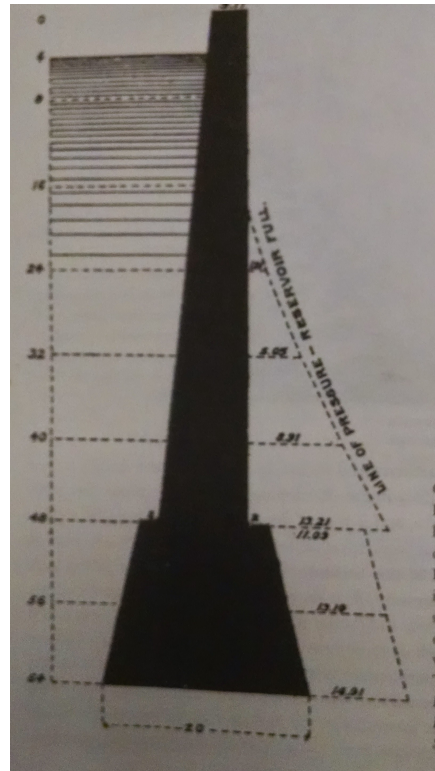


Figure 2: A cross section of a structural style dam

made dams, they used the more economical arched structural method. A few of the later dams made by the U.S. Reclamation Service were in the structural style, but the Hoover was built as a massive dam.

The remaining chapters of the book detail individual dam projects. The Hoover is the first talked about, then the two dams of the Columbia River Control Plan, the Bonneville and Grand Coulee. After those two, the book transitions to discussing a different type of dam in a different area, the earthen dams on the Missouri before finally talking about the California Central Valley Project.

In the writer's opinion, the most fascinating and unique section of this book is the discussion of the different dam styles debated and used by the U.S. Reclamation Service during the New Deal Era. Living up to the title, the history of 1930's dam design is truly "a confluence of Engineering and Politics."