

Historic Civil Engineering Landmark Nomination

This form may be printed. Please submit one copy for each committee member of all materials relating to the nomination. If more space is required to provide full response, please include additional documentation.

To: History & Heritage Committee
ATTN: Carol Reese
1801 Alexander Bell Drive
Reston, VA 20191-4400

Date: 5/3/05 ASCE Section: San Diego

Circle one: This is to nominate the following for designation as a Historic Landmark:
International Sweetwater Dam
National Located at: Spring Valley County: San Diego State: California
Local/State The latitude to the nearest minute (or U.T.M. coordinates). Attach detailed local and vicinity maps that show access from a major city or the Interstate. N 32° 41' 29.771". Vicinity Map attached.
The proposed landmark's owner: Sweetwater Authority

In support of this nomination the following information must be provided:

1. Date of construction (and other significant dates).
November 1886 through March 1888
2. Names of key civil engineer and other professionals associated with project.
James D. Schuyler
3. Historic (international, national, or local) significance of this landmark.
See attached.
4. Comparable or similar projects, both in the United States and other countries.
See attached.
5. Unique features or characteristics which set this proposed landmark apart from other civil engineering projects, including those in #4 above.
See attached.
6. Contribution which this structure or project made toward the development of: (1) the civil engineering profession; (2) the nation or a large region thereof (part 2 is necessary for an NHCEL).
See attached.
7. A list of published references concerning this nomination.
See attached.
8. A list of additional documentation in support of this nomination. (Please list all enclosed documents, publications, photographs, and supporting historical evidence. One 35mm color slide and one 5" X 7" black & white glossy photo are required for publicity and presentation purposes.)
See attached.
9. The recommended citation for CHHACE consideration.
National Historic Civil Engineering Landmark
10. A statement of the owner's support of the nomination.
See attached.

If this nomination is approved for designation as a National Historic Civil Engineering Landmark by the Board of Direction of ASCE, we understand that the Section will have the major responsibility for the public presentation ceremony of the plaque and for plaque maintenance.

Chairman, Section History & Heritage Committee David Carter

Section Secretary Richard J. Hoffmiller

Section President [Signature]

Note: For State Historic Civil Engineering Landmark designation, the other Section presidents from the state should sign the nomination form or concur with the nomination in writing.

Note: Designation by ASCE as a National Historic Civil Engineering Landmark carries no commitment on the part of ASCE, the owner or the government jurisdiction in which it is located.



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April 26, 2005

Ms. Carol Reese
American Society of Civil Engineers
History & Heritage Committee
1801 Alexander Bell Drive
Reston, VA 20191-4400

**SUBJECT: NOMINATION OF THE SWEETWATER DAM FOR HISTORIC
CIVIL ENGINEERING LANDMARK**


Dear Ms. Reese:

It is with great pleasure that the San Diego Section of ASCE offers this nomination of the Sweetwater Dam for recognition as a Historical Civil Engineering Landmark. The Sweetwater Dam is owned by the Sweetwater Authority who fully supports this nomination.

Construction of the Sweetwater Dam was a major engineering accomplishment when it was completed in 1888 and was historically significant to the development of this region of Southern California. The dam was constructed to provide water supply for population growth, business, and agricultural use in the City of National City and unincorporated areas of San Diego County.

At the time of construction, the Sweetwater Dam was the tallest masonry arch dam in the United States. This structure has been in continuous use since its original construction and has undergone several major modifications. Currently, this 117-year-old dam is a critical component of the San Diego area's water supply system and provides for a one-year supply of water for a population of over 177,000. The San Diego Section of ASCE looks forward to your evaluation and commits to coordinating the presentation activities should the structure be designated as a Historic Civil Engineering Landmark.

Sincerely,


Mark Creveling, PE
President, San Diego Section

Historic Civil Engineering Landmark Nomination ATTACHMENT

3. Historic (international, national, or local) significance of this landmark.
On Thursday, April 19, 1888, the City of National City (incorporated in 1887) celebrated the completion of the Sweetwater Dam and delivery of water to its city from the Sweetwater Reservoir. At that time, Sweetwater Dam was the tallest masonry arch dam in the United States. Locally, the City of National City now had a source of water supply for both irrigation and domestic use so the city could expand its business and population. This was also true for the surrounding areas now known as the City of Chula Vista, and the unincorporated area of Bonita. Internationally, the water system put this area on the map as a place to visit, develop, and build its prosperity.

4. Comparable or similar projects, both in the United States and other countries.
The only known dam in the United States prior to 1886, and similar to the Sweetwater Dam, was Bear Valley Dam located in San Bernardino, California. Other dams built after were Hemet, La Grange, and San Mateo, all in California. Internationally, similar arched masonry dams prior to this were Meer Allum (India), Jones Falls (Canada), Zola (France), and Parramatta (Australia).

5. Unique features or characteristics which set this proposed landmark apart from other civil engineering projects, including those in #4 above.
Sweetwater Dam: The original construction began in November 1886 under the direction of F.E. Brown (engineer for the Bear Valley Dam) with the intent of being 50 feet in height and arched upstream. The crest was 360 feet in length with the dam being 46 feet thick at the base and 12 feet at the top, with a constant radius of 213 feet. After two months into construction, the owner of the water system, San Diego Land and Town Company, was not satisfied with the design so they called upon James D. Schuyler to continue with the project. Mr. Schuyler had determined that the original height was arbitrary and without investigation as to the potential volume that was to be stored upon completion of the dam. Mr. Schuyler made use of what was constructed in the previous two months, but made some changes that he considered radical. He had shifted and shortened the point of radius for the dam and increased the length of the dam on the crest. He then rejected the original idea of concrete composed of cement mortar, with small stones rammed into it. Instead he created a masonry, arch-gravity structure fitted together by stonemasons using nearby metavolcanic rock and rich cement mortar. The rock, or masonry units, cut from the nearby quarry was as large as four tons (the density of the rock was nearly 190 pounds per cubic foot). In June 1887, the dam was completed at a height of 60 feet with an expected volume of 5,747 acre-feet. Considerable land surveys were being performed to determine the volume if the height was made greater. After receiving approval from the water system owners, the construction continued and finally completed in March 1888. The volume of water expected to be stored was now 18,636 acre-feet. Mr. Schuyler noted that the height change from 60 feet to 90 feet now relied on the arch design for a "factor of safety." There was a history of dam failures he was familiar with, but felt confident with the

foundation and construction methods. Refer to the ASCE Transactions, Vol. XIX, November 1888, by James D. Schuyler, noted in Item 7 below.

There were subsequent major modifications to the dam since its original completion in 1888. Exhibit 1 reflects a cross section of the original dam, inlet tower, and transmission pipeline; and Exhibit 2 reflects a historical development of this dam. Since its completion, it has experienced unprecedented flood flows that twice overtopped the center crest. One flood event measured the runoff nine times the spillway capacity with depth of flow nearly four feet over the center crest. Damage did occur to the side spillways, but the main dam was not damaged. It is a testament to the engineer and builders of the design and construction materials and techniques.

Water Conveyance: To convey the stored water, approximately 57 miles of pipelines were installed ranging from 4-inch to 36-inch in diameter. Of the 57 miles of new pipelines, over 10 miles was 18-inch and larger. Pipeline materials were mainly wrought iron with some spiral steel, and the manufacturers as far away as New York. It is interesting to note that planning for water use by individual users was formally considered, including the installation of metering systems to customer's properties to maintain conservation.

Today, the Sweetwater Dam stands at 127 feet in height with a crest length of 700 feet that provides over 27,000 acre-feet of storage for local and imported (via San Diego County Water Authority) water. This is sufficient storage for a one-year supply of water for the entire service area of nearly 177,000 in population.

6. Contribution which this structure or project made toward the development of: (1) the civil engineering profession; (2) the nation or a large region thereof (part 2 is necessary for an NHCEL).

The planning, design, and construction of the dam and water system was under the guidance and direction of a Registered Civil Engineer. The design and construction of such an impressive dam and water system reflected well on the education and experience of the engineering team responsible for the development of several communities covering almost 40 square miles in the South Bay portion of San Diego County.

7. A list of published references concerning this nomination.
Reference material enclosed with this application is as follows:

- A. ASCE Transactions, Vol. XIX, November 1888, by James D. Schuyler
- B. Section 3, "Concrete Arch Dams," 1988, Jan A. Veltrop, International Congress of Large Dams Commemorative Book (excerpt)
- C. "100 years of Sweetwater, 1888-1988," 1988, Sweetwater Authority

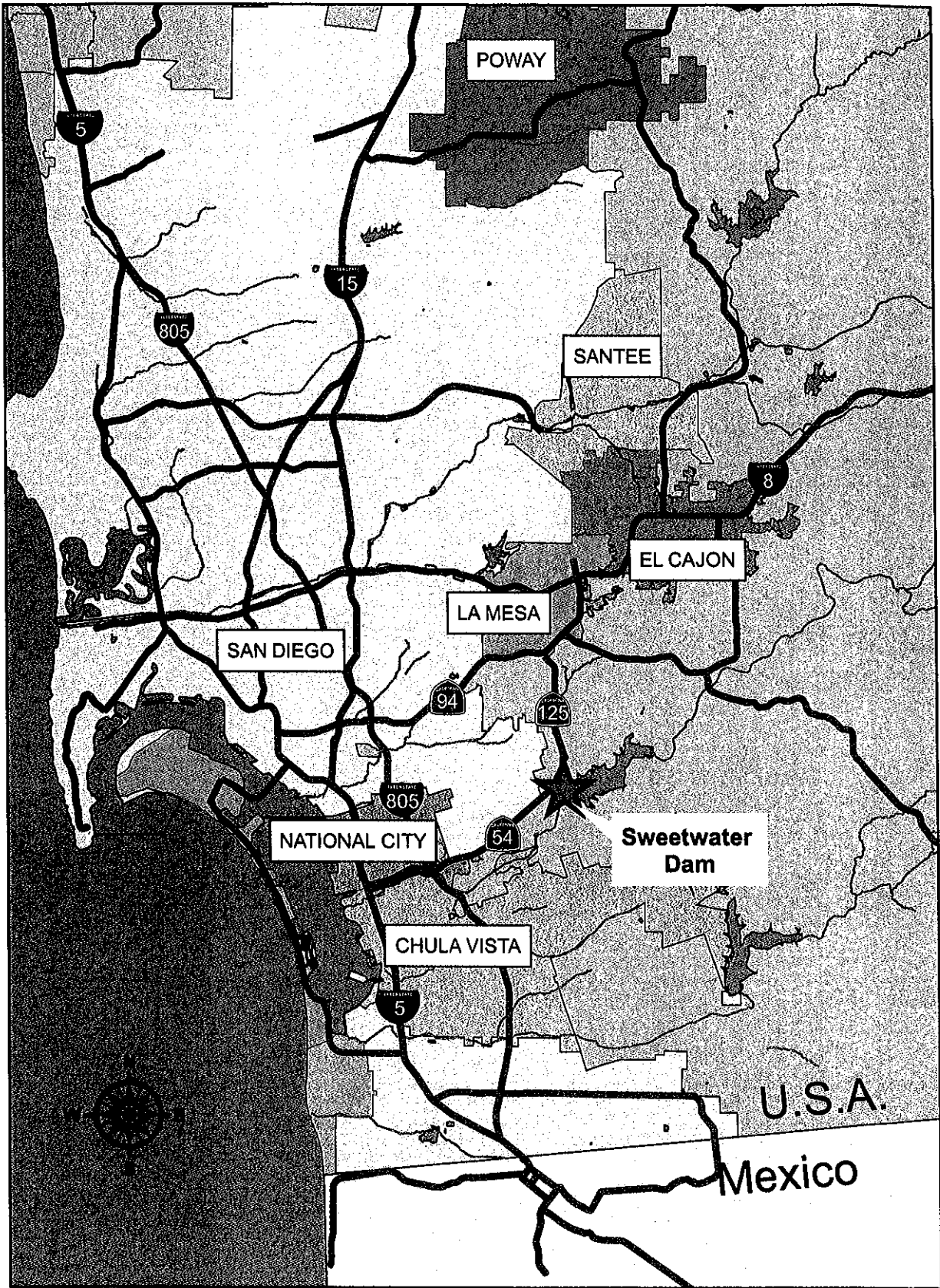
8. A list of additional documentation in support of this nomination. (Please list all enclosed documents, publications, photographs, and supporting historical evidence. One 35mm color slide and one 5" x 7" black & white glossy photo are required for publicity and presentation purposes.)

Photographs are attached that include both historical and current.

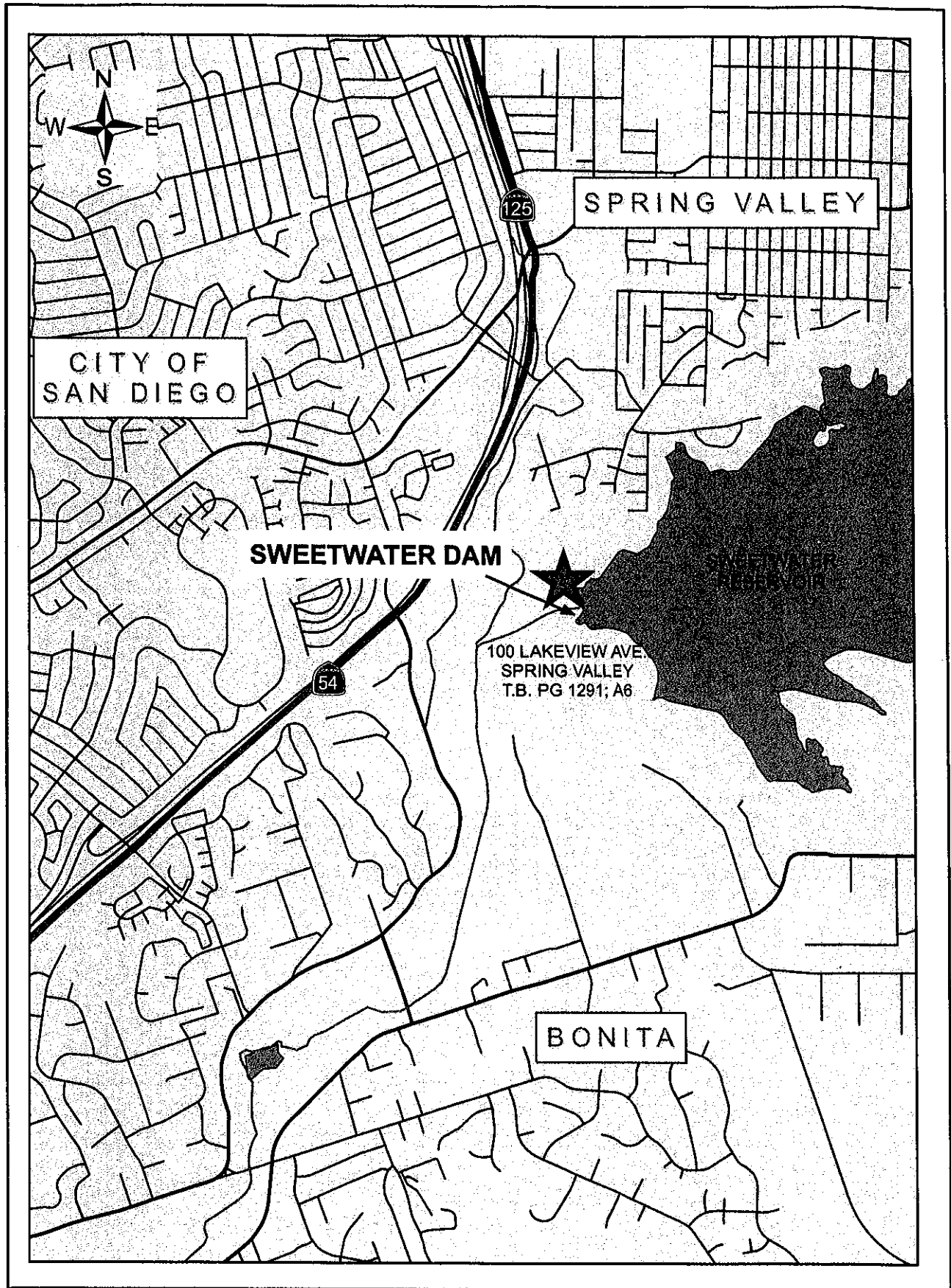
10. A statement of the owner's support of the nomination.

The Governing Board of the Sweetwater Authority approved the submittal of an application at its meeting on January 26, 2005. A copy of the minutes is shown on Exhibit 3. Exhibit 4 reflects the current statement of ownership of Sweetwater Authority.

San Diego area



VICINITY MAP



LOCATION MAP