

**Late Comment Letters for North River Farms
Revised Final Environmental Impact Report
Volume II, Responses to Comments**

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L1 LATE LETTERS OF OPPOSITION

The City notes these multiple comments in opposition of the project. These comments express general concerns regarding General Plan consistency, greenhouse gas emissions, smart growth, growth inducement, population and housing, pollution, agricultural resources, infrastructure, traffic, fire safety, and flooding, which received extensive analysis in the Final EIR and the Recirculated Final EIR. Specifically, refer to Appendices T0 and W0 of the Revised FEIR. These comments do not raise any specific issue regarding that analysis, and no more specific response can therefore be provided or is required. The City will include the comment as part of the Revised FEIR for review and consideration by the decision-makers prior to a final decision on the project.

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L2 LATE LETTERS OF SUPPORT

The City notes these multiple comments in support of the project. These comments do not raise any specific issue regarding the project's environmental analysis; no further response is therefore required. The City will include the comment as part of the Revised FEIR for review and consideration by the decision-makers prior to a final decision on the project.

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L3 PHIL JOHNSTON

This comment letter contends that the Revised FEIR does not adequately address public safety impacts from flooding due to a dam failure as it relates to Henshaw Dam. The comment states that the North River Farms Revised FEIR is dismissive of concerns raised about the risk of dam failure, is unsupported by useful references, and contains statements about dam safety which are false.

The comments are mistaken, and the previously provided responses to comments address these comments. Though CEQA does not require written responses to late comments submitted after the noticed public comment period (Pub. Resources Code, §§21091(d) and 21092.5(c); CEQA Guidelines, §15088), this letter is provided to correct the record.

The Revised FEIR Analyzes Potential Impacts from Flooding from Dam Failure and Concludes Such Effects would be Less than Significant

The EIR was modified to address public comments that the southern portion of the project site may be located within the dam inundation zone of Henshaw Dam. The Revised FEIR, Section 4.10.4 at pages 4.10-17 through 4.10-18 explains that it appears that the southern-most portion of the proposed project site, which would be retained in agricultural use, may be located within the Henshaw dam inundation area. The Revised FEIR ultimately concludes, however, that the project would not “expose people or structures to a significant risk of loss, injury or death involving flooding as a result of the failure of a levee or dam,” and, therefore, would not result in a significant impact under CEQA. This conclusion is based on a number of facts:

First, since being built in 1923, the capacity of Henshaw Dam has been severely reduced—from 203,581 acre-feet to a *limit* of 50,000 acre-feet.¹

Second, while the average water level of Lake Henshaw is generally retained at a much lower level than its maximum capacity, the water level averages about 11,600 acre-feet over 12 months.² (City of Oceanside General Plan, Public Safety Element, p. 29.)

Third, Henshaw Dam received a condition assessment of “Satisfactory,” the highest condition rating achievable, from the Division of Safety of Dams (DSOD).³ This “Satisfactory” rating means:

¹ Refer to City of Oceanside General Plan, Public Safety Element (2002), p. 29. Available at <<https://www.ci.oceanside.ca.us/civicax/filebank/blobdload.aspx?BlobID=24949>>.

² *Id.*

³ “Dams within Jurisdiction of the State of California, Dam Rating Information, DSOD, September 2018, p. 40. Available at < <https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/All-Programs/Division-of-Safety-of-Dams/Files/Publications/Dams-Within-Jurisdiction-of-the-State-of-California-2018-Alphabetically-by-Dam-Name.pdf>>.

No existing or potential dam safety deficiencies are recognized. Acceptable performance is expected under all loading conditions (static, hydrologic, seismic) in accordance with the applicable regulatory criteria or tolerable risk guidelines.”⁴

Dam failure, and adverse impacts therefrom, are therefore unlikely as Henshaw Dam is generally in good condition with no existing or potential dam safety issues recognized.

Fourth, as explained in the City’s General Plan, “Henshaw dam is an earthfill dam that is not subject to the sudden catastrophic failure usually associated with concrete arch-type dams. Even if failure did occur, it would be of a slower, erosive type, resulting in less severe peak flows, allowing ample time for evacuation of downstream residents.”⁵

Fifth, the project site is located 29 miles west of the Dam, assuring ample time for evacuation of downstream residents—particularly when combined with a likely slower, erosive type failure were any dam failure to occur at this dam in good condition.

Sixth, the area of the project site identified as within the dam inundation area (assuming a “worst case scenario”) condition includes southern-most portion of the project site, which would be retained in agricultural uses and not contain structures.⁶ Note also that the Flow Retardation Structure, discussed below, was not yet in place and/or ignored in modeling the inundation area.

Seventh, the project would implement grading and flood control improvements to remove all housing and structures from outside the 100-year flood hazard zone, which would likewise serve to remove most if not all such housing and structures from the dam inundation zone. As the General Plan notes, accommodation of a “100-year flood” within the channel would be “more than adequate size to handle any anticipated flooding caused by the failure of Henshaw Dam.”⁷

The EIR therefore concluded that the project’s potential to expose people or structures to a significant risk of loss, injury, or death due to flooding caused by dam inundation is not considered significant.

Additional Analysis Provided May 15, 2019 Further Demonstrates the Project would Not Result in Significant Impacts related to Dam Inundation.

On May 15, 2019, and following up on his testimony before the Planning Commission, Mr. Tory R. Walker, PE, CFM, LEED GA further responded to comments concerning potential significant impacts related to dam inundation.⁸ Mr. Walker is a registered Professional Engineer, a Certified

⁴ “Dam Rating Information,” DSOD, August 2017, p. 2. Available at <<https://water.ca.gov/LegacyFiles/damsafety/docs/Facts%20Sheet.pdf>>.

⁵ City of Oceanside General Plan, Public Safety Element, p. 29.

⁶ City of Oceanside General Plan, Public Safety Element, p. 29, 31.

⁷ City of Oceanside General Plan, Public Safety Element, p. 31.

⁸ Letter from Tory R. Walker Engineering to City of Oceanside Re: Henshaw Dam Breach Analyses, dated May 15, 2019.

Floodplain Manager, and a widely recognized stormwater quality expert, with 35 years' experience in water resources planning and engineering. Further, Mr. Walker is experienced in dam breach analysis, having prepared seven dam breach analyses under the jurisdiction of the California Department of Water Resources, DSOD, and written a paper on how to estimate dam breach parameters, "the most critical component of these studies."⁹

The May 15, 2019 letter evaluated two Henshaw Dam inundation studies, dated 1991 and 2018, which had been cited by Mr. Johnson for the proposition that the project would result in significant impacts from exposing people or structures to a significant risk of loss, injury, or death due to flooding caused by dam inundation. Mr. Walker concluded, based on his expert review of these studies, that these studies provided no evidence of significant impacts; and the studies were adopted for modeling purposes only with extremely conservative, unreasonable assumptions.

The 1991 study identified the southern portion of the project site within a dam inundation area with an inundation zone for Henshaw. However, on review of the study and assumptions made in the modeling, Mr. Walker concluded that the "1991 study is very conservative and that the 2018 study is impossible."¹⁰ The 1991 study was done using conservative federal regulations, which ignored the presence of the Flow Retardation Structure constructed on the downstream face of the dam in 1981.¹¹ The Flow Retardation Structure was added to the dam to address seismic risk and prevent catastrophic flooding downstream:

The primary function of the flow retardation structure is: (1) to retain reservoir water in the event of failure of the Henshaw Dam by an earthquake, (2) to prevent catastrophic discharge of water downstream, (3) to provide added stability to the downstream slope of the old dam, and (4) to ensure resistance to, and control of piping in the old dam in the event of fault displacement. In the middle of the flow retardation structure there is a 3 m (10 feet) deep and 15m (50 feet) wide channel armored with reinforced rockfill. In the event of a failure of the old embankment during an earthquake when the reservoir is full (62,000,000 m³ or 50,000 acre feet), this channel will safely release the water from the reservoir and prevent catastrophic flooding downstream.¹²

The flow retardation structure also adds resistance to earthquake forces and fault movement.¹³

⁹ *Id.*

¹⁰ *Id.*

¹¹ *Id.*

¹² Tarnay, Dennis S., "Reinforced Flow Retardation Structure at Henshaw Dam" (1984). International Conference on Case Histories in Geotechnical Engineering. 30. Available at <<http://scholarsmine.mst.edu/cgi/viewcontent.cgi?article=3400&context=icchge>>.

¹³ Babbitt, M. ASCE, Donald H., "Improving Seismic Safety of Dams in California." Available at <<https://water.ca.gov/LegacyFiles/damsafety/docs/dhb-paper.pdf>>.

Mr. Walker accordingly quoted the 1991 study report's caution that the methodology used was extremely conservative and the results *do not* reflect anticipated, probabilistic breach parameters (i.e., the study *does not* reflect reasonably foreseeable breach conditions):

The study is founded on an assumed dam failure which has been postulated in compliance with Federal Regulations. *Since there is no rational basis for postulating that such a failure of the dam would occur, the results presented in this report must be considered virtually incredible and do not reflect in any way on the integrity of the dam, spillway, or retardation structure.*¹⁴

The assumptions of the 2018 study likewise presume a “worst case scenario,” but one even farther afield and “not within the realm of possibility.” Again, the Reinforced Flow Retardation Structure was ignored and presumed to provide no flood attenuation.¹⁵ Failure was simulated with water surface at maximum storage elevation. The breach was assumed to the full height of the dam with a large breach size with the fastest possible scenario — essentially assuming the entire dam would “virtually evaporate within six minutes when the dam was at full capacity.”¹⁶

“[T]he inundation mapping at the project site for this impossible event roughly corresponds to a 500-year storm event.”¹⁷ Further, flows under these impossible assumptions would take *over 4 hours* to reach the project site, assuring ample time for evacuation.¹⁸ The dam also has 13 foundation piezometers and 10 survey monuments, which are regularly monitored for any slight changes, and is regularly inspected to allow Vista Irrigation District to lower the water level in the highly unlikely event this good condition dam is deemed potentially vulnerable.¹⁹

In sum, breach of this earthen dam, which is *in good condition*, is unlikely to occur, and if it were to occur it would likely: (1) be at a level below maximum capacity; (2) occur by a slower, erosive type failure; and (3) have the benefit of the flow retardation structure. The site would also have the benefit of implementing grading and flood control improvements to remove all housing and structures from outside the 100-year flood hazard zone, which would likewise serve to remove most if not all such housing and structures from the dam inundation zone. Thus, Mr. Walker concluded the 1991 and 2018 studies did not affect the EIR's determination that the risk of

¹⁴ Letter from Tory R. Walker Engineering to City of Oceanside Re: Henshaw Dam Breach Analyses, dated May 15, 2019, *citing*, Henshaw Dam Failure and Inundation Study, December 1991, p. B-1, italics added.

¹⁵ Letter from Tory R. Walker Engineering to City of Oceanside Re: Henshaw Dam Breach Analyses, dated May 15, 2019, *citing*, “Dam Failure Analysis and Inundation Mapping for Henshaw Dam,” Stetson Engineers, Inc., October 5, 2018, p. 21.

¹⁶ *Id.* See also, “Dam Failure Analysis and Inundation Mapping for Henshaw Dam,” at p. 28.

¹⁷ Letter from Tory R. Walker Engineering to City of Oceanside Re: Henshaw Dam Breach Analyses, dated May 15, 2019.

¹⁸ Dam Breach Exhibit. Available at <<https://fmds.water.ca.gov/maps/damim/service/document/download/2558>>, panel 41.

¹⁹ Letter from Tory R. Walker Engineering to City of Oceanside Re: Henshaw Dam Breach Analyses, dated May 15, 2019, *citing*, “Dam Failure Analysis and Inundation Mapping for Henshaw Dam,” Stetson Engineers, Inc., October 5, 2018, p.8.

significant impact to safety or structures from flooding resulting from Henshaw Dam breach would be less than significant.

Comments Concerning Responses to September 20, 2019 Johnston Letter

The Revised FEIR also provided responses to a September 20, 2019 letter submitted by Mr. Johnston at Responses to Comment Letter I24. As a point of clarification, Comment I24-3 states the downstream hazard for Henshaw Dam is “Extremely high.” Response I24-3 correctly notes the DSOD’s Dam Breach Inundation Map Web Publisher states this is the rating for the Dam. In fact, however, the Henshaw Dam is classified as the lesser “High,” not an “Extremely High,” hazard potential.²⁰ The Response correctly states that the downstream hazard is based on potential downstream impacts, *not* the condition of the dam or its appurtenant structures.

Response I24-3 correctly states that the Dam condition is rated as “Satisfactory”, the highest rating possible, and is “Certified” to safely impound water specific by its Certificate of Approval.²¹ The November 5 comment letter expresses the opinion that the condition of the Dam should not be considered in evaluating potential environmental impacts. The integrity and general *good condition* of the Dam is directly relevant to the *low* likelihood of dam failure-related flooding at the project site. CEQA requires the City to evaluate only reasonably foreseeable impacts caused by the project – not those which are speculative or unlikely to occur, as would be the case if the City ignored evidence that the Dam is in good condition and unlikely to fail. (CEQA Guidelines, §§ 15144, 15145, 15064(d)(3), 15358 (a)(2).)

In any case, the hazard rating for the Henshaw Dam in general does not go to the potential for the project to result in significant adverse effects. As discussed above, the EIR and supplemental expert analysis and testimony explain that even if the Dam were to fail, the unrealistic scenario presented by the 1991 and 2018 studies, coupled with the distance to the project site and modifications made to the site support a finding that project impacts would be less than significant.

Further, the comment letter contends that the 1991 and 2018 studies represent a realistic scenario of dam breach. This is incorrect, for the reasons discussed above. The comment further contends the Dam is likely to be filled to capacity. Historical data, discussed above, indicates this is seldom the case. The comment claims the Dam could quickly fail and result in significant impacts to

²⁰ “Dam Failure Analysis and Inundation Mapping for Henshaw Dam,” Stetson Engineers, Inc., October 5, 2018, p. 5.

²¹ “Dams within Jurisdiction of the State of California, Dam Rating Information, DSOD, September 2018, p. 40. Available at < <https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/All-Programs/Division-of-Safety-of-Dams/Files/Publications/Dams-Within-Jurisdiction-of-the-State-of-California-2018-Alphabetically-by-Dam-Name.pdf>>.

²¹ Dams Within Jurisdiction of the State of California. September 2018. <https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/All-Programs/Division-of-Safety-of-Dams/Files/Publications/Dams-Within-Jurisdiction-of-the-State-of-California-2018-Alphabetically-by-County.pdf>.

persons or property. The “worst case scenario” 2018 study assumed immediate, 6 minute disintegration the Dam (which is nearly impossible for an earthfill dam and ignored the Reinforced Flow Retardation Structure—even the commenter’s example of Johnstown Dam took 65 minutes). Even then, flood waters would not reach the project site for over 4 hours—permitting ample time for evacuation to north of N. River Road.

The comment also contends further that design of the project to remove proposed housing outside of the 100-year flood hazard zone does not reflect risk due to Dam failure. The comment is incorrect. The inundation map shows the inundation area to largely equate to the 100-year flood hazard zone, such that design to remove housing from the 100-year flood likewise would remove such housing from the inundation zone.

In sum, the previously submitted Responses fully address these comments. The proposed project would result in a less than significant impact related to exposure of people or structures to hazards associated with the failure of Henshaw Dam.

L4 KAREN GREEN

Responses to this comment letter will follow the general topics identified as key issues by the commenter in the order they appear in the comment letter. Although CEQA does not require written responses to late comments submitted after the noticed public comment period (Pub. Resources Code, §§21091(d) and 21092.5(c); CEQA Guidelines, §15088), the following response is provided.

Growth Inducement

The commenter is correct in stating that the Revised FEIR and its associated findings identify a significant and unavoidable impact related to growth inducement. Discussion regarding growth inducement and cumulative impacts received extensive analysis in Sections 4.7, 4.11, and 6.1 of the Revised FEIR. Please also refer to Topical Responses CU-1, LU-1, and PH-1 in Appendix T0, Volume II. Sections 6.1 and 4.14 of the Revised FEIR acknowledge that, as the project site is developed and eventually built out as proposed, existing adjacent and nearby land may be encouraged to intensify uses as a result of property owners in the area being encouraged to propose additional community serving retail uses based on the new residences. In other words, construction of the proposed project would generate an economic stimulus from the operation of the proposed project's commercial and agricultural facilities, and introduction of new consumer demand in the area. Additionally, the proposed land use intensification could potentially result in growth inducement due to potential for unplanned infrastructure improvements. Accordingly, the Revised FEIR concluded the project would be considered growth inducing.

A more detailed analysis of potential growth-inducing impacts cannot be provided at this time without engaging in undue speculation, which is not required by CEQA. However, Section 4.2 of the Revised FEIR does discuss potential indirect impacts related to the conversion of off-site agricultural resources to a non-agricultural use, and concludes that such impacts would be less than significant for a variety of reasons. The reasons for finding that indirect impacts would be less than significant would also apply to impacts to agriculture from growth inducement. Thus, the project would not result in other changes to the existing environment that could result in a significant impact from the conversion of agricultural land or Farmland to a non-agricultural use.

Regarding proposed agriculture, approximately 68.1 acres would be dedicated to agriculture throughout the project site as shown on Figure 3-3 of the Revised FEIR. These 68.1 acres include an agricultural easement of approximately 37.5 acres over the Bree Property, community gardens, agricultural trails, production agriculture, and agritourism. These areas may also include associated landscaping. However, it should be noted that other open space and landscaping accounts for approximately 17.0 acres of the project site, which is not included in the 68.1 acres of agricultural land.

Agricultural Resources Impacts and Mitigation

The comment expresses concerns regarding loss of agriculture resources and proposed mitigation, which received extensive analysis in Section 4.2, Agriculture and Forestry Resources, of the Revised FEIR. Please refer to Topical Response AG-1 in Appendix T0, Volume II, which thoroughly addresses the adequacy of the proposed agricultural mitigation. These comments also express the commenter's opinion regarding agricultural mitigation.

Agritourism in Morro Hills

This comment expresses concern regarding the project's potential effect on future agritourism in the Morro Hills area. Regarding the growth inducement comments, please refer above to the previous response related to this topic. Regarding agritourism, please refer to Topical Response LU-4 in Appendix T0, Volume II for a discussion of the project's consistency with the Draft Agritourism Strategic Plan. Additionally, as a condition of project approval, the project applicant will contribute one million dollars in funds towards the preparation of a community plan for the long-range planning efforts for South Morro Hills. Refer to Section PR, Preface to the Recirculated Final Environmental Impact Report, for additional details.

Traffic Impacts to N. River Road

This comment expresses concern regarding potential impacts to N. River Road, which received extensive analysis in Section 4.17 of the Revised FEIR. Refer also to Topical Response TR-1 in Appendix T0, Volume II, for a detailed explanation of potential impacts to N. River Road and the adequacy of proposed mitigation. It should be noted that the reference mitigation of N. River Road from Wilshire Road to Sleeping Indian Road (MM-TRA-9) is required to be implemented prior to the issuance of the 503rd building permit, not after, as suggested by the commenter. In general, all traffic mitigation is timed to be implemented prior to the occurrence of impact. Additionally, contrary to the commenter, the project would not result in significant and unavoidable impacts to the intersection of N. River Road and SR-76; refer to Section 4.17 of the Revised FEIR for a full discussion of potentially significant traffic impacts.

Fire Safety and Evacuation

This comment expresses concerns regarding fire safety, evacuation, and proposed traffic improvements. Refer to Topical Responses FR-1 through FR-5 in Appendix T0, Volume II, as well as the revised public services mitigation MM-PUB-1. In the event of a properly coordinated evacuation, roadway level of service becomes irrelevant due to implementation of manual traffic control from emergency service providers. It should be noted that transportation facilities are planned and designed for estimated average daily use, as opposed to extreme worst case scenarios.

(i.e. emergency evacuation). Refer above regarding the potential impacts, mitigation, and proposed improvements to N. River Road.

It should be noted that the new fire station as required by mitigation measure MM-PUB-1 is not due to a potential impact to emergency evacuation, rather it is required to maintain emergency response times to the project site and surrounding area within the response goal of 5 minutes.

Economic Considerations and Project Enhancements

These comments primarily raise economic, social, or political issues that do not appear to relate to any physical effect on the environment. Although not required by CEQA, the project applicant provided a fiscal analysis for the project that was subsequently reviewed by the City's consultant (Keyser Marston & Associates). That fiscal analysis reflects a net positive fiscal benefit from all aspects of the project including the housing portion. Regarding smart growth, please refer to Topical Response LU-3 in Appendix T0, Volume II.

Please note that the project is not proposing contribution towards the design of the Melrose Bridge, rather it is contributing funding towards improvements to Melba Bishop Recreation Center. Please refer to the project's conditions of approval. The draft CEQA Findings have been corrected in response to this comment.

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L5 DIANE NYGAARD

The following responses generally responds to the primary topics identified in the comment letter in the order in which they appear. Although CEQA does not require written responses to late comments submitted after the noticed public comment period (Pub. Resources Code, §§21091(d) and 21092.5(c); CEQA Guidelines, §15088), the following response is provided.

Economic Viability

These comments primarily raise economic, social, or political issues that do not appear to relate to any physical effect on the environment. Although not required by CEQA, the project applicant provided a fiscal analysis for the project that was subsequently reviewed by the City's consultant (Keyser Marston & Associates). That fiscal analysis reflects a net positive fiscal benefit from all aspects of the project including the housing portion.

General Plan Consistency and the General Plan Update

While the project is not subject to the City's recently approved General Plan Update, including the Economic Development Element and Energy Climate Action Element, a consistency evaluation was nonetheless prepared and included for informational purposes in Appendix V of the Revised FEIR.

This comment also expresses the commenter's opinion regarding the timing of the project with respect to the update to the General Plan currently underway by the City. This comment is included in the Revised FEIR for consideration by the decisionmakers.

Regarding the Regional Housing Needs Assessment, the City has determined that there are adequate sites available with appropriate zoning to accommodate the Regional Housing Need Assessment (RHNA) allocation for this Housing Element cycle (City of Oceanside 2013). Therefore, amendments to the City's General Plan and existing zoning are not required for the City to meet its RHNA allocation. Yet most of the residentially zoned land identified in the City's Housing Element, is already developed with relatively few vacant properties remaining. Most of the RHNA housing needs must be accommodated on commercially zoned land. However many of the underutilized commercial sites are less than one acre in size which would require site consolidation under one ownership. As of 2013, the City has a remaining 5,650 dwelling units needed to fulfill its RHNA allocation by 2020.

The City has the discretion to adjust allocated housing units/sites as necessary to balance proposed plans for residential development, approved/constructed residential development, and sites identified within the housing inventory that is not yet planned for development. Further, Program 9 of the Housing Action Plan within the Housing Element calls for the City's Planning Department to continually monitor its housing sites inventory such that the City meets the RHNA (Oceanside

2013). The City would then be able to account for the proposed units and estimated population resulting from the proposed project when considering future residential development proposals. Additionally, the estimated buildout of the proposed project would carry over into the next Housing Element cycle in which both SANDAG and the City would be required to assess housing needs allocation and the ability for the City to reach that allocation.

Future Infrastructure and Operating Costs

These comments primarily raise economic, social, or political issues that do not appear to relate to any physical effect on the environment. Although not required by CEQA, the project applicant provided a fiscal analysis for the project that was subsequently reviewed by the City's consultant (Keyser Marston & Associates). The fiscal analysis shows that the majority of the revenue comes from the residential portion of the project not the commercial or agricultural aspects. The agricultural operations are structured to pay for their costs and generate limited revenue; they are not a driver of revenue for the City or for the project. The proposed Homeowner's Association (HOA) conditions specific that an HOA or a non-profit are responsible for maintaining the land so that it is explicit that the City is not responsible.

Vision Plan for South Morro Hills

There is currently no formally adopted "Vision Plan" for South Morro Hills. The North River Farms Planned Development Plan (included as Appendix B to the Revised FEIR) incorporates design principles of the draft Vision Plan into the project. Additionally, as a condition of project approval, the project applicant will contribute one million dollars in funds towards the preparation of a community plan for the long-range planning efforts for South Morro Hills. Refer to Section PR, Preface to the Recirculated Final Environmental Impact Report, for additional details.

Potential Traffic Impacts

These comments express concern over potential traffic impacts, which received extensive analysis in Section 4.17 of the Revised FEIR. As discussed in the Section 4.17, the project would result in significant and unavoidable impacts to two intersection and one roadway segment, despite implementation of feasible mitigation. All other identified potentially significant traffic impacts would be reduced to a level below significance with incorporation of mitigation measures. Such mitigation and other transportation improvements include the expansion of the College Boulevard Bridge and widening of College Boulevard, Vandegrift Boulevard, and N. River Road. It should be noted that payment of the project's fair share towards established infrastructure improvement programs that have nexus with respect to the potential impact can be considered adequate mitigation. The proposed improvements linked to this specific program, as identified in the

Revised FEIR, Section 4.17.5, are appropriate mitigation under CEQA, and it is presumed the City will comply with its adopted program.

Please note that the project is not proposing contribution towards the design of the Melrose Bridge, rather it is contributing funding towards improvements to Melba Bishop Recreation Center. Please refer to the project's conditions of approval. The draft CEQA Findings have been corrected in response to this comment.

Greenhouse Gas Emissions

These comments expresses concern regarding the potential impacts to greenhouse gas emissions (GHG), proposed mitigation, and revisions to the project with respect to GHG. Please refer to Topical Responses GHG-1 through GHG-3 and Response to Comment Letter O4 in Appendix T0, Volume II. Refer also to relevant responses to comments raised in Comment Letter L6 below.

Emergency Response and Evacuation

This comment expresses concerns regarding fire safety, evacuation, and proposed traffic improvements. Refer to Topical Responses FR-1 through FR-5 in Appendix T0, Volume II, as well as the revised public services mitigation MM-PUB-1. In the event of a properly coordinated evacuation, roadway level of service becomes irrelevant due to implementation of manual traffic control from emergency service providers. It should be noted that transportation facilities are planned and designed for estimated average daily use, as opposed to extreme worst case scenarios (i.e. emergency evacuation).

An emergency response time analysis of the proposed on-site fire station was prepared and included as Appendix T7 of the Revised FEIR.

Project History

The comments regarding the project's public hearing history are noted. Additionally, it should be noted that the project applicant has revised the project description over the course of the environmental review process, most recently reflected in the Recirculated Final EIR.

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L6 PRESERVE CALAVERA

Preserve Calavera submitted a comment letter dated November 5, 2019. The letter contends that the Revised FEIR's evaluation and mitigation for impacts related to GHGs, fire hazards, and traffic is insufficient. The comment letter raises additional claims regarding the Statement of Overriding consideration and conditions of approval.

The commenter is referred to the Revised FEIR, which addresses GHGs, fire hazards, and traffic impacts in detail. These latest comments do not raise new or additional environmental issues concerning the adequacy of the EIR. Nonetheless, although CEQA does not require written responses to late comments submitted after the noticed public comment period (Pub. Resources Code, §§21091(d) and 21092.5(c); CEQA Guidelines, §15088), the following response is provided.

Additional Project Enhancements

The comment states that “project enhancements” are “presumably intended to mitigate impacts.” The comment suggests the mitigation and/or enhancements are inadequate.

First, the payment of \$100,000 to be used in the City's discretion on CAP implementation is being provided above and beyond required mitigation for the project — it is not intended to mitigate project impacts. The project proposes to implement extensive design features and other measures to reduce GHG emissions, as detailed at Mitigation Measure MM-GHG-1. Beyond such measures, Mitigation Measure MM-GHG-2 and MM-GHG-3 require the applicant purchase and retire carbon offsets in sufficient quantity to offset 100% of the project's construction and operational emissions. With this mitigation, impacts to GHGs will be less-than-significant, and no further mitigation is required.

Second, the project has been enhanced to provide a permanent fire station. This dedication of a site for a permanent station is above and beyond prior Mitigation Measure MM-PUB-1, which would have provided for a temporary fire station such that the entire site is within the acceptable response goal of five minutes. To the extent the comment suggests the location must result in meeting the five-minute response-time goal for the entire City, CEQA does not require the applicant to mitigate for existing conditions or achieve such a lofty goal. Nonetheless, the location of the fire station has been identified with input from the City and fire department. The provision of a permanent fire station within the site will expand fire service and remedy existing deficiencies in the community. The applicant will also pay the requisite fair share fees for fire services. Refer to Topical Response FR-5 and Preface to the Revised FEIR for additional information.

To the extent the comment argues evacuation was not adequately evaluated in the EIR, the commenter is referred to Topical Response FR-3 and Revised FEIR section 4.9.4. As detailed

therein, the EIR acknowledges that wildland fires are a reality in Southern California. However, unlike recent fires in fuel-heavy locales, the project site is not located in a Very High Fire Hazard Severity Zone, and would be set back from the fuels within the San Luis Rey Riverbed through a combination of active agriculture and fuel modification. The project's Evacuation Plan (Appendix J2) analyzed evacuation under a variety of scenarios, and determined the project would not impair or interfere with emergency response or evacuation. Further, the project would widen the College Boulevard Bridge and N. River Road, providing additional capacity in the event of an evacuation scenario. The comment raises no new or additional environmental issues concerning fire hazards or evacuation.

Third, as detailed at Topical Response TR-2, the widening/expansion of the College Boulevard Bridge and/or completion of the Melrose Bridge were deemed to exceed the "rational nexus" and "rough proportionality" requirements for mitigation. The applicant has agreed to provide the enhancement of widening the College Boulevard Bridge despite the improvement exceeding its equitable share of improvement costs.

It is accurate that the EIR conservatively finds, due to constraints regarding timing of this bridge widening, that significant impacts may result temporarily at the College Blvd/N. River Road intersection and the segment from N. River Road to Adams. Once the expansion is complete, such impacts would be fully mitigated. Further, the City does not own needed right-of-way for intersection expansion at Vandegrift/N. River Road, and therefore cannot guarantee timely implementation of mitigation identified for this intersection. Once implemented, this impact would likewise be fully mitigated. The EIR conservatively identifies significant impacts at these locales.

While the comment is correct that the EIR provides for payment of fair share fees for certain improvements identified within the City's Thoroughfare and Traffic Signal Fee Program, its implication that payment of such fees offer inadequate mitigation is wrong. The proposed improvements linked to this specific program, as identified in the Revised FEIR, Section 4.17.5, are appropriate mitigation under CEQA, and it is presumed the City will comply with its adopted program.

Statement of Overriding Considerations

The comment states the draft Statement of Overriding Considerations should include reasons to deny the project. The purpose of the Statement is to provide specific reasons for approving the project, supported by substantial evidence. (CEQA Guidelines, § 15093.) The draft Statement complies with this requirement.

The comment disagrees with the reasoning provided in the Statement as to three proposed Overriding Considerations. The commenter's opinion is noted. The comment does not raise new or additional environmental issues concerning the adequacy of the EIR. The comment states the contribution to the S. Morro Hills Vision Plan is \$1 million, not \$200k as stated in the Draft CEQA Findings. The draft CEQA Findings have been corrected in response to this comment.

Conditions of Approval

The comment expresses opposition to several conditions of approval. The conditions concern project enhancements and benefits, and do not raise any new or additional environmental issues concerning the adequacy of the EIR. No further response is therefore provided.

General Plan Consistency

The comment expresses disagreement with the General Plan Consistency Tables concerning the Economic Development Element, Energy /Climate Action Element and Climate Action Plan, and states that the commenter reached different conclusions. The disagreement is noted. The commenter is referred to Revised FEIR Appendix V for substantial evidence and detailed reasoning substantiating the conclusion reached in the EIR.

GHG Offsets

The comment repeats prior comments that contend that mitigation adopted for GHG emissions is insufficient. The Revised FEIR addresses the sufficiency of mitigation, both on-site and through the purchase and retirement of carbon offsets; the location of GHG mitigation strategies (both on- and off-site); and the selection of a 30-year project life.²²

The comment repeats prior comments expressing concern that offsets outside the U.S. may not be enforceable “in a jurisdiction not subject to U.S. law.” First, MM-GHG-2 and MM-GHG-3 implement geographic priorities that would focus first on local reduction features, providing offsets from international locations be purchased only consistent with this geographic priority strategy. Second, GHG reductions are verified *ex-post* or after the reductions have occurred and during a defined reporting period, which provides a high level of certainty that assertions claimed by the project proponent are indeed additional and permanent.²³ The only enforcement that need occur is assuring that enough offsets are purchased consistent with the requirements of MM-GHG-2 and MM-GHG-3.

²² Refer to Topical Responses GHG-1 through GHG-3, Appendix H1, Appendices U through U11.

²³ *Id.*, Refer also to Appendices U5 through U7, *see also*, Amicus Brief filed by Element Markets, *Sierra Club v. County of San Diego*, Fourth District Court of Appeal Case No. D075478.

The comment lastly states that “no state enforced program” allows out-of-country emissions offsets. This is incorrect. California’s AB32 program is currently joined with the Canadian province of Quebec, allowing GHG allowances and offsets to be traded between the two jurisdictions.²⁴ Nonetheless, offsets purchased to reduce project GHG emissions to net zero would be subject to the geographic priority conditions and other standards set forth in MM-GHG-2 and MM-GHG-3, as discussed above.

Additional Conditions of Approval

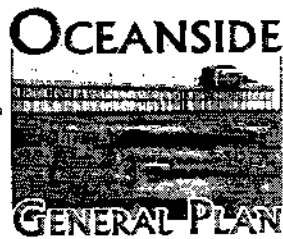
The comment contends additional conditions of approval “should have been included in mitigation,” specifically as concerns the N. River Road/Vandegrift Blvd. improvement, and that the conditions provide additional benefits for the City if the project is approved.

To clarify, the N. River Road at Vandegrift improvement is, in fact, incorporated as required project mitigation, as well as the proposed condition cited by the comments. Refer to MM-TRA-1. However, because the City cannot guarantee acquisition of the needed right-of-way for the improvement, it was conservatively considered significant and unavoidable.

Regarding the Conditions of Approval that the commenter identifies as providing additional benefits, the comment is correct and noted. The benefits are not intended to mitigate for significant project impacts, but, instead, to provide additional benefits for the City and its residents. The comment does not raise any new or additional environmental issues concerning the adequacy of the EIR.

²⁴ *Id.*, Refer also to, California Air Resources Board. *Agreement Between The California Air Resources Board And The Gouvernement Du Québec* (2013): https://ww3.arb.ca.gov/cc/capandtrade/linkage/ca_quebec_linking_agreement_english.pdf.

ATTACHMENT “1”



PUBLIC SAFETY ELEMENT

CITY OF OCEANSIDE, CALIFORNIA

Prepared by

Planning Department
City of Oceanside
May, 1975

Approved by

Planning Commission
City of Oceanside
Resolution No. 75-P27
June 2, 1975

Adopted by

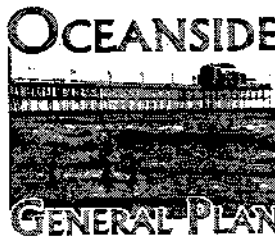
City Council
City of Oceanside
Resolution No. 75-110
September 9, 1975

Text Reformatted in 2002 by

Cotton/Bridges/Associates

Reformatting included the reorganization of the existing text, the addition of introductory material and revision of the Purpose and Authority, Scope and Content, and Relationship to Other General Plan Elements subsections.

(Figures were not reformatted.)



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TABLE OF CONTENTS

SECTION	PAGE
INTRODUCTION	1
PURPOSE AND AUTHORITY	1
SCOPE AND CONTENT	2
RELATED PLANS AND PROGRAMS.....	2
RELATIONSHIP TO OTHER GENERAL PLAN ELEMENTS.....	4
LONG-RANGE POLICY DIRECTION	5
SEISMIC AND GEOLOGIC HAZARD	5
FIRE HAZARD	5
FLOODING HAZARD	5
PUBLIC SAFETY PLAN	6
SEISMIC AND GEOLOGIC HAZARDS	6
FIRE HAZARDS.....	16
FLOODING HAZARDS.....	27
CIVIL DISASTER PREPAREDNESS.....	31
APPENDIX	
APPENDIX A - BIBLIOGRAPHY	

LIST OF TABLES

TABLE	PAGE
TABLE PS-1 RECOMMENDED INVESTIGATIONS FOR VARIOUS GEOTECHNICAL PROBLEMS.....	14
TABLE PS-2 FIRE DEPARTMENT EQUIPMENT	24
TABLE PS-3 FIRE DEPARTMENT MANPOWER.....	24

LIST OF FIGURES

FIGURE	PAGE
FIGURE PS-1 SEISMIC HAZARDS	7
FIGURE PS-2 AREAS OF POTENTIAL HAZARDS	9
FIGURE PS-3 SLOPE STABILITY	11
FIGURE PS-4 GEOTECHNICAL EVALUATION	15
FIGURE PS-5 NATURAL FIRE HAZARDS.....	17
FIGURE PS-6 STRUCTURAL FIRE HAZARDS.....	19
FIGURE PS-7 NON-STRUCTURAL FIRE HAZARDS	21
FIGURE PS-8 FIREFIGHTING FACILITIES	23
FIGURE PS-9 NATURAL FLOODPLAINS	28
FIGURE PS-10 INUNDATION MAP FOR HENSHAW DAM	30
FIGURE PS-11 RELOCATION ROUTES & REFUGEE CENTERS	33

PUBLIC SAFETY ELEMENT

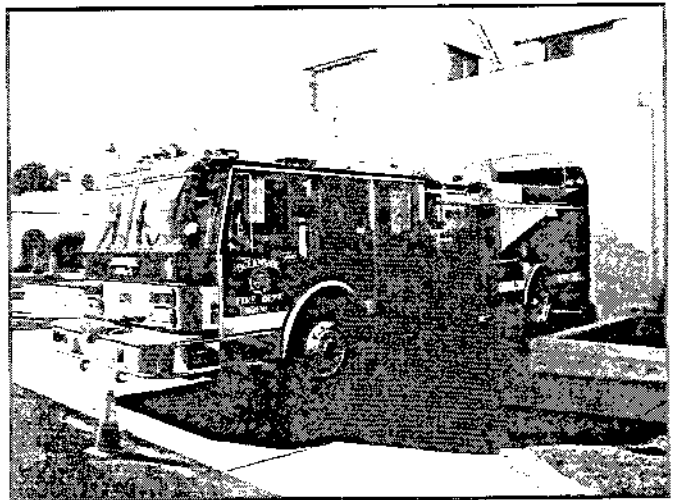
INTRODUCTION

Oceanside, like many other urban centers in California, is subject to certain potential hazards, such as earthquakes, fire, and flooding, the severity of which has a direct bearing upon the quality of life enjoyed by the City's residents. This severity is often directly proportional to the intensity and density of urban development and the proximity of the development to the hazard source. In many cases, however, corrective and preventive measures taken by the City and individual citizens can do much to eliminate or reduce the risk involved.

The purpose of the Public Safety Element of the General Plan is to identify these hazards, and develop appropriate mitigation measures that can and should be integrated into the planning and decision making processes of the City. Knowledge of the existing hazards and consideration of possible corrective action can do much to reduce loss of life, injuries, and property damage resulting from natural causes and man-made occurrences.

Purpose and Authority

The purpose of the Public Safety Element is to identify and address those features or characteristics existing in or near the City that represent a potential hazard to the community's citizens, sites and structures, public facilities, and infrastructure. The Safety Element establishes policies to minimize the danger to residents, workers, and visitors while identifying actions needed to manage crisis situations such as earthquakes, fires, and floods. A civil preparedness approach for the City is also addressed in the element.



Scope and Content

This Element is meant to serve as a guide for introducing safety considerations into the planning process in order to reduce loss of life, injuries, damage to property and economic and social dislocation resulting from fire, flooding, and seismic occurrences.

The planning area addressed in this element is the incorporated limits of the City of Oceanside and the sphere of influence as adopted by City Council Resolution 74-139 of June 26, 1974. The policies outlined herein cannot be directly applied to those areas outside the present City limits; however, the appropriateness of planning for areas beyond the City boundaries which may significantly affect a City's planning process is recognized by Oceanside and authorized by the State of California.

The major areas of concern addressed in this element are:

1. Seismic and Geologic Hazards
2. Fire Hazards
3. Flooding Hazard due to dam failure
4. Civil Disaster Preparedness

The Public Safety Element contains three sections: 1) Introduction; 2) Long-Range Policy Direction; and 3) the Public Safety Plan. Each of the four hazards identified above is defined, identified, and discussed in relation to its severity and probable frequency of occurrence within the element. Various levels of risk are discussed in the Plan section, and figures are included showing those areas of highest risk in the City. Possible mitigation and abatement measures are presented and safety criteria, standards, and policies are formulated, which represent Oceanside's approach toward consideration of safety factors and implementation of such factors into the City's planning process.

Related Plans and Programs

There are a number of existing plans and programs that directly relate to the goal and policies of the Public Safety Element. These plans and programs have been enacted through federal, State, and local legislation and are administered by agencies with powers to enforce federal, State, and local laws.

Oceanside Emergency Plan

The City of Oceanside has an Emergency Plan, which is currently being updated to plan for the year 2020. The plan identifies evacuation routes, emergency facilities, and City personnel and equipment available to effectively deal with emergency situations.

Master Plans of Drainage

The City's two Master Drainage Plans identify drainage deficiencies in the City's drainage system for Drainage Districts One and Five in one plan and Districts Two, Three, and Four in the other. The plans provide solutions to flood hazards in developed and undeveloped areas. The facilities proposed in the plans for undeveloped areas are based on future development consistent with present City land use policies. Cost estimates and financing recommendations have also been prepared for the proposed drainage facilities.

California Environmental Quality Act (CEQA)

The California Environmental Quality Act (CEQA) was adopted by the State legislature in response to a public mandate for a thorough environmental analysis of projects that might adversely affect the environment. The provisions of the law, review procedures, and any subsequent analysis are described in the CEQA Statutes and Guidelines as amended in 1998. Safety hazards are recognized as environmental impacts under CEQA. Continued implementation of CEQA will ensure that City officials and the general public have information describing assessment and mitigation of potentially significant safety impacts associated with private and public development projects.

Seismic Hazards Mapping Act

Pursuant to the Seismic Hazards Mapping Act, the State Geologist compiles maps identifying seismic hazard zones. Development in seismic hazard areas is subject to policies and criteria established by the State Mining and Geology Board. Additionally, approval of development on a site within a seismic hazard area requires the preparation of a geotechnical report and local agency consideration of the policies and criteria set forth by the State Mining and Geology Board (Public Resources Code Section 2690 et. seq.).

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act requires the State Geologist to identify earthquake fault zones along traces of both recently and potentially active major faults. Cities and counties that contain such zones must inform the public regarding the location of these zones, which are usually one-quarter mile or less in width. Proposed development plans within these earthquake fault zones must be accompanied by a geotechnical report prepared by a qualified geologist describing the likelihood of surface rupture.

Cobey-Alquist Floodplain Management Act

The Cobey-Alquist Floodplain Management Act encourages local governments to plan, adopt, and enforce land use regulations for floodplain management, in order to protect people and property from flooding hazards. This act also identifies requirements that jurisdictions must meet in order to receive State financial assistance for flood control.

National Flood Insurance Administration Program (NFIP)

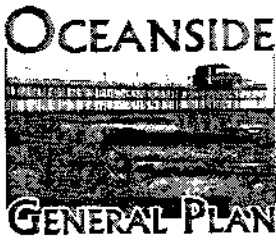
Oceanside participates in the National Flood Insurance Program (NFIP), which is administered by the Federal Emergency Management Agency (FEMA). The NFIP program provides federal flood insurance and federally financed loans for property owners in flood prone areas. To qualify for federal flood insurance, the City must identify flood hazards areas and implement a system of protective controls. The Safety Element, the Flood Overlay Zoning District Regulations, and Chapters and Articles VI of the Municipal Code fulfill these requirements.

Relationship to Other General Plan Elements

The Public Safety Element is an independent element of the General Plan, though it is related to all of the other elements, creating a single General Plan document. One element that is directly related to the Public Safety Element is the Environmental Resource Management Element. Both elements address issues related to flooding and other environmental hazards.

The Public Safety Element also contributes to developing land use standards and policies. These criteria will relate type and intensity of use to the level of risk from fire, flooding, and seismic hazards, to the effect of development upon that risk, and to the availability of services and facilities to mitigate the hazards. As such, it serves as a direct source of data and City policies for developing land use districts and a circulation system as contained in the Land Use and Circulation Elements.

The findings contained in the Public Safety Element would also have a direct effect on implementation of those specialized land uses and facilities such as public buildings and utilities as outlined in the Community Facilities Element.



LONG-RANGE POLICY DIRECTION

Goals and Objectives are broad statements of the City's intent to mitigate or eliminate an identified risk. The actual programs to be developed are in the form of recommendations, contained in the following section (Public Safety Plan). In general terms, one goal will express Oceanside's approach to public safety:

GOAL: Take the action necessary to ensure an acceptable level of public safety for prevention and reduction of loss of life and personal property of the citizens of Oceanside.

To meet this goal, objectives must be specified to ensure appropriate action will be taken for mitigation within the hazard areas identified in Oceanside. These objectives are described below:

Seismic and Geologic Hazard

1. Consider seismic and geologic hazards when making land use decisions particularly in regard to critical structures.
2. Minimize the risk of occupancy of all structures from seismic and geologic occurrences.
3. Provide to the public all available information about existing seismic and geologic conditions.

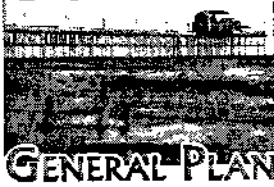
Fire Hazard

1. Maintain the necessary equipment, personnel and water supply levels required for the current class 5 insurance rating over the entire City.
2. Continue an active and effective fire prevention program through public education, code enforcement, and inspection service.

Flooding Hazard

1. Consider the potential for flooding when making land use decisions.
2. Ensure public awareness of existing flooding hazards.

OCEANSIDE PUBLIC SAFETY PLAN



Seismic and Geologic Hazards

San Diego County is a region of known seismic activity. Earthquakes have been documented as far back as 1769 when the Portola expedition passed through this area of Alta California. The eastern portion of the region contains several sizable active faults, as does the ocean floor just five miles off shore (See Figure PS-1).

A full description and analysis of the seismic conditions within Oceanside are contained in a report entitled *Geotechnical Investigations for General Plan Revisions, Oceanside, California* prepared by Burkland and Associates, geologic engineers. The report is available from the Oceanside Planning Department. The information presented below is a summary of the major findings of that report.

Primary Effects

Primary seismic effects are caused by movement along an active fault. These movements can be sudden and severe as in an earthquake or slow and imperceptible as in fault creep. The movement along a fault can be horizontal, vertical, or a combination of both. The width of the ground rupture zone is usually less than 20 feet in rock, but can be up to 60 feet in soft, saturated soils.

There are no proven active or potentially active faults within the City of Oceanside or its sphere of influence. There is one active fault, the Rose Canyon fault, within a radius of 25 miles. This fault has been mapped approximately five miles offshore of the planning area by the U.S. Geological Survey. There has been a great deal of controversy about the location of the fault and whether a branch turns toward shore and enters the planning area. It is the firm conclusion of Burkland and Associates that this is not the case.

The earthquake history of the Rose Canyon fault is active. In 1812, San Juan Capistrano was destroyed by an epicenter on this fault, and this fault was also responsible for the Long Beach earthquake of 1933. An earthquake of a magnitude of 6.5 or greater with its epicenter on the Rose Canyon fault could result in secondary seismic effects in the planning area.

In addition to the Rose Canyon fault, there are four major active fault zones within 100 miles of Oceanside (Figure PS-1). They are the Elsinore fault zone, 25 miles from the coast; Agua Caliente fault zone, 33 miles from the coast; San Jacinto fault zone, 48 miles from the coast; and the San Andreas fault zone, 77 miles from the coast. The energy generated by a high magnitude (7.0 or greater on the Richter Scale) earthquake centered on any of these faults would be attenuated by the time it reached the planning area; however, certain portions of the planning area could be subject to damage from secondary seismic effects.

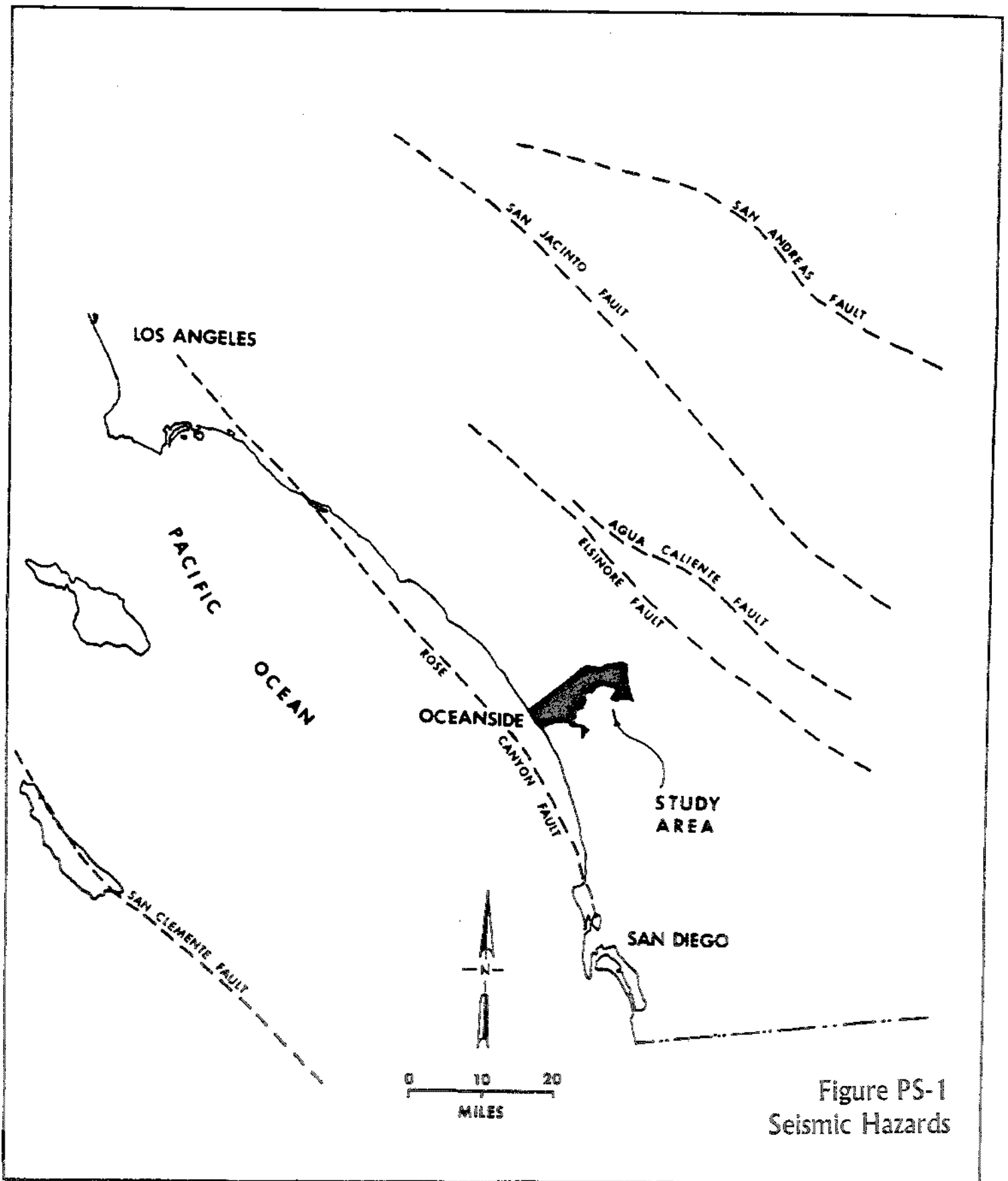


Figure PS-1
Seismic Hazards

The highest danger from primary seismic effects is surface faulting which tends to occur along lines of previous faulting. Since there are no known active or potentially active faults within the planning area, there is considered to be no potential for ground rupture.

Secondary Effects

The secondary effects of seismic occurrences are many; however, those pertinent to the Oceanside planning area are liquefaction, lurch cracking, lateral spreading, local subsidence (ground failure), landslides, vibrational damage, seiche, and tsunamis. There is a likelihood of each effect occurring, with some greater than others.

Figure PS-2 indicates those portions of the planning area susceptible to a moderate to major danger from several related secondary seismic effects. Generally, the greatest hazard from these effects exists in the alluvial areas west of El Camino Real, in and around the lagoons, and along the beach.

These secondary effects are described briefly here. More detailed description and analysis can be found in the Burkland report.

Liquefaction is a "quick" condition that can occur in certain types of saturated soils due to shaking during an earthquake. In this condition, the soils lose all of their cohesive strength causing them to be unable to bear the weight of overlying soils and structure.

Lurch cracking is the development of all types and sizes of fissures in the ground due to ground motion during an earthquake.

Lateral spreading is the movement of loose soils during an earthquake over low-angle slopes into open areas.

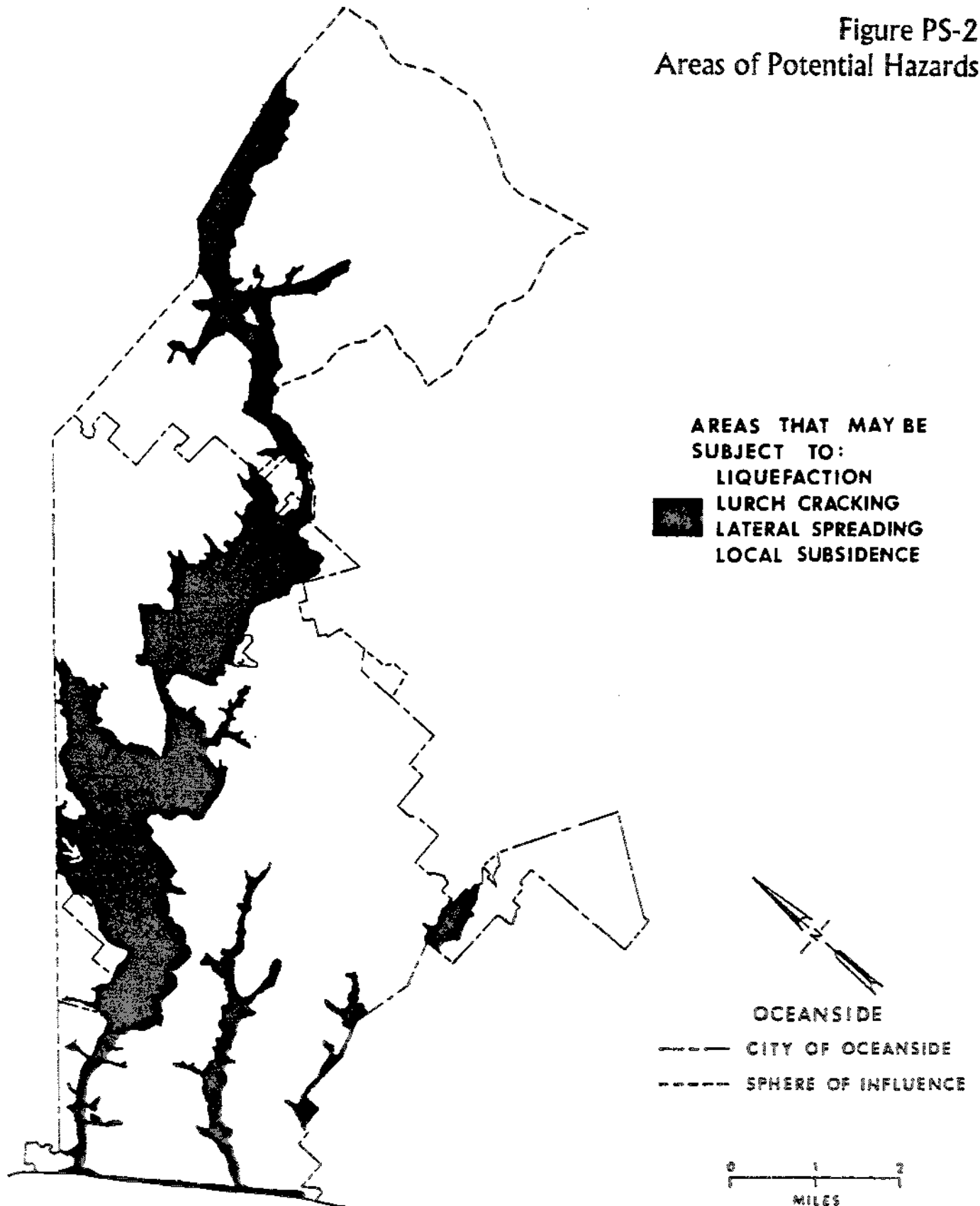
Local subsidence can occur during an earthquake when water is driven out of saturated soils causing the soils to become more compact.

Other secondary effects not indicated on Figure PS-2 are ground vibration, seiches, and tsunamis.

Structural damage due to **ground vibration** is caused by the transmission of earthquake vibrations from the ground into structures. The variables that determine the extent of damage are:

1. The characteristics of the underlying soils and/or rocks.
2. The design of the structure.
3. The quality of materials and workmanship used in construction.
4. The location of the epicenter and magnitude of the earthquake.
5. The duration and intensity of ground shaking.

Figure PS-2
Areas of Potential Hazards



The potential for structural damage due to ground vibration in the planning area is greatest in areas underlain by deep, soft, saturated alluvial soils and least in areas of hard bedrock. Generally, there is some degree of hazard from ground shaking for all locations within the planning area.

A **seiche** is an oscillating wave in an enclosed or restricted body of water generated by ground motion during an earthquake. The effect of these waves can be to cause the overflow of a lake, reservoir, or lagoon. There is a minimal potential for seiche to occur in the lagoons within the planning area.

A **tsunami** is a high ocean wave generated by a submarine earthquake or volcanic eruption. Such an event anywhere in the Pacific Ocean could threaten inundation of the beaches, lagoons, and harbor with waves up to 10 to 15 feet high. The planning area has not been affected by tsunamis in the past; however, this does not eliminate the potential danger. If a threat should occur, it would come from a distant point of origin, because the Rose Canyon fault is considered too close to shore and of such a structure as to probably not generate a tsunami.

Non-Seismic Geologic Hazards

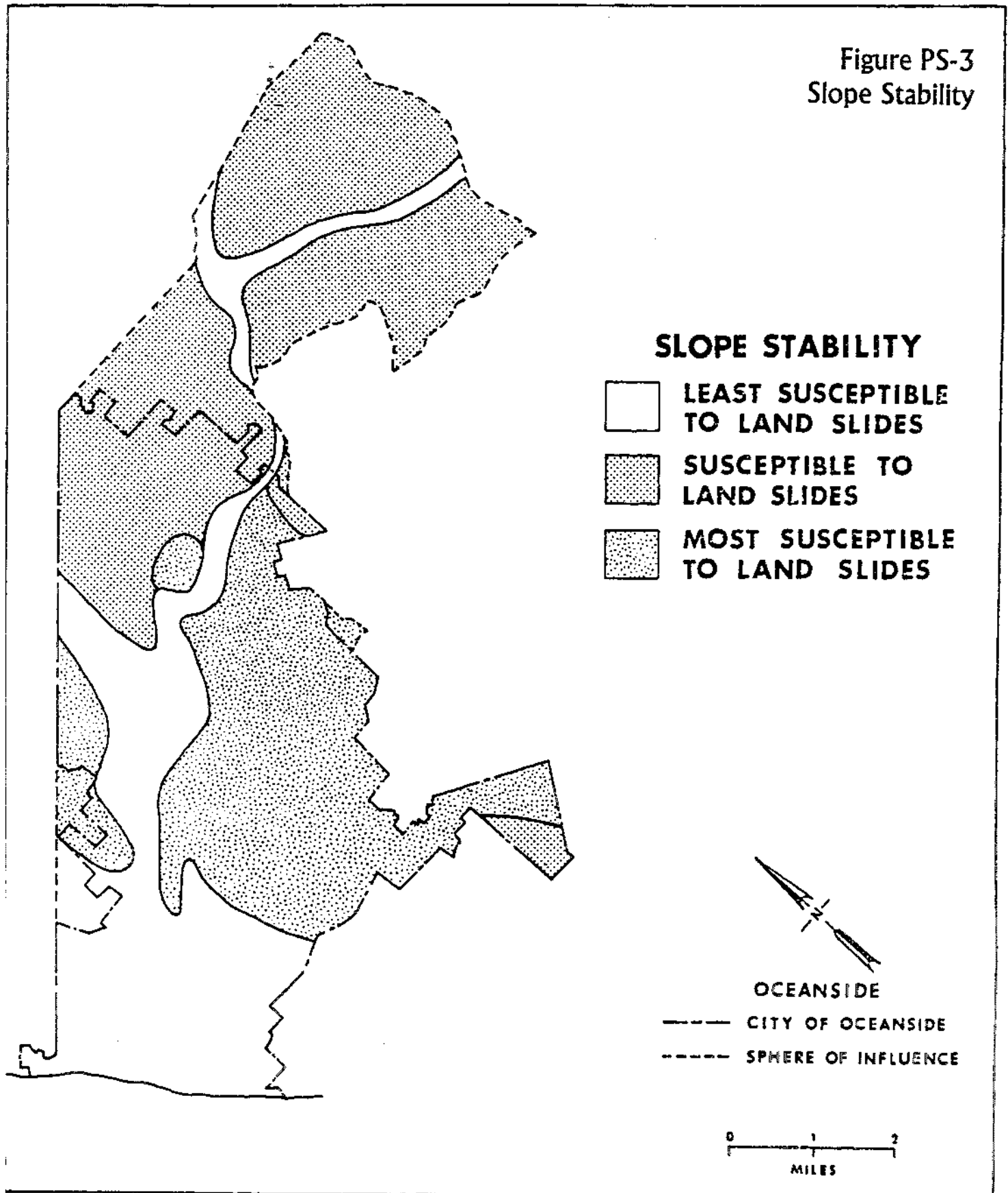
Non-seismic hazards of concern to Oceanside are slope instability, resulting in landslides and slope failure, and erosion. Often, these problems occur as the result of seismic activity, and therefore, their severity and probability for occurring can be related to the probability and severity of earthquakes. A brief description of each hazard is included here. Figure PS-3 shows those areas of the City with a potential for slope instability.

Slope Instability

Susceptibility of slopes to landslides and other forms of slope failure depends on several factors. These are usually present in combination and include, but are not limited to, steep slopes, condition of rock and soil materials, presence of water, formational contacts, geologic shear zones, and seismic activity. Development in a stable, ancient landslide area can result in re-activation of the slide. The La Jolla Group soils are most susceptible to slope instability.

There are no published reports of landslides occurring within Oceanside, nor is there evidence of any found in reconnaissance or aerial photographs. Minor slope movement is occurring throughout the City primarily as soil creep, slumping, and sloughing along road cuts and where soils have accumulated on steep slopes.

Figure PS-3
Slope Stability



Erosion

Erosion is a normal and inevitable geologic process whereby earth materials are loosened, worn away, decomposed or dissolved, removed from one place, and transported to another location. Precipitation, running water, waves, and winds are all agents of erosion. Ordinarily, erosion proceeds so slowly as to be imperceptible, but when the natural equilibrium of the environment is changed, the rate of erosion can be greatly accelerated. This can create aesthetic as well as engineering problems. Accelerated erosion within an urban area can cause damage by undermining structures, blocking storm sewers, and depositing silt, sand, or mud in roads, basements, and tunnels.

Oceanside is presently experiencing four erosion related problems. These include the accelerated erosion in the soft rocks of the La Jolla Group, rapid weathering of granite rocks, siltation of the lagoons, and rapid beach erosion. The most serious of these is the beach erosion, which not only threatens the personal safety and property of beach residents, but also detracts from the tourist industry of the City.

Abatement of Seismic and Geologic Hazards

The major limitation at this time to the elimination of seismic and geologic risk is that there is no available technological capability to control or reduce the actual occurrence of seismic hazards.

The abatement of seismic and geologic hazards is primarily accomplished by regulating land use to some degree in high-risk areas, and by proper engineering practices both before and during construction.

Land Use Regulation

At this time, Oceanside regulates development to a slight degree because of geologic criteria. This is done in the Land Use Element of the General Plan by calling for cluster development and slope preservation in those areas of the City that generally contain steep slope conditions. With the adoption of the Public Safety General Plan Element, those areas subject to a high degree of seismic and geologic problems should be more clearly defined. As indicated in the discussion on risk in the preceding chapter, building and land use types can be classified into three general groups based on their potential for disaster. It is recommended that all Group I buildings and land uses be prohibited in those areas of high seismic and geologic hazard. In addition, other approved development should be required to take the necessary engineering precautions to reduce risk to an acceptable level.

Engineering Practices

1. Grading Regulations - The City currently has a Grading Ordinance in place (Ordinance No. 73-46) that specifies some criteria concerning maximum slope, yards, storm run-off, slope stabilization, and treatment of expansive soils.

2. **Soils and Geologic Testing** - The City presently requires soil borings to be taken on all proposed building sites prior to the issuance of building permits. These borings are generally routine in nature and are used to identify water table levels and presence of expansive soils, uncompacted fill, etc. The Burkland report identifies several other geotechnical investigations that should be accomplished if a site has been identified as being particularly susceptible to certain geologic problems. Burkland surveyed the City and mapped the severity of problems throughout the City as shown on Figure PS-4. Table PS-1, when used in conjunction with Figure PS-4, identifies the suggested investigations that should be carried out dependent upon the nature of the problem and the type of land use proposed. It is recommended that the City consider adopting appropriate standards and procedures for geologic testing using the Burkland analysis as a guide.

3. **Hillside Ordinance** - Many cities have recently adopted or are considering special provisions governing development on slopes over a specified steepness (15-30 percent). Such regulations may prohibit development in part, specify development patterns and site layout, or regulate the amount of permissible cut and fill.

A hillside ordinance could be of benefit to Oceanside as a means of providing more precise implementation of the "cluster overlay" of the Land Use Element. A study should be authorized to explore the possibilities of developing hillside regulations for Oceanside as either a separate ordinance or as part of the Grading Ordinance.

4. **Building Inspection** - The building inspection program in Oceanside is presently geared toward correcting fire hazards and general structural deficiencies. No specific consideration is given to seismic considerations. It is recommended that consideration be given to identifying structures that constitute a seismic hazard and that public buildings so identified be corrected, demolished, or properly marked with warning signs. In addition, architectural appendages such as cornices and parapets should be periodically inspected for weakness and removed or strengthened if necessary.

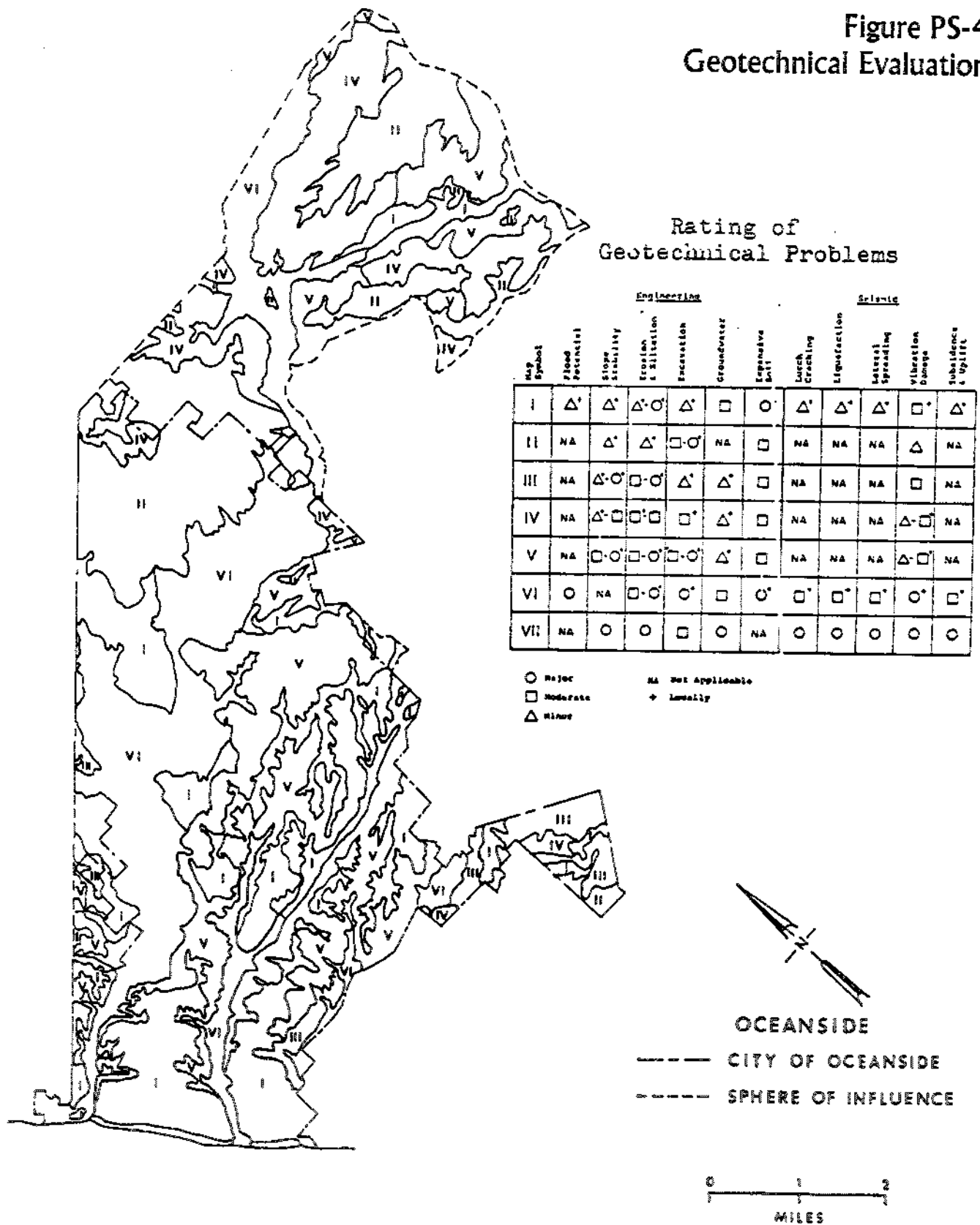
5. **Beach Erosion** - As mentioned previously, the most severe erosion problem in the City is along the beachfront. Solutions to this problem have been under investigation by the Army Corps of Engineers for several years and include possible remedies as submerged breakwaters, a series of rock groins, and beach replenishment. A decision as to which method will prove workable for Oceanside has not



Table PS-1
Recommended Investigations for Various Geotechnical Problems

Map Symbol	Residential	High Rise	Critical Structures	Light Commercial	Heavy Industrial	Site Problems	Routine (R)	Erosion Control (EC)	Detailed (D)
I	EG - R SF - R SH - R EC - R SL - R F - R O - NA	EG - R SF - R SH - D EC - R SL - R F - R O - NA	EG - R SF - R SH - D EC - R SL - R F - R O - NA	EG - R SF - R SH - D EC - R SL - R F - R O - NA	EG - R SF - R SH - D EC - R SL - R F - R O - NA	erosion siltation	drainage control landscaping	In addition to items under routine: erosion rates of rocks or soils siltation control	
II	EG - D SF - R SH - R EC - R SL - R F - NA O - NA	EG - D SF - R SH - D EC - R SL - R F - NA O - NA	EG - D SF - R SH - D EC - R SL - R F - NA O - NA	EG - D SF - R SH - R EC - R SL - R F - NA O - NA	EG - D SF - R SH - D EC - R SL - R F - NA O - NA	faults landslides slope stability grading excavation drainage groundwater	reconnaissance of site review literature and maps prepare generalized geologic map review grading plans inspect during grading prepare AAs built @ geologic map	In addition to items under routine: aerial photograph interpretation prepare detailed geologic map determine subsurface structure analyze: fault potential, groundwater conditions, slope stability geophysical surveys to determine hard rock excavation methods	
III	EG - R SF - R SH - R EC - R SL - D F - NA O - NA	EG - D SF - D SH - D EC - R SL - D F - NA O - NA	EG - D SF - D SH - D EC - R SL - D F - NA O - NA	EG - R SF - R SH - R EC - D SL - D F - NA O - NA	EG - R SF - R SH - D EC - D SL - D F - NA O - NA	faults earthquake effects	generalized evaluation of potential primary and secondary earthquake effects	research earthquake records including site strong motion data establish maximum credible and design earthquakes geophysical investigation for fault locations, micro tremor data, and primary and shear wave velocities dynamic soil response tests computer analysis of dynamic response of soils and rocks	
IV	EG - D SF - R SH - R EC - R SL - D F - NA O - NA	EG - D SF - R SH - D EC - R SL - D F - NA O - NA	EG - D SF - D SH - D EC - R SL - D F - NA O - NA	EG - D SF - R SH - R EC - R SL - R F - NA O - NA	EG - D SF - R SH - D EC - R SL - D F - NA O - NA	soils and foundations	obtain soil samples from various depths, test for applicable engineering characteristics determine groundwater levels, drainage, slope conditions	In addition to items under routine: specialized sampling specialized testing and analysis of soils, consolidation, triaxial testing, permeability, dynamic response recommend specialized foundation designs	
V	EG - D SF - R SH - R EC - D SL - D F - NA O - NA	EG - D SF - D SH - D EC - D SL - D F - NA O - NA	EG - D SF - D SH - D EC - D SL - D F - NA O - NA	EG - D SF - R SH - D EC - D SL - D F - NA O - NA	EG - D SF - D SH - D EC - D SL - D F - NA O - NA	slope stability	generalized analysis of stability based on geologic, soil, and groundwater data	In addition to items under routine: determine subsurface structure geologic analysis of rock structure and proposed slopes analysis of soil data for proposed slopes analyze potential seismic effects on slopes	
VI	EG - R SF - D SH - R EC - D SL - NA F - D O - NA	EG - D SF - D SH - D EC - R SL - NA F - D O - NA	EG - D SF - D SH - D EC - R SL - NA F - D O - NA	EG - R SF - D SH - D EC - D SL - NA F - D O - NA	EG - R SF - D SH - D EC - D SL - NA F - D O - NA	flood	U.S.G.S. Water Resources Division, flood maps California Division of Water Resources publications	determine flood potential based on 100-year or 1000-year storms analyze drainage basin characteristics	
VII	EG - R SF - D SH - D EC - D SL - D F - NA O - D	EG - D SF - D SH - D EC - D SL - D F - NA O - D	EG - D SF - D SH - D EC - D SL - D F - NA O - D	EG - D SF - D SH - D EC - D SL - D F - NA O - D	EG - D SF - D SH - D EC - D SL - D F - NA O - D	beach and sea cliff erosion tsunami	U.S. Corps of Engineers, beach and sea cliff erosion data U.S. Coast and Geodetic Survey, tide, current and storm data California Division of Mines, tsunami hazards maps	In addition to items under routine: determine - longshore currents, maximum storm conditions, sand supply and movement, maximum wave heights, bottom topography, evaluate all control measures as to effects north and south of area, analyze tsunami hazard	
EG - Engineering Geologic SF - Seismic Hazard SH - Slope EC - Erosion Control SL - Slope Stability F - Flooding O - Oceanographic NA - Generally Not Applicable						D - Detailed NA - Generally Not Applicable	R - Routine O - Oceanographic		

Figure PS-4
Geotechnical Evaluation



been made; meanwhile, the City has been replenishing the beach sand by dredging sand from the harbor entrance. The latter is only an interim solution.

Fire Hazards

The danger of fire is probably the most severe hazard faced by the residents of Oceanside. The probability of fire occurring is higher than for any other natural hazard. In 1974 alone, the Oceanside Fire Department answered 527 fire calls, which caused a total of \$382,303 in property losses. This amounts to a loss of over \$7.00 each for every man, woman, and child within the City.

Natural Hazards

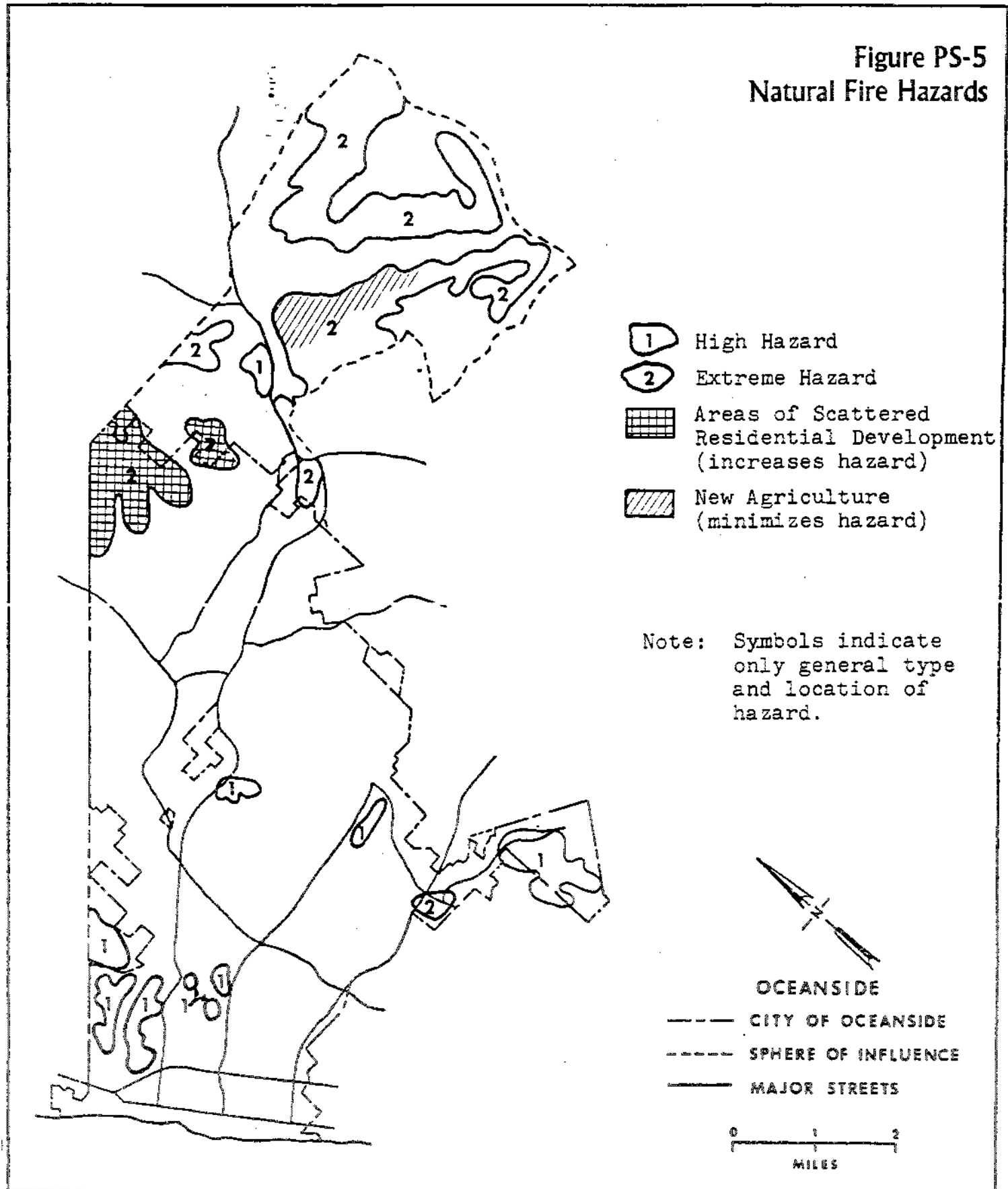
The threat of brushfire is endemic to the Southern California coastal area. Los Angeles County reports nearly 203,000 acres of brushland burned between 1967-1973. In San Diego County, there have been major fires in 1967, 1970, and 1971. The 1970 Laguna Fire resulted in the destruction of 383 homes, 1200 other structures, 225,000 acres of trees and other watershed, and numerous small dams, bridges, and roads, totaling an estimated \$45 million damage.

Responses to brushfires in Oceanside constitutes nearly 1/3 of all fire calls. The City has been very fortunate not to have experienced a major brushfire in recent years because the potential for one has been increasing steadily as residential development has increased into the outlying canyons and mesas. In 1974, there were 166 minor brush fires and grass fires within the City; 95 of these occurred between May and September, of which the highest number, 45, occurred in the month of July.

There are three primary factors that contribute to the brushfire threat in this area – vegetation, climate, and development patterns. The chaparral, sage, and other native vegetation of Southern California is dry and resinous, making it very combustible, especially during the hot summer months. The normal “fire season” is April through November when strong, hot winds of the “Santa Ana” variety compound the problem and can spread a minor fire into a major conflagration in minutes. The current practice of developing “canyon view” subdivisions introduces the potential for loss of homes and lives into the natural hazard. When this occurs, efforts to eliminate fires are often not accompanied by adequate brush and weed abatement and clearance measures. This results in an abnormally high buildup of fuel that increases the potential for a disastrous fire.

Brush fire hazards in Oceanside exist to some degree throughout the City; however, it is “high” only in areas in proximity to residential development. The hazard is rated “extreme” in those areas where the vegetation changes from grass and sage to the denser and more flammable chaparral; an even higher risk occurs where residential development is scattered on large lots, where more of the natural vegetation is preserved, than in the standard single-family development. Such an area of extreme hazard is the northern part of Morro Hills. Figure PS-5 indicates those areas of Oceanside where there is high risk of fire from natural hazards.

Figure PS-5
Natural Fire Hazards



Man-Made Structural Hazards

Fire hazardous structures constitute the greatest man-made fire hazard. These are primarily older structures, characterized by substandard wiring, open stairwells, and obsolete heating facilities. When ignited, fire spreads rapidly inside these structures. Major clusters of these buildings in the downtown area house a variety of commercial and professional uses on the ground floor and low-rent housing units for the poor and elderly on upper floors. A fire in this area could easily spread to other buildings.

High-rise structures, also often occurring in the downtown area, pose another structural hazard. Access of emergency equipment and personnel to the upper stories becomes increasingly difficult. At present, the Oceanside Fire Department can only reach the level of a third-story window (35 feet). Evacuation of a building's occupants, always a problem in high-rise structures, is not even possible at this time from the roof of a three-story building. Internal support systems of such buildings (elevators, ventilation, and water pressure) must also be designed to not fail during a fire when they are most critically needed.

Evacuation of occupants is of primary concern also in places of public assembly such as churches, schools, theaters, and other entertainment and recreation establishments. The concentration of large numbers of people in such facilities provides the potential for mass panic during a crisis such as fire, often resulting in more damage and injury than the fire itself. It is essential that such structures be designed with adequate, well-marked emergency exits and public address systems that would not be rendered inoperable because of fire.

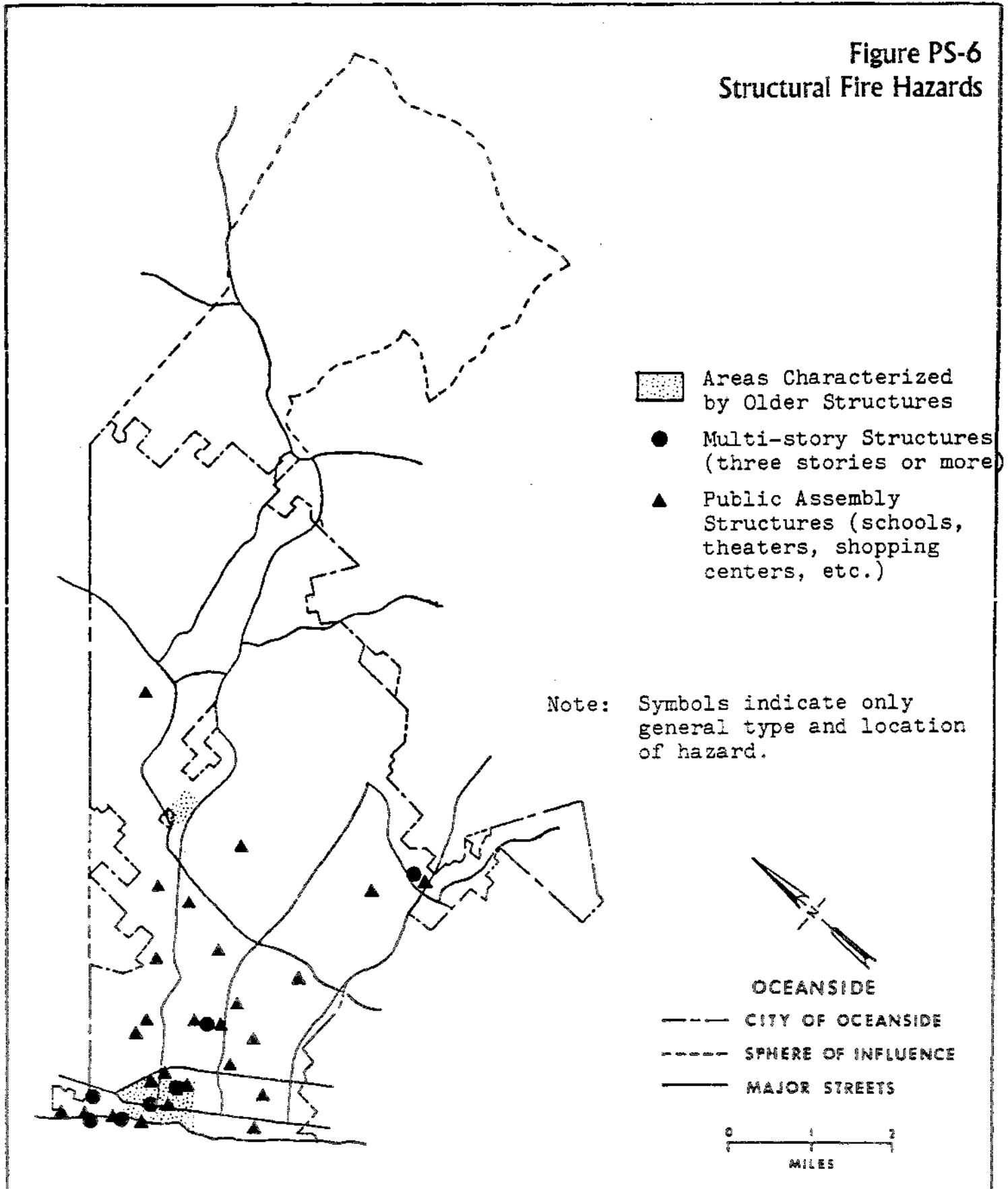
Not all structural hazards are limited to the downtown and other high-density areas. Suburban homes with untreated shake roofs and inadequate side yard access pose just as serious problems in fire control and occupant evacuation. Local Building and Zoning codes must, therefore, contain provisions for elimination of such problems.

In Oceanside, there are several areas where these structural hazards are cause for concern. New high rise construction among older substandard structures downtown is one such area. Any facility in the City designed to accommodate large numbers of people such as shopping centers and schools always contain the potential for disaster. These areas and others are indicated on Figure PS-6.

Man-Made Non-Structural Hazards

Non-structural hazards concern not only the juxtaposition of inherently hazardous to non-hazardous urban activities but also the entire urban infrastructure, including access and water supply, which must be adequate to serve the existing and expected intensity of development. Large industrial areas, often including the storage of noxious and flammable gases and liquids, are in themselves a fire hazard that is only compounded when located adjacent to large residential areas. Access points to any area must be adequate in size for the passage of emergency vehicles and adequate in number for the timely evacuation of residents and employees. Hydrants must be of adequate number and design and located properly. Water

Figure PS-6
Structural Fire Hazards



supply must be of sufficient quantity and pressure to meet the demands of fire fighting. Even the street naming, signing, and numbering must be designed to avoid confusion and allow easy identification of areas and structures where emergency assistance is required.

Oceanside, along with most cities, contains all of the above problems to some degree. The most serious of these is probably the inadequate water supply and pressure in the downtown area. The location of non-structural hazards is indicated on Figure PS-7.

Hazards Associated with Annexations of Land within the Eastern Sphere of Influence - San Luis Rey Downs Area

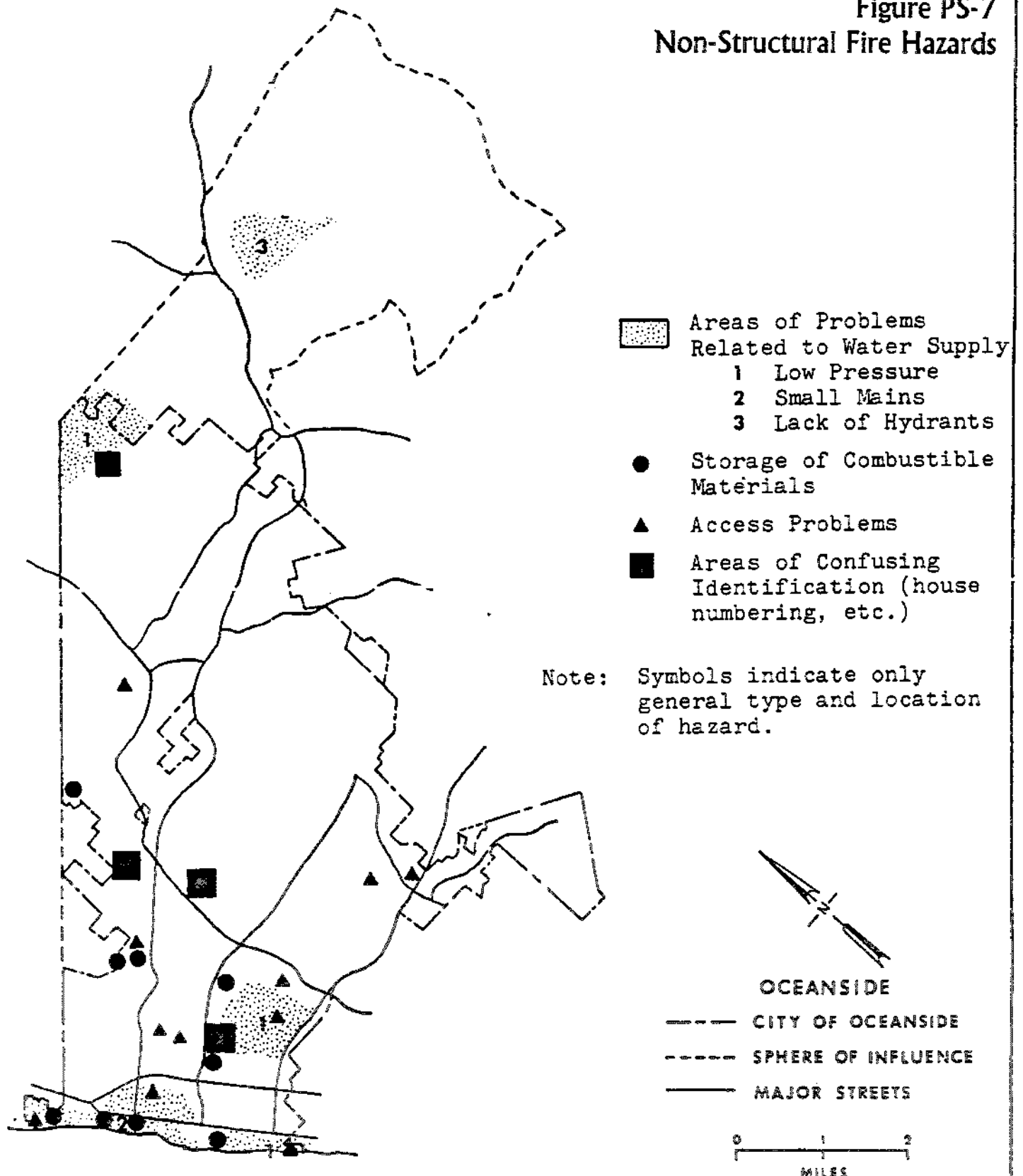
There are several particular problems which would be associated with fire protection for the San Luis Rey Downs area should it ever be annexed to the City. These are summarized as follows:

1. Response Time - from existing fire station #5, response time would be 12-18 minutes, which is over 2-3 times that for the rest of the City.
2. Hydrant Availability - golf club area and fairway estates are very poorly serviced.
3. Radio Communications - inadequate for entire area.
4. Development Patterns - expensive homes with heavy shake roofs often surrounded by heavy growth of natural brush.
5. Climate - very hot and dry during summer months, contributing to brushfire hazard.

The Oceanside Fire Department feels that trying to service this area with existing facilities would significantly decrease the level of service provided to the rest of the City. In addition, the overall insurance rating of the City would be lowered, thereby creating higher insurance rates for everyone. To correct the anticipated problems, they suggest the following steps to be taken upon annexation:

1. Construction of a fire station and purchase of all necessary equipment to furnish the station.
2. Purchase of an engine and all necessary equipment.
3. Purchase of an ambulance and all necessary equipment.
4. Purchase and installation of adequate fuel tanks.
5. Expansion of telephone and radio facilities.

Figure PS-7
Non-Structural Fire Hazards



6. Hiring, training, and equipping twelve (12) additional personnel.
7. Providing additional services such as supplies to the station and fire prevention activities.
8. Promotions of two (2) captains and (2) engineers.
9. Additional fire hydrants.

Abatement of Fire Hazards

Fire hazards mitigation measures fall into four broad categories as seen in the following four objectives of the Oceanside Fire Department:

1. Prevent fires from starting.
2. Prevent loss of life and property when a fire does start.
3. Confine a fire to the place of its origin.
4. Put out the fire.

Firefighting Facilities

The City of Oceanside owns and operates five fire stations, providing a three- to five-minutes response time to all areas within the City. The locations of the stations and their respective service areas are shown on Figure PS-8. Tables PS-2 and PS-3 indicate the equipment and manpower levels of the department at this time. The only serious deficiency as previously noted is the lack of an aerial ladder to service high rise structures. Steps have been taken, however, to correct this, and it is estimated that the department will acquire the ladder within the next two years.

The only other anticipated problem in providing adequate firefighting facilities for the City would occur upon annexation of any additional land to the east, particularly in the San Luis Rey Downs areas, as cited above.

Figure PS-8
Firefighting Facilities

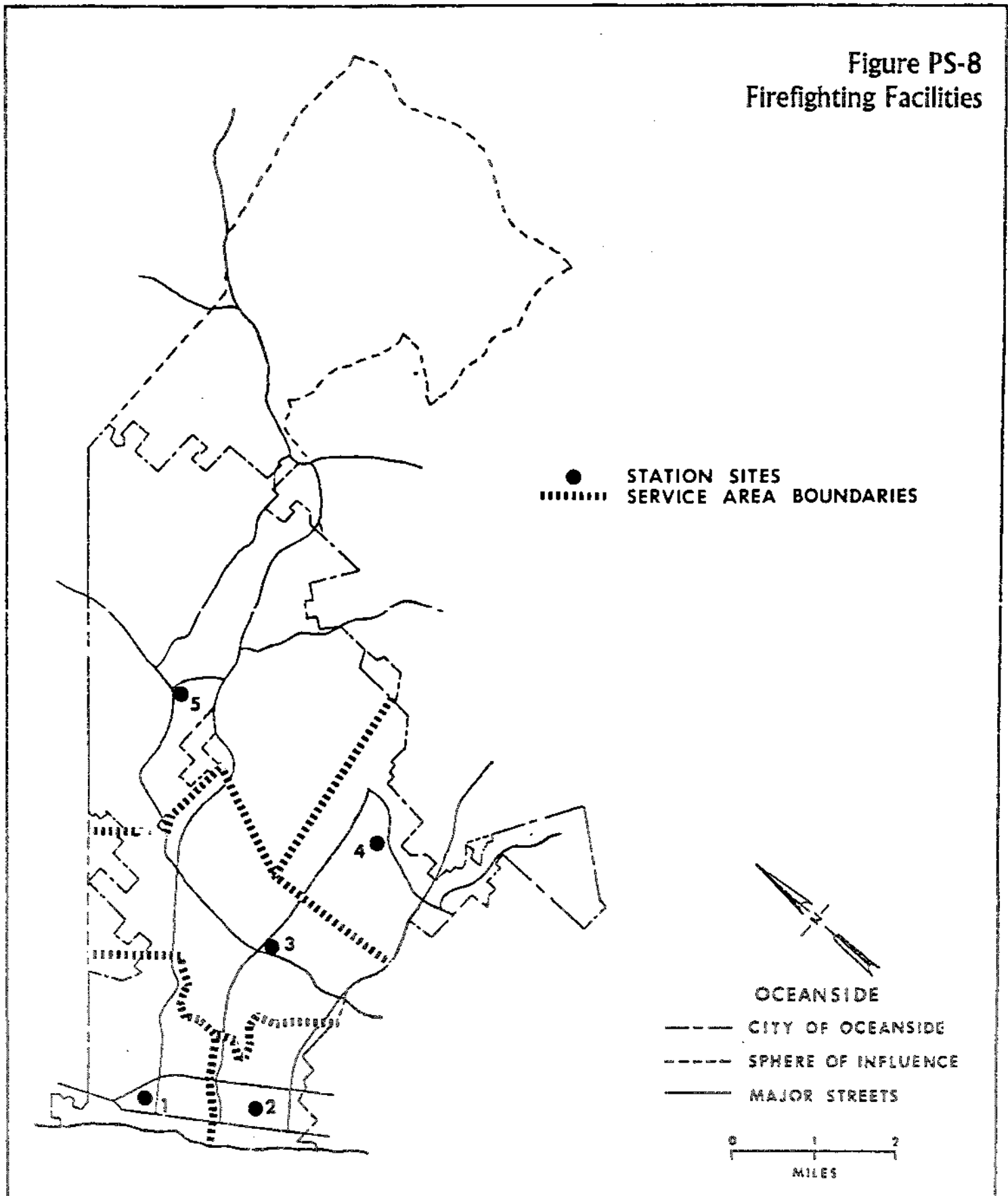


**Table PS-2
Fire Department Equipment**

F-1 1966 Ford - Sedan Radio	F-18 1970 Mack - 1250 gal Pumper Radio
F-2 1948 Mack - 750 gal Pumper Radio	F-19 1958 International Grass Rig Radio
F-4 1953 Mack - 1000 gal Pumper Radio	F-20 1973 Dodge Ambulance Radio (radio prop. of S.D. County)
F-7 1955 International 6x6 Grass Rig Radio	F-21 1973 Chevrolet Van-Reserve Amb. Radio (radio prop. of S.D. County)
F-10 1963 Seagraves - 1250 gal Pumper Radio	F-22 1973 Dodge Wagon - Station wagon Radio
F-11 1965 Ford - Sedan Radio	F-23 1973 International - 1000 gal Pumper Radio
F-14 1967 Seagraves - 1250 gal Pumper Radio	F-24 1974 Dodge - Ambulance Radio (radio prop. of S.D. County)
F-16 1969 Dodge - Sedan Radio	F-25 1974 Matador - Sedan Radio
F-17 1970 Chevrolet Pick-up Radio	F-26 1974 Matador - Sedan Radio
Source: Oceanside Fire Department	

**Table PS-3
Fire Department Manpower**

1	Fire Chief
1	Assistant Chief
2	Battalion Chiefs
1	Fire Marshal
1	Training Officer
11	Captains
12	Engineers
49	Firemen
1	Full Time Secretary
1	Part Time Secretary
Source: Oceanside Fire Department	

Fire Prevention Measures - Structural Hazards

The Code of the City of Oceanside, Chapter 11, establishes criteria governing fire protection within the City. These criteria are supplemented in part by additional standards contained within the City Building Code, Subdivision, and Zoning Ordinances. The more significant measures adopted by the City are outlined below by appropriate code or ordinance sections.

1. Uniform Code Adoptions – Adoption of Uniform Fire Code, 1971 edition, as recommended by the Western Fire Chiefs' Association and the International Conference of Building Officials (Code Section 11.15) and adoption of Uniform

Building Code Standards, 1973 edition, published by International Conference of Building Officials (Code Section 6.1).

Adoption of the latest edition of the uniform codes is essential if the City is going to require the most modern practices of construction and fire prevention. Because the current fire code is four years old, a later edition should be reviewed and adopted if it is found to contain significant advances over those contained in the 1971 edition.

2. Access Standards – The City requires all roads and fire access lanes to be a minimum of 28 feet in width. It also specifies maximum distances of structures from access points, paving criteria for access roads, design criteria for turning areas, and minimum overhead clearances (Code Section 11.26).
3. Clearances Around Structures – Minimum front, rear, and side yard clearances are established by zone in the City's Zoning Ordinance. For residential structures, these are: 20 feet front yard, 15 feet rear yard and side yards equal to 10 percent of the lot width but not less than 3 feet (Zoning Ordinance Section 1701, et seq.). In addition, the City Code specifies minimum clearances around roof signs to be 3 feet in all directions (Code Section 3.24).

The minimum side yard clearance of 3 feet on lots of 30 feet in width or less poses some problems in enforcing firewall requirements of the Uniform Building Code. It also somewhat hampers firefighting operations, especially if extensive landscaping is present. The City should consider requiring a minimum 5-foot side yard on all lots regardless of lot width.

4. Alarm and Sprinkler Systems – All three-story apartments and hotels or those containing more than 15 or 20 units respectively must have alarm systems (Code Section 11.18). All non-residential structures 1,500 to 24,000 square feet in size must have fire detector systems. All structures over 15,000 square feet must be fully protected by an automatic fire sprinkler system ((UBC Section 38).
5. Establishment of Fire Zones – The City is divided into Fire Zones 1, 2, and 3 (Code Section 6.18 et. seq). Construction within these zones is regulated by the provisions of the Uniform Building Code.
6. Abatement of Substandard Structures – The City could abate substandard structures when they are obviously deteriorated to the point of being a menace to the public health and safety (UBC Section 203). Aggressive enforcement of this provision could probably help rid the City of many vacant, unsightly, and unsafe structures, especially in the downtown area. Another provision of the Code calls for bringing substandard buildings up to Code requirements when the cost of proposed renovations to such buildings exceeds more than 50 percent of building value (UBC Section 104 (a)). The City does actively enforce this provision.

Fire Prevention Measures - Non-Structural Hazards

1. Regulation of Flammable Liquids Storage – Such storage can only be done in an M zone, except that above-ground storage is strictly prohibited in the downtown area (Code Section 11.20). All such uses must be granted a Conditional Use Permit (Zoning Ordinance Article 15). Special requirements also apply to storage of such items in areas subject to flooding (UFC Appendix A, adopted by Code Section 11.18).
2. Water Supply – Water supply requirements are specified by land use type, the lowest being 1,000 gallons per minute for one and two-family residential development. Water mains must have a minimum inside diameter of 6 inches; one hydrant is required for every 90,000 square feet of net land area (80,000 square feet for industrial and commercial uses). Hydrant design and spacing is also specified (Code Section 11.26).

As indicated on Figure PS-6, there are a few areas of the City where the water supply is not up to code criteria. The problem in the downtown area, specifically, is caused by inadequate water mains (2" and 4"). The City should take action as soon as possible to correct these problems, especially in those downtown areas where other structural problems create a hazard in themselves.

3. Beach Fire Regulations – Campfires are prohibited on the Oceanside beach except in those areas designed by the City Parks and Recreation Department (Code Sections 19.2, 19.3).

Fire Prevention Measures - Natural Hazards

1. Weed and Rubbish Abatement – City Council can order removal of brush and rubbish after declaring such to be a hazard to the public welfare (Code Section 13.34, et seq.).
2. Suppression and Control of Hazardous Fire Areas – Special provisions limit activities and require brush removal within hazardous fire areas (UFC, Appendix E adopted by Code Section 11.18).
3. Construction of Firebreaks – Each year a 75 to 100 foot firebreak is constructed by Camp Pendleton along the Oceanside-Camp Pendleton boundary. This firebreak, in conjunction with the efforts of the Camp's eight engine companies (117 personnel) has been successful in preventing fires from spreading from Camp Pendleton to the City.

Flooding Hazards

In spite of its dry, coastal desert climate, the Southern California area is very susceptible to periodic damaging floods. The small amount of rainfall (10.7 inches per year) occurs primarily during the winter months, often concentrated in storm periods of several days duration. It is this heavy concentration of rainfall, coming at a time when the ground water level is seasonably high, that causes flooding to occur. Recent urban development on hillsides and in floodplains has increased the rate and amount of storm runoff, and the flood potential.

Natural Flooding

Floods have been recorded in San Diego County since 1770. The most disastrous occurred in 1862, 1916, and 1927; minor floods also occurred in 1938, 1961, and 1969. On the average, the County has been subjected to some degree of damaging flood once every 10 to 15 years.



Oceanside has not been exempt from flood damage. There are three flood prone areas within the City – San Luis Rey River Valley, Loma Alta Creek bed, and Buena Vista Creek bed. Of these, the largest is the San Luis Rey Valley, which is of regional significance and which historically receives heavy damage from flooding. In the 1916 flood, the San Luis Rey Valley was inundated virtually from bank to bank for about 1.5 miles, covering an area of about 1,000 acres. Most of the farms in the lower portion of the Valley were destroyed or damaged, and three to six feet of sand and silt remained when the flood water subsided. On March 8, 1968, an intense local storm flooded several areas of downtown Oceanside, inundating at least 100 homes and businesses, forcing radio station KUDE to shut down and disrupting traffic and business. The floods of 1969 caused \$2.7 million in public and private property damage in the

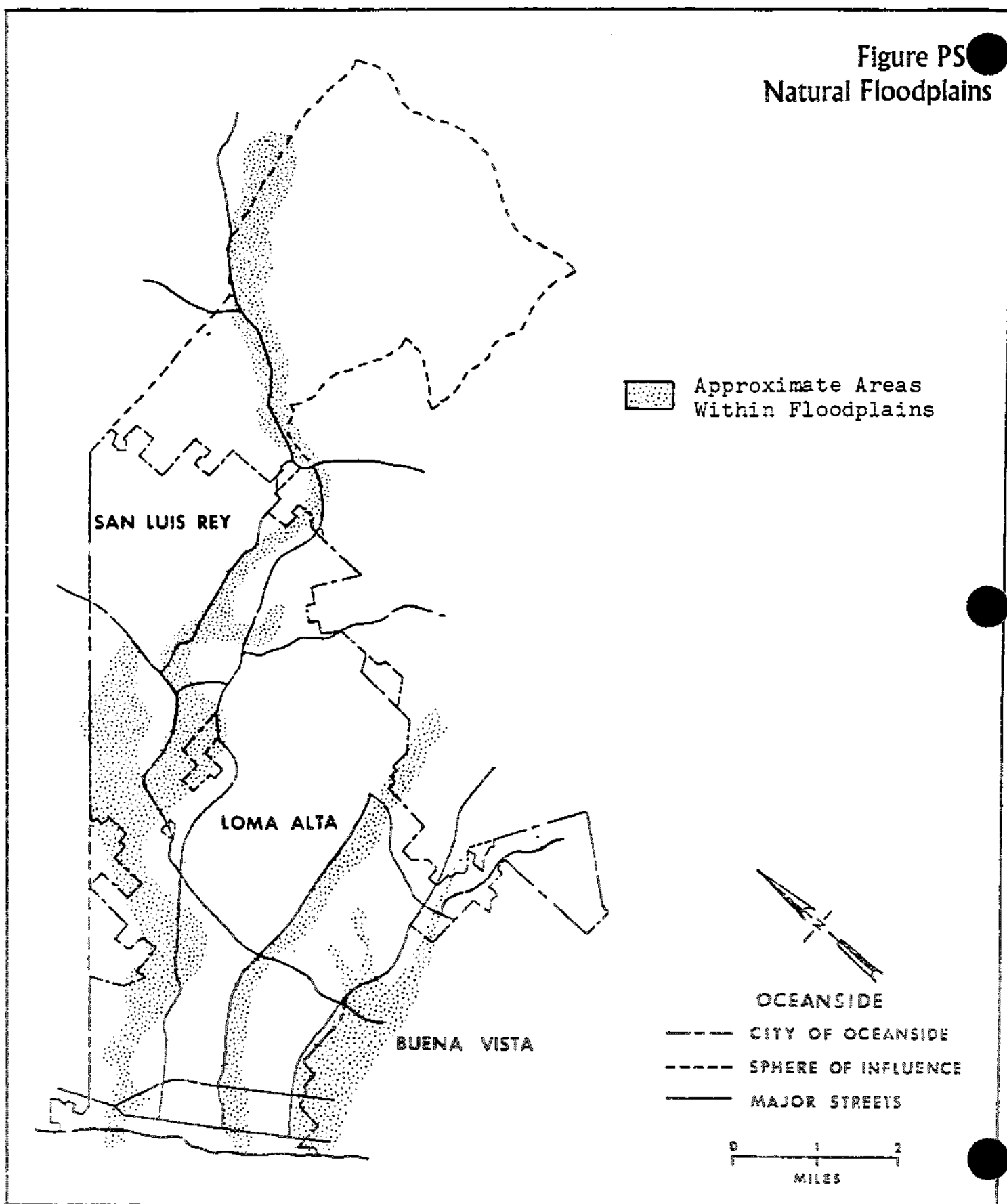
County, three-quarters of which occurred in the Santa Margarita and San Luis Rey basins.

The location and extent of the natural floodplains are shown schematically on Figure PS-9.

Flooding Due to Dam Failure

In addition to the hazards posed by natural flooding, the San Luis Rey Valley is also subject to flooding from failure of Henshaw Dam, the largest man-made reservoir in the County.

Figure PS
Natural Floodplains



Henshaw Dam, owned and operated by the Vista Irrigation District, was designed to create a lake with a capacity of 203,581 acre/feet of water (an acre-foot is the amount of water necessary to cover an acre of area to a depth of one foot: approximately 325,850 gallons). Since the dam's construction in 1922, the State has determined that its large capacity is not really necessary, and according to the irrigation district, action has been taken to limit the lake's capacity to 50,000 acre feet. This will require reconstruction of the spillway, and pending this, the State is limiting capacity to 18,000 acres feet.

Presently, Henshaw Lake contains only 5,200 acres feet. During the last 10 years, the water level has varied between 2,000 and 50,000 acres feet, averaging about 11,600 acres feet over any 12-month period. The irrigation district attempts to maintain a minimum level of 3,000 acres feet, relying on the seasonal rainfall and ground water from about 25 wells in the Henshaw basin. The lake is generally at its highest level during March and April and at its lowest level in September and October.

Henshaw dam is an earthfill dam that is not subject to the sudden catastrophic failure usually associated with concrete arch-type dams. Even if failure did occur, it would be of a slower, erosive type, resulting in less severe peak flows, allowing ample time for evacuation of downstream residents.

Figure PS-10 shows schematically the general area of the City that would be subject to flooding upon failure of Henshaw Dam from seismic activity or for any other reason (structural failure, sabotage, etc.).

Detailed inundation maps are available for study at the Oceanside Planning Department or from Vista Irrigation District. The inundation area shown assumes:

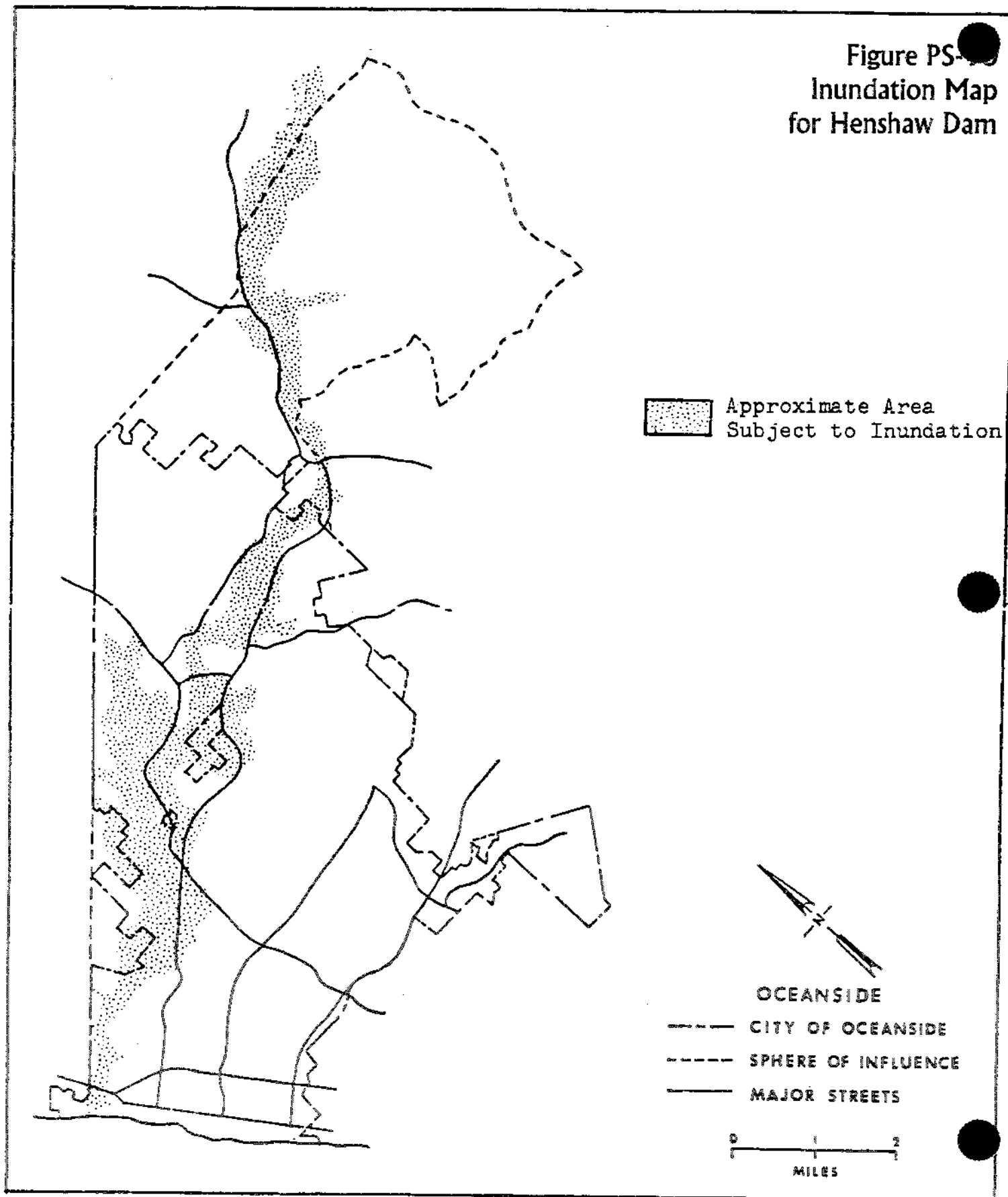
1. That Henshaw Lake will be at capacity of 50,000 acre feet, and
2. That a flood of a 10-year magnitude will be taking place in the Valley.

If either of these two conditions is not present at the time of dam failure, then, of course, the resulting flood would be less severe than the maps indicate.

Abatement of Flooding Hazard

As mentioned earlier, this element is concerned primarily with the flooding hazard presented by possible failure of Henshaw Dam. Mitigating this hazard could be accomplished through either modifications to the dam design, regulation of land uses in the potential inundation area, or construction of a river channel of sufficient size to handle anticipated flood flows.

Figure PS-99
Inundation Map
for Henshaw Dam



Modification to Dam Design

Henshaw Dam was originally designed to contain more than 200,000 acre feet of water. Recent State actions will cause the dam spillway to be redesigned for a capacity of only 50,000 acre feet. Until the modification can be accomplished, the State is limiting the capacity to 18,000 acre feet. This action in itself has greatly reduced the potential flooding hazard.

The dam will undergo inspection in the summer of 1975 for evidence of any signs of stress. No visible signs of stress have been observed thus far. If any structural deficiencies are found, corrective action will be taken.

Channel Construction

Oceanside has been advocating for several years the construction of a flood channel through the San Luis Rey Valley of sufficient size to handle a potential 100-year flood. This would be more than adequate size to handle any anticipated flooding caused by failure of the Henshaw Dam. Presently, City policy is to require adjacent property owners to construct reasonable channel improvements concurrent with development of their land. An application for financial assistance under the Federal Economic Development Act has been contemplated.

Land Use Regulation

Pending completion of the proposed flood channel, the best way to reduce the potential of life and property loss within the flood inundation area is to regulate land uses. Oceanside has recently received maps from the Army Corps of Engineers delineating the natural 100-year flood plain and floodway. These maps, together with the Henshaw Dam inundating maps, should indicate the areas of most severe flood potential; i.e., the flood way. Within these areas, all urban land uses should be prohibited, allowing only agricultural and other open space uses. Within areas of less severe hazards, Group I buildings should be prohibited and other development should be of low-density type.

Civil Disaster Preparedness

In spite of the preventive measures that may be taken by Oceanside, risk levels will never be reduced to zero. For this reason, the City is prepared to take the action necessary to minimize life and property damage.

Emergency Plan

On December 12, 1973, the City of Oceanside adopted an Emergency Plan that forms the basis for the conduct and coordination of emergency operations within the City. The plan is designed to permit the City to respond to earthquakes, tsunamis, flood, fire, accident, civil disturbance, storm, pollution, and epidemic. The plan has a threefold purpose:

1. Provide a basis for the conduct and coordination of operations and the management of critical resources during emergencies.
2. Establish a mutual understanding of the authority, responsibility, functions, and operations of civil government in the City of Oceanside during an emergency.
3. Provide a basis for incorporating into the City emergency organization those non-governmental agencies and organizations having resources necessary to meet foreseeable emergency requirements.

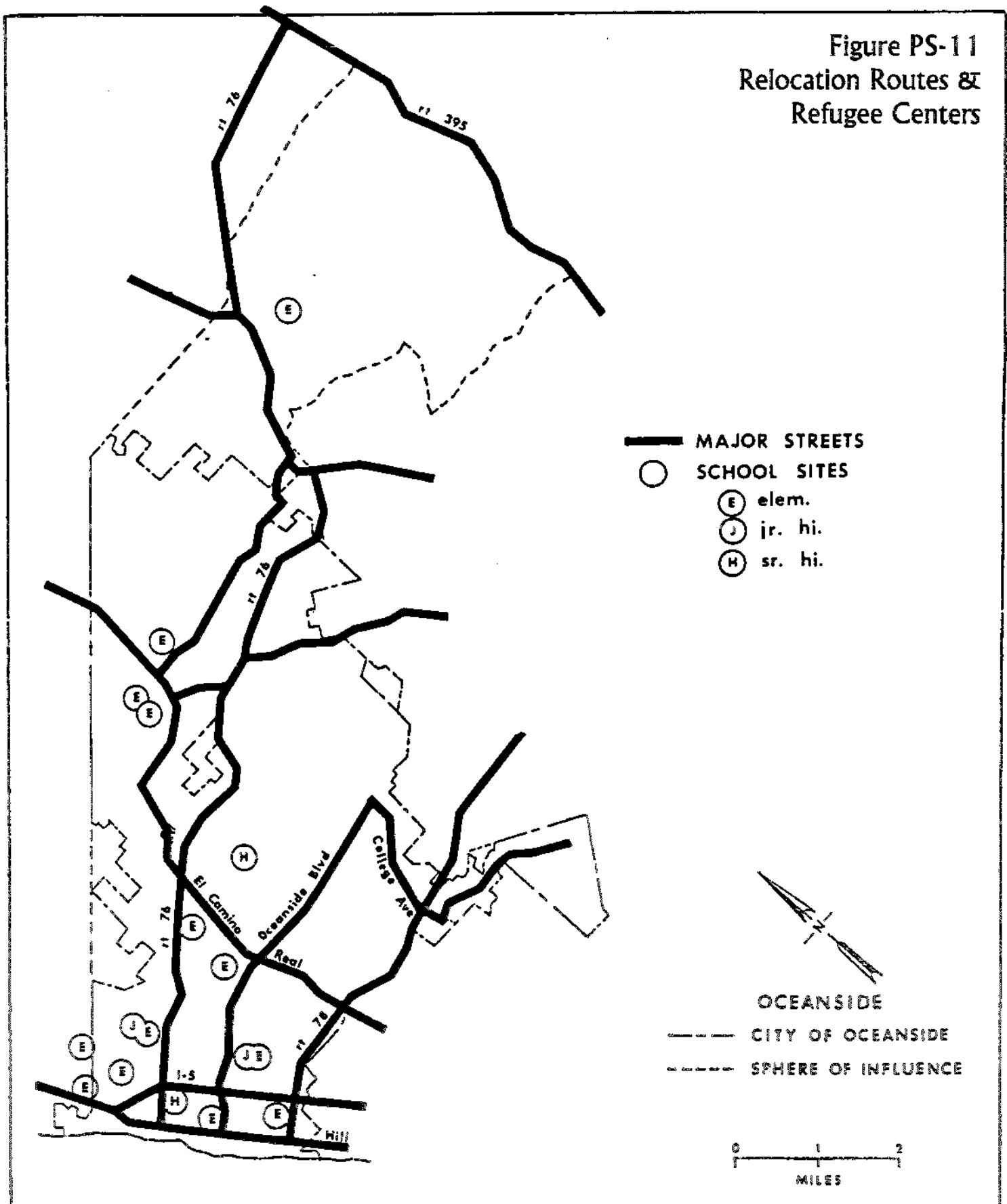
The plan provides for specific organization and tasking of City departments for emergency situations. Manpower requirements, equipment levels, and provisions for communications and mutual aid are also addressed. Copies of the plan may be examined at either the City Planning or Building Department offices.

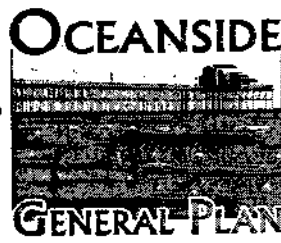
Relocation/Evacuation Routes

In addition to the measures discussed in the Emergency Plan, relocation routes and refuge centers must be established for people who are forced from their homes during a disaster. The main through streets and highways within the City would, of course, be the primary relocation routes. The schools would serve as refuge centers, capable of providing food and shelter to many people. The routes and school sites are indicated on Figure PS-11.



Figure PS-11
Relocation Routes &
Refugee Centers





PUBLIC SAFETY ELEMENT APPENDIX



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ATTACHMENT “2”



State of California
California Natural Resources Agency
Department of Water Resources
Division of Safety of Dams



Dams Within Jurisdiction of the State of California

September 2018

Dams Listed Alphabetically by Dam Name

Dams Within Jurisdiction of the State of California

Dams Listed Alphabetically

By Dam Name

September 2018



Photo used with permission from the
City and County of San Francisco

DSOD – Data Definitions – Page i

Dam Number

Unique identification number used for inventorying dams in California based on the jurisdictional status of a dam. This number is assigned and used by the Division of Safety of Dams (DSOD).

National Inventory of Dams Identification Number (National ID No.)

Unique identification number used for inventorying dams in the U.S. Army Corp of Engineers' National Inventory of Dams (NID) database. DSOD is responsible for assigning this number for dams in California.

Dam Name

The dam name as given by the owner, which may not be unique and may differ from the name of the lake.

Owner Name

The entity or person with legal responsibility for the dam.

Owner Type

Owners are organized into the following categories:

- Associations (Home Owners Associations, etc.)
- City, city agency, or city district
- County, county agency, or county district
- Individual owner/Private citizen (Owner Name not provided)
- Park, sanitation, utility, or water district
- Private company, corporation, LLC, or partnership
- Private trusts and estates
- State Agency
- Water agency or authority

Dam Height

Vertical distance from the downstream toe of the dam to the dam crest (measured in feet).

Crest Length

Distance measured along the dam crest from one abutment to the other (measured in feet).

Reservoir Capacity

Maximum amount of water that the dam can impound (measured in acre-feet).

Dam Type

A four letter code describing and categorizing the principal material, style, or construction method of the dam:

• CORA Constant Radius Arch	• MULA Multiple Arch
• CRIB Crib Wall	• RECT Reinforced Concrete Tank
• ERRK Earth and Rock	• ROCK Rock Fill
• ERTN Earthen Embankment	• SLBT Slab and Buttress
• FLBT Flashboard and Buttress	• VARA Variable Radius Arch
• GRAV Gravity	• INFL Inflatable
• HYDF Hydraulic Fill	• RCC Roller Compacted Concrete

Certified Status

The certified status of a dam is one of three statuses:

Status	Description
Certified	Jurisdictional sized dams that may safely impound water to the elevation specified on the Certificate of Approval.
Certified/Inop	Jurisdictional sized dams without water impounding capabilities under reasonable foreseeable conditions, taking into account the size of the drainage area.
Not Certified	Jurisdictional sized dams that operate without a Certificate of Approval. Generally, these dams are in the process of becoming certified, altered to less than jurisdictional size, or being removed.

DSOD – Data Definitions – Page ii

Downstream Hazard

The downstream hazard is based solely on potential downstream impacts to life and property should the dam fail when operating with a full reservoir. This hazard is not related to the condition of the dam or its appurtenant structures. The definitions for downstream hazard are borrowed from the Federal Guidelines for Inundation Mapping of Flood Risks Associated with Dam Incidents and Failures (FEMA P-946, July 2013). FEMA categorizes the downstream hazard potential into three categories in increasing severity: Low, Significant, and High. DSOD adds a fourth category of “Extremely High.”

Downstream Hazard Potential Classification	Potential Downstream Impacts to Life and Property
Low	No probable loss of human life and low economic and environmental losses. Losses are expected to be principally limited to the owner's property.
Significant	No probable loss of human life but can cause economic loss, environmental damage, impacts to critical facilities, or other significant impacts.
High	Expected to cause loss of at least one human life.
<i>Extremely High</i>	Expected to cause considerable loss of human life or would result in an inundation area with a population of 1,000 or more.

Condition Assessment

California DSOD uses NID's condition rating definitions, with additional criteria, as a guideline in assigning condition assessments.

Rating	National Inventory of Dams Definitions	California DSOD Additional Criteria
Satisfactory	No existing or potential dam safety deficiencies are recognized. Acceptable performance is expected under all loading conditions (static, hydrologic, seismic) in accordance with the applicable regulatory criteria or tolerable risk guidelines	None
Fair	No existing dam safety deficiencies are recognized for normal loading conditions. Rare or extreme hydrologic and/or seismic events may result in a dam safety deficiency. Risk may be in the range to take further action	• Dam has a long-standing deficiency that is not being addressed in a timely manner • Dam is not certified and its safety is under evaluation • Dam is restricted and operation of the reservoir at the lower level does not mitigate the deficiency
Poor	A dam safety deficiency is recognized for loading conditions that may realistically occur. Remedial action is necessary. A poor rating may also be used when uncertainties exist as to critical analysis parameters that identify a potential dam safety deficiency. Further investigations and studies are necessary	Dam has multiple deficiencies or a significant deficiency that requires extensive remedial work
Unsatisfactory	A dam safety deficiency is recognized that requires immediate or emergency remedial action for problem resolution	None
Not Rated	The dam has not been inspected, is not under State jurisdiction, or has been inspected but, for whatever reason, has not been rated	None

Reservoir Restrictions

DSOD may direct or order an owner to operate the reservoir to a specified water surface elevation level that is lower than the maximum storage level. In addition, owners may self-impose a restriction as a result of an owner-initiated study that identifies a dam safety issue. Reservoir restrictions are typically imposed for deficiencies of the dam, spillway, low-level outlet, or other appurtenances with respect to dam safety.



Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018
Page
1 of 101



Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

95.004	#1 Forebay		Pacific Gas and Electric Company	19	69	Certified	Fair	Madera
CA00338	37.16	-119.49	Private company, corporation, LLC, partnership	1,572	ERTH	Low	Yes	1896

95.012	#2 Reservoir		Pacific Gas and Electric Company	30	168	Certified	Satisfactory	Madera
CA00342	37.24	-119.52	Private company, corporation, LLC, partnership	113	CORA	High	No	1912

95.006	#3 Forebay		Pacific Gas and Electric Company	39	20	Certified	Satisfactory	Madera
CA00339	37.25	-119.53	Private company, corporation, LLC, partnership	450	ERTH	Low	No	1906

1049.000	10 MG WALTERIA		City of Torrance	40	31	Certified	Satisfactory	Los Angeles
CA00881	33.79	-118.34	City, city agency, or city district	1,022	RECT	High	No	1953

1049.002	18 MG WALTERIA		City of Torrance	31	58	Certified	Satisfactory	Los Angeles
CA01193	33.79	-118.34	City, city agency, or city district	1,287	RECT	High	No	1987

1087.000	30 MG CENTRAL RESERVOIR		City of Brea	30	92	Certified	Satisfactory	Orange
CA01113	33.93	-117.91	City, city agency, or city district	1,596	ERTH	High	No	1924

1836.000	4-S RANCH RECLAMATION RESERVOIR		Olivenhain Municipal Water District	22	410	Certified	Satisfactory	San Diego
CA01446	33.01	-117.11	Park, sanitation, utility, or water district	1,270	ERTH	High	No	2000

Count: 7

A

Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018

Page
2 of 101

A

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

1110.002	A and C		Private Entity	13	800	Certified	Satisfactory	Modoc
CA00915	41.78	-120.80	Individual owner	1,200	ERTH	Low	No	1923

346.000	A. L. Chaffin		Estate of George R. Chaffin	65	450	Certified	Satisfactory	Butte
CA00552	39.60	-121.59	Private trusts and estates	475	ERTH	Low	No	1957

3462.002	Abrams		Private Entity	37	110	Certified	Satisfactory	El Dorado
CA01065	38.85	-120.98	Individual owner	285	ERTH	Low	No	1950

1038.000	Ada Rose, Lake		Brooktrails Township Community Services District	50	138	Certified	Satisfactory	Mendocino
CA00871	39.43	-123.38	Park, sanitation, utility, or water district	590	ERTH	High	No	1964

1011.000	Adobe Creek		Lake County Watershed Protection District	36	695	Certified	Satisfactory	Lake
CA00827	38.94	-122.89	Park, sanitation, utility, or water district	1,280	ERTH	High	No	1962

2463.000	Aeree		Pilot Hill Estates Homeowner Association	35	90	Certified	Satisfactory	El Dorado
CA01048	38.84	-121.03	Associations	905	ERTH	Significant	No	1951

104.038	Agnew Lake		Southern California Edison	30	810	Certified	Satisfactory	Mono
CA00454	37.76	-119.13	Private company, corporation, LLC, partnership	278	MULA	High	Yes	1916

1012.017	Agua Chinon		County of Orange	41	256	Certified	Satisfactory	Orange
CA01361	33.69	-117.70	County, county agency, or county district	480	ERTH	High	No	1998

849.000	Agua Tibia		Agua Tibia Ranch	35	62	Certified	Satisfactory	San Diego
CA00783	33.36	-117.02	Private company, corporation, LLC, partnership	1,053	ERTH	Low	No	1947

1002.011	Airport Reservoir D		Sonoma County Water Agency	45	315	Certified	Satisfactory	Sonoma
CA01445	38.51	-122.85	County, county agency, or county district	2,125	ERTH	Significant	No	2002

1002.006	Airport Storage Pond		Sonoma County Water Agency	22	290	Certified	Satisfactory	Sonoma
CA01229	38.52	-122.80	County, county agency, or county district	3,700	ERTH	Significant	No	1985

1002.007	Airport Storage Pond 2		Sonoma County Water Agency	20	310	Certified	Satisfactory	Sonoma
CA01202	38.52	-122.81	County, county agency, or county district	3,628	ERTH	Significant	No	1989

1242.000	Albaugh No 1		Private Entity	21	335	Certified	Satisfactory	Lassen
CA00948	41.14	-121.00	Individual owner	835	ERTH	Low	No	1953

1242.002	Albaugh No 2		Private Entity	26	270	Certified	Satisfactory	Lassen
CA00949	41.16	-120.97	Individual owner	4,200	ERTH	Low	No	1966

A

Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018

Page
3 of 101

A

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

1003.003	Alessandro		Riverside County Flood Control and Water Conservation District	66	370	Certified	Satisfactory	Riverside
CA00798	33.93	-117.37	County, county agency, or county district	470	ERTH	High	No	1956

756.000	Alisal Creek		The Alisal Ranch	93	2,342	Certified	Satisfactory	Santa Barbara
CA00731	34.55	-120.14	Private company, corporation, LLC, partnership	1,100	ERTH	High	No	1971

394.000	Allen		Private Entity	33	85	Certified	Satisfactory	Lake
CA00569	38.93	-122.86	Individual owner	250	ERTH	Significant	No	1955

1017.005	Alluvial Drain Detention		Fresno Metropolitan Flood Control District	12	833	Certified	Satisfactory	Fresno
CA01358	36.86	-119.67	Park, sanitation, utility, or water district	134	ERTH	High	No	1994

72.004	Almaden		Santa Clara Valley Water District	110	2,000	Certified	Fair	Santa Clara
CA00289	37.16	-121.83	Park, sanitation, utility, or water district	500	ERTH	Extremely High	Yes	1936

622.014	Almaden Valley		San Jose Water Company	38	27	Certified	Satisfactory	Santa Clara
CA00681	37.20	-121.84	Water agency or authority	1,100	ERTH	Extremely High	No	1965

31.020	Almond		East Bay Municipal Utility District	30	20	Certified	Satisfactory	Alameda
CA00176	37.71	-122.08	Park, sanitation, utility, or water district	1,040	ERTH	Extremely High	No	1954

33.000	Alpine		Marin Municipal Water District	143	8,892	Certified	Satisfactory	Marin
CA00204	37.94	-122.64	Park, sanitation, utility, or water district	524	GRAV	High	No	1917

108.000	Alpine		Northern California Power Agency	49	4,122	Certified	Satisfactory	Alpine
CA00422	38.47	-120.00	Water agency or authority	395	ROCK	Significant	No	1906

87.006	Alta Loma Basin #1		County of San Bernardino Department of Public Works	30	70	Certified	Satisfactory	San Bernardino
CA00319	34.14	-117.59	County, county agency, or county district	2,600	ERTH	High	No	1964

87.007	Alta Loma Basin #2		County of San Bernardino Department of Public Works	22	85	Certified	Satisfactory	San Bernardino
CA00320	34.14	-117.58	County, county agency, or county district	3,000	ERTH	High	No	1971

789.000	Amargosa Creek		City of Palmdale	65	1,187	Certified	Satisfactory	Los Angeles
CA01406	34.60	-118.24	City, city agency, or city district	480	ERTH	Significant	No	1998

51.000	Anderson Cottonwood		Anderson Cottonwood Irrigation District	24	1,240	Certified	Satisfactory	Shasta
CA00226	40.59	-122.39	Park, sanitation, utility, or water district	455	FLBT	Significant	No	1917

1303.000	Anderson Ranch		Private Entity	47	30	Certified	Satisfactory	Nevada
CA01206	39.30	-121.06	Individual owner	227	ERTH	Low	No	1989

Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018

Page
4 of 101

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

2031.000	Andrew Cademartori		Union Public Utility District	80	142	Certified	Satisfactory	Calaveras
CA01274	38.15	-120.43	Park, sanitation, utility, or water district	520	ERTH	Significant	No	1983

2419.000	Angwin		Pacific Union College	35	156	Certified	Satisfactory	Napa
CA01038	38.58	-122.43	Private company, corporation, LLC, partnership	621	ERTH	Significant	No	1967

1.070	Annadel No 1		California Department of Parks and Recreation	67	395	Certified	Satisfactory	Sonoma
CA00056	38.43	-122.63	State agency	400	ERTH	High	No	1956

1.050	Antelope		California Department of Water Resources	113	22,566	Certified	Satisfactory	Plumas
CA00037	40.18	-120.61	State agency	1,320	ERTH	High	No	1964

1083.002	Antelope		Tehachapi-Cummings County Water District	57	764	Certified	Satisfactory	Kern
CA01213	35.11	-118.44	Park, sanitation, utility, or water district	3,500	ERTH	High	No	1987

1300.002	Anthony House		Lake Wildwood Association	75	3,840	Certified	Satisfactory	Nevada
CA00964	39.24	-121.22	Associations	460	ERRK	Significant	No	1970

3.000	Antioch Res		City of Antioch	30	722	Certified	Satisfactory	Contra Costa
CA00057	37.98	-121.81	City, city agency, or city district	450	ERTH	Extremely High	No	1935

5413.000	Araujo Reservoir No. 1		Kerwin Estate, LLC	39	22	Not Certified	Fair	Napa
CA01607	38.59	-122.55	Private company, corporation, LLC, partnership	350	ERTH	High	No	1950

5413.002	Araujo Reservoir No. 2		Kerwin Estate, LLC	33	20	Not Certified	Fair	Napa
CA01608	38.59	-122.55	Private company, corporation, LLC, partnership	230	ERTH	High	No	1950

31.030	Argyle No 2		East Bay Municipal Utility District	27	22	Certified	Satisfactory	Contra Costa
CA00186	37.98	-122.29	Park, sanitation, utility, or water district	875	RECT	Extremely High	No	1970

471.000	Arroyo Seco		Greenrock Ranch Lands, LLC	67	2,433	Certified	Satisfactory	Amador
CA00613	38.36	-121.00	Private company, corporation, LLC, partnership	1,175	ERTH	Significant	No	1957

86.010	Arundell Barranca		Ventura County Watershed Protection District	57	155	Certified	Satisfactory	Ventura
CA01412	34.30	-119.22	County, county agency, or county district	368	ERTH	High	No	1996

1428.000	Asti		E. and J. Gallo Winery	34	325	Certified	Satisfactory	Sonoma
CA00993	38.75	-122.97	Private company, corporation, LLC, partnership	900	ERTH	Low	No	1955

740.000	Atascadero Park		City of Atascadero	18	250	Certified	Satisfactory	San Luis Obispo
CA00723	35.47	-120.67	City, city agency, or city district	500	ERTH	High	No	1918

A

Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018
Page
5 of 101

A

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

3467.000	Auburn Lake Trails		Auburn Lake Trails Property Owners	41	68	Certified	Satisfactory	El Dorado
CA01144	38.92	-120.94	Associations	475	ERTH	Significant	No	1978

1329.003	Auburn Valley Country Club #3		Private Entity	39	200	Certified	Satisfactory	Placer
CA01324	39.00	-121.15	Individual owner	800	ERTH	Significant	No	1959

3461.000	Aukum View		Showcase Ranches Community Services District	32	136	Certified	Satisfactory	El Dorado
CA01063	38.57	-120.71	Park, sanitation, utility, or water district	605	ERTH	Significant	No	1962

622.013	Austrian		San Jose Water Company	185	6,200	Certified	Satisfactory	Santa Clara
CA00680	37.13	-121.93	Water agency or authority	700	ERTH	Extremely High	No	1950

421.000	Axell		Kendall Jackson Wine Estates, LTD	43	155	Certified	Satisfactory	Sonoma
CA00588	38.62	-122.77	Private company, corporation, LLC, partnership	355	ERTH	Significant	No	1952

2420.000	Azalea		Silver Eagle Ranch, LLC	44	85	Certified	Satisfactory	Sonoma
CA01039	38.44	-122.94	Private company, corporation, LLC, partnership	140	ERTH	High	No	1955

Count: 48

Jurisdictional Dams

Listed Alphabetically by Dam Name

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

2410.000	B J Robinson		Private Entity	46	49	Certified	Satisfactory	Napa
CA01033	38.29	-122.22	Individual owner	700	ERTH	High	No	1957

32.024	Bailey Debris Basin		Los Angeles County Department Of Public Works	43	49	Certified	Satisfactory	Los Angeles
CA01150	34.17	-118.06	County, county agency, or county district	585	ERTH	High	No	1954

95.002	Balch Afterbay		Pacific Gas and Electric Company	165	318	Certified	Satisfactory	Fresno
CA00336	36.91	-119.09	Private company, corporation, LLC, partnership	235	CORA	High	No	1928

95.000	Balch Diversion		Pacific Gas and Electric Company	139	1,295	Certified	Satisfactory	Fresno
CA00335	36.92	-119.02	Private company, corporation, LLC, partnership	388	VARA	High	No	1927

104.042	Balsam Meadow		Southern California Edison	127	2,040	Certified	Satisfactory	Fresno
CA01283	37.16	-119.25	Private company, corporation, LLC, partnership	1,325	ROCK	High	No	1986

738.006	BAP Pond 5		Rio Tinto	46	1,114	Certified	Satisfactory	Kern
CA01498	35.05	-117.74	Private company, corporation, LLC, partnership	4,866	ERTH	Low	No	2008

738.007	BAP Pond 6		Rio Tinto	32	1,140	Certified	Satisfactory	Kern
CA01552	35.05	-117.73	Private company, corporation, LLC, partnership	4,891	ERTH	Low	No	2012

738.005	BAP Ponds 1,2,3,4		Rio Tinto	37	1,986	Certified	Satisfactory	Kern
CA01430	35.05	-117.74	Private company, corporation, LLC, partnership	4,000	ERTH	Low	No	2003

1394.000	Bar X Ranch Reservoir # 2		Heart Consciousness Church	30	147	Certified	Satisfactory	Lake
CA01459	38.78	-122.60	Private company, corporation, LLC, partnership	385	ERTH	High	No	2003

1464.000	Barnett		Private Entity	18	115	Certified	Satisfactory	El Dorado
CA00998	38.64	-120.95	Individual owner	688	ERTH	High	No	1948

8.000	Barrett		City of San Diego	161	44,755	Certified	Fair	San Diego
CA00106	32.68	-116.67	City, city agency, or city district	750	GRAV	Extremely High	No	1922

1181.002	Barton		Madison Valley Investment Partners	13	160	Certified	Satisfactory	Siskiyou
CA00928	41.64	-122.45	Private company, corporation, LLC, partnership	570	ERTH	Significant	No	1964

1016.000	Bascherini		Solano Irrigation District	35	19	Certified	Satisfactory	Solano
CA00836	38.37	-121.99	Park, sanitation, utility, or water district	333	ERTH	High	No	1962

1.085	Bass Lake		California Department of Fish and Wildlife	18	223	Certified	Satisfactory	Siskiyou
CA00498	41.70	-122.49	State agency	1,110	ERTH	Significant	No	1949

Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018

Page
7 of 101

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

7000.012	Bassett Brown		Brown Estate Vineyards	36	51	Not Certified	Fair	Napa
CA01337	38.50	-122.28	Private trusts and estates	300	ERTH	Significant	No	1990

2004.002	Battery II		Sacramento Regional County Sanitation District	15	707	Certified	Satisfactory	Sacramento
CA01420	38.44	-121.48	County, county agency, or county district	6,928	ERTH	Low	No	1980

2004.003	Battery III		Sacramento Regional County Sanitation District	12	240	Certified	Satisfactory	Sacramento
CA01421	38.44	-121.48	County, county agency, or county district	4,108	ERTH	Low	No	1983

1118.000	Bayley Res		Alturas Ranches, LLC	20	2,390	Certified	Satisfactory	Modoc
CA00920	41.26	-120.63	Private company, corporation, LLC, partnership	710	ERTH	Low	No	1954

602.002	Bean Hollow #2		Lake Lucerne Mutual Water Company	31	900	Certified	Satisfactory	San Mateo
CA00665	37.21	-122.37	Private company, corporation, LLC, partnership	325	ERTH	Low	No	1938

602.003	Bean Hollow #3		Lake Lucerne Mutual Water Company	40	461	Certified	Satisfactory	San Mateo
CA00666	37.20	-122.37	Private company, corporation, LLC, partnership	405	ERTH	Low	No	1939

104.000	Bear Creek Diversion		Southern California Edison	55	103	Certified	Satisfactory	Fresno
CA00428	37.34	-118.98	Private company, corporation, LLC, partnership	241	CORA	Low	No	1927

581.006	Bear Gulch		California Water Service Company	61	672	Certified	Fair	San Mateo
CA00658	37.43	-122.23	Private company, corporation, LLC, partnership	730	ERTH	Extremely High	Yes	1896

97.061	Bear River		Pacific Gas and Electric Company	83	6,818	Certified	Satisfactory	Amador
CA00379	38.56	-120.22	Private company, corporation, LLC, partnership	748	ROCK	Significant	No	1900

2015.000	Bear Valley		Big Bear Municipal Water District	80	74,000	Certified	Satisfactory	San Bernardino
CA00757	34.24	-116.98	Park, sanitation, utility, or water district	360	MULA	Significant	No	1911

1088.000	Bear Valley SH		Bear Valley Water District	43	346	Certified	Satisfactory	Alpine
CA01114	38.45	-120.03	Park, sanitation, utility, or water district	520	ERTH	Significant	No	1975

62.004	Beardsley		Tri-Dam Project	278	77,600	Certified	Satisfactory	Tuolumne
CA00263	38.20	-120.08	Water agency or authority	820	ERRK	Extremely High	No	1957

62.007	Beardsley Afterbay		Tri-Dam Project	41	320	Certified	Fair	Tuolumne
CA00266	38.20	-120.09	Water agency or authority	385	CRIB	Significant	Yes	1958

1258.000	Beaver Creek		Beaver Creek Ranch	22	214	Certified	Satisfactory	Lassen
CA01147	41.00	-121.33	Private company, corporation, LLC, partnership	468	ERTH	Low	No	1978

Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018

Page
8 of 101

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

1024.008	Beaver Creek Diversion		Calaveras County Water District	50	20	Certified	Satisfactory	Tuolumne
CA01259	38.23	-120.28	County, county agency, or county district	180	GRAV	Low	No	1990

2048.000	Beck		Rainbow Municipal Water District	95	625	Certified	Satisfactory	San Diego
CA01551	33.36	-117.17	Park, sanitation, utility, or water district	3,500	ERTH	High	No	1983

1012.009	Bee Canyon Retention Basin		County of Orange	62	243	Certified	Satisfactory	Orange
CA01360	33.71	-117.71	County, county agency, or county district	570	ERTH	Low	No	1994

576.000	Beggs		Private Entity	40	81	Certified	Satisfactory	San Joaquin
CA01291	38.22	-121.05	Individual owner	300	ERTH	Low	No	1971

16.003	Bell Canyon		City of Saint Helena	95	2,530	Certified	Satisfactory	Napa
CA00149	38.56	-122.48	City, city agency, or city district	500	ERTH	High	No	1959

317.000	Bellett		Tomahawk Realty LLC	54	90	Certified	Satisfactory	Nevada
CA00542	39.37	-121.04	Private company, corporation, LLC, partnership	312	ERTH	Low	No	1950

1015.000	Berenda Slough		Chowchilla Water District	21	2,450	Certified	Satisfactory	Madera
CA00835	37.13	-120.19	Park, sanitation, utility, or water district	1,040	ERTH	Significant	No	1962

8.014	Bernardo Reservoir		City of San Diego	54	30	Certified	Satisfactory	San Diego
CA00118	33.01	-117.08	City, city agency, or city district	830	ERTH	High	No	1964

1051.000	Berrenda Mesa		Berrenda Mesa Water District	22	180	Certified	Satisfactory	Kern
CA00884	35.70	-120.03	Park, sanitation, utility, or water district	2,550	ERTH	Significant	No	1967

1.045	Bethany Forebay		California Department of Water Resources	95	5,000	Certified	Satisfactory	Alameda
CA00033	37.78	-121.62	State agency	695	ERTH	High	No	1961

495.000	Bevanda		Private Entity	29	90	Certified	Satisfactory	Calaveras
CA00619	38.15	-120.89	Individual owner	610	ERTH	Low	No	1925

387.000	Bevans Creek		Private Entity	51	215	Certified	Satisfactory	Mendocino
CA00562	39.31	-123.13	Individual owner	460	ERRK	High	No	1955

273.000	Bidwell Lake		Indian Valley Community Service District	35	5,200	Certified	Satisfactory	Plumas
CA00530	40.11	-120.96	Park, sanitation, utility, or water district	325	ERRK	High	No	1865

1058.000	Big Canyon		City of Newport Beach	65	600	Certified	Satisfactory	Orange
CA00891	33.61	-117.86	City, city agency, or city district	3,824	ERTH	Extremely High	No	1959

Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018

Page
9 of 101

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

469.000	Big Canyon Creek		Private Entity	63	395	Certified	Satisfactory	El Dorado
CA00611	38.61	-120.90	Individual owner	432	ERTH	Low	No	1935

557.000	Big Creek		Pine Mountain Lake Association	120	7,650	Certified	Satisfactory	Tuolumne
CA00652	37.86	-120.20	Associations	480	ERTH	High	No	1969

104.004	Big Creek No 4		Southern California Edison	75	100	Certified	Satisfactory	Fresno
CA00430	37.20	-119.24	Private company, corporation, LLC, partnership	220	CORA	Low	No	1913

104.005	Big Creek No 5		Southern California Edison	58	42	Certified	Satisfactory	Fresno
CA00431	37.20	-119.31	Private company, corporation, LLC, partnership	153	CORA	High	No	1921

104.006	Big Creek No 6		Southern California Edison	140	993	Certified	Satisfactory	Fresno
CA00432	37.21	-119.33	Private company, corporation, LLC, partnership	485	CORA	Low	No	1923

104.022	Big Creek No. 7		Southern California Edison	233	35,000	Certified	Satisfactory	Fresno
CA00440	37.15	-119.45	Private company, corporation, LLC, partnership	893	GRAV	High	No	1951

32.000	Big Dalton		Los Angeles County Department Of Public Works	153	1,290	Certified	Satisfactory	Los Angeles
CA00187	34.17	-117.81	County, county agency, or county district	480	MULA	High	No	1929

32.030	Big Dalton Debris Basin		Los Angeles County Department Of Public Works	59	208	Certified	Satisfactory	Los Angeles
CA01156	34.16	-117.83	County, county agency, or county district	840	ERTH	High	No	1960

129.000	Big Dobe North		Private Entity	9	6,530	Certified	Satisfactory	Modoc
CA00467	41.63	-120.56	Individual owner	365	ERTH	Low	No	1912

129.002	Big Dobe South		Private Entity	11	3,860	Certified	Satisfactory	Modoc
CA00468	41.62	-120.57	Individual owner	2,640	ERTH	Low	No	1912

1017.002	Big Dry Creek		Fresno Metropolitan Flood Control District	50	30,200	Certified	Satisfactory	Fresno
CA01075	36.89	-119.66	Park, sanitation, utility, or water district	25,300	ERTH	Extremely High	No	1948

737.000	Big Four Ranch		Kern-Tulare Water District	38	312	Certified	Satisfactory	Kern
CA00722	35.75	-119.09	Park, sanitation, utility, or water district	1,200	ERTH	Significant	No	1970

1116.000	Big Johnson		Private Entity	18	410	Certified	Satisfactory	Modoc
CA00918	41.95	-121.22	Individual owner	1,900	ERTH	Low	No	1959

203.000	Big Lagoon		California Redwood Acquisition Company	16	780	Certified	Satisfactory	Humboldt
CA00503	41.15	-124.10	Private company, corporation, LLC, partnership	3,700	ERTH	Significant	No	1947

Jurisdictional Dams

Listed Alphabetically by Dam Name

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

6.011	Big Pine Creek		City of Los Angeles Department of Water And Power	14	1,071	Certified	Satisfactory	Inyo
CA00072	37.12	-118.49	City, city agency, or city district	50	ROCK	High	No	

437.000	Big Rock Ranch		Lucasfilm, LTD	45	91	Certified	Satisfactory	Marin
CA01457	38.05	-122.63	Private company, corporation, LLC, partnership	490	ERTH	Significant	No	2002

55.000	Big Sage		Hot Spring Valley Water District	49	77,000	Certified	Satisfactory	Modoc
CA00233	41.58	-120.63	Park, sanitation, utility, or water district	680	ERTH	High	No	1921

32.002	Big Santa Anita		Los Angeles County Department Of Public Works	225	858	Certified	Satisfactory	Los Angeles
CA00188	34.18	-118.02	County, county agency, or county district	612	VARA	Extremely High	No	1927

32.006	Big Tujunga No. 1		Los Angeles County Department Of Public Works	220	5,750	Certified	Satisfactory	Los Angeles
CA00191	34.29	-118.19	County, county agency, or county district	505	VARA	Extremely High	No	1931

104.033	Bishop Creek Intake No. 2		Southern California Edison	34	78	Certified	Satisfactory	Inyo
CA00449	37.25	-118.58	Private company, corporation, LLC, partnership	443	ERTH	High	No	1908

1266.000	Black Butte Reregulating		City of Santa Clara	25	52	Certified	Satisfactory	Tehama
CA01226	39.81	-122.33	City, city agency, or city district	1,464	GRAV	Low	No	1989

687.000	Black Hawk		Private Entity	45	740	Certified	Satisfactory	Madera
CA00707	37.16	-119.78	Individual owner	510	ERTH	Significant	No	1971

8.016	Black Mountain Water Tank		City of San Diego	55	77	Certified	Satisfactory	San Diego
CA01442	32.99	-117.13	City, city agency, or city district	0	RECT	High	No	2002

538.000	Black Reservoir		Bently Family, LP	18	185	Certified	Satisfactory	Mono
CA00646	38.34	-119.48	Private company, corporation, LLC, partnership	1,330	ERTH	Low	No	1905

643.000	Black Rock Creek		White Rock Club, Inc.	54	30	Certified	Satisfactory	Monterey
CA00693	36.41	-121.77	Private company, corporation, LLC, partnership	150	ERRK	Low	No	1925

1083.003	Blackburn		Tehachapi-Cummings County Water District	48	625	Certified	Satisfactory	Kern
CA01310	35.10	-118.41	Park, sanitation, utility, or water district	4,000	ERTH	High	No	1991

4468.000	Blakely		Walker Land Company, LLC	19	152	Certified	Fair	El Dorado
CA00229	38.74	-120.71	Private company, corporation, LLC, partnership	700	ERTH	Low	No	1875

32.025	Blanchard Debris Basin		Los Angeles County Department Of Public Works	35	26	Certified	Satisfactory	Los Angeles
CA01151	34.25	-118.27	County, county agency, or county district	925	ERTH	High	No	1966

Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018

Page
11 of 101

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

2416.000	Blanchard-Offner		Private Entity	47	274	Certified	Satisfactory	Napa
CA01037	38.64	-122.47	Individual owner	785	ERTH	Significant	No	1963

454.000	Blodgett		Private Entity	19	374	Certified	Fair	Sacramento
CA00601	38.52	-121.21	Individual owner	990	ERTH	Significant	No	1939

1060.000	Blossom Valley Reservoir		Padre Dam Municipal Water District	42	22	Certified	Satisfactory	San Diego
CA00892	32.87	-116.86	Park, sanitation, utility, or water district	350	ERRK	High	No	1962

97.012	Blue Lake		Pacific Gas and Electric Company	23	1,123	Certified	Satisfactory	Nevada
CA00347	39.36	-120.64	Private company, corporation, LLC, partnership	230	ERRK	Low	No	1870

1120.000	Boggs And Warren		Private Entity	12	1,058	Certified	Satisfactory	Modoc
CA00922	41.68	-120.02	Individual owner	1,000	ERTH	Low	No	1922

33.006	Bon Tempe		Marin Municipal Water District	98	4,300	Certified	Satisfactory	Marin
CA00207	37.96	-122.61	Park, sanitation, utility, or water district	1,150	ERTH	High	No	1949

868.000	Bonita Long Canyon		City of Chula Vista	29	49	Certified	Satisfactory	San Diego
CA01201	32.66	-117.01	City, city agency, or city district	400	ERTH	Low	No	1986

1320.000	Boole		Our Lady of the Oaks	25	65	Certified	Satisfactory	Placer
CA00967	39.00	-120.98	Private company, corporation, LLC, partnership	180	ERTH	Low	No	1951

738.004	Borax Solar Evaporation Ponds		Rio Tinto	18	242	Certified	Satisfactory	Kern
CA01190	35.03	-117.74	Private company, corporation, LLC, partnership	10,383	ERTH	Low	No	1984

392.003	Bordeaux, Lake		Langtry Farms, LLC	43	538	Certified	Satisfactory	Lake
CA00566	38.74	-122.53	Private trusts and estates	965	ERTH	Low	No	1962

738.000	Boron Tails Pond		Rio Tinto	25	1,480	Certified/Inop	Satisfactory	Kern
CA01099	35.05	-117.71	Private company, corporation, LLC, partnership	6,850	ERTH	Low	No	1975

738.003	Boron Tails Pond 6		Rio Tinto	39	2,235	Certified	Satisfactory	Kern
CA01178	35.04	-117.72	Private company, corporation, LLC, partnership	10,200	ERTH	Low	No	1980

2429.000	Bosch No 2		Private Entity	55	37	Certified	Satisfactory	Sonoma
CA01044	38.56	-122.75	Individual owner	230	ERTH	High	No	1962

1393.000	Bottoms		Middletown Enterprises	47	315	Certified	Satisfactory	Lake
CA01265	38.72	-122.56	Private company, corporation, LLC, partnership	970	ERTH	High	No	1990

Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018

Page
12 of 101

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

6.031	Bouquet Canyon		City of Los Angeles Department of Water And Power	190	36,505	Certified	Satisfactory	Los Angeles
CA00088	34.58	-118.39	City, city agency, or city district	1,180	ERTH	Extremely High	No	1934

61.002	Bowman		Nevada Irrigation District	178	64,000	Certified	Satisfactory	Nevada
CA00245	39.45	-120.65	Park, sanitation, utility, or water district	400	ROCK	Extremely High	No	1927

1056.000	Box Canyon		Siskiyou County Flood Control and Water Conservation District	204	26,000	Certified	Satisfactory	Siskiyou
CA00889	41.28	-122.33	County, county agency, or county district	1,000	GRAV	Extremely High	No	1969

1003.007	Boxsprings		Riverside County Flood Control and Water Conservation District	49	405	Certified	Satisfactory	Riverside
CA00802	33.96	-117.33	County, county agency, or county district	550	ERTH	High	No	1960

3222.000	Boyd No. 1		Joshua Cahoon and Tiffany McHale	31	218	Certified	Satisfactory	Shasta
CA01053	40.39	-122.33	Private company, corporation, LLC, partnership	620	ERTH	High	No	1971

3222.002	Boyd No. 2		Joshua Cahoon and Tiffany McHale	53	670	Certified	Satisfactory	Shasta
CA01054	40.40	-122.34	Private company, corporation, LLC, partnership	790	ERTH	High	No	1973

2388.000	Bradford		Private Entity	58	440	Certified	Satisfactory	Mendocino
CA01263	38.93	-123.08	Individual owner	390	ERTH	High	No	1985

32.026	Brand Debris Basin		Los Angeles County Department Of Public Works	45	42	Certified	Satisfactory	Los Angeles
CA01152	34.19	-118.28	County, county agency, or county district	400	ERTH	High	No	1965

5.000	Brand Park		City of Glendale	99	32	Certified	Satisfactory	Los Angeles
CA00061	34.19	-118.28	City, city agency, or city district	230	ERTH	High	No	1930

249.003	Branham Flat		Mapes Ranch, Inc.	20	1,200	Certified	Satisfactory	Lassen
CA00524	40.73	-120.51	Private company, corporation, LLC, partnership	200	ERTH	Low	No	1880

713.000	Bravo Lake Reservoir		Wutchumna Water Company	24	3,427	Certified	Satisfactory	Tulare
CA01098	36.40	-119.10	Private company, corporation, LLC, partnership	1,780	ERTH	High	No	1980

555.000	Brentwood Park		Brentwood Lake Club, Inc.	58	80	Certified	Satisfactory	Tuolumne
CA00651	38.04	-120.25	Private company, corporation, LLC, partnership	505	ERTH	Significant	No	1964

4224.000	Brick Flat Pit Containment		Iron Mountain Mine Remediation Trust I	135	220	Certified	Satisfactory	Shasta
CA01397	40.67	-122.53	Private company, corporation, LLC, partnership	155	ROCK	Low	No	1994

70.002	Bridgeport		Walker River Irrigation District	63	44,100	Certified	Satisfactory	Mono
CA00284	38.33	-119.21	Park, sanitation, utility, or water district	900	ERTH	Significant	No	1924

Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018

Page
13 of 101

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

31.015	Briones		East Bay Municipal Utility District	273	67,520	Certified	Satisfactory	Contra Costa
CA00172	37.91	-122.21	Park, sanitation, utility, or water district	2,100	ERTH	Extremely High	No	1964

1038.003	Brooktrails 3 North		Brooktrails Township Community Services District	49	251	Certified	Satisfactory	Mendocino
CA00872	39.44	-123.39	Park, sanitation, utility, or water district	385	ERTH	High	No	1970

1009.012	Brush Creek		Sacramento Municipal Utility District	213	1,530	Certified	Satisfactory	El Dorado
CA00824	38.81	-120.62	Park, sanitation, utility, or water district	780	VARA	Significant	No	1970

1009.008	Buck Island		Sacramento Municipal Utility District	18	1,070	Certified	Satisfactory	El Dorado
CA00821	39.01	-120.26	Park, sanitation, utility, or water district	290	GRAV	Low	No	1963

230.004	Buckhorn		Dodge Ranch LLC	35	2,000	Certified	Satisfactory	Lassen
CA00519	40.85	-120.09	Private company, corporation, LLC, partnership	300	ERTH	Low	No	1904

94.000	Bucks Diversion		Pacific Gas and Electric Company	99	5,843	Certified	Satisfactory	Plumas
CA00331	39.90	-121.23	Private company, corporation, LLC, partnership	385	VARA	High	No	1928

94.002	Bucks Storage		Pacific Gas and Electric Company	122	103,000	Certified	Satisfactory	Plumas
CA00332	39.90	-121.20	Private company, corporation, LLC, partnership	1,220	ROCK	Extremely High	No	1928

3423.000	Budge		Jordan Vineyard and Winery	28	110	Certified	Satisfactory	Sonoma
CA01059	38.65	-122.85	Private company, corporation, LLC, partnership	360	ERTH	Significant	No	1964

735.002	Buena Vista		Kern County Parks and Recreation	14	7,500	Certified	Satisfactory	Kern
CA00721	35.22	-119.27	County, county agency, or county district	24,000	ERTH	Significant	No	1973

732.000	Buena Vista		J.G. Boswell Company and Tenneco West	20	205,000	Certified	Satisfactory	Kern
CA00717	35.19	-119.24	Private company, corporation, LLC, partnership	33,000	ERTH	Significant	No	1890

4422.000	Buena Vista Winery		Foley Family Winery	40	120	Certified	Satisfactory	Sonoma
CA01068	38.23	-122.37	Private company, corporation, LLC, partnership	556	ERTH	Significant	No	1971

1117.000	Burger		Private Entity	47	161	Certified	Satisfactory	Modoc
CA00919	41.90	-120.16	Individual owner	550	ERTH	Low	No	1968

392.004	Burgundy, Lake		Langtry Farms, LLC	28	200	Certified	Satisfactory	Lake
CA00567	38.75	-122.52	Private trusts and estates	535	ERTH	Low	No	1962

1419.000	Burns		M.V.P. Vineyards, LLC	39	62	Certified	Satisfactory	Napa
CA00986	38.65	-122.49	Private company, corporation, LLC, partnership	480	ERTH	Significant	No	1956

Jurisdictional Dams

Listed Alphabetically by Dam Name

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built
93.000	Butt Valley		Pacific Gas and Electric Company	106	49,800	Certified	Satisfactory	Plumas
CA00326	40.11	-121.15	Private company, corporation, LLC, partnership	1,483	HYDF	High	No	1924

Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018

Page
15 of 101

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

29.002	C L Tilden Park		East Bay Regional Park District	88	268	Certified	Satisfactory	Contra Costa
CA00161	37.90	-122.25	Park, sanitation, utility, or water district	355	ERTH	High	No	1938

1080.000	Cache Creek		Yolo County Flood Control and Water Conservation District	38	315,000	Certified	Satisfactory	Lake
CA00911	38.92	-122.57	County, county agency, or county district	260	GRAV	High	No	1914

1.084	Cache Creek Settling Basin		Central Valley Flood Protection Board	29	3,800	Certified	Satisfactory	Yolo
CA01348	38.68	-121.67	State agency	40,083	ERTH	Low	No	1993

87.017	Cactus Basin #3		County of San Bernardino Department of Public Works	38	528	Certified	Satisfactory	San Bernardino
CA10374	34.12	-117.39	County, county agency, or county district	4,150	ERTH	High	No	2017

35.021	Cajalco Creek		Metropolitan Water District Of Southern California	46	889	Certified	Satisfactory	Riverside
CA01441	33.84	-117.36	Park, sanitation, utility, or water district	2,287	ERTH	High	No	2001

1023.002	Calavera		Carlsbad Municipal Water District	67	520	Certified	Satisfactory	San Diego
CA00781	33.17	-117.29	Park, sanitation, utility, or water district	490	ERTH	High	No	1940

10.000	Calaveras		City and County of San Francisco	210	100,000	Certified	Fair	Alameda
CA00126	37.49	-121.82	City, city agency, or city district	1,200	HYDF	Extremely High	Yes	1925

72.003	Calero		Santa Clara Valley Water District	90	9,850	Certified	Fair	Santa Clara
CA00288	37.18	-121.79	Park, sanitation, utility, or water district	840	ERTH	Extremely High	Yes	1935

1450.003	Calero		Rancho Murieta Community Services District	55	2,832	Certified	Satisfactory	Sacramento
CA01209	38.52	-121.08	Park, sanitation, utility, or water district	2,400	ERTH	High	No	1982

1340.000	California Park		California Park Association	23	335	Certified	Satisfactory	Butte
CA01270	39.75	-121.79	Associations	2,100	ERTH	Extremely High	No	1986

31.016	Camanche		East Bay Municipal Utility District	171	417,120	Certified	Satisfactory	San Joaquin
CA00173	38.23	-121.02	Park, sanitation, utility, or water district	2,400	ERTH	Extremely High	No	1963

40.000	Cameron Park		Cameron Park Community Services District	29	480	Certified	Satisfactory	El Dorado
CA00230	38.68	-120.99	Park, sanitation, utility, or water district	1,800	ERTH	Extremely High	No	1951

1.005	Camille, Lake		Napa State Hospital	30	47	Certified	Satisfactory	Napa
CA00003	38.28	-122.25	State agency	600	ERTH	Significant	No	1880

1009.004	Camino		Sacramento Municipal Utility District	110	275	Certified	Satisfactory	El Dorado
CA00817	38.83	-120.54	Park, sanitation, utility, or water district	469	VARA	Low	No	1961

Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018

Page
16 of 101

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

52.000	Camp Far West		South Sutter Water District	185	104,500	Certified	Fair	Yuba
CA00227	39.05	-121.32	Park, sanitation, utility, or water district	2,100	ERRK	Extremely High	No	1963

52.002	Camp Far West Diversion		South Sutter Water District	32	425	Certified	Satisfactory	Yuba
CA01086	39.04	-121.33	Park, sanitation, utility, or water district	244	GRAV	Significant	No	1977

180.000	Campbell Lake		Private Entity	19	350	Certified	Satisfactory	Siskiyou
CA00495	41.54	-123.10	Individual owner	65	ERRK	Significant	No	1929

1.069	Canada Road		California Department of Transportation	52	74	Certified	Satisfactory	San Mateo
CA00055	37.50	-122.33	State agency	1,300	ERTH	Low	No	1971

345.000	Cannon Ranch		Private Entity	18	176	Certified	Satisfactory	Butte
CA00551	39.61	-121.53	Individual owner	310	ERTH	High	No	1870

1125.003	Capik		Russ Ranch Company, LLC	20	1,367	Certified	Satisfactory	Modoc
CA00466	41.67	-120.40	Private company, corporation, LLC, partnership	3,510	ERTH	Low	No	1965

53.013	Caples Lake		El Dorado Irrigation District	71	21,580	Certified	Satisfactory	Alpine
CA00378	38.71	-120.05	Park, sanitation, utility, or water district	1,200	ERRK	Significant	No	1922

97.120	Caribou Afterbay		Pacific Gas and Electric Company	164	2,400	Certified	Satisfactory	Plumas
CA00413	40.08	-121.16	Private company, corporation, LLC, partnership	400	ERRK	High	No	1959

234.000	Caribou Lake		Roney Land and Cattle Company, Inc.	16	460	Certified	Satisfactory	Lassen
CA00514	40.50	-121.16	Private company, corporation, LLC, partnership	250	ERTH	High	No	1928

172.002	Carpenter Wilson		Private Entity	21	93	Certified	Satisfactory	Modoc
CA00491	41.42	-120.87	Individual owner	985	ERTH	Low	No	1948

1.058	Castaic		California Department of Water Resources	340	323,700	Certified	Fair	Los Angeles
CA00044	34.52	-118.61	State agency	5,200	ERTH	Extremely High	No	1973

666.002	Castle		County of Merced	40	7,510	Certified	Satisfactory	Merced
CA01355	37.40	-120.55	County, county agency, or county district	2,027	ERTH	Extremely High	No	1991

802.000	Cedar Lake		Cedar Lake Camp, Inc.	28	30	Certified	Satisfactory	San Bernardino
CA00756	34.23	-116.94	Private company, corporation, LLC, partnership	220	VARA	High	No	1928

1.063	Cedar Springs		California Department of Water Resources	236	78,000	Certified	Satisfactory	San Bernardino
CA00049	34.30	-117.31	State agency	2,235	ERRK	Extremely High	No	1971

Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018

Page
17 of 101

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

2036.002	Centennial		City of Willits	62	504	Certified	Satisfactory	Mendocino
CA01246	39.36	-123.31	City, city agency, or city district	530	ERTH	High	No	1990

31.000	Central		East Bay Municipal Utility District	55	485	Certified	Satisfactory	Alameda
CA00162	37.80	-122.22	Park, sanitation, utility, or water district	929	ERTH	Extremely High	No	1910

1.071	Century		California Department of Parks and Recreation	44	70	Certified	Satisfactory	Los Angeles
CA00740	34.10	-118.73	State agency	149	CORA	High	No	1913

31.005	Chabot		East Bay Municipal Utility District	142	10,281	Certified	Satisfactory	Alameda
CA00165	37.73	-122.12	Park, sanitation, utility, or water district	450	HYDF	Extremely High	No	1892

14.006	Chabot, Lake		City of Vallejo	47	504	Certified	Satisfactory	Solano
CA00145	38.14	-122.24	City, city agency, or city district	395	ERTH	High	No	1870

1243.000	Chace Valley		Private Entity	16	92	Certified	Satisfactory	Lassen
CA00950	41.15	-120.89	Individual owner	910	ERTH	Low	No	1955

6.039	Channel Diversion Dike		City of Los Angeles Department of Water And Power	42	437	Certified/Inop	Satisfactory	Los Angeles
CA00093	34.29	-118.49	City, city agency, or city district	390	ERTH	Low	No	1940

1224.000	Charles Smith Irrigation		Private Entity	24	150	Certified	Satisfactory	Shasta
CA00936	40.67	-122.29	Individual owner	500	ERTH	High	No	1958

6.004	Chatsworth		City of Los Angeles Department of Water And Power	45	9,886	Certified	Satisfactory	Los Angeles
CA00067	34.23	-118.63	City, city agency, or city district	2,700	HYDF	High	No	1918

509.000	Cherokee		Private Entity	44	630	Certified	Satisfactory	Calaveras
CA00628	38.08	-120.61	Individual owner	550	ERTH	Significant	No	1959

24.000	Cherry Flat		City of San Jose	60	500	Certified	Satisfactory	Santa Clara
CA00158	37.40	-121.76	City, city agency, or city district	230	ERTH	Extremely High	No	1936

9.007	Cherry Valley		San Francisco Public Utilities Commission	315	273,500	Certified	Satisfactory	Tuolumne
CA00125	37.97	-119.91	City, city agency, or city district	2,630	ERRK	High	No	1956

1450.002	Chesbro		Rancho Murieta Community Services District	79	1,250	Certified	Satisfactory	Sacramento
CA00995	38.51	-121.07	Park, sanitation, utility, or water district	720	ERTH	Significant	No	1972

1.075	Chester Diversion		Central Valley Flood Protection Board	47	75	Certified	Satisfactory	Plumas
CA01173	40.30	-121.26	State agency	1,165	ERTH	High	No	1975

Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018

Page
18 of 101

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

56.009	Chet Harritt		Helix Water District	200	9,790	Certified	Satisfactory	San Diego
CA00236	32.86	-116.89	Park, sanitation, utility, or water district	1,117	ERTH	Extremely High	No	1962

5.008	Chevy Chase 1290		City of Glendale	90	17	Certified	Satisfactory	Los Angeles
CA01078	34.18	-118.21	City, city agency, or city district	300	ERTH	High	No	1940

97.125	Chili Bar		Pacific Gas and Electric Company	111	3,700	Certified	Satisfactory	El Dorado
CA00418	38.77	-120.81	Private company, corporation, LLC, partnership	380	GRAV	High	No	1964

2025.000	Chino Ranch #1		City Of Industry Urban Development Agency	22	137	Certified	Satisfactory	San Bernardino
CA00755	33.99	-117.79	City, city agency, or city district	460	ERTH	Significant	No	1918

1089.003	Chinquapin		County of Mendocino	49	45	Certified	Satisfactory	Mendocino
CA00975	39.38	-123.28	County, county agency, or county district	285	ERTH	High	No	1971

8.002	Chollas		City of San Diego	50	310	Certified	Satisfactory	San Diego
CA00107	32.74	-117.06	City, city agency, or city district	565	ERTH	High	No	1901

1.072	Chorro Creek		California Department of Corrections and Rehabilitation	77	90	Certified	Satisfactory	San Luis Obispo
CA01076	35.34	-120.69	State agency	500	ERTH	High	No	1941

504.000	Christensen No. 1		Rancho Campana, LLC	33	69	Certified	Satisfactory	Calaveras
CA00625	38.13	-120.70	Private company, corporation, LLC, partnership	750	ERTH	Low	No	1951

97.015	Christian Valley		Pacific Gas and Electric Company	33	110	Certified	Satisfactory	Placer
CA00348	38.96	-121.04	Private company, corporation, LLC, partnership	222	ERRK	High	No	1916

2417.000	Circle S		Circle S. Ranch, LLC	28	131	Certified	Satisfactory	Napa
CA01141	38.42	-122.27	Private company, corporation, LLC, partnership	412	ERTH	Significant	No	1979

174.000	Clarke		Private Entity	17	70	Certified	Satisfactory	Modoc
CA00493	41.69	-120.38	Individual owner	810	ERTH	Low	No	1939

1082.002	Clearwell Phase 2		Central Contra Costa Sanitary District	30	100	Certified	Satisfactory	Contra Costa
CA01109	38.00	-122.07	Park, sanitation, utility, or water district	2,090	ERTH	Significant	No	1977

1450.004	Clementia		Rancho Murieta Community Services District	33	850	Certified	Satisfactory	Sacramento
CA01119	38.50	-121.07	Park, sanitation, utility, or water district	1,300	ERTH	High	No	1976

1.064	Clifton Court Forebay		California Department of Water Resources	34	29,000	Certified	Satisfactory	Contra Costa
CA00050	37.82	-121.59	State agency	39,000	ERTH	Low	No	1970

Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018

Page
19 of 101

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

1181.000	Cloak Lake		Madison Valley Investment Partners	13	123	Certified	Satisfactory	Siskiyou
CA00927	41.64	-122.44	Private company, corporation, LLC, partnership	432	ERTH	Significant	No	1955

1030.005	Clover Valley		Placer County Water Agency	35	29	Certified	Satisfactory	Placer
CA00860	38.87	-121.20	County, county agency, or county district	180	ERTH	Low	No	1909

1128.003	Cloverswale		Milano Land and Cattle Co, LLC	21	4,620	Certified	Satisfactory	Modoc
CA01513	41.53	-120.84	Private company, corporation, LLC, partnership	490	ERTH	Low	No	1973

1600.000	Coastways		Coastways Ranch	46	100	Certified	Satisfactory	San Mateo
CA01007	37.12	-122.30	Private company, corporation, LLC, partnership	1,000	ERTH	Significant	No	1951

7000.140	Coddling Reservoir		Private Entity	36	73	Not Certified	Fair	Mendocino
CA10385	38.92	-122.97	Individual owner	250	ERTH	Low	No	

5420.000	Coen C-3		Frei Brothers Reserve and Gallo Glass Company	97	480	Certified	Satisfactory	Sonoma
CA01317	38.67	-122.91	Private company, corporation, LLC, partnership	627	ERTH	Low	No	1982

32.005	Cogswell		Los Angeles County Department Of Public Works	266	8,969	Certified	Satisfactory	Los Angeles
CA00190	34.24	-117.96	County, county agency, or county district	585	ROCK	High	No	1935

1.077	Coit		California Department of Parks and Recreation	54	275	Certified	Satisfactory	Santa Clara
CA01011	37.14	-121.43	State agency	400	ERTH	Low	No	1956

7000.110	Cold Springs Reservoir #1		R.C. Roberts Ranches, LLC	17	2,815	Not Certified	Fair	Lassen
CA01488	40.96	-120.22	Private company, corporation, LLC, partnership	300	ERTH	Low	No	

107.000	Collett Addition		Malacha Hydro Limited Partnership	40	7,800	Certified	Satisfactory	Lassen
CA01325	40.97	-121.22	Private company, corporation, LLC, partnership	2,900	ERRK	High	No	1991

107.002	Collett Afterbay		Malacha Hydro Limited Partnership	13	300	Certified	Satisfactory	Lassen
CA01352	40.98	-121.26	Private company, corporation, LLC, partnership	5,000	ERTH	Low	No	1991

622.015	Columbine		San Jose Water Company	24	60	Certified	Satisfactory	Santa Clara
CA00682	37.35	-121.79	Water agency or authority	1,480	ERTH	Extremely High	No	1963

61.009	Combie		Nevada Irrigation District	85	5,555	Certified	Satisfactory	Nevada
CA00249	39.01	-121.06	Park, sanitation, utility, or water district	762	VARA	High	No	1928

568.000	ConAgra Aerated and Settling Ponds		ConAgra Grocery Products Company, LLC	15	140	Not Certified	Fair	Stanislaus
CA01604	37.76	-120.85	Private company, corporation, LLC, partnership	2,860	ERTH	High	No	

Jurisdictional Dams

Listed Alphabetically by Dam Name

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

67.000	Concow		Thermalito Water and Sewer District	94	6,370	Certified	Satisfactory	Butte
CA00277	39.76	-121.53	Park, sanitation, utility, or water district	335	VARA	High	No	1925

7.003	Conn Creek		City of Napa	125	31,000	Certified	Fair	Napa
CA00104	38.48	-122.37	City, city agency, or city district	700	ERTH	Extremely High	No	1946

1428.003	Cook No 2		E. and J. Gallo Winery	35	82	Certified	Satisfactory	Sonoma
CA01056	38.66	-122.90	Private company, corporation, LLC, partnership	510	ERTH	Significant	No	1961

249.000	Coon Camp		Mapes Ranch, Inc.	23	548	Certified	Satisfactory	Lassen
CA00522	40.72	-120.49	Private company, corporation, LLC, partnership	1,175	ERTH	Low	No	1900

91.000	Copco No 1		PacifiCorp	132	77,000	Certified	Satisfactory	Siskiyou
CA00323	41.98	-122.34	Private company, corporation, LLC, partnership	415	GRAV	High	No	1922

91.002	Copco No 2		PacifiCorp	37	55	Certified	Satisfactory	Siskiyou
CA00324	41.98	-122.34	Private company, corporation, LLC, partnership	148	GRAV	Low	No	1925

35.003	Copper Basin		Metropolitan Water District Of Southern California	184	22,000	Certified	Satisfactory	San Bernardino
CA00214	34.28	-114.22	Park, sanitation, utility, or water district	265	VARA	High	No	1938

1024.009	Copper Cove		Calaveras County Water District	42	205	Certified	Satisfactory	Calaveras
CA01356	37.91	-120.63	County, county agency, or county district	1,308	ERTH	Low	No	1993

1499.000	Copperopolis		Private Entity	33	225	Certified	Satisfactory	Calaveras
CA00845	37.98	-120.65	Individual owner	600	ERRK	High	No	1905

1385.000	Cornett		Locavore, LLC	31	65	Certified	Satisfactory	Mendocino
CA01118	38.97	-123.09	Private company, corporation, LLC, partnership	455	ERTH	Significant	No	1974

265.000	Corral		T.M. Cattle Company	31	51	Certified	Satisfactory	Tehama
CA00527	39.83	-122.52	Private company, corporation, LLC, partnership	500	ERTH	Significant	No	1959

837.000	Corte Madera		Rancho Corte Madera, Inc.	16	325	Certified	Satisfactory	San Diego
CA00774	32.78	-116.58	Private company, corporation, LLC, partnership	200	ERTH	Low	No	1919

97.119	Courtright		Pacific Gas and Electric Company	315	123,300	Certified	Satisfactory	Fresno
CA00412	37.08	-118.97	Private company, corporation, LLC, partnership	862	ROCK	Extremely High	No	1958

72.002	Coyote		Santa Clara Valley Water District	140	23,666	Certified	Satisfactory	Santa Clara
CA00287	37.12	-121.55	Park, sanitation, utility, or water district	980	ERRK	Extremely High	No	1936

Jurisdictional Dams

Listed Alphabetically by Dam Name

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

397.000	Coyote Creek		Hidden Valley Lake Association	92	3,375	Certified	Satisfactory	Lake
CA00572	38.81	-122.57	Associations	410	ERTH	High	No	1968

233.000	Coyote Flat		Nobmann Dixie Valley Ranch, LLC	52	5,250	Certified	Satisfactory	Lassen
CA00513	40.91	-120.99	Private company, corporation, LLC, partnership	205	ERTH	Significant	No	1928

72.000	Coyote Percolation		Santa Clara Valley Water District	24	72	Certified	Satisfactory	Santa Clara
CA00286	37.24	-121.76	Park, sanitation, utility, or water district	204	FLBT	High	No	1934

1.091	Crafton Hills		California Department of Water Resources	95	130	Certified	Satisfactory	San Bernardino
CA01437	34.06	-117.05	State agency	496	ERTH	High	No	2001

1230.000	Cramer		Wood Ranch, Leland Wood Jr.	13	3,000	Certified	Satisfactory	Lassen
CA00940	40.64	-120.51	Private company, corporation, LLC, partnership	800	ERTH	Low	No	1910

95.003	Crane Valley Storage		Pacific Gas and Electric Company	152	45,410	Certified	Fair	Madera
CA00337	37.29	-119.53	Private company, corporation, LLC, partnership	1,880	HYDF	Extremely High	No	1910

511.002	Crater Lake		Private Entity	36	320	Certified	Satisfactory	Alpine
CA00630	38.72	-119.97	Individual owner	220	ERTH	Low	No	1937

1387.000	Crawford Ranch		McDowell Valley Farming Company, LLC	80	340	Certified	Satisfactory	Mendocino
CA00977	38.98	-123.06	Private company, corporation, LLC, partnership	450	ERTH	High	No	1972

84.000	Crescent Weir		Crescent Canal Company	16	50	Certified	Satisfactory	Kings
CA00311	36.39	-119.88	Private company, corporation, LLC, partnership	327	SLBT	Low	No	1933

93.006	Cresta		Pacific Gas and Electric Company	103	4,400	Certified	Satisfactory	Plumas
CA00329	39.88	-121.37	Private company, corporation, LLC, partnership	367	GRAV	Significant	No	1949

2014.000	Crocker		Town of Hillsborough	45	22	Certified	Satisfactory	San Mateo
CA00672	37.56	-122.37	City, city agency, or city district	200	ERTH	Significant	No	1890

58.000	Crocker Diversion		Merced Irrigation District	22	300	Certified	Satisfactory	Merced
CA00239	37.52	-120.37	Park, sanitation, utility, or water district	725	GRAV	Low	No	1910

1465.000	Cross Creek Ranch		Sauer Grapes, LLC	23	55	Certified	Satisfactory	El Dorado
CA00999	38.76	-120.89	Private company, corporation, LLC, partnership	410	ERTH	Low	No	1949

410.000	Crystal		Private Entity	51	105	Certified	Satisfactory	Napa
CA00573	38.54	-122.44	Individual owner	475	ERTH	High	No	1952

Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018

Page
22 of 101

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

2465.000	Crystal Lake		Bridlewood Canyon Owners Association	32	225	Certified	Satisfactory	El Dorado
CA01282	38.67	-121.01	Associations	700	ERTH	Extremely High	No	1952

104.019	Crystal Lake		Southern California Edison	17	162	Certified	Satisfactory	Tulare
CA00438	36.44	-118.56	Private company, corporation, LLC, partnership	94	GRAV	Low	No	1903

1.081	CSP Mule Creek		California Department of Corrections and Rehabilitation	51	535	Certified	Satisfactory	Amador
CA01195	38.38	-120.95	State agency	2,300	ERTH	High	No	1988

87.009	Cucamonga Creek Debris Basin		County of San Bernardino Department of Public Works	60	355	Certified	Satisfactory	San Bernardino
CA01277	34.15	-117.64	County, county agency, or county district	2,980	ERTH	High	No	1980

97.017	Culbertson		Pacific Gas and Electric Company	19	850	Certified	Satisfactory	Nevada
CA00349	39.42	-120.62	Private company, corporation, LLC, partnership	258	ERRK	Low	No	1872

1020.002	Cull Creek		Alameda County Public Works Agency	55	140	Certified	Satisfactory	Alameda
CA00840	37.70	-122.06	County, county agency, or county district	440	ERTH	High	No	1963

148.000	Cummings Reservoir No 1		Private Entity	11	400	Certified	Satisfactory	Modoc
CA00479	41.51	-120.65	Individual owner	1,300	ERTH	Significant	No	1912

56.000	Cuyamaca		Helix Water District	40	11,740	Certified	Satisfactory	San Diego
CA00234	32.99	-116.59	Park, sanitation, utility, or water district	665	ERTH	High	No	1887

1411.000	Cynthia, Lake		Krupp Brothers Vineyard	20	92	Certified	Satisfactory	Napa
CA00980	38.35	-122.28	Private company, corporation, LLC, partnership	750	ERTH	Significant	No	1955

Count: 107

Jurisdictional Dams

Listed Alphabetically by Dam Name

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

466.000	D'Agostini		Private Entity	32	355	Certified	Satisfactory	El Dorado
CA00610	38.59	-120.74	Individual owner	710	ERTH	Low	No	1950

161.000	Danhauser		Wilson Ranches	17	1,258	Certified	Satisfactory	Modoc
CA00487	41.41	-120.48	Private company, corporation, LLC, partnership	3,200	ERTH	High	No	1890

31.028	Danville		East Bay Municipal Utility District	75	45	Certified	Satisfactory	Contra Costa
CA00184	37.81	-122.00	Park, sanitation, utility, or water district	765	ERTH	Extremely High	No	1961

1416.000	Davis		Private Entity	42	140	Certified	Satisfactory	Napa
CA00984	38.65	-122.45	Individual owner	897	ERTH	Significant	No	1955

1391.003	Davis Creek		Homestake Mining Company	105	6,079	Certified	Satisfactory	Yolo
CA01223	38.86	-122.35	Private company, corporation, LLC, partnership	953	ERTH	High	No	1985

171.002	Davis Creek Orchard		Modoc Ranch Properties, LLC.	17	1,841	Certified	Satisfactory	Modoc
CA00465	41.71	-120.39	Private company, corporation, LLC, partnership	2,900	ERTH	Low	No	1975

572.002	Davis No 2		Private Entity	26	1,400	Certified	Satisfactory	San Joaquin
CA00656	38.06	-121.03	Individual owner	1,653	ERTH	Significant	No	1955

68.004	Dawson Lake		Turlock Irrigation District	22	960	Certified	Satisfactory	Stanislaus
CA00280	37.64	-120.48	Park, sanitation, utility, or water district	287	ERTH	Low	No	1896

87.012	Day Creek Debris Basin		County of San Bernardino Department of Public Works	90	140	Certified	Satisfactory	San Bernardino
CA01232	34.18	-117.54	County, county agency, or county district	975	ERTH	High	No	1988

628.000	DeBell		City of Gilroy	53	120	Certified	Satisfactory	Santa Clara
CA00686	37.00	-121.63	City, city agency, or city district	580	ERTH	Extremely High	No	1952

87.008	Declerz Retention		County of San Bernardino Department of Public Works	30	331	Certified	Satisfactory	Riverside
CA01204	34.03	-117.50	County, county agency, or county district	1,500	ERTH	High	No	1984

1065.004	Decoto Reservoir		Alameda County Water District	33	46	Certified	Satisfactory	Alameda
CA00898	37.59	-122.00	County, county agency, or county district	1,360	ERTH	Extremely High	No	1966

87.011	Deer Canyon Debris Basin		County of San Bernardino Department of Public Works	78	24	Certified	Satisfactory	San Bernardino
CA01231	34.17	-117.57	County, county agency, or county district	1,857	ERTH	High	No	1980

1007.003	Deer Creek		Contra Costa County Flood Control and Water Conservation Distri	29	233	Certified	Satisfactory	Contra Costa
CA00810	37.92	-121.76	County, county agency, or county district	900	ERTH	High	No	1963

Jurisdictional Dams

Listed Alphabetically by Dam Name

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

3414.000	Deer Creek		Juliana Mutual Water Company	40	103	Certified	Satisfactory	Napa
CA01187	38.65	-122.43	Private company, corporation, LLC, partnership	1,085	ERTH	Low	No	1980

61.003	Deer Creek Diversion		Nevada Irrigation District	92	1,400	Certified	Satisfactory	Nevada
CA00246	39.27	-120.95	Park, sanitation, utility, or water district	334	VARA	Extremely High	No	1928

413.005	Deer Lake		Howell Mountain Mutual Water Company	72	248	Certified	Satisfactory	Napa
CA00579	38.60	-122.47	Private company, corporation, LLC, partnership	620	ERTH	High	No	1958

1.056	Del Valle		California Department of Water Resources	222	77,100	Certified	Satisfactory	Alameda
CA00043	37.62	-121.75	State agency	880	ERTH	Extremely High	No	1968

1050.004	Delta Pond		City of Santa Rosa	27	1,950	Certified	Satisfactory	Sonoma
CA01272	38.45	-122.83	City, city agency, or city district	11,000	ERTH	High	No	1984

87.010	Demens Creek Debris Basin		County of San Bernardino Department of Public Works	35	35	Certified	Satisfactory	San Bernardino
CA01278	34.16	-117.60	County, county agency, or county district	4,237	ERTH	High	No	1980

1428.004	Dennis No 2		E. and J. Gallo Winery	60	148	Certified	Satisfactory	Sonoma
CA01398	38.67	-122.90	Private company, corporation, LLC, partnership	550	ERTH	Low	No	1997

97.005	DeSabra Forebay		Pacific Gas and Electric Company	53	280	Certified	Satisfactory	Butte
CA00343	39.87	-121.61	Private company, corporation, LLC, partnership	1,035	ERTH	High	No	1903

2037.000	Detention Pond A		City of Dixon	15	737	Certified	Satisfactory	Solano
CA01476	38.42	-121.83	City, city agency, or city district	3,700	ERTH	Significant	No	1989

1.088	Devil Canyon		California Department of Water Resources	77	980	Certified	Satisfactory	San Bernardino
CA01364	34.20	-117.35	State agency	370	ERTH	Significant	No	1995

17.002	Devils Canyon Dike #1		County of San Bernardino Department of Public Works	15	79	Certified	Satisfactory	San Bernardino
CA00150	34.19	-117.33	County, county agency, or county district	3,290	ERTH	High	No	1934

32.003	Devils Gate		Los Angeles County Department Of Public Works	108	2,600	Certified	Satisfactory	Los Angeles
CA00189	34.19	-118.18	County, county agency, or county district	252	GRAV	Extremely High	No	1920

35.018	Diamond Valley Lake		Metropolitan Water District Of Southern California	284	800,000	Certified	Satisfactory	Riverside
CA01410	33.68	-117.07	Park, sanitation, utility, or water district	8,300	ERRK	Extremely High	No	2000

35.019	Diamond Valley Lake Forebay		Metropolitan Water District Of Southern California	22	500	Certified	Satisfactory	Riverside
CA01413	33.68	-117.07	Park, sanitation, utility, or water district	4,482	ERTH	High	No	1999

Jurisdictional Dams

Listed Alphabetically by Dam Name

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National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

3414.003	Dick Week		Juliana Mutual Water Company	70	3,140	Certified	Satisfactory	Napa
CA00585	38.65	-122.41	Private company, corporation, LLC, partnership	1,050	ERTH	Significant	No	1955

5.006	Diederich Res		City of Glendale	60	174	Certified	Satisfactory	Los Angeles
CA00064	34.17	-118.25	City, city agency, or city district	100	ERTH	High	No	1950

35.009	Diemer No. 8		Metropolitan Water District Of Southern California	172	18	Certified	Satisfactory	Orange
CA00220	33.91	-117.82	Park, sanitation, utility, or water district	1,004	RECT	High	No	1968

35.022	Diemer Ozone Contact Basin		Metropolitan Water District Of Southern California	32	23	Certified	Satisfactory	Orange
CA01492	33.91	-117.82	Park, sanitation, utility, or water district	1,012	RECT	High	No	2011

35.010	Diemer Reservoir		Metropolitan Water District Of Southern California	22	80	Certified	Satisfactory	Orange
CA00221	33.91	-117.82	Park, sanitation, utility, or water district	1,880	RECT	Extremely High	No	1963

1426.000	Dina Bob Lake		Private Entity	33	139	Certified	Satisfactory	Sonoma
CA00991	38.62	-122.69	Individual owner	635	ERTH	Significant	No	1955

104.002	Diversion No 1		Southern California Edison	38	150	Certified	Satisfactory	Kern
CA00429	35.53	-118.68	Private company, corporation, LLC, partnership	204	GRAV	High	No	1906

834.002	Dixon		City of Escondido	116	2,500	Certified	Satisfactory	San Diego
CA00878	33.16	-117.04	City, city agency, or city district	830	ERRK	High	No	1970

431.000	Dolcini		Private Entity	35	70	Certified	Satisfactory	Marin
CA00593	38.16	-122.70	Individual owner	440	ERTH	Significant	No	1949

68.007	Don Pedro		Turlock Irrigation District	568	2,030,000	Certified	Satisfactory	Tuolumne
CA00281	37.70	-120.42	Park, sanitation, utility, or water district	1,900	ERRK	Extremely High	No	1971

62.005	Donnells		Tri-Dam Project	291	56,893	Certified	Satisfactory	Tuolumne
CA00264	38.33	-119.96	Water agency or authority	714	VARA	Extremely High	No	1958

319.000	Donner Euer Valley		Donner Euer Valley Corporation	21	80	Certified	Satisfactory	Nevada
CA00543	39.36	-120.30	Private company, corporation, LLC, partnership	520	ERTH	Low	No	1966

301.000	Donner Lake		Truckee Meadows Water Authority	16	10,300	Certified	Satisfactory	Nevada
CA00537	39.32	-120.24	Water agency or authority	45	SLBT	Extremely High	No	1927

1422.000	Donovan		Private Entity	40	70	Certified	Satisfactory	Sonoma
CA00989	38.57	-122.77	Individual owner	295	ERTH	Significant	No	1953

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

179.000	Donovan		California Pines Property Owners Association	28	1,234	Certified	Satisfactory	Modoc
CA00494	41.41	-120.69	Associations	2,750	ERTH	Significant	No	1953

754.000	Dos Pueblos		Standard Portfolios Asset Management Company	78	300	Certified	Satisfactory	Santa Barbara
CA00730	34.45	-119.95	Private company, corporation, LLC, partnership	448	ERTH	High	No	1946

790.000	Dove Canyon		Dove Canyon Master Association	88	415	Certified	Satisfactory	Orange
CA01248	33.64	-117.57	Associations	700	ERTH	High	No	1989

6.016	Drinkwater		City of Los Angeles Department of Water And Power	105	92	Certified	Satisfactory	Los Angeles
CA00077	34.53	-118.52	City, city agency, or city district	448	ERTH	High	No	1923

97.020	Drum Forebay		Pacific Gas and Electric Company	65	564	Certified	Satisfactory	Placer
CA00350	39.25	-120.75	Private company, corporation, LLC, partnership	4,100	ERRK	Significant	No	1913

6.005	Dry Canyon		City of Los Angeles Department of Water And Power	66	1,140	Certified	Satisfactory	Los Angeles
CA00068	34.48	-118.53	City, city agency, or city district	780	HYDF	High	No	1912

1007.004	Dry Creek		Contra Costa County Flood Control and Water Conservation Distri	30	330	Certified	Satisfactory	Contra Costa
CA00811	37.91	-121.73	County, county agency, or county district	470	ERTH	High	No	1963

1128.002	Duncan		Milano Land and Cattle Co, LLC	19	2,575	Certified	Satisfactory	Modoc
CA00480	41.52	-120.94	Private company, corporation, LLC, partnership	900	ERTH	Significant	No	1919

1812.000	Dunn Ranch		The Agri-Empire Corporation	44	90	Certified	Satisfactory	Riverside
CA01302	33.57	-116.62	Private company, corporation, LLC, partnership	425	ERTH	High	No	1987

31.018	Dunsmuir Reservoir		East Bay Municipal Utility District	43	197	Certified	Satisfactory	Alameda
CA00174	37.74	-122.14	Park, sanitation, utility, or water district	2,275	RECT	Extremely High	No	1968

61.024	Dutch Flat 2 Forebay		Nevada Irrigation District	77	185	Certified	Satisfactory	Nevada
CA00258	39.22	-120.84	Park, sanitation, utility, or water district	440	ERTH	Low	No	1965

61.023	Dutch Flat Afterbay		Nevada Irrigation District	165	1,300	Certified	Satisfactory	Nevada
CA00257	39.21	-120.84	Park, sanitation, utility, or water district	495	ERRK	Low	No	1965

1428.002	Dutcher Creek		E. and J. Gallo Winery	43	186	Certified	Satisfactory	Sonoma
CA01362	38.76	-122.99	Private company, corporation, LLC, partnership	790	ERTH	Significant	No	1992

414.000	Duvall		Private Entity	30	242	Certified	Satisfactory	Napa
CA00581	38.64	-122.47	Individual owner	1,500	ERTH	Significant	No	1940

Jurisdictional Dams

Listed Alphabetically by Dam Name

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built
1182.000	Dwight Hammond		Hammond Lake Irrigation Association	25	348	Certified	Satisfactory	Siskiyou
CA00929	41.38	-122.42	Associations	720	ERTH	Low	No	1959
1.093	Dyer		California Department of Water Resources	30	525	Certified	Satisfactory	Alameda
CA01491	37.76	-121.66	State agency	1,850	ERTH	High	No	2011

Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018
Page
28 of 101

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

371.000	E A Wright		Private Entity	38	400	Certified	Satisfactory	Glenn
CA00556	39.61	-122.54	Individual owner	320	ERTH	Significant	No	1950

1003.017	Eagle Canyon Debris Basin		Riverside County Flood Control and Water Conservation District	55	222	Certified	Satisfactory	Riverside
CA01503	33.78	-116.48	County, county agency, or county district	370	ERTH	High	No	2015

747.000	Eagle Ranch		Eagle Ranch, LLC	55	300	Certified	Satisfactory	San Luis Obispo
CA01101	35.41	-120.68	Private company, corporation, LLC, partnership	370	ERTH	Significant	No	1974

6.041	Eagle Rock		City of Los Angeles Department of Water And Power	113	254	Certified	Satisfactory	Los Angeles
CA00094	34.15	-118.19	City, city agency, or city district	495	ERTH	Extremely High	No	1953

9.000	Early Intake		San Francisco Public Utilities Commission	56	115	Certified	Fair	Tuolumne
CA00120	37.88	-119.96	City, city agency, or city district	262	CORA	Low	Yes	1925

5.009	East Glorietta		City of Glendale	22	71	Certified	Satisfactory	Los Angeles
CA01079	34.19	-118.21	City, city agency, or city district	1,730	RECT	High	No	1932

1012.015	East Hicks Canyon Retarding Basin		County of Orange	49	75	Certified	Satisfactory	Orange
CA01415	33.72	-117.72	County, county agency, or county district	1,168	ERTH	Low	No	1997

1799.000	Eastfoot Retarding Basin		City of Irvine	39	213	Certified	Satisfactory	Orange
CA01496	33.75	-117.75	City, city agency, or city district	1,000	ERTH	High	No	2007

867.000	Eastlake		Eastlake 1 Association	35	77	Certified	Satisfactory	San Diego
CA01220	32.65	-116.98	Associations	900	ERTH	High	No	1986

392.006	Eaton H. Magoon Lake		Langtry Farms, LLC	27	2,762	Certified	Satisfactory	Napa
CA01055	38.73	-122.44	Private trusts and estates	925	ERTH	Low	No	1965

32.020	Eaton Wash Debris Basin		Los Angeles County Department Of Public Works	63	721	Certified	Satisfactory	Los Angeles
CA00201	34.17	-118.09	County, county agency, or county district	1,545	ERTH	High	No	1936

53.009	Echo Lake		El Dorado Irrigation District	14	1,900	Certified	Satisfactory	El Dorado
CA00374	38.84	-120.04	Park, sanitation, utility, or water district	320	GRAV	Extremely High	No	1876

1057.000	Ed R Levin		County of Santa Clara	38	150	Certified	Satisfactory	Santa Clara
CA00890	37.45	-121.86	County, county agency, or county district	470	ERTH	Extremely High	No	1968

757.000	Edwards Reservoir		Edwards Ranch, LLC	120	596	Certified	Satisfactory	Santa Barbara
CA01240	34.49	-119.98	Private company, corporation, LLC, partnership	462	ERTH	High	No	1985

Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018
Page
29 of 101

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

8.007	El Capitan		City of San Diego	237	112,800	Certified	Fair	San Diego
CA00111	32.89	-116.81	City, city agency, or city district	1,170	HYDF	Extremely High	Yes	1934

822.000	El Casco		Riverside Land Conservancy	19	143	Certified/Inop	Satisfactory	Riverside
CA00767	33.98	-117.11	Private company, corporation, LLC, partnership	1,200	ERTH	Low	No	1879

2016.000	El Centro Water Purification Plant		City of El Centro	13	185	Certified	Fair	Imperial
CA01136	32.77	-115.56	City, city agency, or city district	3,430	ERTH	High	No	1956

53.010	El Dorado Forebay		El Dorado Irrigation District	91	361	Certified	Fair	El Dorado
CA00375	38.77	-120.59	Park, sanitation, utility, or water district	836	ERTH	High	Yes	1923

53.008	El Dorado Hills		El Dorado Irrigation District	31	215	Certified	Satisfactory	El Dorado
CA01176	38.64	-121.06	Park, sanitation, utility, or water district	2,340	ERTH	High	No	1980

1041.000	El Toro Reservoir		El Toro Water District	113	877	Certified	Satisfactory	Orange
CA00875	33.62	-117.67	Park, sanitation, utility, or water district	900	ERTH	Extremely High	No	1967

6.049	Elderberry Forebay		City of Los Angeles Department of Water And Power	179	28,400	Certified	Satisfactory	Los Angeles
CA01080	34.56	-118.63	City, city agency, or city district	1,935	ERTH	Low	No	1974

1763.000	Eleanor, Lake		Conejo Open Space Conservation Agency	37	104	Certified	Satisfactory	Ventura
CA00737	34.14	-118.85	Park, sanitation, utility, or water district	140	CORA	High	No	1881

97.114	Electra Diversion		Pacific Gas and Electric Company	44	65	Certified	Satisfactory	Amador
CA00408	38.42	-120.55	Private company, corporation, LLC, partnership	180	GRAV	Low	No	1947

1066.000	Elk Bayou		Kaweah Delta Water Conservation District	16	60	Certified	Satisfactory	Tulare
CA00899	36.14	-119.33	County, county agency, or county district	104	SLBT	Low	No	1903

1241.000	Elkins And Lane		Lassen Ranch Partners, LLC	22	412	Certified	Satisfactory	Lassen
CA00947	41.08	-120.76	Private company, corporation, LLC, partnership	400	ERTH	Low	No	1953

72.011	Elmer J Chesbro		Santa Clara Valley Water District	95	8,086	Certified	Satisfactory	Santa Clara
CA00806	37.12	-121.70	Park, sanitation, utility, or water district	690	ERRK	Extremely High	No	1955

6.006	Elysian		City of Los Angeles Department of Water And Power	71	167	Certified	Satisfactory	Los Angeles
CA00069	34.08	-118.23	City, city agency, or city district	480	ERTH	High	No	1943

612.000	Emerald Lake 1 Lower		Emerald Lake Country Club	57	45	Certified	Satisfactory	San Mateo
CA00668	37.47	-122.26	Private company, corporation, LLC, partnership	280	ERTH	High	No	1885

Jurisdictional Dams

Listed Alphabetically by Dam Name

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

1062.002	Emerg Effluent Holding		South Tahoe Public Utility District	27	184	Certified	Satisfactory	El Dorado
CA01106	38.92	-119.97	Park, sanitation, utility, or water district	3,250	ERTH	High	No	1961

2004.000	Emergency Storage Basin		Sacramento Regional County Sanitation District	20	835	Certified	Satisfactory	Sacramento
CA01419	38.46	-121.46	County, county agency, or county district	11,570	ERTH	Low	No	1977

255.000	Emerson		Private Entity	30	418	Certified	Satisfactory	Lassen
CA00526	40.37	-120.64	Individual owner	1,700	ERTH	High	No	

491.000	Emery		M-24 Ranch Association	53	630	Certified	Satisfactory	Calaveras
CA00618	38.25	-120.50	Associations	505	ERTH	Low	No	1850

721.000	Empire Weir No 1		Empire Westside Irrigation District	18	50	Certified	Satisfactory	Kings
CA00714	36.24	-119.86	Park, sanitation, utility, or water district	77	FLBT	Low	No	1906

720.000	Empire Weir No 2		Tulare Lake Basin Water Storage District	15	480	Certified	Satisfactory	Kings
CA00713	36.18	-119.83	Park, sanitation, utility, or water district	185	FLBT	Low	No	1938

6.007	Encino		City of Los Angeles Department of Water And Power	168	9,789	Certified	Satisfactory	Los Angeles
CA00070	34.15	-118.51	City, city agency, or city district	1,850	ERTH	Extremely High	No	1924

1442.002	Encinosa Basin (North)		City of Vacaville	21	147	Certified	Satisfactory	Solano
CA01512	38.36	-122.02	City, city agency, or city district	1,750	ERTH	High	No	2009

158.000	Enquist		Private Entity	12	185	Certified	Satisfactory	Modoc
CA00486	41.91	-120.54	Individual owner	475	ERTH	Low	No	1919

87.018	Etiwanda Debris Basin		County of San Bernardino Department of Public Works	51	283	Certified	Satisfactory	San Bernardino
CA01495	34.15	-117.51	County, county agency, or county district	4,175	ERRK	High	No	2008

1.042	Eureka		California Department of Parks and Recreation	29	220	Certified	Satisfactory	Plumas
CA00031	39.76	-120.71	State agency	410	ERTH	Significant	No	1866

1072.000	Ewing		Trinity County Waterworks District 1	63	887	Certified	Satisfactory	Trinity
CA00903	40.56	-123.17	County, county agency, or county district	550	ERRK	Significant	No	1972

Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018
Page
31 of 101

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

836.000	Fairbanks		Fairbanks Ranch Association	36	100	Certified	Satisfactory	San Diego
CA00773	33.00	-117.18	Associations	194	GRAV	High	No	1927

6.008	Fairmont		City of Los Angeles Department of Water And Power	121	7,507	Certified	Satisfactory	Los Angeles
CA00071	34.70	-118.43	City, city agency, or city district	4,300	HYDF	Significant	No	1912

6.053	Fairmont #2		City of Los Angeles Department of Water And Power	24	493	Certified	Satisfactory	Los Angeles
CA01295	34.71	-118.43	City, city agency, or city district	4,437	ERTH	Significant	No	1982

81.000	Fairmount Park		City of Riverside	12	200	Certified	Satisfactory	Riverside
CA00304	34.00	-117.38	City, city agency, or city district	800	ERTH	High	No	1923

1017.004	Fancher Creek		Fresno Metropolitan Flood Control District	46	9,600	Certified	Satisfactory	Fresno
CA01327	36.85	-119.54	Park, sanitation, utility, or water district	15,312	ERTH	High	No	1991

1017.006	Fancher Creek Detention		Fresno Metropolitan Flood Control District	16	1,891	Certified	Satisfactory	Fresno
CA01497	36.76	-119.61	Park, sanitation, utility, or water district	2,860	ERTH	High	No	2006

61.022	Faucherie		Nevada Irrigation District	50	5,500	Certified	Satisfactory	Nevada
CA00256	39.43	-120.57	Park, sanitation, utility, or water district	665	ROCK	Significant	No	1964

4463.000	Fay Gunby		Private Entity	40	117	Certified	Satisfactory	El Dorado
CA01051	38.73	-120.74	Individual owner	396	ERTH	High	No	1961

1.047	Feather River Hatchery		California Department of Water Resources	63	580	Certified	Satisfactory	Butte
CA00034	39.52	-121.55	State agency	600	GRAV	Low	No	1964

7000.132	Feliz North Lake		Brutocao Vineyards	24	55	Not Certified	Fair	Mendocino
CA01610	38.98	-123.14	Private company, corporation, LLC, partnership	630	ERTH	High	No	

614.002	Felt Lake		Stanford University Board of Trustees	67	900	Certified	Satisfactory	Santa Clara
CA00670	37.40	-122.18	Private company, corporation, LLC, partnership	590	ERTH	High	No	1930

1.013	Fern Lake		Sonoma Developmental Center	40	241	Certified	Satisfactory	Sonoma
CA00007	38.34	-122.53	State agency	300	ERTH	High	No	1921

506.000	Ferrario		Private Entity	25	250	Certified	Satisfactory	Calaveras
CA00626	38.19	-120.92	Individual owner	900	ERTH	Significant	No	1955

86.008	Ferro Debris Basin		Ventura County Watershed Protection District	45	24	Certified	Satisfactory	Ventura
CA01299	34.26	-119.11	County, county agency, or county district	265	ERTH	Significant	No	1986

Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018
Page
32 of 101

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

4466.000	Finnon Lake		Mosquito Volunteer Fire Department	46	400	Certified	Satisfactory	El Dorado
CA00024	38.80	-120.75	Park, sanitation, utility, or water district	830	ERTH	Significant	No	2012

2181.000	Flock No 2		Private Entity	14	318	Certified	Satisfactory	Siskiyou
CA00502	41.70	-122.51	Individual owner	890	ERTH	High	No	1946

1626.000	Fisher Creek		Brandenburg Properties	14	1,573	Certified	Satisfactory	Santa Clara
CA01458	37.21	-121.75	Private company, corporation, LLC, partnership	4,000	ERTH	Low	No	2008

14.004	Fleming Hill No. 2		City of Vallejo	39	33	Certified	Satisfactory	Solano
CA00143	38.14	-122.24	City, city agency, or city district	570	ERTH	Extremely High	No	1912

104.009	Florence Lake		Southern California Edison	149	64,406	Certified	Satisfactory	Fresno
CA00433	37.27	-118.97	Private company, corporation, LLC, partnership	3,106	MULA	Extremely High	No	1926

507.000	Flowers		Private Entity	41	724	Certified	Satisfactory	Calaveras
CA00627	37.97	-120.68	Individual owner	712	ERRK	Significant	No	1957

503.000	Fly-In-Acres		Blue Lakes Springs Homeowners Association	41	58	Certified	Satisfactory	Calaveras
CA00624	38.25	-120.34	Associations	260	ERTH	Significant	No	1953

428.002	Foote #3		Rancho Mallacomes	28	77	Certified	Satisfactory	Sonoma
CA01090	38.64	-122.67	Private company, corporation, LLC, partnership	600	ERTH	Significant	No	1970

428.003	Foote #4		Rancho Mallacomes	47	117	Certified	Satisfactory	Sonoma
CA01091	38.64	-122.67	Private company, corporation, LLC, partnership	319	ERTH	Significant	No	1976

1036.000	Foothill Park		City of Palo Alto	86	67	Certified	Satisfactory	Santa Clara
CA00868	37.36	-122.18	City, city agency, or city district	600	ERTH	Significant	No	1988

573.000	Foothill Ranch		Private Entity	15	100	Certified	Satisfactory	San Joaquin
CA00657	38.10	-121.03	Individual owner	380	ERTH	Low	No	1952

1002.008	Foothill Regulating Park		County of Sonoma Regional Parks Department	51	109	Certified	Satisfactory	Sonoma
CA01057	38.56	-122.79	County, county agency, or county district	274	ERTH	High	No	1963

63.007	Forbestown Diversion		South Feather Water and Power Agency	99	358	Certified	Satisfactory	Butte
CA00273	39.55	-121.21	Water agency or authority	333	VARA	Low	No	1962

649.000	Forest Lake		Pebble Beach Community Services District	65	353	Certified	Satisfactory	Monterey
CA00690	36.59	-121.94	Park, sanitation, utility, or water district	2,365	ERTH	Extremely High	No	1892

Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018
Page
33 of 101

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

1495.000	Forest Meadows		Sierra Golf Management	60	108	Certified	Fair	Calaveras
CA01120	38.16	-120.41	Private company, corporation, LLC, partnership	457	ERTH	Low	No	1975

20.002	Foss Creek North Area		City of Healdsburg	19	85	Certified	Satisfactory	Sonoma
CA01431	38.64	-122.87	City, city agency, or city district	1,100	ERTH	Significant	No	1998

2415.000	Foss Valley		Atlas Peak Vineyards	56	800	Certified	Satisfactory	Napa
CA01268	38.43	-122.28	Private company, corporation, LLC, partnership	2,500	ERTH	High	No	1988

827.000	Foster		Idyllwild Water District	38	56	Certified	Satisfactory	Riverside
CA00769	33.76	-116.73	Park, sanitation, utility, or water district	277	ERTH	High	No	1945

1050.005	Fountaingrove		City of Santa Rosa	38	427	Certified	Satisfactory	Sonoma
CA00988	38.48	-122.72	City, city agency, or city district	500	ERTH	Extremely High	No	1953

1034.009	Francis, Lake		Yuba County Water Agency	79	1,905	Certified	Satisfactory	Yuba
CA00866	39.36	-121.21	County, county agency, or county district	1,341	ERTH	Significant	No	2000

249.002	Fredonia		Mapes Ranch, Inc.	27	300	Certified	Satisfactory	Lassen
CA00523	40.70	-120.53	Private company, corporation, LLC, partnership	180	ERTH	Low	No	1914

61.006	French Lake		Nevada Irrigation District	100	13,800	Certified	Satisfactory	Nevada
CA00247	39.42	-120.54	Park, sanitation, utility, or water district	200	ROCK	Significant	No	1859

1.043	Frenchman		California Department of Water Resources	139	55,477	Certified	Satisfactory	Plumas
CA00032	39.89	-120.19	State agency	720	ERTH	High	No	1961

97.021	Fuller Lake		Pacific Gas and Electric Company	36	1,060	Certified	Satisfactory	Nevada
CA00351	39.34	-120.65	Private company, corporation, LLC, partnership	365	ERTH	Significant	No	1870

Count: 38

Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018

Page
34 of 101

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

1012.012	Galivan Retarding Basin		County of Orange	14	169	Certified	Satisfactory	Orange
CA01427	33.56	-117.68	County, county agency, or county district	600	ERTH	Low	No	2000

1452.000	Galt		City of Galt	16	90	Certified	Satisfactory	Sacramento
CA01225	38.30	-121.33	City, city agency, or city district	868	ERTH	Low	No	1983

1.092	Gardella		California Department of Corrections and Rehabilitation	69	370	Certified	Satisfactory	Tuolumne
CA01499	37.89	-120.43	State agency	980	ERTH	Low	No	2009

35.006	Garvey Reservoir		Metropolitan Water District Of Southern California	160	1,610	Certified	Satisfactory	Los Angeles
CA00217	34.05	-118.12	Park, sanitation, utility, or water district	5,164	ERTH	Extremely High	No	1954

1466.000	Gastaldi		Private Entity	36	83	Certified	Satisfactory	El Dorado
CA01000	38.76	-120.88	Individual owner	525	ERTH	Low	No	1951

104.037	Gem Lake		Southern California Edison	75	17,228	Certified	Fair	Mono
CA00453	37.75	-119.14	Private company, corporation, LLC, partnership	688	MULA	High	Yes	1917

35.002	Gene Wash		Metropolitan Water District Of Southern California	140	6,300	Certified	Satisfactory	San Bernardino
CA00213	34.30	-114.17	Park, sanitation, utility, or water district	383	VARA	High	No	1937

189.000	George Fiock No 1		The Kuck Brothers	19	223	Certified	Satisfactory	Siskiyou
CA00501	41.69	-122.52	Private company, corporation, LLC, partnership	725	ERTH	Significant	No	1954

225.000	George Reese Reservoir		Private Entity	29	195	Certified	Satisfactory	Shasta
CA00507	40.53	-122.46	Individual owner	442	ERTH	Significant	No	1876

460.002	Georgetown Cntrl		Georgetown Divide Public Utility District	38	50	Certified	Satisfactory	El Dorado
CA00606	38.92	-120.78	Park, sanitation, utility, or water district	550	ERTH	Significant	No	1956

1231.000	Gerig		Gerig Dam Association	10	110	Certified	Satisfactory	Lassen
CA00941	41.15	-121.15	Associations	74	FLBT	Low	No	1939

1009.005	Gerle		Sacramento Municipal Utility District	58	1,200	Certified	Satisfactory	El Dorado
CA00818	38.97	-120.39	Park, sanitation, utility, or water district	395	GRAV	Low	No	1962

11.000	Gibraltar		City of Santa Barbara	169	9,998	Certified	Satisfactory	Santa Barbara
CA00138	34.53	-119.69	City, city agency, or city district	600	CORA	High	No	1920

699.000	Giffen Reservoir		Harris Farms, Inc.	29	900	Certified	Satisfactory	Fresno
CA00711	36.80	-119.44	Private company, corporation, LLC, partnership	1,250	ERTH	High	No	1971

Jurisdictional Dams

Listed Alphabetically by Dam Name

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

448.000	Giles		Private Entity	18	119	Certified	Satisfactory	Solano
CA00598	38.44	-121.97	Individual owner	695	ERTH	High	No	1965

571.000	Gilmore		Private Entity	28	550	Certified	Satisfactory	San Joaquin
CA00655	38.04	-120.99	Individual owner	1,080	ERTH	Significant	No	1918

800.000	Glen Martin		Highest and Best Use, LLC	55	33	Certified	Fair	San Bernardino
CA00754	34.14	-116.99	Private trusts and estates	302	ERTH	High	No	1950

5.007	Glenoaks 968 Reservoir		City of Glendale	62	28	Certified	Satisfactory	Los Angeles
CA00065	34.15	-118.21	City, city agency, or city district	220	ERTH	High	No	1949

470.000	Goffinet		Private Entity	38	197	Certified	Satisfactory	Amador
CA00612	38.38	-120.88	Individual owner	585	ERTH	Significant	No	1954

35.020	Goodhart Canyon Detention Basin		Metropolitan Water District Of Southern California	15	1,026	Certified	Satisfactory	Riverside
CA01424	33.68	-116.98	Park, sanitation, utility, or water district	6,823	ERTH	High	No	1999

62.000	Goodwin		Tri-Dam Project	101	500	Certified	Satisfactory	Calaveras
CA00260	37.86	-120.63	Water agency or authority	460	MULA	High	No	1912

395.000	Graham		Private Entity	39	62	Certified	Satisfactory	Lake
CA00570	38.97	-122.95	Individual owner	220	ERTH	Low	No	1959

1450.007	Granlees		Rancho Murieta Community Services District	17	75	Certified	Satisfactory	Sacramento
CA00599	38.50	-121.07	Park, sanitation, utility, or water district	364	GRAV	Low	No	1921

1057.002	Grant Company 2		County of Santa Clara	27	400	Certified	Satisfactory	Santa Clara
CA00675	37.34	-121.72	County, county agency, or county district	80	ERTH	Significant	No	1927

6.033	Grant Lake		City of Los Angeles Department of Water And Power	87	47,525	Certified	Satisfactory	Mono
CA00089	37.86	-119.10	City, city agency, or city district	700	ERTH	High	No	1940

805.002	Grass Valley		Arrowhead Lake Association	35	243	Certified	Satisfactory	San Bernardino
CA00760	34.26	-117.22	Associations	170	ERTH	High	No	1964

134.000	Graven		Private Entity	15	1,100	Certified	Satisfactory	Modoc
CA00472	41.29	-120.67	Individual owner	1,630	ERTH	Low	No	1917

1604.002	Green Oaks #1		Ana Nuevo Ranch	39	322	Certified	Satisfactory	San Mateo
CA01010	37.13	-122.32	Private company, corporation, LLC, partnership	880	ERTH	Low	No	1936

Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018

Page
36 of 101

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

673.000	Green Valley		Private Entity	33	240	Certified	Satisfactory	Mariposa
CA00700	37.78	-120.15	Individual owner	1,040	ERTH	Low	No	1957

447.000	Green Valley Lake		John Newmeyer, Green Valley Ranch, LLC	40	150	Certified	Satisfactory	Solano
CA00597	38.27	-122.20	Private company, corporation, LLC, partnership	330	ERTH	High	No	1956

804.000	Green Valley Lake		Green Valley Mutual Water Company	56	250	Certified	Satisfactory	San Bernardino
CA00758	34.24	-117.08	Private company, corporation, LLC, partnership	425	MULA	High	No	1925

6.043	Green Verdugo		City of Los Angeles Department of Water And Power	118	99	Certified	Satisfactory	Los Angeles
CA00096	34.26	-118.34	City, city agency, or city district	452	ERTH	High	No	1953

1010.000	Greenhorn		City of Yreka	35	251	Certified	Satisfactory	Siskiyou
CA00826	41.71	-122.65	City, city agency, or city district	1,300	ERTH	High	No	1960

1422.002	Greeott		Private Entity	40	100	Certified	Satisfactory	Sonoma
CA01089	38.56	-122.78	Individual owner	170	ERTH	Significant	No	1951

1803.003	Gregory, Lake		San Bernardino County Regional Parks	90	2,100	Certified	Fair	San Bernardino
CA00224	34.25	-117.27	County, county agency, or county district	475	ERTH	High	Yes	1938

1061.000	Greystone Reservoir		City of Beverly Hills	75	60	Certified	Satisfactory	Los Angeles
CA00893	34.09	-118.40	City, city agency, or city district	1,140	RECT	High	No	1970

2018.000	Grinding Rock		Tuolumne City Sanitary District	55	330	Certified	Satisfactory	Tuolumne
CA01184	37.94	-120.26	Park, sanitation, utility, or water district	525	ERTH	Low	No	1979

285.000	Grizzly Creek		Private Entity	39	140	Certified	Satisfactory	Plumas
CA00532	39.84	-120.43	Individual owner	163	GRAV	High	No	1915

349.000	Grizzly Creek		Private Entity	50	76	Certified	Satisfactory	Butte
CA00553	39.54	-121.16	Individual owner	280	ERTH	Significant	No	1964

94.003	Grizzly Forebay		Pacific Gas and Electric Company	92	1,112	Certified	Satisfactory	Plumas
CA00333	39.89	-121.29	Private company, corporation, LLC, partnership	511	VARA	High	No	1928

1.052	Grizzly Valley		California Department of Water Resources	115	83,000	Certified	Satisfactory	Plumas
CA00039	39.88	-120.48	State agency	800	ERRK	High	No	1966

1551.000	Groveland Wastewater Reclamation		Groveland Community Services District	45	172	Certified	Satisfactory	Tuolumne
CA01308	37.85	-120.23	Park, sanitation, utility, or water district	900	ERTH	Significant	No	1981

Jurisdictional Dams

September 2018
Page
37 of 101*Listed Alphabetically by Dam Name*

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

72.005	Guadalupe		Santa Clara Valley Water District	142	3,460	Certified	Fair	Santa Clara
CA00290	37.20	-121.88	Park, sanitation, utility, or water district	695	ERTH	Extremely High	Yes	1935

392.000	Guenoc Lake		Langtry Farms, LLC	50	3,237	Certified	Fair	Lake
CA00564	38.72	-122.53	Private trusts and estates	1,410	ERTH	Significant	Yes	1928

Count: 44

Jurisdictional Dams

Listed Alphabetically by Dam Name

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

6.024	Haiwee		City of Los Angeles Department of Water And Power	81	60,600	Certified	Fair	Inyo
CA00082	36.14	-117.95	City, city agency, or city district	1,555	HYDF	High	Yes	1913

1125.000	Halls Meadows		Russ Ranch Company, LLC	13	581	Certified	Satisfactory	Modoc
CA01208	41.64	-120.33	Private company, corporation, LLC, partnership	1,040	ERTH	Low	No	1941

97.023	Halsey Forebay		Pacific Gas and Electric Company	42	220	Certified	Satisfactory	Placer
CA00352	38.97	-121.04	Private company, corporation, LLC, partnership	1,167	ERTH	High	No	1916

459.000	Hamel		Private Entity	26	350	Certified	Satisfactory	Sacramento
CA00605	38.31	-121.06	Individual owner	400	ERTH	Significant	No	1957

374.000	Hamilton		Private Entity	28	111	Certified	Satisfactory	Glenn
CA00558	39.69	-122.56	Individual owner	742	ERTH	Significant	No	1967

6.054	Hansen Recreational Lake		City of Los Angeles Department of Water And Power	50	85	Certified	Satisfactory	Los Angeles
CA01448	34.27	-118.39	City, city agency, or city district	3,600	ERTH	Low	No	1999

1012.002	Harbor View		County of Orange	65	28	Certified	Satisfactory	Orange
CA00830	33.60	-117.87	County, county agency, or county district	330	ERTH	High	No	1964

3414.007	Hardester North		Juliana Mutual Water Company	36	150	Certified	Satisfactory	Napa
CA01375	38.62	-122.41	Private company, corporation, LLC, partnership	1,350	ERTH	Significant	No	2003

57.002	Harold Reservoir		Palmdale Water District	30	3,870	Certified	Satisfactory	Los Angeles
CA00238	34.55	-118.11	Park, sanitation, utility, or water district	2,800	ERTH	High	No	1891

1003.002	Harrison Street		Riverside County Flood Control and Water Conservation District	50	208	Certified	Satisfactory	Riverside
CA00797	33.88	-117.43	County, county agency, or county district	760	ERTH	High	No	1954

746.000	Hartzell		Old Creek Road, LLC	50	300	Certified	Satisfactory	San Luis Obispo
CA00727	35.53	-120.84	Private company, corporation, LLC, partnership	275	ERRK	Significant	No	1965

1062.003	Harvey Place		South Tahoe Public Utility District	72	3,700	Certified	Satisfactory	Alpine
CA01222	38.76	-119.78	Park, sanitation, utility, or water district	725	ERTH	Significant	No	1989

97.109	Hat Creek #2 Diversion		Pacific Gas and Electric Company	19	634	Certified	Satisfactory	Shasta
CA00404	40.95	-121.55	Private company, corporation, LLC, partnership	120	GRAV	Significant	No	1942

651.000	Hawkins		Ausaymas Cattle Company	72	575	Certified	Satisfactory	San Benito
CA00694	36.96	-121.31	Private company, corporation, LLC, partnership	350	HYDF	Significant	No	1928

Jurisdictional Dams

Listed Alphabetically by Dam Name

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

2223.000	Haynes Res		Denny Land and Cattle Company, LLC	67	5,870	Certified	Satisfactory	Shasta
CA01030	40.91	-121.76	Private company, corporation, LLC, partnership	875	ERTH	High	No	1965

6.055	Headworks Reservoir East		City of Los Angeles Department of Water And Power	32	165	Certified	Satisfactory	Los Angeles
CA01510	34.15	-118.31	City, city agency, or city district	2,095	RECT	Low	No	2016

1002.000	Healdsburg Recreation		County of Sonoma Regional Parks Department	15	275	Certified	Fair	Sonoma
CA00791	38.60	-122.86	County, county agency, or county district	330	FLBT	Low	Yes	1953

250.004	Heath Reservoir		Private Entity	45	8,650	Certified	Satisfactory	Lassen
CA00525	40.84	-120.78	Individual owner	1,620	ERTH	Low	No	1965

1.083	Heenan Lake		California Department of Fish and Wildlife	39	3,100	Certified	Satisfactory	Alpine
CA00641	38.66	-119.66	State agency	600	ERTH	Low	No	1929

1491.000	Hein		Naki, Inc.	16	145	Certified	Satisfactory	Calaveras
CA01003	38.16	-120.93	Private company, corporation, LLC, partnership	1,250	ERTH	Low	No	1962

4415.000	Heitz		Heitz Wine Cellars	87	272	Certified	Satisfactory	Napa
CA01345	38.63	-122.47	Private company, corporation, LLC, partnership	540	ERTH	Significant	No	1991

3425.000	Helen, Lake		Private Entity	39	192	Certified	Satisfactory	Sonoma
CA01060	38.45	-122.91	Individual owner	355	ERTH	Significant	No	1966

2029.000	Henderson		Amador Regional Sanitation Authority	56	500	Certified	Fair	Amador
CA00005	38.39	-120.88	Water agency or authority	630	ERTH	High	No	1923

675.000	Hendricks		Private Entity	33	130	Certified	Satisfactory	Mariposa
CA00702	37.36	-119.90	Individual owner	340	ERTH	Low	No	1958

413.004	Henne		Howell Mountain Mutual Water Company	49	109	Certified	Satisfactory	Napa
CA00578	38.59	-122.46	Private company, corporation, LLC, partnership	470	ERTH	High	No	1959

35.016	Henry J Mills No 2		Metropolitan Water District Of Southern California	34	92	Certified	Satisfactory	Riverside
CA01349	33.92	-117.32	Park, sanitation, utility, or water district	2,044	ERTH	High	No	1996

35.014	Henry J Mills Reservoir		Metropolitan Water District Of Southern California	23	83	Certified	Satisfactory	Riverside
CA01085	33.92	-117.32	Park, sanitation, utility, or water district	2,038	ERTH	High	No	1979

841.000	Henry Jr		Private Entity	33	196	Certified	Satisfactory	San Diego
CA00777	32.71	-116.65	Individual owner	249	VARA	Low	No	1929

Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018

Page
40 of 101

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

69.002	Henshaw		Vista Irrigation District	123	50,000	Certified	Satisfactory	San Diego
CA00283	33.24	-116.76	Park, sanitation, utility, or water district	650	HYDF	High	No	1923

1028.000	Herman, Lake		City of Benicia	51	2,210	Certified	Satisfactory	Solano
CA00851	38.10	-122.15	City, city agency, or city district	700	ERTH	High	No	1905

1025.002	Hernandez		San Benito County Water District	124	18,000	Certified	Satisfactory	San Benito
CA00848	36.40	-120.84	County, county agency, or county district	950	ERTH	High	No	1962

5414.000	Hestan Vineyards Dam		Private Entity	21	146	Not Certified	Fair	Napa
CA01544	38.32	-122.11	Individual owner	700	ERTH	Significant	No	

87.013	Hickory Basin		County of San Bernardino Department of Public Works	19	220	Certified	Satisfactory	San Bernardino
CA01373	34.09	-117.51	County, county agency, or county district	4,600	ERTH	Low	No	2001

1012.014	Hicks Canyon Retention Basin		County of Orange	60	110	Certified	Satisfactory	Orange
CA01414	33.74	-117.72	County, county agency, or county district	806	ERTH	Low	No	1997

1011.002	Highland Creek		Lake County Watershed Protection District	75	3,500	Certified	Satisfactory	Lake
CA00828	38.95	-122.90	Park, sanitation, utility, or water district	625	ERTH	High	No	1962

629.000	Higuera		Wells Fargo Bank	44	65	Certified	Satisfactory	Santa Clara
CA00687	37.46	-121.89	Private trusts and estates	525	ERTH	Extremely High	No	1953

104.030	Hillside		Southern California Edison	81	12,883	Certified	Satisfactory	Inyo
CA00446	37.17	-118.57	Private company, corporation, LLC, partnership	650	ROCK	High	No	1910

4420.000	Hillside Ranch		Rafanelli and Nahas Real Estate Development	60	210	Certified	Satisfactory	Sonoma
CA01067	38.66	-123.18	Private company, corporation, LLC, partnership	317	ERTH	Low	No	1967

1114.000	Hines Brothers		Private Entity	14	200	Certified	Satisfactory	Modoc
CA00917	41.27	-121.15	Individual owner	1,660	ERTH	Low	No	1955

1031.002	Hinkle		San Juan Water District	20	200	Certified	Satisfactory	Placer
CA01192	38.71	-121.17	Park, sanitation, utility, or water district	1,300	ERTH	High	No	1980

35.017	HJ Mills Reclamation		Metropolitan Water District Of Southern California	48	98	Certified	Satisfactory	Riverside
CA01374	33.92	-117.32	Park, sanitation, utility, or water district	1,560	ERTH	High	No	1996

8.003	Hodges, Lake		City of San Diego	131	37,700	Certified	Fair	San Diego
CA00108	33.05	-117.13	City, city agency, or city district	729	MULA	Extremely High	No	1918

Jurisdictional Dams

Listed Alphabetically by Dam Name

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

236.000	Hog Flat		Lassen Irrigation Company	15	8,000	Certified	Satisfactory	Lassen
CA00515	40.44	-120.91	Private company, corporation, LLC, partnership	1,760	ERTH	High	No	1891

1237.000	Holbrook		Private Entity	26	719	Certified	Satisfactory	Lassen
CA00945	41.08	-120.63	Individual owner	455	ERTH	Low	No	1952

1079.000	Holiday Lake		Holiday Lake Community Services District	39	150	Certified	Satisfactory	El Dorado
CA00910	38.66	-120.92	Park, sanitation, utility, or water district	585	ERTH	Significant	No	1951

2006.000	Holman		City of Angels	101	250	Certified	Satisfactory	Calaveras
CA01128	38.05	-120.54	City, city agency, or city district	672	ERTH	Significant	No	1976

1391.000	Homestake Tailings		Homestake Mining Company	169	0	Certified	Satisfactory	Lake
CA01205	38.86	-122.44	Private company, corporation, LLC, partnership	11,670	ERTH	High	No	1990

337.000	Honcut Creek Ranch No 1		Honcut Creek Ranch, A Partnership	19	95	Certified	Satisfactory	Yuba
CA01300	39.31	-121.54	Private company, corporation, LLC, partnership	900	ERTH	High	No	1964

7000.048	Hooper No 1		Private Entity	25	200	Not Certified	Fair	Mendocino
CA01438	38.96	-123.04	Individual owner	690	ERTH	Significant	No	

7000.049	Hooper No 2		Private Entity	20	120	Not Certified	Fair	Mendocino
CA01439	38.96	-123.03	Individual owner	510	ERTH	Significant	No	

245.000	Horse Lake		Snow Storm Ranch	12	75	Certified	Satisfactory	Lassen
CA00521	40.68	-120.39	Private company, corporation, LLC, partnership	1,200	ERTH	Low	No	1912

1034.002	Hour House		Yuba County Water Agency	68	285	Certified	Satisfactory	Sierra
CA00864	39.41	-121.00	County, county agency, or county district	364	VARA	Low	No	1968

4416.000	Hudson Vineyards		Hudson Vineyards	25	80	Not Certified	Fair	Napa
CA01353	38.26	-122.37	Private company, corporation, LLC, partnership	400	ERTH	Significant	No	1983

112.002	Huffman Antelope		D.S.L.R., LLC	15	1,550	Certified	Satisfactory	Modoc
CA00462	41.58	-120.79	Private company, corporation, LLC, partnership	1,027	ERTH	Low	No	1922

109.000	Hunters		Utica Water and Power Authority	57	253	Certified	Satisfactory	Calaveras
CA00423	38.20	-120.36	Water agency or authority	389	CORA	High	No	1928

104.010	Huntington Lake 1		Southern California Edison	170	88,834	Certified	Satisfactory	Fresno
CA00434	37.23	-119.24	Private company, corporation, LLC, partnership	1,310	GRAV	Extremely High	No	1917

Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018

Page
42 of 101

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

1009.000	Ice House		Sacramento Municipal Utility District	150	45,960	Certified	Satisfactory	El Dorado
CA00814	38.82	-120.36	Park, sanitation, utility, or water district	1,440	ROCK	Extremely High	No	1959

1324.000	Ice Lakes		Sierra Lakes County Water District	12	220	Certified	Satisfactory	Placer
CA00971	39.29	-120.38	Park, sanitation, utility, or water district	40	GRAV	Low	No	1942

105.006	Independence		Truckee Meadows Water Authority	31	18,500	Certified	Satisfactory	Sierra
CA00458	39.45	-120.29	Water agency or authority	847	ERTH	Significant	No	1939

1462.000	Indian Creek		Greenstone Country Owners Association	36	457	Certified	Satisfactory	El Dorado
CA00997	38.73	-120.92	Associations	685	ERTH	High	No	1946

1062.000	Indian Creek		South Tahoe Public Utility District	71	3,160	Certified	Satisfactory	Alpine
CA00894	38.75	-119.78	Park, sanitation, utility, or water district	1,440	ERTH	Significant	No	1967

97.113	Indian Ole		Pacific Gas and Electric Company	26	24,800	Certified	Satisfactory	Lassen
CA00407	40.28	-121.02	Private company, corporation, LLC, partnership	264	FLBT	High	No	1924

1080.002	Indian Valley		Yolo County Flood Control and Water Conservation District	222	300,000	Certified	Satisfactory	Lake
CA01107	39.08	-122.54	County, county agency, or county district	980	ERTH	Extremely High	No	1976

112.004	Ingals Swamp		D.S.L.R., LLC	23	2,850	Certified	Satisfactory	Modoc
CA00474	41.71	-120.68	Private company, corporation, LLC, partnership	2,200	ERTH	Low	No	1918

1030.003	Interbay		Placer County Water Agency	70	178	Certified	Satisfactory	Placer
CA00858	39.03	-120.60	County, county agency, or county district	230	GRAV	Low	No	1966

2035.000	Ione Canal		Amador Water Agency	48	24	Certified	Satisfactory	Amador
CA01244	38.34	-120.91	County, county agency, or county district	270	ERTH	Low	No	1962

97.124	Iron Canyon		Pacific Gas and Electric Company	210	24,300	Certified	Satisfactory	Shasta
CA00417	41.04	-121.99	Private company, corporation, LLC, partnership	1,038	ERTH	High	No	1965

91.003	Iron Gate		PacifiCorp	188	58,000	Certified	Satisfactory	Siskiyou
CA00325	41.93	-122.44	Private company, corporation, LLC, partnership	745	ERRK	High	No	1962

2011.002	Irrigation Reservoir		City of Bakersfield	22	5,200	Certified	Satisfactory	Kern
CA01181	35.33	-118.97	City, city agency, or city district	24,260	ERTH	High	No	1980

1625.000	Isabel Lake No 1		Private Entity	23	435	Certified	Satisfactory	Santa Clara
CA01238	37.32	-121.54	Individual owner	990	ERTH	Low	No	1948

Jurisdictional Dams

September 2018

Page
43 of 101

Listed Alphabetically by Dam Name

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

1625.002	Isabel Lake No 2		Private Entity	18	95	Certified	Satisfactory	Santa Clara
CA01255	37.33	-121.53	Individual owner	320	ERTH	Low	No	

80.002	Island Weir		Laguna Irrigation District	13	230	Certified	Satisfactory	Kings
CA00303	36.39	-119.79	Park, sanitation, utility, or water district	224	FLBT	Low	No	1926

1239.000	Iverson		Mcarthur 1989 Trust	45	1,800	Certified	Satisfactory	Lassen
CA00946	41.08	-121.06	Private trusts and estates	1,854	ERTH	Low	No	1968

Count: 17

Jurisdictional Dams

Listed Alphabetically by Dam Name

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

1083.000	J C Jacobsen		Tehachapi-Cummings County Water District	56	1,820	Certified	Satisfactory	Kern
CA00587	35.11	-118.54	Park, sanitation, utility, or water district	3,900	ERTH	High	No	1973

653.000	J V De Laveaga		Las Aguilas Corporation	28	514	Certified	Satisfactory	San Benito
CA00695	36.86	-121.20	Private company, corporation, LLC, partnership	1,050	ERTH	Low	No	1940

1.067	J W Wisda		California Department of Parks and Recreation	50	45	Certified/Inop	Satisfactory	Los Angeles
CA00053	34.09	-118.59	State agency	350	ERTH	Low	No	1958

567.000	J&T Cattle Company No. 1		J&T Cattle Company	22	132	Not Certified	Fair	Stanislaus
CA01602	37.62	-120.51	Private company, corporation, LLC, partnership	300	ERTH	Low	No	2013

567.002	J&T Cattle Company No. 2		J&T Cattle Company	14	96	Not Certified	Fair	Stanislaus
CA01605	37.62	-120.50	Private company, corporation, LLC, partnership	350	ERTH	Low	No	1980

149.003	Jack's Swamp Dam No 2		Private Entity	12	1,013	Certified	Satisfactory	Modoc
CA01425	41.55	-120.82	Individual owner	300	ERTH	Low	No	1926

1035.000	Jackson Creek		Jackson Valley Irrigation District	193	22,000	Certified	Satisfactory	Amador
CA00867	38.31	-120.89	Park, sanitation, utility, or water district	1,140	ERRK	High	No	1965

61.017	Jackson Lake		Nevada Irrigation District	28	1,000	Certified	Satisfactory	Nevada
CA00252	39.46	-120.56	Park, sanitation, utility, or water district	772	ERTH	Low	No	1942

61.020	Jackson Meadows		Nevada Irrigation District	195	52,500	Certified	Satisfactory	Nevada
CA00254	39.51	-120.55	Park, sanitation, utility, or water district	1,530	ROCK	Extremely High	No	1965

4467.000	Jacobs Creek		Four Corners Land Owners Association	53	587	Certified	Satisfactory	El Dorado
CA00232	38.80	-120.94	Associations	350	ERTH	Low	No	1948

10.021	James H Turner		City and County of San Francisco	193	50,500	Certified	Fair	Alameda
CA00132	37.58	-121.85	City, city agency, or city district	2,160	ERTH	Extremely High	Yes	1964

72.008	James J. Lenihan		Santa Clara Valley Water District	208	21,430	Certified	Satisfactory	Santa Clara
CA00293	37.20	-121.99	Park, sanitation, utility, or water district	810	ERTH	Extremely High	No	1953

1220.000	James Montgomery		Private Entity	24	65	Certified	Satisfactory	Shasta
CA00932	40.52	-122.48	Individual owner	240	ERTH	Significant	No	1869

1123.002	James Porter		Private Entity	21	106	Certified	Fair	Modoc
CA00925	41.51	-120.42	Individual owner	1,240	ERTH	High	Yes	1928

Jurisdictional Dams

Listed Alphabetically by Dam Name

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

4418.000	Jamieson Vineyards		Boisset Family Estates	41	75	Certified	Satisfactory	Napa
CA01417	38.20	-122.22	Private company, corporation, LLC, partnership	375	ERTH	Significant	No	

686.000	Jane, Lake		Swd Investments-Fulton Ranch, Inc.	37	182	Certified	Satisfactory	Madera
CA00706	37.06	-119.82	Private company, corporation, LLC, partnership	361	ERTH	Low	No	1961

2385.000	Jayne's Lake		Eden Valley Ranch, LLC	70	1,225	Certified	Satisfactory	Mendocino
CA01262	39.63	-123.17	Private company, corporation, LLC, partnership	650	ERTH	Low	No	1985

82.004	Jeff Davis		Calaveras Public Utility District	114	1,800	Certified	Satisfactory	Calaveras
CA00309	38.34	-120.54	Park, sanitation, utility, or water district	102	ERTH	High	No	1973

5423.000	John Carl Warnecke		Warnecke Ranch and Vineyards	32	30	Certified	Satisfactory	Sonoma
CA01319	38.61	-122.78	Private company, corporation, LLC, partnership	238	ERTH	Low	No	1974

483.000	John Orr		Private Entity	20	152	Certified	Satisfactory	Amador
CA00615	38.30	-120.97	Individual owner	590	ERTH	Low	No	1959

7000.104	Johnson Ranch		Beckstoffer Vineyards	26	182	Not Certified	Fair	Mendocino
CA01479	38.97	-123.13	Private company, corporation, LLC, partnership	680	ERTH	Significant	No	

605.002	Johnston		Peninsula Open Space Trust	31	30	Certified/Inop	Satisfactory	San Mateo
CA00667	37.45	-122.42	Private company, corporation, LLC, partnership	132	GRAV	Low	No	1919

219.000	Jones Ranch		Private Entity	36	58	Certified	Satisfactory	Trinity
CA01258	40.80	-123.49	Individual owner	350	ERTH	Significant	No	1980

34.002	Juncal		Montecito Water District	160	6,140	Certified	Satisfactory	Santa Barbara
CA00211	34.49	-119.51	Park, sanitation, utility, or water district	430	VARA	High	No	1930

1009.002	Junction		Sacramento Municipal Utility District	168	3,250	Certified	Satisfactory	El Dorado
CA00815	38.85	-120.46	Park, sanitation, utility, or water district	550	VARA	Significant	No	1962

2225.000	Junge No 2		Private Entity	34	42	Certified	Satisfactory	Shasta
CA01031	40.69	-121.95	Individual owner	480	ERTH	Low	No	1965

2225.002	Junge No 3		Private Entity	43	180	Certified	Satisfactory	Shasta
CA01032	40.67	-121.96	Individual owner	860	ERTH	Low	No	1966

1003.014	Jurupa Basin		Riverside County Flood Control and Water Conservation District	22	167	Certified	Satisfactory	Riverside
CA01212	34.00	-117.45	County, county agency, or county district	1,350	ERTH	High	No	1983

Jurisdictional Dams

Listed Alphabetically by Dam Name

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

87.015	Jurupa Basin		County of San Bernardino Department of Public Works	29	1,680	Certified	Satisfactory	San Bernardino
CA01405	34.05	-117.51	County, county agency, or county district	7,000	ERTH	High	No	2001

Count: 29

Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018

Page
47 of 101

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

133.000	Kelley and Greiner		Private Entity	11	71	Certified	Satisfactory	Modoc
CA00470	41.56	-120.49	Individual owner	580	ERRK	Low	No	1923

7000.125	Kelley Hot Spring Fish		Private Entity	30	300	Not Certified	Poor	Modoc
CA01599	41.45	-120.84	Individual owner	2,550	ERTH	High	No	

1.078	Kelly Cabin Can		California Department of Parks and Recreation	32	70	Certified	Satisfactory	Santa Clara
CA01012	37.12	-121.43	State agency	300	ERTH	Low	No	1955

97.024	Kelly Lake		Pacific Gas and Electric Company	21	290	Certified	Satisfactory	Placer
CA00353	39.31	-120.58	Private company, corporation, LLC, partnership	500	ERTH	Low	No	1928

662.000	Kelsey		Private Entity	28	1,000	Certified	Satisfactory	Merced
CA00698	37.55	-120.35	Individual owner	900	ERTH	Significant	No	1929

95.008	Kerckhoff Diversion		Pacific Gas and Electric Company	106	4,200	Certified	Satisfactory	Madera
CA00340	37.13	-119.53	Private company, corporation, LLC, partnership	495	VARA	High	No	1920

735.000	Kern River County Park		Kern County Parks and Recreation	24	790	Certified	Satisfactory	Kern
CA00720	35.44	-118.86	County, county agency, or county district	4,700	ERTH	High	No	1959

97.025	Kidd Lake		Pacific Gas and Electric Company	40	1,930	Certified	Satisfactory	Placer
CA00354	39.31	-120.43	Private company, corporation, LLC, partnership	430	ERRK	High	No	1855

1550.002	Kilmer		Private Entity	31	99	Certified	Satisfactory	Tuolumne
CA01307	37.76	-120.51	Individual owner	675	ERTH	Low	No	1953

83.000	Kimball Creek		City of Calistoga	80	405	Certified	Satisfactory	Napa
CA00310	38.62	-122.61	City, city agency, or city district	325	ERTH	High	No	1939

7000.121	King Ridge Road		Private Entity	52	160	Not Certified	Fair	Sonoma
CA01554	38.62	-123.28	Individual owner	500	ERTH	Significant	No	

513.000	Kinney Meadows		Alpine Land and Reservoir Company	44	900	Certified	Satisfactory	Alpine
CA00634	38.56	-119.81	Private company, corporation, LLC, partnership	335	ERTH	Low	No	1929

320.000	Kokila		Private Entity	18	54	Certified	Satisfactory	Placer
CA00544	38.76	-121.18	Individual owner	625	ERTH	Significant	No	1951

156.006	Kramer		Kramer Ranch, LLC	31	118	Certified	Satisfactory	Modoc
CA00484	41.18	-121.21	Private company, corporation, LLC, partnership	400	ERRK	Significant	No	1937

Jurisdictional Dams

*Listed Alphabetically by Dam Name*September 2018
Page
48 of 101

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

624.000	Kuhn		Private Entity	67	85	Certified	Satisfactory	Santa Clara
CA00683	37.30	-121.74	Individual owner	312	ERTH	High	No	1947

97.007	Kunkle		Pacific Gas and Electric Company	54	155	Certified	Satisfactory	Butte
CA00344	39.71	-121.58	Private company, corporation, LLC, partnership	1,040	ERTH	Significant	No	1907

Count: 16

Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018
Page
49 of 101

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

1030.000	L. L. Anderson		Placer County Water Agency	231	155,500	Certified	Satisfactory	Placer
CA00856	39.11	-120.47	County, county agency, or county district	2,700	ERRK	Extremely High	No	1965

1024.010	La Contenta		Calaveras County Water District	43	172	Certified	Satisfactory	Calaveras
CA01464	38.17	-120.82	County, county agency, or county district	565	ERTH	High	No	2002

7000.129	La Crema Winery		Jackson Family Wines	32	103	Not Certified	Fair	Sonoma
CA01606	38.23	-122.57	Private company, corporation, LLC, partnership	1,600	ERTH	High	No	

68.002	La Grange		Turlock Irrigation District	131	500	Certified	Satisfactory	Stanislaus
CA00278	37.67	-120.44	Park, sanitation, utility, or water district	280	GRAV	Significant	No	1894

415.000	La Herradura		L.P.R.P. Legacy Trust	73	110	Certified	Satisfactory	Napa
CA00582	38.52	-122.42	Private company, corporation, LLC, partnership	285	ERTH	Low	No	1948

32.027	La Tuna Debris Basin		Los Angeles County Department Of Public Works	47	207	Certified	Satisfactory	Los Angeles
CA01153	34.24	-118.33	County, county agency, or county district	654	ERTH	High	No	1960

1414.000	La Verne, Lake		Private Entity	50	54	Certified	Satisfactory	Napa
CA00983	38.46	-122.21	Individual owner	255	ERTH	Significant	No	1956

104.011	Lady Franklin Lake		Southern California Edison	21	467	Certified	Satisfactory	Tulare
CA00435	36.42	-118.56	Private company, corporation, LLC, partnership	400	GRAV	Low	No	1905

31.002	Lafayette		East Bay Municipal Utility District	132	4,250	Certified	Fair	Contra Costa
CA00163	37.88	-122.14	Park, sanitation, utility, or water district	1,200	ERTH	Extremely High	Yes	1929

5421.000	Lafranchi Creek		Wine World, Inc.	23	100	Certified	Satisfactory	Sonoma
CA01318	38.65	-122.70	Private company, corporation, LLC, partnership	965	ERTH	Significant	No	1982

1442.000	Lagoon Valley County Park		City of Vacaville	13	780	Certified	Satisfactory	Solano
CA01315	38.33	-122.01	City, city agency, or city district	5,200	ERTH	High	No	1981

32.022	Laguna Regulating Basin		Los Angeles County Department Of Public Works	43	310	Certified	Satisfactory	Los Angeles
CA00203	34.06	-118.16	County, county agency, or county district	380	ERTH	Significant	No	1970

1427.000	Lagunita		Private Entity	49	133	Certified	Satisfactory	Sonoma
CA00992	38.57	-122.80	Individual owner	308	ERTH	High	No	1954

614.003	Lagunita		Stanford University Board of Trustees	16	280	Certified	Satisfactory	Santa Clara
CA00671	37.42	-122.17	Private company, corporation, LLC, partnership	2,500	ERTH	Extremely High	No	1900

Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018
Page
50 of 101

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

33.002	Lagunitas		Marin Municipal Water District	48	341	Certified	Satisfactory	Marin
CA00205	37.95	-122.60	Park, sanitation, utility, or water district	433	ERTH	Significant	No	1872

93.003	Lake Almanor		Pacific Gas and Electric Company	130	1,308,000	Certified	Satisfactory	Plumas
CA00327	40.17	-121.09	Private company, corporation, LLC, partnership	1,250	HYDF	Extremely High	No	1927

1030.007	Lake Alta		Placer County Water Agency	22	270	Certified	Fair	Placer
CA00355	39.20	-120.82	County, county agency, or county district	955	ERTH	Significant	Yes	1862

89.002	Lake Angela		Donner Summit Public Utility District	28	310	Certified	Fair	Nevada
CA00322	39.32	-120.33	Park, sanitation, utility, or water district	820	GRAV	High	Yes	1924

805.000	Lake Arrowhead		Arrowhead Lake Association	190	48,000	Certified	Satisfactory	San Bernardino
CA00759	34.26	-117.17	Associations	720	HYDF	Significant	No	1922

1030.008	Lake Arthur		Placer County Water Agency	44	87	Certified	Satisfactory	Placer
CA00356	38.96	-121.03	County, county agency, or county district	290	ERTH	Significant	No	1909

291.000	Lake Buck		Private Entity	37	140	Certified	Fair	Sierra
CA00536	39.63	-120.00	Individual owner	500	ERTH	Low	Yes	1951

1081.000	Lake Co San Dist		Lake County Sanitation District	40	530	Certified	Satisfactory	Lake
CA00912	38.98	-122.63	County, county agency, or county district	1,540	ERTH	Significant	No	1972

1081.002	Lake Co San Dist 2		Lake County Sanitation District	77	870	Certified	Satisfactory	Lake
CA01108	39.12	-122.92	County, county agency, or county district	650	ERTH	High	No	1976

14.000	Lake Curry		City of Vallejo	107	10,700	Certified	Fair	Napa
CA00140	38.36	-122.13	City, city agency, or city district	572	ERTH	High	Yes	1926

1076.000	Lake Cuyamaca		Lake Cuyamaca Recreation and Park District	17	1,000	Certified	Satisfactory	San Diego
CA00907	32.99	-116.58	Park, sanitation, utility, or water district	1,027	ERTH	Low	No	1968

9.002	Lake Eleanor		San Francisco Public Utilities Commission	61	28,600	Certified	Satisfactory	Tuolumne
CA00121	37.97	-119.88	City, city agency, or city district	1,260	MULA	High	No	1918

97.028	Lake Fordyce		Pacific Gas and Electric Company	143	48,900	Certified	Fair	Nevada
CA00357	39.38	-120.50	Private company, corporation, LLC, partnership	965	ERRK	Extremely High	No	1873

14.003	Lake Frey		City of Vallejo	83	638	Certified	Satisfactory	Solano
CA00142	38.29	-122.19	City, city agency, or city district	575	ERTH	High	No	1894

Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018
Page
51 of 101

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

817.000	Lake Hemet		Lake Hemet Municipal Water District	135	14,000	Certified	Satisfactory	Riverside
CA00763	33.67	-116.71	Park, sanitation, utility, or water district	324	GRAV	Extremely High	No	1895

2020.002	Lake Loveland		Sweetwater Authority	203	25,400	Certified	Satisfactory	San Diego
CA00776	32.78	-116.79	Water agency or authority	765	VARA	Extremely High	No	1945

14.002	Lake Madigan		City of Vallejo	89	1,175	Certified	Satisfactory	Solano
CA00141	38.31	-122.19	City, city agency, or city district	665	ERTH	High	No	1908

1004.000	Lake Madrone		Lake Madrone Water District	37	200	Certified	Satisfactory	Butte
CA00804	39.65	-121.41	Park, sanitation, utility, or water district	525	ERTH	High	No	1931

622.000	Lake Ranch		San Jose Water Company	38	215	Certified	Fair	Santa Clara
CA00676	37.22	-122.05	Water agency or authority	160	ERTH	Significant	No	1877

765.000	Lake Sherwood		Sherwood Development Company	45	2,600	Certified	Satisfactory	Ventura
CA00736	34.14	-118.86	Private company, corporation, LLC, partnership	350	CORA	Extremely High	No	1904

97.029	Lake Spaulding		Pacific Gas and Electric Company	275	74,773	Certified	Satisfactory	Nevada
CA00358	39.33	-120.64	Private company, corporation, LLC, partnership	800	VARA	Extremely High	No	1913

97.030	Lake Sterling		Pacific Gas and Electric Company	30	1,649	Certified	Satisfactory	Nevada
CA00359	39.36	-120.49	Private company, corporation, LLC, partnership	225	ROCK	Low	No	1877

1186.000	Lake Suzanne		Private Entity	18	89	Certified	Satisfactory	Siskiyou
CA00930	41.75	-122.51	Individual owner	1,966	ERTH	Significant	No	1962

97.067	Lake Tabeaud		Pacific Gas and Electric Company	123	1,170	Certified	Satisfactory	Amador
CA00383	38.35	-120.67	Private company, corporation, LLC, partnership	645	ERTH	High	No	1901

1030.009	Lake Theodore		Placer County Water Agency	40	207	Certified	Satisfactory	Placer
CA00360	38.97	-121.01	County, county agency, or county district	402	ERTH	Significant	No	1896

97.032	Lake Valley		Pacific Gas and Electric Company	74	8,127	Certified	Satisfactory	Placer
CA00361	39.30	-120.60	Private company, corporation, LLC, partnership	940	ERTH	High	No	1911

1305.000	Lake Van Norden		Truckee Donner Land Trust	30	300	Not Certified	Fair	Nevada
CA00362	39.32	-120.38	Private company, corporation, LLC, partnership	1,633	ERTH	High	No	1916

303.000	Lake Vera		Lake Vera Mutual Water Company	16	136	Certified	Satisfactory	Nevada
CA00538	39.30	-121.03	Private company, corporation, LLC, partnership	275	SLBT	Low	No	1926

Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018
Page
52 of 101

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

2021.000	Lakeport		City of Lakeport Municipal Sewer District Number 1	51	650	Certified	Satisfactory	Lake
CA01230	39.01	-122.93	City, city agency, or city district	890	ERTH	High	No	1980

1003.016	Lakeview		Riverside County Flood Control and Water Conservation District	37	530	Certified	Satisfactory	Riverside
CA01392	33.82	-117.10	County, county agency, or county district	3,100	ERTH	High	No	1994

1322.000	Lakewood		The Armtrout Family Trust	33	152	Certified	Fair	Placer
CA00969	38.96	-121.08	Private company, corporation, LLC, partnership	460	ERTH	High	No	1959

86.011	Lang Creek Detention Basin		Ventura County Watershed Protection District	67	263	Certified	Satisfactory	Ventura
CA01368	34.21	-118.83	County, county agency, or county district	345	ERTH	High	No	2004

392.005	Langtry		Langtry Farms, LLC	50	525	Certified	Satisfactory	Lake
CA01350	38.72	-122.53	Private trusts and estates	450	ERTH	Low	No	1992

712.000	Larson		South Tule Independent Ditch Company	54	325	Certified	Satisfactory	Tulare
CA00712	36.03	-118.85	Private company, corporation, LLC, partnership	650	ERTH	Significant	No	1963

86.005	Las Lajas		Ventura County Watershed Protection District	96	1,250	Certified	Satisfactory	Ventura
CA01217	34.30	-118.69	County, county agency, or county district	580	ERTH	High	No	1981

742.000	Las Tablas Creek		Rabobank	37	180	Certified	Satisfactory	San Luis Obispo
CA00724	35.69	-120.94	Private trusts and estates	140	ERTH	Low	No	1961

723.000	Last Chance Weir		Last Chance Water Ditch Company	24	50	Certified	Satisfactory	Kings
CA00716	36.42	-119.67	Private company, corporation, LLC, partnership	143	FLBT	Low	No	1919

1070.000	Laurel Creek		City of San Mateo	40	55	Certified	Satisfactory	San Mateo
CA00901	37.53	-122.32	City, city agency, or city district	287	ERTH	High	No	1969

1624.000	Laurel Springs Club		Laurel Spring Club	28	250	Certified	Satisfactory	Santa Clara
CA01016	37.23	-121.52	Private company, corporation, LLC, partnership	250	ERTH	Low	No	1968

1014.000	Lawler		City of Petaluma	40	227	Certified/Inop	Satisfactory	Sonoma
CA00834	38.30	-122.58	City, city agency, or city district	1,150	ERTH	Low	No	1910

236.002	Leavitt, Lake		Lassen Irrigation Company	17	7,482	Certified	Satisfactory	Lassen
CA00516	40.38	-120.50	Private company, corporation, LLC, partnership	8,800	ERTH	Significant	No	1891

818.002	Lee Lake		Elsinore Valley Municipal Water District	47	1,100	Certified	Poor	Riverside
CA00766	33.75	-117.45	Park, sanitation, utility, or water district	520	ERTH	Significant	No	1893



Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018
Page
53 of 101



Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

31.021	Leland		East Bay Municipal Utility District	41	60	Certified	Satisfactory	Contra Costa
CA00177	37.89	-122.09	Park, sanitation, utility, or water district	945	ERTH	Extremely High	No	1955

559.000	Leland Meadows		Leland Meadow Water District	17	79	Certified	Satisfactory	Tuolumne
CA01149	38.23	-119.98	Park, sanitation, utility, or water district	350	ERTH	Low	No	1978

1225.000	Lema		The McConnell Foundation	31	108	Certified	Satisfactory	Shasta
CA00937	40.60	-122.33	Private company, corporation, LLC, partnership	516	ERTH	Significant	No	1957

722.000	Lemoore Div Weir		Lemoore Canal and Irrigation Company	21	50	Certified	Satisfactory	Kings
CA00715	36.42	-119.72	Private company, corporation, LLC, partnership	192	FLBT	Low	No	1924

1125.004	Leonard Johnson		Russ Ranch Company, LLC	18	120	Certified	Satisfactory	Modoc
CA00492	41.64	-120.41	Private company, corporation, LLC, partnership	720	ERTH	Low	No	1948

1252.000	Leonard No. 2		Private Entity	26	187	Certified	Satisfactory	Lassen
CA00960	41.12	-121.04	Individual owner	1,120	ERTH	Low	No	1968

72.009	Leroy Anderson		Santa Clara Valley Water District	235	91,300	Certified	Fair	Santa Clara
CA00294	37.17	-121.63	Park, sanitation, utility, or water district	1,430	ERTH	Extremely High	Yes	1950

419.002	Leticia, Lake		Private Entity	49	115	Certified	Satisfactory	Napa
CA01191	38.36	-122.23	Individual owner	390	ERTH	High	No	1960

2412.000	Linda Vista		Private Entity	39	52	Certified	Satisfactory	Napa
CA01035	38.56	-122.36	Individual owner	215	ERTH	Significant	No	1959

785.000	Lindero		Lake Lindero Homeowners Association	19	90	Certified	Satisfactory	Los Angeles
CA00742	34.15	-118.79	Associations	170	ERTH	Significant	No	1966

32.028	Little Dalton Debris Basin		Los Angeles County Department Of Public Works	71	234	Certified	Satisfactory	Los Angeles
CA01154	34.16	-117.84	County, county agency, or county district	543	ERTH	High	No	1960

63.003	Little Grass Valley		South Feather Water and Power Agency	210	74,730	Certified	Satisfactory	Plumas
CA00269	39.72	-121.02	Water agency or authority	840	ROCK	High	No	1961

136.000	Little Juniper		Alturas Ranches, LLC	22	1,370	Certified	Satisfactory	Modoc
CA00471	41.34	-120.48	Private company, corporation, LLC, partnership	1,530	ERTH	Significant	No	1926

87.005	Little Mountain		County of San Bernardino Department of Public Works	28	150	Certified	Satisfactory	San Bernardino
CA00318	34.16	-117.29	County, county agency, or county district	2,100	ERTH	High	No	1958

Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018
Page
54 of 101

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

57.000	Littlerock		Littlerock Creek Irrigation District	124	4,600	Certified	Satisfactory	Los Angeles
CA00237	34.49	-118.02	Park, sanitation, utility, or water district	576	RCC	Extremely High	No	1924

32.007	Live Oak		Los Angeles County Department Of Public Works	76	239	Certified	Satisfactory	Los Angeles
CA00192	34.13	-117.75	County, county agency, or county district	303	GRAV	High	No	1922

35.013	Live Oak Reservoir		Metropolitan Water District Of Southern California	105	2,500	Certified	Satisfactory	Los Angeles
CA01084	34.14	-117.75	Park, sanitation, utility, or water district	3,000	ERTH	High	No	1975

539.000	Lobdel Lake		Private Entity	27	640	Certified	Satisfactory	Mono
CA00647	38.44	-119.36	Individual owner	3,460	ERTH	Low	No	1948

1034.003	Log Cabin		Yuba County Water Agency	49	89	Certified	Satisfactory	Yuba
CA00865	39.44	-121.06	County, county agency, or county district	300	VARA	High	No	1968

2380.000	Lolonis Vineyards		Lolonis Family Vineyards and Winery, Inc.	67	209	Certified	Satisfactory	Mendocino
CA01423	39.26	-123.19	Private company, corporation, LLC, partnership	325	ERTH	High	No	1999

61.025	Loma Rica Airport		Nevada Irrigation District	41	94	Certified	Satisfactory	Nevada
CA00259	39.22	-120.99	Park, sanitation, utility, or water district	900	ERTH	High	No	1965

289.000	Long Lake		Graeagle Water Company	12	1,478	Certified	Satisfactory	Plumas
CA00534	39.71	-120.68	Private company, corporation, LLC, partnership	110	ROCK	Significant	No	1938

6.034	Long Valley		City of Los Angeles Department of Water And Power	126	183,465	Certified	Satisfactory	Mono
CA00090	37.59	-118.71	City, city agency, or city district	595	ERTH	Extremely High	No	1941

3414.004	Long Valley West No. 2		Juliana Mutual Water Company	35	177	Certified	Satisfactory	Napa
CA01292	38.65	-122.44	Private company, corporation, LLC, partnership	940	ERTH	Low	No	1982

104.031	Longley		Southern California Edison	27	178	Certified	Satisfactory	Inyo
CA00447	37.28	-118.66	Private company, corporation, LLC, partnership	120	ROCK	Low	No	1910

164.000	Lookout		Lookout Dam Company	11	430	Certified	Satisfactory	Modoc
CA00489	41.21	-121.15	Private company, corporation, LLC, partnership	70	FLBT	Low	No	1930

1009.007	Loon Lake		Sacramento Municipal Utility District	108	76,500	Certified	Satisfactory	El Dorado
CA00820	39.00	-120.31	Park, sanitation, utility, or water district	2,290	ROCK	Extremely High	No	1963

1055.000	Lopez		San Luis Obispo County Flood Control and Water Conservation Di	166	52,500	Certified	Satisfactory	San Luis Obispo
CA00887	35.19	-120.49	County, county agency, or county district	1,120	ERTH	Extremely High	No	1969



Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018
Page
55 of 101



Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

6.050	Los Angeles Reservoir		City of Los Angeles Department of Water And Power	130	10,000	Certified	Satisfactory	Los Angeles
CA01081	34.29	-118.48	City, city agency, or city district	3,415	ERTH	Significant	No	1977

2007.000	Los Carneros, Lake		City of Goleta	31	168	Certified	Satisfactory	Santa Barbara
CA00728	34.44	-119.85	City, city agency, or city district	1,921	ERTH	High	No	1932

642.004	Los Padres		California American Water	148	3,100	Certified	Satisfactory	Monterey
CA00692	36.39	-121.67	Private company, corporation, LLC, partnership	570	ERTH	Extremely High	No	1949

1019.003	Los Vaqueros		Contra Costa Water District	231	160,000	Certified	Satisfactory	Contra Costa
CA01396	37.84	-121.73	Park, sanitation, utility, or water district	1,280	ERTH	Extremely High	No	1997

334.000	Los Verjels		Equity Lifestyle Properties	56	1,530	Certified	Satisfactory	Yuba
CA00548	39.37	-121.28	Private company, corporation, LLC, partnership	310	MULA	High	No	1915

63.002	Lost Creek		South Feather Water and Power Agency	122	5,680	Certified	Satisfactory	Butte
CA00268	39.58	-121.14	Water agency or authority	440	VARA	High	No	1924

512.000	Lost Lake East		Carson Water Subconservancy District	15	230	Certified	Satisfactory	Alpine
CA00632	38.65	-119.95	Park, sanitation, utility, or water district	240	ERRK	Low	No	1925

512.002	Lost Lake West		Carson Water Subconservancy District	21	140	Certified	Satisfactory	Alpine
CA00633	38.65	-119.95	Park, sanitation, utility, or water district	200	ERRK	Low	No	1925

2427.000	Lowe		Ferrari-Carano Vineyards and Winery, LLC	30	95	Certified	Satisfactory	Sonoma
CA01043	38.63	-122.75	Private company, corporation, LLC, partnership	550	ERTH	High	No	1959

97.115	Lower Bear River		Pacific Gas and Electric Company	253	48,750	Certified	Satisfactory	Amador
CA00409	38.54	-120.26	Private company, corporation, LLC, partnership	979	ROCK	High	No	1952

97.062	Lower Blue Lake		Pacific Gas and Electric Company	48	4,300	Certified	Fair	Alpine
CA00380	38.61	-119.93	Private company, corporation, LLC, partnership	1,050	ERRK	Significant	Yes	1903

10.006	Lower Crystal Springs		City and County of San Francisco	149	57,910	Certified	Satisfactory	San Mateo
CA00127	37.53	-122.36	City, city agency, or city district	600	GRAV	Extremely High	Yes	1888

97.035	Lower Feeley Lake		Pacific Gas and Electric Company	17	184	Certified	Satisfactory	Nevada
CA00363	39.40	-120.64	Private company, corporation, LLC, partnership	150	ERRK	Low	No	1870

6.014	Lower Franklin		City of Los Angeles Department of Water And Power	103	920	Certified	Satisfactory	Los Angeles
CA00075	34.09	-118.41	City, city agency, or city district	500	HYDF	High	No	1922

Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018
Page
56 of 101

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

6.052	Lower Franklin No. 2		City of Los Angeles Department of Water And Power	49	206	Certified	Satisfactory	Los Angeles
CA01188	34.10	-118.41	City, city agency, or city district	410	ERTH	Significant	No	1982

1030.002	Lower Hell Hole		Placer County Water Agency	410	208,400	Certified	Satisfactory	Placer
CA00857	39.06	-120.41	County, county agency, or county district	1,550	ROCK	Extremely High	No	1966

622.002	Lower Howell		San Jose Water Company	39	153	Certified	Satisfactory	Santa Clara
CA00677	37.19	-122.01	Water agency or authority	475	ERTH	Significant	Yes	1877

513.002	Lower Kinney Lake		Alpine Land and Reservoir Company	40	920	Certified	Satisfactory	Alpine
CA00635	38.56	-119.82	Private company, corporation, LLC, partnership	370	ERTH	Low	No	1926

97.036	Lower Lindsey Lake		Pacific Gas and Electric Company	17	320	Certified	Satisfactory	Nevada
CA00364	39.41	-120.64	Private company, corporation, LLC, partnership	486	ERRK	Low	No	1870

97.037	Lower Peak		Pacific Gas and Electric Company	33	494	Certified	Satisfactory	Placer
CA00365	39.30	-120.44	Private company, corporation, LLC, partnership	655	ERRK	Significant	No	1860

1012.005	Lower Peters Canyon Retarding Basi		County of Orange	52	206	Certified	Satisfactory	Orange
CA01207	33.76	-117.77	County, county agency, or county district	1,166	ERTH	High	No	1990

6.015	Lower San Fernando		City of Los Angeles Department of Water And Power	125	9,843	Certified	Satisfactory	Los Angeles
CA00076	34.29	-118.48	City, city agency, or city district	1,840	HYDF	Extremely High	No	1918

1.051	Lower Sardine Lake		California Department of Fish and Wildlife	17	280	Certified	Satisfactory	Sierra
CA00038	39.62	-120.62	State agency	162	ERRK	Low	No	1965

869.002	Lower Stehly		Private Entity	60	145	Certified	Satisfactory	San Diego
CA01227	33.30	-117.06	Individual owner	420	ERTH	High	No	

513.003	Lower Sunset		Alpine Land and Reservoir Company	38	860	Certified	Satisfactory	Alpine
CA00636	38.61	-119.88	Private company, corporation, LLC, partnership	420	ERTH	Low	No	

32.034	Lower Sunset Debris Basin		Los Angeles County Department Of Public Works	86	37	Certified	Satisfactory	Los Angeles
CA01161	34.20	-118.30	County, county agency, or county district	379	ERTH	High	No	1963

94.004	Lower Three Lakes		Pacific Gas and Electric Company	32	525	Certified	Satisfactory	Plumas
CA00334	39.97	-121.22	Private company, corporation, LLC, partnership	560	ROCK	Significant	No	1928

3414.005	Lower Twin Lake		Juliana Mutual Water Company	18	127	Certified	Fair	Napa
CA01293	38.65	-122.42	Private company, corporation, LLC, partnership	1,080	ERTH	Low	No	1985

L

Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018
Page
57 of 101

L

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

531.002	Lower Twin Lake		Centennial Livestock	16	4,011	Certified	Fair	Mono
CA00644	38.17	-119.33	Private company, corporation, LLC, partnership	240	ROCK	High	No	1888

6.048	Lower Van Norman Bypass		City of Los Angeles Department of Water And Power	78	240	Certified	Satisfactory	Los Angeles
CA00101	34.29	-118.49	City, city agency, or city district	600	ERTH	Low	No	1970

1424.000	Lowrey No 1		Private Entity	19	82	Certified	Satisfactory	Sonoma
CA00990	38.32	-122.56	Individual owner	210	ERTH	Significant	No	1954

602.000	Lucerne, Lake		Lake Lucerne Mutual Water Company	21	455	Certified	Satisfactory	San Mateo
CA00664	37.22	-122.41	Private company, corporation, LLC, partnership	346	ERTH	Low	No	1923

104.035	Lundy Lake		Southern California Edison	45	4,113	Certified	Satisfactory	Mono
CA00451	38.03	-119.22	Private company, corporation, LLC, partnership	690	ERRK	High	No	1911

7000.090	Lynch Canyon		Solano Land Trust	21	80	Not Certified	Fair	Solano
CA01474	38.19	-122.19	Private company, corporation, LLC, partnership	430	ERTH	High	No	

97.073	Lyons		Pacific Gas and Electric Company	132	6,228	Certified	Satisfactory	Tuolumne
CA00387	38.09	-120.17	Private company, corporation, LLC, partnership	518	VARA	High	No	1930

2424.000	Lytton		Lytton Rancheria of California	34	410	Certified	Satisfactory	Sonoma
CA01042	38.65	-122.87	Private company, corporation, LLC, partnership	275	ERTH	Significant	No	1956

Count: 120

Jurisdictional Dams

Listed Alphabetically by Dam Name

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

1003.009	Mabey Canyon		Riverside County Flood Control and Water Conservation District	46	68	Certified	Satisfactory	Riverside
CA01103	33.85	-117.61	County, county agency, or county district	520	ERTH	High	No	1974

97.094	Macumber		Pacific Gas and Electric Company	28	425	Certified	Satisfactory	Shasta
CA00393	40.54	-121.73	Private company, corporation, LLC, partnership	2,425	ERRK	High	No	1907

2227.000	Madeline		Private Entity	22	400	Certified	Satisfactory	Lassen
CA00954	41.06	-120.47	Individual owner	345	ERTH	Low	No	1900

682.000	Madera Lake		Madera Irrigation District	31	2,300	Certified	Satisfactory	Madera
CA00027	37.02	-120.00	Park, sanitation, utility, or water district	6,600	ERTH	High	No	1958

1023.000	Maerkle		Carlsbad Municipal Water District	165	600	Certified	Satisfactory	San Diego
CA00844	33.15	-117.26	Park, sanitation, utility, or water district	800	ERTH	High	No	1963

73.000	Magalia		Paradise Irrigation District	103	2,900	Certified	Satisfactory	Butte
CA00296	39.81	-121.58	Park, sanitation, utility, or water district	830	HYDF	High	No	1918

1302.000	Magnolia		Lake of the Pines Association	68	4,150	Certified	Satisfactory	Nevada
CA00966	39.04	-121.07	Associations	620	ERTH	High	No	1967

97.074	Main Strawberry		Pacific Gas and Electric Company	143	18,312	Certified	Satisfactory	Tuolumne
CA00388	38.20	-119.99	Private company, corporation, LLC, partnership	612	ROCK	High	No	1916

1040.000	Maine Prairie 3		Maine Prairie Water District	11	96	Certified	Satisfactory	Solano
CA00874	38.33	-121.81	Park, sanitation, utility, or water district	120	FLBT	Low	No	1965

771.000	Malibu Lake Club		Malibu Lake Mountain Club, Inc.	44	500	Certified	Satisfactory	Los Angeles
CA00739	34.10	-118.75	Private company, corporation, LLC, partnership	190	CORA	High	No	1923

428.000	Mallacomes		Rancho Mallacomes	57	200	Certified	Satisfactory	Sonoma
CA00591	38.64	-122.68	Private company, corporation, LLC, partnership	940	ERTH	High	No	1951

1019.000	Mallard		Contra Costa Water District	30	3,113	Certified	Satisfactory	Contra Costa
CA00838	38.01	-122.04	Park, sanitation, utility, or water district	11,000	ERTH	Significant	No	1930

31.024	Maloney		East Bay Municipal Utility District	107	68	Certified	Satisfactory	Contra Costa
CA00180	38.00	-122.30	Park, sanitation, utility, or water district	620	ERTH	Extremely High	No	1960

104.025	Mammoth Pool		Southern California Edison	406	123,000	Certified	Satisfactory	Fresno
CA00443	37.32	-119.32	Private company, corporation, LLC, partnership	820	ERTH	Extremely High	No	1960

Jurisdictional Dams

Listed Alphabetically by Dam Name

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

1030.006	Mammoth Reservoir		Placer County Water Agency	23	103	Certified	Satisfactory	Placer
CA00861	38.82	-121.14	County, county agency, or county district	2,360	ERTH	High	No	1851

2461.000	Manhattan Creek		Private Entity	32	110	Certified	Satisfactory	El Dorado
CA01046	38.87	-120.86	Individual owner	350	ERTH	High	No	1952

1228.002	Mardis Barry		Private Entity	14	113	Certified	Satisfactory	Lassen
CA00939	40.42	-120.63	Individual owner	600	ERTH	Significant	No	1941

577.000	Maria		Studley Company	48	277	Certified	Satisfactory	San Joaquin
CA01468	37.71	-121.54	Private company, corporation, LLC, partnership	610	ERTH	High	No	2003

1.006	Marie, Lake		Napa State Hospital	60	170	Certified	Satisfactory	Napa
CA00004	38.26	-122.23	State agency	454	ERTH	High	No	1908

1070.002	Marina Lagoon		City of San Mateo	17	1,600	Certified	Satisfactory	San Mateo
CA01429	37.57	-122.29	City, city agency, or city district	350	ERTH	Low	No	1953

460.003	Mark Edson		Georgetown Divide Public Utility District	162	20,000	Certified	Satisfactory	El Dorado
CA00607	38.91	-120.60	Park, sanitation, utility, or water district	1,230	ERRK	High	No	1962

1007.002	Marsh Creek		Contra Costa County Flood Control and Water Conservation Distri	59	4,425	Certified	Satisfactory	Contra Costa
CA00809	37.89	-121.72	County, county agency, or county district	1,540	ERTH	High	No	1963

1012.011	Marshburn Retarding Basin		County of Orange	27	424	Certified	Satisfactory	Orange
CA01426	33.69	-117.73	County, county agency, or county district	2,456	ERTH	High	No	1998

1003.011	Mary Street		Riverside County Flood Control and Water Conservation District	40	320	Certified	Satisfactory	Riverside
CA01211	33.93	-117.38	County, county agency, or county district	1,035	ERTH	High	No	1981

2320.000	Mary, Lake		Sugar Bowl Corporation	22	172	Certified	Satisfactory	Placer
CA00539	39.31	-120.33	Private company, corporation, LLC, partnership	600	ERTH	Low	No	1926

1380.000	Mast		Private Entity	85	380	Certified	Satisfactory	Mendocino
CA00972	39.67	-123.53	Individual owner	580	ERTH	Significant	No	1963

1002.004	Matanzas Creek		Sonoma County Water Agency	95	1,500	Certified	Satisfactory	Sonoma
CA00794	38.41	-122.65	County, county agency, or county district	685	ERTH	Extremely High	No	1963

35.000	Mathews		Metropolitan Water District Of Southern California	264	182,000	Certified	Satisfactory	Riverside
CA00212	33.84	-117.46	Park, sanitation, utility, or water district	6,522	ERTH	Extremely High	No	1938

Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018
Page
60 of 101

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

86.000	Matilija		Ventura County Watershed Protection District	163	1,800	Certified	Poor	Ventura
CA00312	34.48	-119.31	County, county agency, or county district	620	VARA	Extremely High	No	1949

858.000	Matthews		Private Entity	47	52	Certified	Satisfactory	San Diego
CA00788	33.47	-117.31	Individual owner	297	ERTH	High	No	1967

411.000	Maxville		Maxville Lake Winery	37	183	Certified	Satisfactory	Napa
CA00574	38.56	-122.38	Private company, corporation, LLC, partnership	330	ERTH	Significant	No	1953

110.000	McBrien		Hagge Ranch, Inc.	12	1,000	Certified	Satisfactory	Modoc
CA00459	41.46	-120.70	Private company, corporation, LLC, partnership	74	FLBT	Low	No	1880

500.000	McCarty		Private Entity	19	93	Certified	Satisfactory	Calaveras
CA00621	38.03	-120.69	Individual owner	670	ERTH	Low	No	1938

97.123	McCloud		Pacific Gas and Electric Company	240	35,300	Certified	Satisfactory	Shasta
CA00416	41.13	-122.07	Private company, corporation, LLC, partnership	660	ERRK	High	No	1965

236.003	Mccoy Flat		Lassen Irrigation Company	21	17,290	Certified	Satisfactory	Lassen
CA00517	40.45	-120.94	Private company, corporation, LLC, partnership	650	ERTH	Low	No	1891

392.002	McCreary		Langtry Farms, LLC	20	2,098	Certified	Satisfactory	Lake
CA00565	38.75	-122.51	Private trusts and estates	2,400	ERTH	Low	No	1961

274.003	Mcguire		Soper-Wheeler Company	27	190	Certified	Satisfactory	Mendocino
CA00976	39.36	-123.62	Private company, corporation, LLC, partnership	200	ERTH	Significant	No	1967

1024.006	McKays Point Diversion		Calaveras County Water District	233	2,100	Certified	Satisfactory	Calaveras
CA01257	38.23	-120.29	County, county agency, or county district	870	CORA	Extremely High	No	1989

674.000	McMahon		Private Entity	52	520	Certified	Satisfactory	Mariposa
CA00701	37.70	-120.20	Individual owner	705	ERTH	Low	No	1957

384.000	McNab		Fetzer Vineyards	40	96	Certified	Satisfactory	Mendocino
CA00561	39.04	-123.19	Private company, corporation, LLC, partnership	830	ERTH	Significant	No	1947

58.004	McSwain		Merced Irrigation District	97	9,730	Certified	Satisfactory	Mariposa
CA00242	37.52	-120.31	Park, sanitation, utility, or water district	1,600	ERRK	High	No	1966

97.040	Meadow Lake		Pacific Gas and Electric Company	37	4,930	Certified	Satisfactory	Nevada
CA00366	39.40	-120.50	Private company, corporation, LLC, partnership	1,020	ERRK	Low	No	1864

Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018
Page
61 of 101

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

97.063	Meadow Lake		Pacific Gas and Electric Company	77	5,160	Certified	Satisfactory	Alpine
CA00381	38.60	-119.98	Private company, corporation, LLC, partnership	775	ROCK	Significant	No	1903

1050.003	Meadow Lane		City of Santa Rosa	30	2,100	Certified	Satisfactory	Sonoma
CA01104	38.37	-122.78	City, city agency, or city district	9,500	ERTH	Significant	No	1979

53.011	Medley Lakes		El Dorado Irrigation District	21	5,350	Certified	Satisfactory	El Dorado
CA00376	38.86	-120.14	Park, sanitation, utility, or water district	92	GRAV	Significant	No	1923

1834.000	Melrose Avenue		Rancho Carrillo Home Owners Association	57	52	Certified	Satisfactory	San Diego
CA01400	33.12	-117.24	Associations	700	ERTH	High	No	1998

1234.000	Mendiboure		Private Entity	30	1,130	Certified	Satisfactory	Lassen
CA00942	41.00	-120.41	Individual owner	800	ERTH	High	No	1949

1089.002	Mendocino 3 Upper		County of Mendocino	49	85	Certified	Satisfactory	Mendocino
CA00002	39.13	-123.13	County, county agency, or county district	254	GRAV	Significant	No	1915

1089.000	Mendocino Middle		County of Mendocino	39	27	Certified	Satisfactory	Mendocino
CA00001	39.13	-123.14	County, county agency, or county district	119	GRAV	Significant	No	1908

1053.000	Mendota Diversion		Central California Irrigation District	23	3,000	Certified	Satisfactory	Fresno
CA00886	36.79	-120.37	Park, sanitation, utility, or water district	485	FLBT	High	No	1917

58.005	Merced Falls		Merced Irrigation District	37	620	Certified	Satisfactory	Merced
CA00341	37.52	-120.33	Park, sanitation, utility, or water district	815	GRAV	Low	No	1901

4426.000	Merlo		Private Entity	74	930	Certified	Satisfactory	Sonoma
CA01313	38.69	-122.99	Individual owner	210	ERTH	High	No	1982

3413.000	Metcalf		Skalli Corporation	34	1,045	Certified	Satisfactory	Napa
CA01289	38.61	-122.37	Private company, corporation, LLC, partnership	1,350	ERTH	High	No	1974

1003.015	Metz Road Debris Basin		Riverside County Flood Control and Water Conservation District	12	88	Certified	Satisfactory	Riverside
CA01197	33.79	-117.23	County, county agency, or county district	4,505	ERTH	High	No	1981

676.000	Metzger		Private Entity	30	75	Certified	Satisfactory	Mariposa
CA00703	37.72	-120.11	Individual owner	460	ERTH	Low	No	1956

1450.005	Michigan Bar No. 1		Rancho Murieta Community Services District	17	814	Certified	Satisfactory	Sacramento
CA01243	38.48	-121.08	Park, sanitation, utility, or water district	1,900	ERTH	Significant	No	1989

Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018
Page
62 of 101

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

1450.006	Michigan Bar No. 2		Rancho Murieta Community Services District	36	35	Certified	Satisfactory	Sacramento
CA01288	38.48	-121.08	Park, sanitation, utility, or water district	1,400	ERTH	Low	No	1983

1550.000	Middle Cooperstown		Private Entity	24	90	Certified	Satisfactory	Tuolumne
CA01306	37.75	-120.54	Individual owner	550	ERTH	Low	No	1947

82.002	Middle Fork		Calaveras Public Utility District	98	1,700	Certified	Satisfactory	Calaveras
CA00307	38.39	-120.44	Park, sanitation, utility, or water district	900	ERTH	High	No	1939

1002.003	Middle Fork Brush Creek		Sonoma County Water Agency	37	138	Certified	Satisfactory	Sonoma
CA00793	38.49	-122.67	County, county agency, or county district	1,100	ERTH	High	No	1961

1681.000	Middle Lake		L.R. Martin, Inc.	26	74	Certified	Satisfactory	Madera
CA01121	37.14	-119.83	Private company, corporation, LLC, partnership	370	ERTH	Low	No	1953

97.041	Middle Lindsey Lake		Pacific Gas and Electric Company	9	103	Certified	Satisfactory	Nevada
CA00367	39.42	-120.63	Private company, corporation, LLC, partnership	372	ERRK	Low	No	1870

1065.002	Middlefield Res		Alameda County Water District	147	22	Certified	Satisfactory	Alameda
CA00896	37.53	-121.95	County, county agency, or county district	1,017	ERTH	High	No	1958

630.000	Mill Creek		Lockheed Martin Space Systems Company	76	223	Certified	Satisfactory	Santa Cruz
CA00688	37.12	-122.21	Private company, corporation, LLC, partnership	250	HYDF	Significant	No	1889

2381.000	Mill Pond		Georgia-Pacific Corporation	33	72	Certified	Fair	Mendocino
CA01139	39.44	-123.81	Private company, corporation, LLC, partnership	200	ERTH	Low	No	1885

7.000	Milliken		City of Napa	110	1,980	Certified	Satisfactory	Napa
CA00102	38.38	-122.23	City, city agency, or city district	647	CORA	Extremely High	No	1924

457.000	Mills		Private Entity	23	195	Certified	Satisfactory	Sacramento
CA00603	38.50	-121.11	Individual owner	1,050	ERTH	High	No	1952

61.007	Milton Diversion		Nevada Irrigation District	37	270	Certified	Satisfactory	Nevada
CA00248	39.52	-120.58	Park, sanitation, utility, or water district	286	CORA	Low	No	1928

1801.000	Mineral Hot Springs Lake		San Manuel Band of Mission Indians	54	37	Certified	Satisfactory	San Bernardino
CA01026	34.18	-117.27	Private company, corporation, LLC, partnership	200	ERTH	High	No	1967

63.009	Miners Ranch		South Feather Water and Power Agency	55	895	Certified	Satisfactory	Butte
CA00275	39.51	-121.46	Water agency or authority	1,650	ERRK	High	No	1962

Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018
Page
63 of 101

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

2046.000	Miners Ravine Detention		Placer County Flood Control and Water Conservation District	23	120	Certified	Satisfactory	Placer
CA01531	38.76	-121.23	County, county agency, or county district	2,000	ERTH	Low	No	2007

8.011	Miramar		City of San Diego	165	7,250	Certified	Satisfactory	San Diego
CA00115	32.92	-117.11	City, city agency, or city district	2,265	ERTH	Extremely High	No	1960

8.018	Miramar Clearwells		City of San Diego	22	161	Not Certified	Satisfactory	San Diego
CA01615	32.91	-117.10	City, city agency, or city district	3,306	RECT	High	No	1961

2220.002	Misselbeck		Igo-Ono Community Services District	96	3,600	Certified	Poor	Shasta
CA01027	40.50	-122.70	Park, sanitation, utility, or water district	470	HYDF	High	No	1920

1794.000	Mission Viejo, Lake		Lake Mission Viejo Association, Inc.	123	4,300	Certified	Satisfactory	Orange
CA01122	33.63	-117.65	Associations	1,750	ERTH	Extremely High	No	1976

9.004	Moccasin Lower		San Francisco Public Utilities Commission	60	554	Certified	Poor	Tuolumne
CA00122	37.81	-120.31	City, city agency, or city district	720	ERRK	High	Yes	1930

81.003	Mockingbird Canyon		City of Riverside	74	1,250	Certified	Satisfactory	Riverside
CA00305	33.90	-117.42	City, city agency, or city district	1,525	HYDF	High	No	1914

566.000	Modesto Effluent Storage		City of Modesto	20	7,830	Certified	Satisfactory	Stanislaus
CA01286	37.54	-121.08	City, city agency, or city district	25,000	ERTH	Significant	No	1987

59.000	Modesto Res		Modesto Irrigation District	36	40,000	Certified	Satisfactory	Stanislaus
CA00243	37.66	-120.68	Park, sanitation, utility, or water district	1,235	ERTH	Extremely High	No	1911

1084.000	Mokelumne Hill		Mokelumne Hill Sanit District	52	52	Certified	Satisfactory	Calaveras
CA01111	38.31	-120.72	Park, sanitation, utility, or water district	490	ERTH	Low	No	1973

104.012	Mono Creek Diversion		Southern California Edison	50	45	Certified	Satisfactory	Fresno
CA00436	37.36	-119.00	Private company, corporation, LLC, partnership	112	CORA	Low	No	1927

2012.000	Montague No 2		City of Montague	41	160	Certified	Satisfactory	Siskiyou
CA01135	41.74	-122.55	City, city agency, or city district	1,250	ERTH	High	No	1978

5411.000	Montana Lake		Private Entity	39	150	Certified	Satisfactory	Napa
CA01460	38.38	-122.16	Individual owner	918	ERTH	Low	No	2009

1443.000	Montezuma		Montezuma Wetlands, LLC	14	225	Certified	Satisfactory	Solano
CA01466	38.07	-121.86	Private company, corporation, LLC, partnership	5,150	ERTH	Low	No	2003

Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018
Page
64 of 101

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

31.022	Moraga		East Bay Municipal Utility District	37	36	Certified	Satisfactory	Contra Costa
CA00178	37.85	-122.12	Park, sanitation, utility, or water district	210	ERTH	Extremely High	No	1965

8.005	Morena		City of San Diego	181	50,206	Certified	Fair	San Diego
CA00110	32.69	-116.55	City, city agency, or city district	550	ROCK	Extremely High	No	1912

3417.000	Morgan		Private Entity	34	94	Certified	Satisfactory	Napa
CA01297	38.34	-122.10	Individual owner	620	ERTH	Significant	No	

32.039	Morgan Debris Basin		Los Angeles County Department Of Public Works	37	21	Certified	Satisfactory	Los Angeles
CA01385	34.14	-117.82	County, county agency, or county district	380	ERTH	High	No	1962

325.000	Morning Star		De Anza Placer Gold Mining Company	44	1,405	Certified	Satisfactory	Placer
CA00546	39.14	-120.76	Private company, corporation, LLC, partnership	780	ERTH	Low	No	1870

2036.000	Morris		City of Willits	66	621	Certified	Satisfactory	Mendocino
CA00406	39.37	-123.30	City, city agency, or city district	143	CORA	High	No	1927

32.040	Morris		Los Angeles County Department Of Public Works	245	27,500	Certified	Satisfactory	Los Angeles
CA00216	34.18	-117.88	County, county agency, or county district	750	GRAV	Extremely High	No	1935

19.003	Morris S. Jones		Pasadena City Department Of Water and Power	49	153	Certified	Satisfactory	Los Angeles
CA00154	34.16	-118.08	City, city agency, or city district	1,470	ERTH	High	No	1952

416.000	Moskowite		Private Entity	50	472	Certified	Satisfactory	Napa
CA00583	38.46	-122.19	Individual owner	900	ERTH	Low	No	1955

1.016	Mount Stoneman		California Department of Corrections and Rehabilitation	43	33	Certified/Inop	Satisfactory	Sacramento
CA00009	38.70	-121.15	State agency	420	ERTH	Low	No	1937

7000.101	Mountain Springs Golf #5		Mountain Springs Golf, LLC	17	52	Not Certified	Fair	Tuolumne
CA01487	37.94	-120.38	Private company, corporation, LLC, partnership	350	ERTH	Low	No	

1044.000	Mt Woodson		Ramona Municipal Water District	38	30	Certified	Fair	San Diego
CA00877	33.02	-116.97	Park, sanitation, utility, or water district	1,130	ERTH	High	No	1958

1085.000	Mud		James Irrigation District	14	304	Certified	Satisfactory	Fresno
CA00913	36.56	-120.17	Park, sanitation, utility, or water district	127	ERTH	Significant	No	1919

129.005	Mud Lake		Private Entity	10	300	Certified	Satisfactory	Modoc
CA00469	41.55	-120.50	Individual owner	1,750	ERTH	Low	No	1926

Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018
Page
65 of 101

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

6.017	Mulholland		City of Los Angeles Department of Water And Power	195	4,036	Certified	Satisfactory	Los Angeles
CA00078	34.12	-118.33	City, city agency, or city district	933	GRAV	Extremely High	No	1924

21.000	Municipal		Private Entity	56	169	Certified	Satisfactory	Solano
CA00155	38.30	-122.14	Individual owner	430	ERTH	High	No	1939

109.003	Murphys Afterbay		Utica Water and Power Authority	42	40	Certified	Satisfactory	Calaveras
CA00410	38.15	-120.45	Water agency or authority	250	ERTH	High	No	1953

109.004	Murphys Forebay		Utica Water and Power Authority	67	54	Certified	Satisfactory	Calaveras
CA00420	38.15	-120.43	Water agency or authority	316	ERTH	High	No	1953

2024.000	Murphys Wastewater		Murphys Sanitary District	24	140	Certified	Satisfactory	Calaveras
CA01185	38.13	-120.46	Park, sanitation, utility, or water district	590	ERTH	Significant	No	1980

5429.000	Murray		Coyote Hills Partnership	55	117	Certified	Satisfactory	Sonoma
CA01061	38.61	-122.75	Private company, corporation, LLC, partnership	300	ERTH	Significant	No	1970

8.012	Murray		City of San Diego	110	4,818	Certified	Fair	San Diego
CA00116	32.78	-117.05	City, city agency, or city district	870	MULA	Extremely High	No	1918

1.079	Murry		California Department of Parks and Recreation	54	715	Certified	Satisfactory	Santa Clara
CA01013	37.20	-121.42	State agency	350	ERTH	Low	No	1957

666.000	Mustang Creek		County of Merced	18	700	Certified	Satisfactory	Merced
CA01097	37.51	-120.66	County, county agency, or county district	1,600	ERTH	Significant	No	1975

1247.000	Myers		Private Entity	27	279	Certified	Satisfactory	Lassen
CA00953	41.12	-120.97	Individual owner	1,740	ERTH	Low	No	1957

Count: 108

Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018

Page
66 of 101

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

1008.000	Nacimiento		Monterey County Water Resources Agency	210	350,000	Certified	Satisfactory	San Luis Obispo
CA00812	35.76	-120.88	Water agency or authority	1,630	ERTH	Extremely High	No	1957

392.007	Napa Valley Lake		Langtry Farms, LLC	40	200	Certified	Satisfactory	Napa
CA01256	38.75	-122.41	Private trusts and estates	2,170	ERTH	Low	No	1990

2222.000	Nash		Private Entity	41	428	Certified	Satisfactory	Shasta
CA01029	40.60	-122.31	Individual owner	480	ERTH	High	No	1960

1418.000	Naz Lake		Huneelus-Chantre Properties	29	150	Certified	Satisfactory	Napa
CA00985	38.49	-122.41	Private company, corporation, LLC, partnership	795	ERTH	Significant	No	1955

2026.000	Nevada City Raw Water Reservoir		City of Nevada	48	53	Certified	Satisfactory	Nevada
CA01186	39.25	-121.00	City, city agency, or city district	908	ERTH	Low	No	1980

1469.000	New Bass Lake		Rescue Union School District	26	745	Certified	Satisfactory	El Dorado
CA01087	38.68	-121.03	City, city agency, or city district	1,400	ERTH	Extremely High	No	1978

1034.000	New Bullards Bar		Yuba County Water Agency	635	969,600	Certified	Satisfactory	Yuba
CA00863	39.39	-121.15	County, county agency, or county district	2,220	VARA	Extremely High	No	1970

97.128	New Drum Afterbay		Pacific Gas and Electric Company	95	341	Certified	Satisfactory	Nevada
CA00421	39.25	-120.78	Private company, corporation, LLC, partnership	355	VARA	Low	No	1968

58.002	New Exchequer		Merced Irrigation District	479	1,032,000	Certified	Satisfactory	Mariposa
CA00240	37.59	-120.27	Park, sanitation, utility, or water district	1,240	ROCK	Extremely High	No	1967

1803.002	New Lake Arrowhead		County of San Bernardino	225	1,970	Certified	Satisfactory	San Bernardino
CA01124	34.26	-117.16	County, county agency, or county district	1,300	ERTH	High	No	1976

1024.005	New Spicer Meadow		Calaveras County Water District	262	189,000	Certified	Satisfactory	Tuolumne
CA01224	38.40	-120.00	County, county agency, or county district	2,055	ROCK	Extremely High	No	1989

31.031	New Upper San Leandro		East Bay Municipal Utility District	182	42,000	Certified	Satisfactory	Alameda
CA01082	37.76	-122.09	Park, sanitation, utility, or water district	1,300	ERTH	Extremely High	No	1977

71.002	New Woodbridge Diversion		Woodbridge Irrigation District	31	2,462	Certified	Satisfactory	San Joaquin
CA01461	38.16	-121.30	Park, sanitation, utility, or water district	600	INFL	Significant	No	2006

23.002	Newell		City of Santa Cruz	182	8,991	Certified	Fair	Santa Cruz
CA00156	37.10	-122.07	City, city agency, or city district	750	ERTH	Extremely High	No	1960

Jurisdictional Dams

Listed Alphabetically by Dam Name

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

2462.000	Niegel		Private Entity	63	99	Certified	Satisfactory	El Dorado
CA01047	38.88	-120.98	Individual owner	420	ERTH	Significant	No	1951

1245.000	Nine Springs		Private Entity	16	125	Certified	Satisfactory	Lassen
CA00951	41.12	-121.21	Individual owner	3,600	ERTH	Significant	No	1954

31.027	North		East Bay Municipal Utility District	82	244	Certified	Satisfactory	Contra Costa
CA00183	37.97	-122.33	Park, sanitation, utility, or water district	1,080	ERTH	Extremely High	No	1961

97.096	North Battle Creek		Pacific Gas and Electric Company	51	1,090	Certified	Satisfactory	Shasta
CA00394	40.60	-121.66	Private company, corporation, LLC, partnership	439	ROCK	High	No	1909

77.000	North Fork		Pacheco Pass Water District	100	6,150	Certified	Poor	Santa Clara
CA00299	37.05	-121.29	Park, sanitation, utility, or water district	600	ERTH	Extremely High	Yes	1939

1024.007	North Fork Diversion		Calaveras County Water District	53	120	Certified	Satisfactory	Alpine
CA01234	38.44	-120.02	County, county agency, or county district	218	GRAV	Low	No	1988

4428.000	Norton No 2		Ridge Vineyards	28	102	Certified	Satisfactory	Sonoma
CA01041	38.65	-122.90	Private company, corporation, LLC, partnership	430	ERTH	Significant	No	1956

619.000	Notre Dame		Belmont City Department Of Public Works	51	120	Certified	Satisfactory	San Mateo
CA00674	37.51	-122.31	City, city agency, or city district	210	ERTH	High	No	

88.000	Novato Creek		North Marin County Water District	71	4,430	Certified	Satisfactory	Marin
CA00321	38.12	-122.64	Park, sanitation, utility, or water district	650	ERTH	Extremely High	No	1951

1221.000	Null		The Hatch 1987 Revocable Trust	54	188	Certified	Satisfactory	Shasta
CA00933	40.45	-121.77	Private trusts and estates	400	ERTH	Significant	No	1954



Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018

Page
68 of 101



Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

9.005	O' Shaughnessy		San Francisco Public Utilities Commission	312	360,000	Certified	Satisfactory	Tuolumne
CA00123	37.95	-119.79	City, city agency, or city district	900	GRAV	Extremely High	No	1923

1.065	Oak Site		California Department of Forestry and Fire Protection	43	20	Certified	Satisfactory	Santa Cruz
CA00051	37.13	-122.17	State agency	290	ERTH	Low	No	1969

1003.010	Oak Street		Riverside County Flood Control and Water Conservation District	36	138	Certified	Satisfactory	Riverside
CA01179	33.84	-117.60	County, county agency, or county district	2,000	ERTH	High	No	1979

1687.000	Oakhurst Wastewater Treatment		Madera County Maintenance District 22A	60	110	Certified	Satisfactory	Madera
CA01485	37.33	-119.68	County, county agency, or county district	2,150	ERTH	Significant	No	2005

2033.002	Olivenhain		San Diego County Water Authority	309	24,900	Certified	Satisfactory	San Diego
CA01454	33.07	-117.14	County, county agency, or county district	2,500	RCC	Extremely High	No	2003

1410.000	Olson		Private Entity	45	200	Certified	Satisfactory	Napa
CA00979	38.32	-122.09	Individual owner	646	ERTH	High	No	1955

35.007	Orange County Reservoir		Metropolitan Water District Of Southern California	103	217	Certified	Satisfactory	Orange
CA00218	33.94	-117.88	Park, sanitation, utility, or water district	655	ERTH	High	No	1941

1012.016	Orchard Estates Retarding Basin		County of Orange	21	138	Certified	Satisfactory	Orange
CA01436	33.74	-117.75	County, county agency, or county district	810	ERTH	High	No	1999

587.000	Orinda, Lake		Orinda Country Club	45	168	Certified	Fair	Contra Costa
CA00659	37.89	-122.19	Private company, corporation, LLC, partnership	360	ERTH	High	Yes	1935

1.048	Oroville		California Department of Water Resources	770	3,537,577	Certified	Unsatisfactory	Butte
CA00035	39.54	-121.49	State agency	6,920	ERTH	Extremely High	Yes	1968

413.006	Orville		Howell Mountain Mutual Water Company	28	89	Certified	Satisfactory	Napa
CA00580	38.59	-122.46	Private company, corporation, LLC, partnership	725	ERTH	High	No	1959

560.000	Orvis		Private Entity	34	500	Certified	Satisfactory	Stanislaus
CA00654	37.95	-120.78	Individual owner	460	ERTH	Low	No	1959

Count: 12

Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018
Page
69 of 101

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

642.003	Pacific Grove		California American Water	32	76	Certified/Inop	Satisfactory	Monterey
CA00691	36.61	-121.92	Private company, corporation, LLC, partnership	750	ERTH	Low	No	1882

32.008	Pacoima		Los Angeles County Department Of Public Works	365	3,777	Certified	Satisfactory	Los Angeles
CA00193	34.34	-118.40	County, county agency, or county district	640	VARA	Extremely High	No	1929

1025.000	Paicines		San Benito County Water District	29	4,500	Certified	Satisfactory	San Benito
CA00847	36.72	-121.28	County, county agency, or county district	3,200	ERTH	High	No	1912

290.000	Palen		Harris Family Trust	25	146	Certified	Satisfactory	Sierra
CA00535	39.65	-120.31	Private company, corporation, LLC, partnership	260	ERTH	Low	No	1951

1022.002	Palisades Reservoir		South Coast Water District	146	147	Certified	Satisfactory	Orange
CA00843	33.46	-117.65	Park, sanitation, utility, or water district	620	ERTH	Extremely High	No	1963

860.000	Palo Verde		Palo Verde Ranch Homeowners	67	730	Certified	Satisfactory	San Diego
CA00789	32.81	-116.73	Associations	758	ERTH	High	No	1970

35.004	Palos Verdes Res		Metropolitan Water District Of Southern California	82	1,100	Certified	Satisfactory	Los Angeles
CA00215	33.77	-118.32	Park, sanitation, utility, or water district	2,150	ERTH	Extremely High	No	1939

73.002	Paradise		Paradise Irrigation District	175	11,500	Certified	Satisfactory	Butte
CA00297	39.85	-121.58	Park, sanitation, utility, or water district	1,720	ERTH	Extremely High	No	1957

5430.000	Paradise Vineyards		Paradise Vineyards, LLC	40	100	Certified	Satisfactory	Sonoma
CA01462	38.14	-122.45	Private company, corporation, LLC, partnership	504	ERTH	Low	No	2003

31.004	Pardee		East Bay Municipal Utility District	345	197,950	Certified	Satisfactory	Amador
CA00164	38.26	-120.85	Park, sanitation, utility, or water district	1,337	GRAV	Extremely High	No	1929

1.062	Patterson		California Department of Water Resources	39	104	Certified	Satisfactory	Alameda
CA00048	37.70	-121.68	State agency	1,275	ERTH	High	No	1962

1065.000	Patterson		Alameda County Water District	100	46	Certified	Fair	Alameda
CA00895	37.54	-122.08	County, county agency, or county district	1,306	ERTH	Significant	Yes	1962

2467.000	Patterson		Lake Oaks Community	37	350	Certified	Satisfactory	El Dorado
CA01050	38.68	-120.83	Private company, corporation, LLC, partnership	435	ERTH	Significant	No	1960

1328.000	Patterson Section 29		Private Entity	22	92	Certified	Satisfactory	Placer
CA01253	39.03	-121.34	Individual owner	685	ERTH	Low	No	1962

Jurisdictional Dams

Listed Alphabetically by Dam Name

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

143.000	Payne		Private Entity	12	2,850	Certified	Satisfactory	Modoc
CA00475	41.40	-120.47	Individual owner	6,250	ERTH	Low	No	1928

627.000	Peabody		Private Entity	63	76	Certified	Satisfactory	Santa Clara
CA00685	37.04	-121.51	Individual owner	295	ERTH	Significant	No	1950

1228.000	Peconom		Private Entity	15	173	Certified	Satisfactory	Lassen
CA00938	40.44	-120.60	Individual owner	470	ERTH	Low	No	1920

1304.000	Penn Valley Wastewater		Nevada County Department of Sanitation	39	52	Certified	Satisfactory	Nevada
CA01247	39.18	-121.21	County, county agency, or county district	540	ERTH	Low	No	1990

1052.002	Pennsylvania Creek		City of Fairfield	14	148	Certified	Satisfactory	Solano
CA00023	38.26	-122.07	City, city agency, or city district	3,100	ERTH	High	No	1958

79.000	Peoples Weir		Peoples Ditch Company	23	120	Certified	Satisfactory	Kings
CA00301	36.49	-119.54	Private company, corporation, LLC, partnership	530	FLBT	Low	No	1936

653.002	Percolation Area		Las Aguilas Corporation	12	430	Certified	Satisfactory	San Benito
CA00696	36.84	-121.20	Private company, corporation, LLC, partnership	5,000	ERTH	Low	No	1951

1.068	Perris		California Department of Water Resources	130	131,452	Certified	Satisfactory	Riverside
CA00054	33.86	-117.20	State agency	11,600	ERTH	Extremely High	No	1973

17.006	Perris Hill Res		City of San Bernardino	31	31	Certified	Satisfactory	San Bernardino
CA00151	34.13	-117.26	City, city agency, or city district	1,150	RECT	High	No	1962

2382.000	Perry Gulch		Perry Gulch Ranch	37	33	Certified	Satisfactory	Mendocino
CA01261	39.14	-123.56	Private company, corporation, LLC, partnership	331	ERTH	Significant	No	1980

33.007	Peters		Marin Municipal Water District	230	32,900	Certified	Satisfactory	Marin
CA00208	38.00	-122.70	Park, sanitation, utility, or water district	700	ERTH	High	No	1954

393.000	Peters		Private Entity	32	112	Certified	Satisfactory	Lake
CA00568	39.00	-123.01	Individual owner	465	ERTH	Low	No	1940

1012.006	Peters Canyon		County of Orange	54	1,090	Certified	Satisfactory	Orange
CA00746	33.78	-117.76	County, county agency, or county district	580	ERTH	High	No	1932

1256.000	Petes Valley		Petes Valley Partners	29	240	Certified	Satisfactory	Lassen
CA00961	40.54	-120.45	Private company, corporation, LLC, partnership	1,360	ERTH	Low	No	1954

Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018
Page
71 of 101

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

97.008	Philbrook		Pacific Gas and Electric Company	85	5,180	Certified	Satisfactory	Butte
CA00345	40.03	-121.48	Private company, corporation, LLC, partnership	850	ERTH	Significant	No	1926

550.007	Phoenix		Tuolumne Utilities District	52	455	Certified	Satisfactory	Tuolumne
CA00389	38.00	-120.33	Park, sanitation, utility, or water district	795	ERTH	High	No	1880

33.003	Phoenix Lake		Marin Municipal Water District	90	612	Certified	Satisfactory	Marin
CA00206	37.96	-122.58	Park, sanitation, utility, or water district	320	ERTH	Extremely High	No	1907

31.011	Piedmont		East Bay Municipal Utility District	64	60	Certified/Inop	Satisfactory	Alameda
CA00170	37.83	-122.22	Park, sanitation, utility, or water district	250	ERTH	High	No	1905

1003.006	Pigeon Pass		Riverside County Flood Control and Water Conservation District	36	900	Certified	Satisfactory	Riverside
CA00801	33.95	-117.25	County, county agency, or county district	2,915	ERTH	High	No	1958

10.008	Pilarcitos		City and County of San Francisco	103	3,100	Certified	Satisfactory	San Mateo
CA00128	37.55	-122.42	City, city agency, or city district	520	ERTH	High	No	1866

1007.000	Pine Creek		Contra Costa County Flood Control and Water Conservation Distri	87	225	Certified	Satisfactory	Contra Costa
CA00808	37.89	-121.99	County, county agency, or county district	320	ERTH	High	No	1956

1007.006	Pine Creek Detention		Contra Costa County Flood Control and Water Conservation Distri	30	320	Certified	Satisfactory	Contra Costa
CA01252	37.91	-122.00	County, county agency, or county district	232	GRAV	Significant	No	1981

2003.000	Pine Grove		San Juan Ridge County Water District	42	155	Certified	Satisfactory	Nevada
CA00541	39.32	-121.13	Park, sanitation, utility, or water district	610	ERTH	Low	No	1911

1002.002	Piner Creek		Sonoma County Water Agency	28	172	Certified	Satisfactory	Sonoma
CA00792	38.47	-122.71	County, county agency, or county district	205	ERTH	High	No	1962

3429.000	Pinheiro		Private Entity	26	83	Certified	Satisfactory	Sonoma
CA01062	38.24	-122.53	Individual owner	723	ERTH	Significant	No	1967

97.099	Pit #1 Diversion		Pacific Gas and Electric Company	15	50	Certified	Satisfactory	Shasta
CA00396	41.01	-121.46	Private company, corporation, LLC, partnership	600	GRAV	Significant	No	1922

97.110	Pit #1 Forebay		Pacific Gas and Electric Company	47	2,800	Certified	Satisfactory	Shasta
CA00405	41.01	-121.45	Private company, corporation, LLC, partnership	623	ERTH	Extremely High	No	1947

97.098	Pit #3		Pacific Gas and Electric Company	120	34,600	Certified	Satisfactory	Shasta
CA00395	41.02	-121.68	Private company, corporation, LLC, partnership	494	GRAV	High	No	1925

Jurisdictional Dams

Listed Alphabetically by Dam Name

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

97.100	Pit #4		Pacific Gas and Electric Company	74	2,000	Certified	Satisfactory	Shasta
CA00397	40.99	-121.77	Private company, corporation, LLC, partnership	415	SLBT	High	No	1927

97.107	Pit #5 Diversion		Pacific Gas and Electric Company	52	390	Certified	Satisfactory	Shasta
CA00402	40.99	-121.87	Private company, corporation, LLC, partnership	320	GRAV	High	No	1943

97.108	Pit #5 Open Conduit Embankment		Pacific Gas and Electric Company	61	1,147	Certified	Satisfactory	Shasta
CA00403	41.00	-121.89	Private company, corporation, LLC, partnership	2,825	ERTH	High	No	1943

97.121	Pit #6		Pacific Gas and Electric Company	172	15,700	Certified	Satisfactory	Shasta
CA00414	40.92	-121.99	Private company, corporation, LLC, partnership	560	GRAV	High	No	1965

97.122	Pit No. 7		Pacific Gas and Electric Company	230	34,000	Certified	Satisfactory	Shasta
CA00415	40.85	-121.99	Private company, corporation, LLC, partnership	770	GRAV	High	No	1965

6.045	Pleasant Valley		City of Los Angeles Department of Water And Power	87	3,825	Certified	Satisfactory	Inyo
CA00098	37.41	-118.53	City, city agency, or city district	530	ERTH	High	No	1957

139.000	Plum Canyon		Private Entity	26	184	Certified	Satisfactory	Modoc
CA00473	41.44	-120.38	Individual owner	270	ERTH	Low	No	1913

489.000	Plymouth Effluent		City of Plymouth	59	248	Certified	Satisfactory	Amador
CA01189	38.48	-120.88	City, city agency, or city district	545	ERTH	Significant	No	1989

93.005	Poe		Pacific Gas and Electric Company	62	1,150	Certified	Satisfactory	Butte
CA00328	39.81	-121.43	Private company, corporation, LLC, partnership	441	GRAV	Significant	No	1959

1113.000	Poison Springs		Fee Ranch, Inc. and P.H. Peterson	43	7,120	Certified	Satisfactory	Modoc
CA00916	41.82	-120.03	Private company, corporation, LLC, partnership	1,000	ERTH	Low	No	1957

1601.000	Pomponio Ranch		Private Entity	64	274	Certified	Satisfactory	San Mateo
CA01008	37.29	-122.31	Individual owner	245	ERTH	Significant	No	1952

449.000	Pond 2B		International Technology Corporation	55	89	Certified	Satisfactory	Solano
CA01092	38.10	-122.13	Private company, corporation, LLC, partnership	490	ERTH	High	No	1975

1583.003	Pond K		US Mine Corporation	22	1,056	Certified	Satisfactory	Amador
CA01505	38.34	-120.96	Private company, corporation, LLC, partnership	1,250	ERTH	Low	No	2006

1050.002	Pond No 2		City of Santa Rosa	12	290	Certified	Satisfactory	Sonoma
CA00883	38.44	-122.76	City, city agency, or city district	7,920	ERTH	High	No	1952

Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018
Page
73 of 101

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

63.008	Ponderosa Diversion		South Feather Water and Power Agency	157	4,750	Certified	Satisfactory	Butte
CA00274	39.55	-121.30	Water agency or authority	653	ERTH	Low	No	1962

540.000	Poore Lake Reservoir		Park Livestock Company	23	1,200	Certified	Satisfactory	Mono
CA00648	38.32	-119.52	Private company, corporation, LLC, partnership	400	ERTH	Low	No	1900

104.024	Portal Powerhouse Forebay		Southern California Edison	65	325	Certified	Satisfactory	Fresno
CA00442	37.32	-119.07	Private company, corporation, LLC, partnership	792	ERTH	Low	No	1955

2013.002	Portola		Santa Margarita Water District	53	586	Certified	Satisfactory	Orange
CA01183	33.63	-117.58	Park, sanitation, utility, or water district	1,200	ERTH	High	No	1980

786.000	Potrero		Westlake Lake Management Association	40	1,600	Certified	Satisfactory	Los Angeles
CA00743	34.14	-118.83	Associations	730	GRAV	High	No	1967

1078.000	Poway		City of Poway	162	3,300	Certified	Satisfactory	San Diego
CA00909	33.01	-117.01	City, city agency, or city district	970	ERTH	High	No	1971

1003.004	Prenda		Riverside County Flood Control and Water Conservation District	44	192	Certified	Satisfactory	Riverside
CA00799	33.91	-117.37	County, county agency, or county district	1,313	ERTH	High	No	1954

2029.003	Preston		Amador Regional Sanitation Authority	40	268	Certified	Satisfactory	Amador
CA00012	38.37	-120.94	Water agency or authority	647	ERTH	High	No	1949

2029.002	Preston Forebay		Amador Regional Sanitation Authority	40	30	Certified	Satisfactory	Amador
CA00006	38.38	-120.92	Water agency or authority	176	ERTH	Low	No	1892

9.006	Priest		San Francisco Public Utilities Commission	168	2,067	Certified	Satisfactory	Tuolumne
CA00124	37.80	-120.27	City, city agency, or city district	1,000	HYDF	High	No	1923

32.009	Puddingstone		Los Angeles County Department Of Public Works	147	16,342	Certified	Satisfactory	Los Angeles
CA00194	34.09	-117.81	County, county agency, or county district	2,698	ERTH	Extremely High	No	1928

32.016	Puddingstone Diversion		Los Angeles County Department Of Public Works	34	150	Certified	Satisfactory	Los Angeles
CA00199	34.13	-117.78	County, county agency, or county district	825	ERTH	High	No	1928

311.004	Putts Lake		Walter M. Saunders Trust	19	249	Certified	Satisfactory	Placer
CA00540	39.29	-120.68	Private trusts and estates	1,025	ERTH	Significant	No	1916

1.066	Pyramid		California Department of Water Resources	386	178,700	Certified	Satisfactory	Los Angeles
CA00052	34.64	-118.77	State agency	1,080	ERRK	Extremely High	No	1973

Q

Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018

Page
74 of 101

Q

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

829.000	Quail Valley		K. Hovnanian Companies of California, Inc.	37	103	Certified	Satisfactory	Riverside
CA00771	33.70	-117.25	Private company, corporation, LLC, partnership	275	ERTH	High	No	1959

1065.009	Quarry Pits		Alameda County Water District	26	3,360	Certified	Satisfactory	Alameda
CA01422	37.58	-122.01	County, county agency, or county district	9,150	ERTH	High	No	1997

550.008	Quartz		Tuolumne Utilities District	104	1,500	Certified	Satisfactory	Tuolumne
CA01146	37.93	-120.43	Park, sanitation, utility, or water district	1,050	ERTH	Low	No	1978

Count: 3

Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018

Page
75 of 101

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

1622.000	R Simoni Irrigation		Private Entity	44	152	Certified	Satisfactory	Santa Clara
CA01015	37.09	-121.71	Individual owner	330	ERTH	Low	No	1961

818.000	Railroad Canyon		Elsinore Valley Municipal Water District	94	11,586	Certified	Satisfactory	Riverside
CA00765	33.68	-117.27	Park, sanitation, utility, or water district	590	VARA	Extremely High	No	1928

1251.000	Rains Creek		Private Entity	15	126	Certified	Satisfactory	Lassen
CA00959	41.11	-121.31	Individual owner	1,840	ERTH	Low	No	1960

1050.000	Ralphine, Lake		City of Santa Rosa	35	387	Certified	Satisfactory	Sonoma
CA00882	38.45	-122.67	City, city agency, or city district	700	ERTH	Extremely High	No	1882

1030.004	Ralston Afterbay		Placer County Water Agency	85	2,800	Certified	Satisfactory	Placer
CA00859	39.00	-120.75	County, county agency, or county district	600	GRAV	Significant	No	1966

1044.002	Ramona		Ramona Municipal Water District	228	12,200	Certified	Satisfactory	San Diego
CA01215	33.02	-117.00	Park, sanitation, utility, or water district	970	ERTH	High	No	1988

808.000	Rancho Cielito		Rolling Ridge Ranch	9	110	Certified	Satisfactory	San Bernardino
CA00761	33.98	-117.71	Private company, corporation, LLC, partnership	1,000	ERTH	High	No	1912

752.000	Rancho Del Ciervo		Santa Barbara Mountain Water Co., LLC	65	165	Certified	Satisfactory	Santa Barbara
CA00719	34.47	-119.82	Private company, corporation, LLC, partnership	758	ERTH	High	No	1938

361.000	Rancho Rubini		Private Entity	31	106	Certified	Satisfactory	Colusa
CA00555	39.20	-122.42	Individual owner	790	ERTH	Significant	No	1955

1009.013	Rancho Seco		Sacramento Municipal Utility District	58	2,950	Certified	Satisfactory	Sacramento
CA00825	38.34	-121.10	Park, sanitation, utility, or water district	3,400	ERTH	High	No	1972

1029.003	Rattlesnake Canyon		Irvine Ranch Water District	79	1,480	Certified	Satisfactory	Orange
CA00855	33.73	-117.74	Park, sanitation, utility, or water district	980	ERTH	High	No	1959

1180.002	Ray Soule Reservoir		Private Entity	28	132	Certified	Satisfactory	Siskiyou
CA01603	41.73	-122.37	Individual owner	1,100	ERTH	Significant	No	1953

519.000	Reba		Lake Alpine Water Company	70	361	Certified	Satisfactory	Alpine
CA00642	38.47	-120.05	Private company, corporation, LLC, partnership	555	ERTH	High	No	1965

2039.000	Reclaimed Water Res		City of Shasta Lake	37	370	Certified	Satisfactory	Shasta
CA01391	40.66	-122.39	City, city agency, or city district	1,000	ERTH	High	No	1995

Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018

Page
76 of 101

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

1.021	Rector Creek		California Department of Veteran Affairs	164	4,587	Certified	Satisfactory	Napa
CA00011	38.44	-122.35	State agency	890	ERTH	Extremely High	No	1946

1.090	Red Lake		California Department of Fish and Wildlife	35	1,410	Certified	Satisfactory	Alpine
CA00631	38.70	-119.97	State agency	1,920	ERTH	Significant	No	1924

37.000	Red Mountain Reservoir		Fallbrook Public Utility District	120	1,350	Certified	Satisfactory	San Diego
CA00225	33.40	-117.19	Park, sanitation, utility, or water district	1,500	ERTH	Extremely High	No	1985

230.000	Red Rock No 1		Dodge Ranch LLC	63	10,000	Certified	Satisfactory	Lassen
CA00510	40.97	-120.14	Private company, corporation, LLC, partnership	485	ERTH	Significant	No	1893

1017.000	Redbank		Fresno Metropolitan Flood Control District	33	1,100	Certified	Satisfactory	Fresno
CA00837	36.81	-119.58	Park, sanitation, utility, or water district	1,450	ERTH	High	No	1962

1017.003	Redbank Creek Detention Basin		Fresno Metropolitan Flood Control District	17	940	Certified	Satisfactory	Fresno
CA01331	36.77	-119.66	Park, sanitation, utility, or water district	6,619	ERTH	High	No	1990

82.000	Redhawk Lake		Calaveras Public Utility District	33	2,760	Certified	Satisfactory	Calaveras
CA00306	38.33	-120.49	Park, sanitation, utility, or water district	780	ERTH	Significant	No	1882

7000.119	Redwood Landfill Leachate Impound		Waste Management, Inc.	10	84	Not Certified	Fair	Marin
CA01550	38.17	-122.56	Private company, corporation, LLC, partnership	1,800	ERTH	Significant	No	1991

1492.000	Reid		Private Entity	32	70	Certified	Satisfactory	Calaveras
CA01004	38.30	-120.46	Individual owner	720	ERTH	Low	No	1969

97.080	Relief		Pacific Gas and Electric Company	145	15,122	Certified	Satisfactory	Tuolumne
CA00390	38.28	-119.73	Private company, corporation, LLC, partnership	505	ROCK	High	No	1910

1119.000	Renner Sibley Creek		Usa Investments Associates	28	765	Certified	Satisfactory	Modoc
CA00921	41.99	-120.59	Private company, corporation, LLC, partnership	1,275	ERTH	Low	No	1959

1086.000	Reservoir A		Northstar Community Services District	93	180	Certified	Satisfactory	Placer
CA01112	39.26	-120.11	Park, sanitation, utility, or water district	516	ERTH	Significant	No	1973

4.006	Reservoir No 4		City of Burbank	38	34	Certified	Satisfactory	Los Angeles
CA00059	34.19	-118.30	City, city agency, or city district	210	RECT	High	No	1955

4.007	Reservoir No 5		City of Burbank	36	77	Certified	Satisfactory	Los Angeles
CA00060	34.21	-118.33	City, city agency, or city district	870	RECT	High	No	1949

Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018

Page
77 of 101

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

80.000	Reynolds Weir		Laguna Irrigation District	13	260	Certified	Satisfactory	Fresno
CA00302	36.43	-119.67	Park, sanitation, utility, or water district	130	FLBT	Low	No	1928

104.041	Rhinedollar		Southern California Edison	17	490	Certified	Satisfactory	Mono
CA00457	37.93	-119.23	Private company, corporation, LLC, partnership	430	ROCK	High	No	1927

274.004	Richardson		Soper-Wheeler Company	65	520	Certified	Satisfactory	Sonoma
CA00994	38.63	-123.19	Private company, corporation, LLC, partnership	265	ERTH	Significant	No	1954

2428.000	Richardson		Rips Redwood, LLC	40	96	Certified	Satisfactory	Sonoma
CA01142	38.68	-123.37	Private company, corporation, LLC, partnership	137	ERTH	Significant	No	1974

1603.000	Rickey		Mid-Peninsula Open Space District	64	47	Certified	Satisfactory	San Mateo
CA01009	37.31	-122.18	Park, sanitation, utility, or water district	200	ERTH	Low	No	1951

382.000	Ridgewood		The Walker Lake Association	44	185	Certified	Satisfactory	Mendocino
CA00560	39.32	-123.34	Associations	230	HYDF	High	No	1929

743.000	Righetti		Private Entity	83	735	Certified	Satisfactory	San Luis Obispo
CA00725	35.25	-120.59	Individual owner	1,200	ERTH	High	No	1966

72.010	Rinconada Reservoir		Santa Clara Valley Water District	40	46	Certified	Satisfactory	Santa Clara
CA00295	37.26	-121.99	Park, sanitation, utility, or water district	240	ERTH	Extremely High	No	1969

1043.000	Riviera Reservoir		City of Santa Monica Department Of Public Works	40	76	Certified	Satisfactory	Los Angeles
CA00876	34.05	-118.50	City, city agency, or city district	1,280	RECT	High	No	1962

1009.006	Robbs Peak Forebay		Sacramento Municipal Utility District	44	30	Certified	Satisfactory	El Dorado
CA00819	38.95	-120.39	Park, sanitation, utility, or water district	275	GRAV	Low	No	1963

35.012	Robert A Skinner		Metropolitan Water District Of Southern California	109	43,800	Certified	Satisfactory	Riverside
CA00223	33.60	-117.07	Park, sanitation, utility, or water district	5,150	ERTH	Extremely High	No	1973

1413.000	Robert L. Matheson		Sage Canyon, LLC	32	90	Certified	Satisfactory	Napa
CA00982	38.51	-122.28	Private company, corporation, LLC, partnership	390	ERTH	Significant	No	1954

1013.000	Robert W Matthews		Humboldt Bay Municipal Water District	150	51,800	Certified	Satisfactory	Trinity
CA00833	40.37	-123.43	Park, sanitation, utility, or water district	630	ERTH	High	No	1962

157.002	Roberts		Big Valley Mutual Water Company	17	5,500	Certified	Satisfactory	Modoc
CA00485	41.23	-121.14	Private company, corporation, LLC, partnership	700	ERTH	Significant	No	1905

Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018

Page
78 of 101

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

93.007	Rock Creek		Pacific Gas and Electric Company	120	4,660	Certified	Satisfactory	Plumas
CA00330	39.99	-121.28	Private company, corporation, LLC, partnership	550	GRAV	Significant	No	1950

97.043	Rock Creek		Pacific Gas and Electric Company	35	410	Certified	Satisfactory	Placer
CA00368	38.95	-121.09	Private company, corporation, LLC, partnership	1,080	MULA	Extremely High	No	1916

465.000	Rock Creek		Private Entity	35	34	Certified	Satisfactory	El Dorado
CA00609	38.94	-120.73	Individual owner	270	ERTH	Low	No	1932

62.003	Rodden Lake		Oakdale Irrigation District	40	380	Certified	Satisfactory	Stanislaus
CA00262	37.82	-120.77	Park, sanitation, utility, or water district	320	ERTH	Low	No	1916

61.021	Rollins		Nevada Irrigation District	242	66,000	Certified	Satisfactory	Nevada
CA00255	39.14	-120.95	Park, sanitation, utility, or water district	1,260	ERRK	Extremely High	No	1965

109.002	Ross		Utica Water and Power Authority	44	85	Certified	Satisfactory	Calaveras
CA00424	38.12	-120.52	Water agency or authority	710	ERRK	Significant	No	1895

1222.000	Ross No 1		The McConnell Foundation	30	709	Certified	Satisfactory	Shasta
CA00934	40.64	-122.32	Private company, corporation, LLC, partnership	740	ERTH	High	No	1957

1222.002	Ross No 2		The McConnell Foundation	29	243	Certified	Satisfactory	Shasta
CA00935	40.64	-122.31	Private company, corporation, LLC, partnership	760	ERTH	High	No	1957

1041.002	Rossmoor No 1		El Toro Water District	36	43	Certified	Satisfactory	Orange
CA00753	33.62	-117.73	Park, sanitation, utility, or water district	305	ERTH	High	No	1964

1012.013	Rossmoor Retarding Basin		County of Orange	14	175	Certified	Satisfactory	Orange
CA01443	33.79	-118.09	County, county agency, or county district	95	ERTH	Significant	No	2002

1012.010	Round Canyon Retarding Basin		County of Orange	98	286	Certified	Satisfactory	Orange
CA01378	33.70	-117.70	County, county agency, or county district	750	ERTH	Low	No	1994

1382.000	Round Mountain		Round Mountain Cooperative Community, Inc.	43	282	Certified	Satisfactory	Mendocino
CA00974	39.21	-123.23	Private company, corporation, LLC, partnership	475	ERTH	High	No	1964

97.009	Round Valley		Pacific Gas and Electric Company	30	1,147	Certified	Satisfactory	Butte
CA00346	40.07	-121.46	Private company, corporation, LLC, partnership	825	ERTH	Significant	No	1877

228.000	Round Valley		Private Entity	45	5,500	Certified	Satisfactory	Lassen
CA00509	40.52	-120.66	Individual owner	220	ERRK	Significant	No	1892

Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018

Page
79 of 101

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

1065.005	Rubber Dam 3		Alameda County Water District	17	154	Certified	Satisfactory	Alameda
CA01251	37.57	-121.97	County, county agency, or county district	375	INFL	Significant	No	1990

1009.009	Rubicon		Sacramento Municipal Utility District	36	1,450	Certified	Satisfactory	El Dorado
CA00822	38.99	-120.22	Park, sanitation, utility, or water district	635	GRAV	Low	No	1963

32.021	Rubio Debris Basin		Los Angeles County Department Of Public Works	64	44	Certified	Satisfactory	Los Angeles
CA00202	34.20	-118.12	County, county agency, or county district	780	ERTH	High	No	1944

97.044	Rucker Lake		Pacific Gas and Electric Company	20	620	Certified	Satisfactory	Nevada
CA00369	39.36	-120.66	Private company, corporation, LLC, partnership	765	ERRK	Low	No	1871

86.003	Runkle		Ventura County Watershed Protection District	41	100	Certified	Satisfactory	Ventura
CA00313	34.24	-118.73	County, county agency, or county district	250	ERTH	High	No	1949

104.034	Rush Creek Meadows		Southern California Edison	50	5,277	Certified	Fair	Mono
CA00450	37.75	-119.18	Private company, corporation, LLC, partnership	463	CORA	High	Yes	1925

1026.000	Russian River No 1		Russian River Recreation and Parks District	10	315	Certified	Satisfactory	Sonoma
CA00849	38.48	-123.01	Park, sanitation, utility, or water district	365	FLBT	Low	No	1963

265.002	Rye		T.M. Cattle Company	37	83	Certified	Satisfactory	Tehama
CA00528	39.84	-122.53	Private company, corporation, LLC, partnership	350	ERTH	Significant	No	1959

150.000	Rye Grass Swale		Private Entity	20	530	Certified	Satisfactory	Modoc
CA00481	41.36	-120.65	Individual owner	450	ERTH	Significant	No	1923

Count: 65

Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018

Page
80 of 101

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

104.032	Sabrina		Southern California Edison	70	8,376	Certified	Satisfactory	Inyo
CA00448	37.21	-118.61	Private company, corporation, LLC, partnership	900	ROCK	High	No	1908

104.039	Saddlebag		Southern California Edison	33	9,765	Certified	Satisfactory	Mono
CA00455	37.97	-119.27	Private company, corporation, LLC, partnership	590	ROCK	High	No	1921

1008.003	Salinas River Diversion		Monterey County Water Resources Agency	16	120	Certified	Satisfactory	Monterey
CA01519	36.71	-121.75	Water agency or authority	140	INFL	Low	No	2009

1420.000	Salinger		Private Entity	46	58	Certified	Satisfactory	Sonoma
CA00987	38.50	-122.73	Individual owner	270	ERTH	Low	No	1952

97.066	Salt Springs		Pacific Gas and Electric Company	332	141,900	Certified	Satisfactory	Amador
CA00382	38.50	-120.22	Private company, corporation, LLC, partnership	1,257	ROCK	Extremely High	No	1931

496.000	Salt Springs Valley		Rock Creek Water District	47	10,900	Certified	Satisfactory	Calaveras
CA00620	38.03	-120.76	Park, sanitation, utility, or water district	2,150	ERTH	Significant	No	1882

10.010	San Andreas		City and County of San Francisco	107	19,027	Certified	Satisfactory	San Mateo
CA00129	37.58	-122.41	City, city agency, or city district	727	ERTH	High	No	1870

1008.002	San Antonio		Monterey County Water Resources Agency	202	350,000	Certified	Satisfactory	Monterey
CA00813	35.80	-120.89	Water agency or authority	1,433	ERTH	Extremely High	No	1965

1069.000	San Diego Reservoir		Yosemite Community College District	39	40	Certified	Satisfactory	Tuolumne
CA00900	38.03	-120.39	Park, sanitation, utility, or water district	155	ERTH	Significant	No	1860

1075.000	San Dieguito		Santa Fe Irrigation and San Dieguito Water District	51	883	Certified	Satisfactory	San Diego
CA00906	33.04	-117.20	Park, sanitation, utility, or water district	650	MULA	High	No	1918

32.010	San Dimas		Los Angeles County Department Of Public Works	131	1,534	Certified	Satisfactory	Los Angeles
CA00195	34.15	-117.77	County, county agency, or county district	340	GRAV	Extremely High	No	1922

1621.000	San Felipe Ranch		Private Entity	49	64	Certified	Satisfactory	Santa Clara
CA01014	37.29	-121.68	Individual owner	410	ERTH	Significant	No	1959

32.019	San Gabriel No 1		Los Angeles County Department Of Public Works	320	44,183	Certified	Satisfactory	Los Angeles
CA00200	34.21	-117.86	County, county agency, or county district	1,520	ERRK	Extremely High	No	1938

1029.000	San Joaquin Reservoir		Irvine Ranch Water District	224	3,036	Certified	Satisfactory	Orange
CA00853	33.62	-117.84	Park, sanitation, utility, or water district	873	ERTH	Extremely High	No	1966

S

Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018

Page
81 of 101

S

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

1020.003	San Lorenzo Creek		Alameda County Public Works Agency	65	380	Certified	Satisfactory	Alameda
CA00841	37.69	-122.06	County, county agency, or county district	385	ERTH	High	No	1964

848.000	San Marcos		Citizens Development Corporation	52	480	Certified	Satisfactory	San Diego
CA00782	33.11	-117.21	Private company, corporation, LLC, partnership	290	VARA	High	No	1946

745.000	San Marcos		Private Entity	42	325	Certified	Satisfactory	San Luis Obispo
CA00726	35.67	-120.81	Individual owner	502	ERTH	Significant	No	1964

854.000	San Marcos		Vallecitos Water District	85	320	Certified	Satisfactory	San Diego
CA00785	33.12	-117.17	Park, sanitation, utility, or water district	400	ERTH	High	No	1958

31.006	San Pablo		East Bay Municipal Utility District	170	43,193	Certified	Satisfactory	Contra Costa
CA00166	37.94	-122.26	Park, sanitation, utility, or water district	1,250	ERTH	Extremely High	No	1920

31.029	San Pablo Clearwell		East Bay Municipal Utility District	42	17	Certified	Satisfactory	Contra Costa
CA00185	37.90	-122.29	Park, sanitation, utility, or water district	627	ERTH	Extremely High	No	1922

87.014	San Sevaine Basin #5		County of San Bernardino Department of Public Works	49	2,765	Certified	Satisfactory	San Bernardino
CA01363	34.14	-117.50	County, county agency, or county district	9,000	ERTH	High	No	2004

8.009	San Vicente		City of San Diego	338	245,000	Certified	Satisfactory	San Diego
CA00113	32.91	-116.93	City, city agency, or city district	1,425	RCC	Extremely High	No	1943

1044.004	San Vicente Storage Pond 2		Ramona Municipal Water District	30	137	Certified	Satisfactory	San Diego
CA01344	33.00	-116.84	Park, sanitation, utility, or water district	2,350	ERTH	High	No	1991

1044.006	San Vicente Storage Pond 3		Ramona Municipal Water District	24	69	Certified	Satisfactory	San Diego
CA01467	33.00	-116.84	Park, sanitation, utility, or water district	1,938	ERTH	High	No	2002

1029.002	Sand Canyon		Irvine Ranch Water District	58	960	Certified	Satisfactory	Orange
CA00854	33.65	-117.79	Park, sanitation, utility, or water district	861	ERTH	Extremely High	No	1912

1691.000	Sand Creek		Tulare County Resource Management Agency	60	1,050	Certified	Satisfactory	Tulare
CA01180	36.66	-119.23	County, county agency, or county district	933	ERTH	High	No	1980

375.000	Sanhedrin Ranch		Private Entity	27	120	Certified	Satisfactory	Glenn
CA00559	39.62	-122.60	Individual owner	510	ERTH	Low	No	1967

32.029	Santa Anita Debris Basin		Los Angeles County Department Of Public Works	56	116	Certified	Fair	Los Angeles
CA01155	34.17	-118.02	County, county agency, or county district	955	ERTH	Low	Yes	1960

Jurisdictional Dams

Listed Alphabetically by Dam Name

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

2043.000	Santa Fe Seasonal Storage		Santa Fe Community Services District	22	132	Certified	Satisfactory	San Diego
CA01455	33.03	-117.13	Park, sanitation, utility, or water district	500	ERTH	High	No	2004

1005.000	Santa Felicia		United Water Conservation District	213	100,000	Certified	Fair	Ventura
CA00805	34.46	-118.75	Park, sanitation, utility, or water district	1,275	ERTH	Extremely High	No	1955

1044.005	Santa Maria		Ramona Municipal Water District	25	217	Certified	Satisfactory	San Diego
CA01354	33.05	-116.94	Park, sanitation, utility, or water district	2,240	ERTH	High	No	1995

2010.000	Santa Monica Debris Basin		Santa Barbara County Flood Control and Water Conservation Dist	102	79	Certified	Satisfactory	Santa Barbara
CA01134	34.42	-119.53	County, county agency, or county district	467	ERTH	High	No	1978

1002.005	Santa Rosa Creek Reservoir		Sonoma County Water Agency	37	3,550	Certified	Satisfactory	Sonoma
CA00795	38.46	-122.65	County, county agency, or county district	1,950	ERTH	Extremely High	No	1963

6.047	Santa Ynez Canyon		City of Los Angeles Department of Water And Power	157	356	Certified	Satisfactory	Los Angeles
CA00100	34.07	-118.57	City, city agency, or city district	455	ERTH	Extremely High	No	1968

75.000	Santiago Creek		Serrano Water District and Irvine Ranch Water District	136	25,000	Certified	Satisfactory	Orange
CA00298	33.79	-117.72	Park, sanitation, utility, or water district	1,425	ERTH	Extremely High	No	1933

8.004	Savage		City of San Diego	149	56,500	Certified	Fair	San Diego
CA00109	32.61	-116.93	City, city agency, or city district	750	GRAV	Extremely High	No	1919

61.010	Sawmill Lake		Nevada Irrigation District	50	3,040	Certified	Satisfactory	Nevada
CA00250	39.45	-120.60	Park, sanitation, utility, or water district	384	ROCK	Significant	No	1910

32.012	Sawpit		Los Angeles County Department Of Public Works	150	406	Certified	Satisfactory	Los Angeles
CA00196	34.18	-117.99	County, county agency, or county district	527	CORA	Extremely High	No	1927

32.031	Sawpit Debris Basin		Los Angeles County Department Of Public Works	82	152	Not Certified	Fair	Los Angeles
CA01157	34.17	-117.99	County, county agency, or county district	520	ERTH	High	Yes	1955

1122.000	Schadler		Schadler Ranch, Inc.	39	205	Certified	Satisfactory	Modoc
CA00924	41.94	-120.07	Private company, corporation, LLC, partnership	600	ERTH	High	No	1967

458.000	Schneider		Private Entity	22	126	Certified	Satisfactory	Sacramento
CA00604	38.47	-121.09	Individual owner	455	ERTH	Low	No	1941

32.036	Schoolhouse Debris Basin		Los Angeles County Department Of Public Works	38	19	Certified	Satisfactory	Los Angeles
CA01172	34.33	-118.46	County, county agency, or county district	265	ERTH	High	No	1962

Jurisdictional Dams

Listed Alphabetically by Dam Name

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

2460.000	Schubin		Private Entity	55	225	Certified	Satisfactory	El Dorado
CA01045	38.76	-120.92	Individual owner	425	ERTH	Significant	No	1952

2383.000	Schwindt		Private Entity	37	23	Not Certified	Fair	Mendocino
CA01323	39.85	-123.52	Individual owner	200	ERTH	Significant	No	

205.000	Scotia Log Pond		Scotia Community Services District	24	210	Certified	Poor	Humboldt
CA00504	40.48	-124.11	City, city agency, or city district	3,700	ERTH	High	Yes	1910

97.101	Scott		Pacific Gas and Electric Company	138	73,000	Certified	Satisfactory	Lake
CA00398	39.41	-122.96	Private company, corporation, LLC, partnership	815	GRAV	High	No	1921

511.000	Scott Lake		Private Entity	35	600	Certified	Satisfactory	Alpine
CA00629	38.76	-119.96	Individual owner	390	ERTH	Low	No	1926

417.000	Scotts Canyon		Private Entity	41	58	Certified	Satisfactory	Napa
CA00584	38.30	-122.36	Individual owner	320	ERTH	Significant	No	1948

61.018	Scotts Flat		Nevada Irrigation District	175	49,000	Certified	Satisfactory	Nevada
CA00253	39.27	-120.93	Park, sanitation, utility, or water district	980	ERTH	Extremely High	No	1948

389.000	Scout Lake		Boy Scouts of America San Francisco Bay Area Council	63	1,140	Certified	Satisfactory	Mendocino
CA00563	39.42	-123.28	Private company, corporation, LLC, partnership	300	ERTH	High	No	1964

5428.000	Sea Ranch		The Sea Ranch Water Company	61	300	Certified	Satisfactory	Sonoma
CA01411	38.76	-123.50	Private company, corporation, LLC, partnership	2,500	ERTH	Low	No	1996

614.000	Searsville		Stanford University Board of Trustees	68	1,840	Certified	Satisfactory	San Mateo
CA00669	37.41	-122.24	Private company, corporation, LLC, partnership	260	GRAV	Extremely High	No	1890

33.008	Seeger		Marin Municipal Water District	115	22,400	Certified	Satisfactory	Marin
CA00209	38.08	-122.76	Park, sanitation, utility, or water district	400	ERTH	High	No	1961

625.000	Selvage # 2		Lucky Hereford Ranch	42	24	Certified	Poor	Santa Clara
CA00684	37.05	-121.63	Private company, corporation, LLC, partnership	440	ERTH	Low	Yes	1948

1.023	Sempervirens		California Department of Parks and Recreation	42	78	Certified	Satisfactory	Santa Cruz
CA00013	37.19	-122.21	State agency	260	ERTH	Significant	No	1951

31.026	Seneca		East Bay Municipal Utility District	40	92	Certified/Inop	Satisfactory	Alameda
CA00182	37.75	-122.16	Park, sanitation, utility, or water district	1,520	ERTH	Low	No	1950

Jurisdictional Dams

Listed Alphabetically by Dam Name

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

1761.000	Senior Canyon		Senior Canyon Mutual Water Company	76	73	Certified	Satisfactory	Ventura
CA01019	34.47	-119.20	Private company, corporation, LLC, partnership	970	ERTH	High	No	1964

693.000	Sequoia Lake		Y.M.C.A., Inc.	51	1,370	Certified	Satisfactory	Fresno
CA00709	36.73	-119.00	Private company, corporation, LLC, partnership	225	ERRK	High	No	1888

87.016	Seven Oaks		County of San Bernardino Department of Public Works	550	145,600	Certified	Satisfactory	San Bernardino
CA01530	34.12	-117.10	County, county agency, or county district	2,980	ROCK	Extremely High	No	1999

3469.000	Shaffer		Echo Lane Investors, LLC	33	111	Certified	Satisfactory	El Dorado
CA01309	38.71	-120.87	Private company, corporation, LLC, partnership	370	ERTH	Significant	No	1968

60.000	Shasta River		Montague Water Conservation District	96	50,000	Certified	Satisfactory	Siskiyou
CA00244	41.54	-122.37	Park, sanitation, utility, or water district	1,247	HYDF	High	No	1928

104.018	Shaver Lake		Southern California Edison	180	135,283	Certified	Satisfactory	Fresno
CA00437	37.15	-119.30	Private company, corporation, LLC, partnership	2,169	GRAV	Extremely High	No	1927

1125.002	Shedd		Russ Ranch Company, LLC	22	100	Certified	Satisfactory	Modoc
CA00923	41.63	-120.40	Private company, corporation, LLC, partnership	482	ERTH	Low	No	1962

1180.000	Shelley		Private Entity	27	364	Certified	Satisfactory	Siskiyou
CA00926	41.73	-122.40	Individual owner	1,700	ERTH	Significant	No	1952

486.000	Shenandoah Lake		Renwood Ranch	33	168	Certified	Satisfactory	Amador
CA00617	38.54	-120.82	Private company, corporation, LLC, partnership	510	ERTH	Low	No	1962

5425.000	Shiloh Ranch		Shiloh Homeowners' Association	37	300	Certified	Satisfactory	Sonoma
CA01320	38.54	-122.74	Associations	635	ERTH	Significant	No	1991

1065.006	Shinn		Alameda County Water District	45	390	Certified	Satisfactory	Alameda
CA01326	37.57	-121.98	County, county agency, or county district	1,000	ERTH	Significant	No	1987

239.000	Shugru		Private Entity	20	195	Certified	Satisfactory	Lassen
CA00520	40.35	-120.56	Individual owner	1,110	ERTH	Low	No	

32.013	Sierra Madre		Los Angeles County Department Of Public Works	69	51	Certified	Satisfactory	Los Angeles
CA00197	34.18	-118.04	County, county agency, or county district	200	CORA	High	No	1928

32.032	Sierra Madre Villa		Los Angeles County Department Of Public Works	50	109	Certified	Satisfactory	Los Angeles
CA01158	34.17	-118.08	County, county agency, or county district	906	ERTH	High	No	1958

Jurisdictional Dams

Listed Alphabetically by Dam Name

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

681.000	Sierra Vista		Private Entity	12	90	Certified	Satisfactory	Madera
CA00705	37.15	-120.28	Individual owner	350	ERTH	Low	No	1872

650.000	Silacci		Private Entity	32	133	Not Certified	Fair	Monterey
CA01545	36.70	-121.56	Individual owner	750	ERTH	Significant	No	1915

232.000	Silva Flat		Private Entity	11	3,900	Certified	Satisfactory	Lassen
CA00512	40.97	-120.92	Individual owner	1,250	ERTH	Significant	No	1926

53.012	Silver Lake		El Dorado Irrigation District	26	3,840	Certified	Satisfactory	Amador
CA00377	38.67	-120.12	Park, sanitation, utility, or water district	200	CRIB	Significant	No	1876

274.000	Silver Lake		Soper-Wheeler Company	21	650	Certified	Satisfactory	Plumas
CA00531	39.96	-121.13	Private company, corporation, LLC, partnership	620	ERRK	High	No	1906

6.051	Silver Lake		City of Los Angeles Department of Water And Power	43	2,020	Certified	Satisfactory	Los Angeles
CA00081	34.09	-118.27	City, city agency, or city district	760	ERTH	High	No	1976

1760.000	Sinaloa Lake		Sinaloa Lake Owners Associates, Inc.	30	205	Certified	Satisfactory	Ventura
CA01018	34.26	-118.79	Associations	800	ERTH	High	No	1925

5424.000	Ski		Kunde Estate Winery and Vineyards	24	55	Not Certified	Fair	Sonoma
CA01478	38.40	-122.53	Private company, corporation, LLC, partnership	1,097	ERTH	Significant	No	

35.015	Skinner Clearwell		Metropolitan Water District Of Southern California	44	356	Certified	Satisfactory	Riverside
CA01271	33.58	-117.08	Park, sanitation, utility, or water district	1,910	ERTH	High	No	1991

1500.004	Skyrocket		Meridian Gold Company	43	1,715	Certified	Satisfactory	Calaveras
CA01428	37.99	-120.69	Private company, corporation, LLC, partnership	585	ERTH	Significant	No	1999

1009.011	Slab Creek		Sacramento Municipal Utility District	233	16,600	Certified	Satisfactory	El Dorado
CA00823	38.77	-120.70	Park, sanitation, utility, or water district	810	VARA	Significant	No	1967

63.005	Slate Creek Diversion		South Feather Water and Power Agency	72	643	Certified	Satisfactory	Plumas
CA00271	39.62	-121.05	Water agency or authority	279	VARA	Low	No	1961

426.000	Sleepy Hollow 2		Sleepy Hollow Properties	39	104	Certified	Satisfactory	Sonoma
CA00590	38.16	-122.50	Private company, corporation, LLC, partnership	600	ERTH	Significant	No	1949

4224.002	Slickrock Creek		Iron Mountain Mine Remediation Trust I	155	231	Certified	Satisfactory	Shasta
CA01444	40.67	-122.52	Private company, corporation, LLC, partnership	440	ERRK	High	No	2004

Jurisdictional Dams

Listed Alphabetically by Dam Name

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

63.006	Sly Creek		South Feather Water and Power Agency	271	65,050	Certified	Satisfactory	Butte
CA00272	39.58	-121.12	Water agency or authority	2,100	ERTH	High	No	1961

53.014	Sly Park		El Dorado Irrigation District	182	41,000	Certified	Satisfactory	El Dorado
CA01523	38.72	-120.56	Park, sanitation, utility, or water district	760	ERTH	Extremely High	No	1955

87.000	Small Canyon		County of San Bernardino Department of Public Works	68	20	Certified	Satisfactory	San Bernardino
CA00314	34.15	-117.20	County, county agency, or county district	245	ERTH	High	No	1957

1236.000	Smoke Creek		Jackrabbit Properties, LLC	37	960	Certified	Satisfactory	Lassen
CA00944	40.63	-120.00	Private company, corporation, LLC, partnership	1,750	ERTH	Low	No	1949

1323.000	Snowflower		Equity Lifestyle Properties	28	165	Certified	Satisfactory	Placer
CA00970	39.31	-120.59	Private company, corporation, LLC, partnership	404	ERTH	Low	No	1964

31.023	Sobranite Clearwell		East Bay Municipal Utility District	28	25	Certified	Satisfactory	Contra Costa
CA00179	37.96	-122.28	Park, sanitation, utility, or water district	1,032	ERTH	Extremely High	No	1964

636.000	Soda Lake		Granite Rock Company	44	2,631	Certified	Satisfactory	Santa Cruz
CA01094	36.91	-121.61	Private company, corporation, LLC, partnership	3,686	ERTH	Significant	No	1978

5427.000	Sonoma Hills		Private Entity	38	240	Certified	Satisfactory	Sonoma
CA01321	38.22	-122.51	Individual owner	323	ERTH	Low	No	1991

33.009	SoulaJule		Marin Municipal Water District	122	10,700	Certified	Satisfactory	Marin
CA01083	38.15	-122.78	Park, sanitation, utility, or water district	700	ERTH	High	No	1979

63.004	South Fork Diversion		South Feather Water and Power Agency	70	88	Certified	Satisfactory	Plumas
CA00270	39.65	-121.12	Water agency or authority	190	VARA	Low	No	1961

238.003	Spaulding		R.C. Roberts Ranches, LLC	28	147	Certified	Satisfactory	Lassen
CA00952	40.92	-120.28	Private company, corporation, LLC, partnership	930	ERTH	Low	No	1954

2014.002	Spenser Lake		Town of Hillsborough	87	73	Certified	Satisfactory	San Mateo
CA00673	37.57	-122.38	City, city agency, or city district	400	ERTH	Significant	No	1876

2228.000	Spoonier		Private Entity	17	3,123	Certified	Satisfactory	Lassen
CA00957	41.01	-120.63	Individual owner	450	ERTH	Low	No	1906

1682.000	Spring		Yosemite Lakes Owners Association	41	152	Certified	Satisfactory	Madera
CA00708	37.18	-119.77	Associations	335	ERTH	Significant	No	1971

Jurisdictional Dams

Listed Alphabetically by Dam Name

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National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

396.000	Spring Valley		County of Lake	37	325	Certified	Satisfactory	Lake
CA00571	39.07	-122.59	County, county agency, or county district	300	ERTH	Significant	No	1968

1321.000	Spring Valley Ranch		Spring Valley Dam Homeowner's Association	39	60	Certified	Satisfactory	Placer
CA00968	39.10	-120.97	Associations	350	ERTH	High	No	1958

16.002	St. Helena Lower		City of Saint Helena	44	210	Certified	Fair	Napa
CA00148	38.51	-122.49	City, city agency, or city district	856	ERTH	High	Yes	1878

10.013	Stanford Heights		City and County of San Francisco	31	37	Certified	Satisfactory	San Francisco
CA00130	37.74	-122.45	City, city agency, or city district	1,480	ERTH	Extremely High	No	1928

97.083	Stanislaus Forebay		Pacific Gas and Electric Company	60	320	Certified	Satisfactory	Tuolumne
CA00391	38.15	-120.36	Private company, corporation, LLC, partnership	1,000	ERTH	Significant	No	1908

854.002	Stanley A Mahr Reservoir		Vallecitos Water District	79	166	Certified	Satisfactory	San Diego
CA01280	33.09	-117.22	Park, sanitation, utility, or water district	950	ERTH	High	No	1981

1.086	Steamboat Lake		California Department of Fish and Wildlife	22	2,700	Certified	Satisfactory	Siskiyou
CA00499	41.69	-122.47	State agency	655	ERTH	Significant	No	1968

350.000	Steidlmayer #3		Moon Bend West Butte, Inc.	49	82	Certified	Satisfactory	Sutter
CA01216	39.23	-121.83	Private company, corporation, LLC, partnership	600	ERTH	Low	No	1961

1498.000	Stevenot		Sutton Enterprises	70	150	Certified	Satisfactory	Calaveras
CA01301	38.03	-120.50	Private company, corporation, LLC, partnership	419	ERTH	Significant	No	1987

72.007	Stevens Creek		Santa Clara Valley Water District	132	3,800	Certified	Satisfactory	Santa Clara
CA00292	37.30	-122.08	Park, sanitation, utility, or water district	1,080	ERTH	Extremely High	No	1935

32.041	Stevenson Ranch		Los Angeles County Department Of Public Works	54	105	Certified	Satisfactory	Los Angeles
CA01469	34.38	-118.58	County, county agency, or county district	280	ERTH	High	No	2004

86.009	Stewart Canyon Debris Basin		Ventura County Watershed Protection District	34	67	Certified	Satisfactory	Ventura
CA01159	34.46	-119.25	County, county agency, or county district	1,263	ERTH	High	No	1963

696.000	Stinson Weir		Stinson Canal and Irrigation Company	14	50	Certified	Satisfactory	Fresno
CA00710	36.46	-119.99	Private company, corporation, LLC, partnership	256	FLBT	Low	No	1910

672.000	Stockton Creek		Mariposa Public Utility District	95	368	Certified	Satisfactory	Mariposa
CA00699	37.50	-119.96	Park, sanitation, utility, or water district	330	ERTH	High	No	1950

Jurisdictional Dams

Listed Alphabetically by Dam Name

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

6.025	Stone Canyon		City of Los Angeles Department of Water And Power	188	10,372	Certified	Satisfactory	Los Angeles
CA00083	34.11	-118.46	City, city agency, or city district	1,150	ERTH	Extremely High	No	1924

2005.000	Stony Creek Gravel		Glenn Colusa Irrigation District	10	100	Certified/Inop	Satisfactory	Glenn
CA01127	39.71	-122.01	Park, sanitation, utility, or water district	400	ERTH	Low	No	1906

32.033	Stough Debris Basin		Los Angeles County Department Of Public Works	46	67	Certified	Satisfactory	Los Angeles
CA01160	34.20	-118.30	County, county agency, or county district	567	ERTH	High	No	1961

3462.000	Straza		Private Entity	62	185	Certified	Satisfactory	El Dorado
CA01064	38.83	-120.98	Individual owner	365	ERTH	Low	No	1971

2045.000	Sugar Pine		Foresthill Public Utility District	251	6,916	Certified	Satisfactory	Placer
CA01527	39.13	-120.80	Park, sanitation, utility, or water district	587	ERTH	High	No	1981

1012.007	Sulphur Creek		County of Orange	42	520	Certified	Satisfactory	Orange
CA00873	33.55	-117.71	County, county agency, or county district	485	ERTH	High	No	1966

10.028	Summit Reservoir		City and County of San Francisco	39	43	Not Certified	Fair	San Francisco
CA10373	37.76	-122.45	City, city agency, or city district	2,131	ERTH	Extremely High	No	

14.007	Summit Reservoir		City of Vallejo	124	220	Certified	Satisfactory	Solano
CA00146	38.15	-122.23	City, city agency, or city district	900	ERTH	Extremely High	No	1968

4465.000	Sun Ridge Meadow		Sun Ridge Meadow Owners Association	18	83	Certified	Satisfactory	El Dorado
CA01369	38.58	-120.98	Associations	1,000	ERTH	Low	No	1990

1261.000	Sunflower		Private Entity	50	420	Certified	Satisfactory	Tehama
CA01116	40.07	-122.59	Individual owner	720	ERTH	High	No	1976

1811.000	Sunnymead Ranch		Sunnymead Ranch Planned Community Association	41	400	Certified	Satisfactory	Riverside
CA01237	33.97	-117.25	Associations	780	ERTH	High	No	1985

10.023	Sunset North Basin		City and County of San Francisco	74	275	Certified	Satisfactory	San Francisco
CA00134	37.75	-122.48	City, city agency, or city district	2,300	ERTH	Extremely High	No	1938

10.025	Sunset South Basin		City and County of San Francisco	34	268	Certified	Satisfactory	San Francisco
CA00136	37.75	-122.49	City, city agency, or city district	980	ERTH	Extremely High	No	1960

8.010	Sutherland		City of San Diego	162	29,000	Certified	Satisfactory	San Diego
CA00114	33.12	-116.79	City, city agency, or city district	1,020	MULA	Extremely High	No	1954

Jurisdictional Dams

Listed Alphabetically by Dam Name

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

10.024	Sutro Reservoir		City and County of San Francisco	55	96	Certified	Satisfactory	San Francisco
CA00135	37.75	-122.46	City, city agency, or city district	850	ERTH	Extremely High	No	1952

1.018	Suttenfield		Sonoma Developmental Center	76	600	Certified	Satisfactory	Sonoma
CA00010	38.35	-122.52	State agency	965	ERTH	Extremely High	No	1938

1002.009	SVCSD Reclamation Pond 1		Sonoma County Water Agency	17	166	Certified	Satisfactory	Sonoma
CA01407	38.22	-122.39	County, county agency, or county district	3,437	ERTH	Significant	No	1990

1002.010	SVCSD Reclamation Pond 2		Sonoma County Water Agency	19	187	Certified	Satisfactory	Sonoma
CA01408	38.22	-122.38	County, county agency, or county district	3,150	ERTH	Significant	No	1990

1301.000	Swan		Lakewood Association	59	550	Certified	Satisfactory	Nevada
CA00965	39.14	-121.14	Associations	515	ERTH	Significant	No	1967

14.005	Swanzy Lake		City of Vallejo	86	107	Certified	Satisfactory	Solano
CA00144	38.08	-122.23	City, city agency, or city district	375	ERTH	Extremely High	No	1931

2020.000	Sweetwater Main		Sweetwater Authority	112	27,689	Certified	Fair	San Diego
CA00775	32.69	-117.01	Water agency or authority	700	GRAV	Extremely High	No	1888

1257.000	Sworinger		Private Entity	35	4,050	Certified	Satisfactory	Lassen
CA00962	41.18	-120.10	Individual owner	1,055	ERTH	High	No	1961

112.000	S-X		D.S.L.R., LLC	45	4,225	Certified	Satisfactory	Modoc
CA00461	41.51	-120.75	Private company, corporation, LLC, partnership	650	ERTH	Low	No	1917

1003.005	Sycamore		Riverside County Flood Control and Water Conservation District	63	860	Certified	Satisfactory	Riverside
CA00800	33.95	-117.34	County, county agency, or county district	620	ERTH	High	No	1956

86.006	Sycamore Canyon		Ventura County Watershed Protection District	40	890	Certified	Satisfactory	Ventura
CA01266	34.25	-118.80	County, county agency, or county district	1,520	ERTH	High	No	1981

1029.004	Syphon Canyon		Irvine Ranch Water District	59	578	Certified	Satisfactory	Orange
CA00749	33.71	-117.73	Park, sanitation, utility, or water district	843	ERTH	High	No	1949

Jurisdictional Dams

Listed Alphabetically by Dam Name

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

1003.013	Tahchevah		Riverside County Flood Control and Water Conservation District	42	650	Certified	Satisfactory	Riverside
CA01170	33.83	-116.56	County, county agency, or county district	3,600	ERTH	High	No	1964

1003.012	Tahquitz Creek Debris		Riverside County Flood Control and Water Conservation District	32	75	Certified	Satisfactory	Riverside
CA01242	33.81	-116.55	County, county agency, or county district	1,697	ERTH	High	No	1991

7000.139	Tallac		Wooldridge and Jarvis	11	176	Not Certified	Fair	El Dorado
CA10376	38.93	-120.01	Private company, corporation, LLC, partnership	85	GRAV	Low	No	

513.005	Tamarac Lake		Alpine Land and Reservoir Company	21	400	Certified	Satisfactory	Alpine
CA00637	38.61	-119.90	Private company, corporation, LLC, partnership	165	ERRK	Low	No	1905

1490.000	Tanner		Lake Mont Pines Homeowners	35	124	Certified	Satisfactory	Calaveras
CA01002	38.23	-120.38	Associations	335	ERTH	Significant	No	1959

114.000	Taylor Creek No. 1		Private Entity	34	1,500	Certified	Satisfactory	Modoc
CA00463	41.23	-121.19	Individual owner	1,000	ERTH	Significant	No	1952

288.000	Taylor Lake		Nature Conservancy	14	380	Certified	Satisfactory	Plumas
CA00533	40.15	-120.72	Private company, corporation, LLC, partnership	170	ERTH	Significant	No	1929

734.000	Tejon Storage 1		Tejon Ranch Company	32	700	Certified	Satisfactory	Kern
CA00718	34.99	-118.83	Private company, corporation, LLC, partnership	580	ERTH	Low	No	1946

734.002	Tejon Storage 2		Tejon Ranch Company	67	860	Certified	Satisfactory	Kern
CA00729	35.02	-118.72	Private company, corporation, LLC, partnership	1,100	ERTH	Low	No	1956

29.000	Temescal, Lake		East Bay Regional Park District	116	200	Certified	Satisfactory	Alameda
CA00160	37.85	-122.23	Park, sanitation, utility, or water district	650	ERTH	High	No	1869

1055.002	Terminal		San Luis Obispo County Flood Control and Water Conservation Di	53	844	Certified	Satisfactory	San Luis Obispo
CA00888	35.17	-120.53	County, county agency, or county district	550	ERTH	Extremely High	No	1969

2422.000	The Hill Ranch		Private Entity	49	160	Certified	Satisfactory	Sonoma
CA01273	38.44	-122.59	Individual owner	202	ERTH	High	No	1955

1.055	Thermalito Afterbay		California Department of Water Resources	38	57,041	Certified	Satisfactory	Butte
CA00042	39.51	-121.68	State agency	42,000	ERTH	Extremely High	No	1967

1.049	Thermalito Diversion		California Department of Water Resources	128	13,328	Certified	Satisfactory	Butte
CA00036	39.53	-121.55	State agency	1,300	GRAV	High	No	1967

Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018

Page
91 of 101

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

1.054	Thermalito Forebay		California Department of Water Resources	75	11,768	Certified	Satisfactory	Butte
CA00041	39.52	-121.63	State agency	15,900	ERTH	High	No	1967

171.000	Thomas Briles		Modoc Ranch Properties, LLC.	23	209	Certified	Satisfactory	Modoc
CA00490	41.77	-120.35	Private company, corporation, LLC, partnership	345	ERTH	High	No	1910

104.027	Thompson		Southern California Edison	114	1,010	Certified	Satisfactory	Los Angeles
CA00445	33.36	-118.44	Private company, corporation, LLC, partnership	445	ERTH	High	No	1925

32.015	Thompson Creek		Los Angeles County Department Of Public Works	66	543	Certified	Satisfactory	Los Angeles
CA00198	34.14	-117.71	County, county agency, or county district	1,500	ERTH	High	No	1928

3220.000	Thurman		Private Entity	66	140	Certified	Satisfactory	Shasta
CA01052	40.66	-121.95	Individual owner	350	ERTH	High	No	1966

97.105	Tiger Creek Afterbay		Pacific Gas and Electric Company	115	3,960	Certified	Satisfactory	Amador
CA00401	38.44	-120.51	Private company, corporation, LLC, partnership	450	VARA	Significant	No	1931

97.126	Tiger Creek Forebay		Pacific Gas and Electric Company	33	36	Certified	Satisfactory	Amador
CA00419	38.45	-120.48	Private company, corporation, LLC, partnership	900	ERTH	Low	No	1931

97.104	Tiger Creek Regulator		Pacific Gas and Electric Company	112	523	Certified	Satisfactory	Amador
CA00400	38.48	-120.45	Private company, corporation, LLC, partnership	470	SLBT	Significant	No	1931

6.026	Tinemaha		City of Los Angeles Department of Water And Power	32	16,405	Certified	Fair	Inyo
CA00084	37.06	-118.23	City, city agency, or city district	5,800	ERTH	High	Yes	1928

104.040	Tioga Lake		Southern California Edison	27	1,254	Certified	Satisfactory	Mono
CA00456	37.93	-119.25	Private company, corporation, LLC, partnership	270	ROCK	High	No	1928

1260.000	Top Cat		Paskenta Band Of Nomlaki Indians of California	26	516	Certified	Satisfactory	Tehama
CA01115	39.88	-122.22	Private company, corporation, LLC, partnership	830	ERTH	High	No	1976

70.003	Topaz Lake		Walker River Irrigation District	11	59,600	Certified	Satisfactory	Mono
CA01473	38.65	-119.50	Park, sanitation, utility, or water district	11,100	ERTH	Significant	No	1937

153.000	Toreson		Private Entity	55	1,140	Certified	Satisfactory	Modoc
CA00483	41.39	-120.82	Individual owner	315	ERTH	Significant	No	1898

421.002	Towibalya		Kendall Jackson Wine Estates, LTD	51	376	Certified	Satisfactory	Sonoma
CA00589	38.62	-122.66	Private company, corporation, LLC, partnership	525	ERTH	High	No	1962

Jurisdictional Dams

Listed Alphabetically by Dam Name

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

2030.002	Trabuco		Trabuco Canyon Water District	108	138	Certified	Satisfactory	Orange
CA01241	33.64	-117.56	Park, sanitation, utility, or water district	620	ERTH	High	No	1984

1012.008	Trabuco Retarding Basin		County of Orange	18	390	Certified	Satisfactory	Orange
CA01399	33.70	-117.76	County, county agency, or county district	2,250	ERTH	High	No	1996

2013.004	Trampas Canyon		Santa Margarita Water District	183	5,700	Certified	Satisfactory	Orange
CA01123	33.50	-117.58	Park, sanitation, utility, or water district	1,300	ERTH	Extremely High	No	1975

3223.000	Treatment Ponds		Private Entity	16	450	Certified	Satisfactory	Shasta
CA01143	40.44	-122.26	Individual owner	6,000	ERTH	High	No	1975

1.087	Trout Lake		California Department of Fish and Wildlife	40	2,108	Certified	Satisfactory	Siskiyou
CA00500	41.69	-122.48	State agency	650	ERTH	Significant	No	1960

2221.000	Truett		Woodridge Mutual Water and Property Owners Corporation	31	219	Certified	Satisfactory	Shasta
CA01028	40.49	-121.90	Private company, corporation, LLC, partnership	570	ERTH	High	No	1958

1249.004	Tule Lake		John Hancock Mutual Insurance Company	16	39,500	Certified	Satisfactory	Lassen
CA00956	41.08	-120.36	Private company, corporation, LLC, partnership	1,100	ERTH	High	No	1904

62.006	Tulloch		Tri-Dam Project	205	68,400	Certified	Satisfactory	Calaveras
CA00265	37.88	-120.61	Water agency or authority	1,860	GRAV	Extremely High	No	1958

558.000	Tuolumne Log Pond		The Tuolumne Band of Me-Wuk Indians	22	120	Certified	Fair	Tuolumne
CA00653	37.96	-120.24	Private company, corporation, LLC, partnership	450	GRAV	Significant	Yes	1912

4419.000	Turkey Ranch		The Hess Collection Winery	35	240	Certified	Satisfactory	Napa
CA01367	38.63	-122.45	Private company, corporation, LLC, partnership	3,035	ERTH	Significant	No	1999

68.003	Turlock Lake		Turlock Irrigation District	36	63,406	Certified	Satisfactory	Stanislaus
CA00279	37.61	-120.59	Park, sanitation, utility, or water district	196	HYDF	High	No	1915

1074.000	Turner		Valley Center Municipal Water District	111	2,000	Certified	Satisfactory	San Diego
CA00905	33.22	-117.08	Park, sanitation, utility, or water district	700	ERTH	High	No	1971

551.000	Twain Harte		Twain Harte Lake Association, Inc.	36	143	Certified	Satisfactory	Tuolumne
CA00649	38.03	-120.24	Associations	325	MULA	Significant	No	1928

97.069	Twin Lakes		Pacific Gas and Electric Company	22	1,300	Certified	Satisfactory	Alpine
CA00384	38.61	-119.94	Private company, corporation, LLC, partnership	1,260	ERRK	Significant	No	1901



Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018
Page
93 of 101



Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

108.002	Union		Northern California Power Agency	36	2,000	Certified	Satisfactory	Alpine
CA00426	38.43	-120.00	Water agency or authority	1,142	ROCK	Significant	No	1902

1009.003	Union Valley		Sacramento Municipal Utility District	453	271,000	Certified	Satisfactory	El Dorado
CA00816	38.87	-120.44	Park, sanitation, utility, or water district	1,800	ERRK	Extremely High	No	1963

10.015	University Mound North Basin		City and County of San Francisco	17	182	Certified	Satisfactory	San Francisco
CA00131	37.73	-122.41	City, city agency, or city district	2,422	ERTH	Extremely High	No	1885

10.022	University Mound South Basin		City and County of San Francisco	61	250	Certified	Satisfactory	San Francisco
CA00133	37.72	-122.41	City, city agency, or city district	1,150	ERTH	Extremely High	No	1937

1805.000	Upland Basin		City of Upland	20	362	Certified	Satisfactory	San Bernardino
CA01502	34.10	-117.70	City, city agency, or city district	2,275	ERTH	High	No	2008

842.000	Upper 4S Ranch		4S Ranch Master Association	28	48	Certified	Satisfactory	San Diego
CA00779	33.00	-117.10	Associations	246	CORA	Low	No	1927

97.070	Upper Blue Lake		Pacific Gas and Electric Company	31	7,576	Certified	Fair	Alpine
CA00385	38.63	-119.94	Private company, corporation, LLC, partnership	790	ERRK	Significant	Yes	1901

2013.003	Upper Chiquita		Santa Margarita Water District	177	754	Certified	Satisfactory	Orange
CA01553	33.59	-117.62	Park, sanitation, utility, or water district	965	ERTH	Extremely High	No	2012

4222.000	Upper Elder		Private Entity	26	202	Certified	Satisfactory	Shasta
CA01338	40.98	-121.87	Individual owner	180	ERTH	Low	No	

97.045	Upper Feeley Lake		Pacific Gas and Electric Company	23	780	Certified	Satisfactory	Nevada
CA00370	39.40	-120.64	Private company, corporation, LLC, partnership	186	ERRK	Low	No	1870

6.042	Upper Gorge		City of Los Angeles Department of Water And Power	44	26	Certified	Satisfactory	Mono
CA00095	37.55	-118.59	City, city agency, or city district	37	GRAV	Low	No	1953

6.029	Upper Hollywood		City of Los Angeles Department of Water And Power	87	196	Certified	Satisfactory	Los Angeles
CA00087	34.12	-118.34	City, city agency, or city district	368	ERTH	Low	No	1933

622.003	Upper Howell		San Jose Water Company	36	243	Certified	Satisfactory	Santa Clara
CA00678	37.19	-122.02	Water agency or authority	640	ERTH	Significant	No	1878

513.006	Upper Kinney Lake		Alpine Land and Reservoir Company	26	328	Certified	Satisfactory	Alpine
CA00638	38.56	-119.83	Private company, corporation, LLC, partnership	145	ERTH	Low	No	

Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018
Page
94 of 101

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

104.020	Upper Monarch Lake		Southern California Edison	22	314	Certified	Satisfactory	Tulare
CA00439	36.45	-118.56	Private company, corporation, LLC, partnership	263	GRAV	Low	No	1905

2013.000	Upper Oso		Santa Margarita Water District	142	3,700	Certified	Satisfactory	Orange
CA01145	33.66	-117.63	Park, sanitation, utility, or water district	800	ERTH	Extremely High	No	1979

8.008	Upper Otay		City of San Diego	78	2,825	Certified	Satisfactory	San Diego
CA00112	32.65	-116.93	City, city agency, or city district	283	CORA	Low	No	1901

161.002	Upper Pasture		Wilson Ranches	15	250	Certified	Satisfactory	Modoc
CA00488	41.43	-120.47	Private company, corporation, LLC, partnership	1,100	ERTH	Significant	No	

97.047	Upper Peak Lake		Pacific Gas and Electric Company	37	2,112	Certified	Satisfactory	Placer
CA00371	39.30	-120.44	Private company, corporation, LLC, partnership	290	ERRK	Significant	No	1850

97.048	Upper Rock Lake		Pacific Gas and Electric Company	20	207	Certified	Satisfactory	Nevada
CA00372	39.43	-120.62	Private company, corporation, LLC, partnership	230	ERRK	Low	No	1855

6.028	Upper San Fernando		City of Los Angeles Department of Water And Power	82	1,848	Certified	Satisfactory	Los Angeles
CA00086	34.30	-118.49	City, city agency, or city district	1,740	HYDF	Low	No	1921

1007.009	Upper Sand Creek Detention Basin		Contra Costa County Flood Control and Water Conservation Distri	40	895	Certified	Satisfactory	Contra Costa
CA01555	37.95	-121.76	County, county agency, or county district	1,400	ERTH	High	No	2014

7000.138	Upper Settling Basin		Stevens Creek Quarry, Inc.	58	40	Not Certified	Fair	Santa Clara
CA10372	37.30	-122.09	Private company, corporation, LLC, partnership	120	ERTH	Low	No	

869.000	Upper Stehly		Private Entity	29	229	Certified	Satisfactory	San Diego
CA01254	33.31	-117.06	Individual owner	420	ERTH	High	No	1999

6.044	Upper Stone Canyon		City of Los Angeles Department of Water And Power	111	425	Certified	Satisfactory	Los Angeles
CA00097	34.12	-118.46	City, city agency, or city district	740	ERTH	Low	No	1954

513.007	Upper Sunset Lake		Alpine Land and Reservoir Company	22	200	Certified	Satisfactory	Alpine
CA00639	38.61	-119.88	Private company, corporation, LLC, partnership	70	ERTH	Low	No	1904

531.000	Upper Twin Lake		Centennial Livestock	14	2,070	Certified	Fair	Mono
CA00643	38.15	-119.35	Private company, corporation, LLC, partnership	160	ERRK	High	No	1905

3414.006	Upper Twin Lake		Juliana Mutual Water Company	19	63	Certified	Fair	Napa
CA01294	38.65	-122.42	Private company, corporation, LLC, partnership	350	ERTH	Low	No	1987

Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018

Page
95 of 101

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

1686.000	Upper Wilcox		C.B.S. Development Corporation	48	200	Certified	Satisfactory	Madera
CA01450	37.23	-119.68	Private company, corporation, LLC, partnership	840	ERTH	Significant	No	1930

2413.002	Usibelli No 2		Usibelli Coal Mine, Inc.	26	900	Certified	Satisfactory	Napa
CA01140	38.60	-122.39	Private company, corporation, LLC, partnership	3,600	ERTH	High	No	1973

108.003	Utica		Northern California Power Agency	59	2,400	Certified	Satisfactory	Alpine
CA00427	38.44	-120.00	Water agency or authority	308	GRAV	Significant	No	1908

72.012	Uvas		Santa Clara Valley Water District	118	10,000	Certified	Satisfactory	Santa Clara
CA00807	37.06	-121.69	Park, sanitation, utility, or water district	1,100	ERTH	Extremely High	No	1957

Count: 32



Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018
Page
96 of 101



Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

2028.000	Vail		Rancho California Water District	152	51,000	Certified	Fair	Riverside
CA00770	33.50	-116.98	Park, sanitation, utility, or water district	788	VARA	Extremely High	Yes	1949

97.102	Van Arsdale		Pacific Gas and Electric Company	96	700	Certified	Satisfactory	Mendocino
CA00399	39.39	-123.12	Private company, corporation, LLC, partnership	515	GRAV	Significant	No	1907

456.000	Van Vleck		Van Vleck Ranch	26	2,000	Certified	Satisfactory	Sacramento
CA00602	38.47	-121.06	Private company, corporation, LLC, partnership	4,100	ERTH	Significant	No	1950

72.006	Vasona Percolating		Santa Clara Valley Water District	34	410	Certified	Satisfactory	Santa Clara
CA00291	37.25	-121.96	Park, sanitation, utility, or water district	1,000	ERTH	Extremely High	No	1935

5412.000	Veeder Hills Dam		The Hess Collection Winery	54	24	Not Certified	Fair	Napa
CA01516	38.34	-122.38	Private company, corporation, LLC, partnership	350	ERTH	Significant	No	

796.000	Veeh		Lake Hills Community Church	37	185	Certified	Satisfactory	Orange
CA00750	33.63	-117.73	Private company, corporation, LLC, partnership	417	ERTH	High	No	1936

104.023	Vermilion Valley		Southern California Edison	167	125,000	Certified	Satisfactory	Fresno
CA00441	37.37	-119.00	Private company, corporation, LLC, partnership	4,234	ERTH	Extremely High	No	1954

1.014	Veterans Home		California Department of Veteran Affairs	47	39	Certified	Fair	Napa
CA00008	38.39	-122.38	State agency	320	ERTH	High	No	1908

487.000	Vicini		Private Entity	19	150	Certified	Satisfactory	Amador
CA01093	38.47	-120.94	Individual owner	1,550	ERTH	Low	No	1980

1012.000	Villa Park		County of Orange	118	15,600	Certified	Satisfactory	Orange
CA00829	33.82	-117.76	County, county agency, or county district	1,475	ERTH	Extremely High	No	1963

3422.000	Vineyard Subdivision		The Vineyards Club, Inc.	26	245	Certified	Satisfactory	Sonoma
CA01058	38.75	-122.92	Private company, corporation, LLC, partnership	1,660	ERTH	Significant	No	1962

1021.000	Virginia Ranch		Browns Valley Irrigation District	152	57,000	Certified	Satisfactory	Yuba
CA00842	39.32	-121.32	Park, sanitation, utility, or water district	2,700	ERTH	High	No	1963

1584.000	Vista Del Mar Detention Basin		Alves Ranch, LLC	42	33	Certified	Satisfactory	Contra Costa
CA01489	38.02	-121.96	Private company, corporation, LLC, partnership	552	ERTH	High	No	2011

1468.000	Volo Mining Company		Private Entity	35	148	Certified	Satisfactory	El Dorado
CA01001	38.71	-120.88	Individual owner	335	ERTH	High	No	1958



Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018
Page
97 of 101



Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

430.000	Vonsen		Private Entity	35	70	Certified	Satisfactory	Marin
CA00592	38.18	-122.68	Individual owner	402	ERTH	Significant	No	1951

Count: 15

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

434.000	Walker Creek		Marin County Office of Education	25	66	Certified	Satisfactory	Marin
CA01221	38.17	-122.82	County, county agency, or county district	430	ERTH	Significant	No	1976

6.035	Walker Lake		City of Los Angeles Department of Water And Power	12	540	Certified	Satisfactory	Mono
CA00091	37.88	-119.16	City, city agency, or city district	310	ERTH	Low	No	

499.000	Wallace		Wallace Community Services District Operations and Maintenance	29	410	Certified	Satisfactory	Calaveras
CA01314	38.19	-120.97	Park, sanitation, utility, or water district	700	ERTH	Significant	No	

1037.000	Walnut Canyon		City of Anaheim	187	2,570	Certified	Satisfactory	Orange
CA00869	33.84	-117.75	City, city agency, or city district	930	ERTH	Extremely High	No	1968

1020.000	Ward Creek		Alameda County Public Works Agency	71	130	Certified	Satisfactory	Alameda
CA00839	37.67	-122.07	County, county agency, or county district	190	ERTH	High	No	1963

227.002	Ward Lake		R. and H. Leasing	23	350	Certified/Inop	Satisfactory	Lassen
CA00508	40.41	-120.44	Private company, corporation, LLC, partnership	800	ERTH	Low	No	1889

2022.000	Wastewater Storage		City of Colfax	75	212	Certified	Satisfactory	Placer
CA01137	39.08	-120.94	City, city agency, or city district	385	ERTH	Low	No	1978

53.000	Weber		El Dorado Irrigation District	92	1,100	Certified	Satisfactory	El Dorado
CA00228	38.72	-120.69	Park, sanitation, utility, or water district	374	MULA	High	No	1924

1024.002	West Point Regulating		Calaveras County Water District	36	60	Certified	Satisfactory	Calaveras
CA00846	38.41	-120.51	County, county agency, or county district	550	ERTH	Significant	No	1965

78.000	West Valley		South Fork Irrigation District	65	23,000	Certified	Satisfactory	Modoc
CA00300	41.22	-120.41	Park, sanitation, utility, or water district	305	ERRK	High	No	1936

1073.000	Westlake Reservoir		Las Virgenes Municipal Water District	158	9,200	Certified	Satisfactory	Los Angeles
CA00904	34.13	-118.83	Park, sanitation, utility, or water district	1,400	ERTH	Extremely High	No	1972

513.008	Wet Meadows		Alpine Land and Reservoir Company	28	450	Certified	Satisfactory	Alpine
CA00640	38.61	-119.87	Private company, corporation, LLC, partnership	500	ERTH	Low	No	

35.011	Weymouth Memorial Reservoir		Metropolitan Water District Of Southern California	18	151	Certified	Satisfactory	Los Angeles
CA00222	34.11	-117.78	Park, sanitation, utility, or water district	2,400	RECT	High	No	1966

1.040	Whale Rock		Whale Rock Commission	193	40,662	Certified	Satisfactory	San Luis Obispo
CA00029	35.45	-120.89	Water agency or authority	850	ERTH	Extremely High	No	1960

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

1671.000	Whispering Oaks		Whispering Oaks West Homeowner's Association	31	69	Certified	Satisfactory	Mariposa
CA01346	37.47	-120.11	Associations	250	GRAV	Low	No	1968

1129.002	White		Private Entity	16	290	Certified	Satisfactory	Modoc
CA00482	41.37	-120.78	Individual owner	400	ERTH	Low	No	1918

1024.004	White Pines		Calaveras County Water District	35	262	Certified	Satisfactory	Calaveras
CA01005	38.27	-120.34	County, county agency, or county district	650	ERTH	Low	No	1970

97.049	White Rock Lake		Pacific Gas and Electric Company	16	578	Certified	Satisfactory	Nevada
CA00373	39.42	-120.39	Private company, corporation, LLC, partnership	285	ERRK	Low	No	1850

18.002	Whittier Res No 4		City of Whittier Water District	55	32	Certified/Inop	Satisfactory	Los Angeles
CA00153	34.00	-118.05	City, city agency, or city district	190	ERTH	Low	No	1931

1003.008	Wide Canyon		Riverside County Flood Control and Water Conservation District	84	1,490	Certified	Satisfactory	Riverside
CA00803	33.94	-116.40	County, county agency, or county district	2,225	ERTH	High	No	1968

419.000	William, Lake		Private Entity	66	340	Certified	Satisfactory	Napa
CA00586	38.36	-122.22	Individual owner	575	ERTH	High	No	1960

622.004	Williams		San Jose Water Company	69	160	Certified	Satisfactory	Santa Clara
CA00679	37.12	-121.91	Water agency or authority	87	GRAV	Low	No	1895

1381.000	Williams Valley		Private Entity	47	200	Certified	Satisfactory	Mendocino
CA00973	39.84	-123.18	Individual owner	243	ERTH	Low	No	1965

464.000	Williamson No 1		Private Entity	42	117	Certified	Poor	El Dorado
CA00608	38.76	-120.94	Individual owner	240	ERTH	Significant	Yes	1926

453.002	Willow Hill Reservoir		City of Folsom	24	125	Certified	Fair	Sacramento
CA00600	38.65	-121.16	City, city agency, or city district	240	ERTH	Extremely High	No	

3419.002	Willow Lake #1		C. Mondavi and Son, Inc.	40	89	Certified	Satisfactory	Napa
CA01463	38.28	-122.34	Private company, corporation, LLC, partnership	750	ERTH	Significant	No	2004

32.035	Wilson Debris Basin		Los Angeles County Department Of Public Works	50	84	Certified	Satisfactory	Los Angeles
CA01162	34.33	-118.45	County, county agency, or county district	666	ERTH	High	No	1961

2321.000	Winchester		Winchester R.E.O., LLC	39	58	Certified	Satisfactory	Placer
CA01418	38.98	-121.04	Private company, corporation, LLC, partnership	400	ERTH	Significant	No	1999

Jurisdictional Dams

Listed Alphabetically by Dam Name

Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

1412.000	Wine Lake		Private Entity	29	310	Certified	Satisfactory	Napa
CA00981	38.26	-122.35	Individual owner	620	ERTH	Significant	No	1953

97.118	Wishon		Pacific Gas and Electric Company	265	118,000	Certified	Satisfactory	Fresno
CA00411	37.01	-118.97	Private company, corporation, LLC, partnership	3,328	ROCK	Extremely High	No	1958

834.000	Wohlford, Lake		City of Escondido	100	6,950	Certified	Fair	San Diego
CA00772	33.17	-117.00	City, city agency, or city district	422	HYDF	Extremely High	Yes	1924

1027.000	Wood Ranch		Calleguas Municipal Water District	146	11,000	Certified	Satisfactory	Ventura
CA00850	34.24	-118.82	Park, sanitation, utility, or water district	1,020	ERTH	Extremely High	No	1965

1003.000	Woodcrest		Riverside County Flood Control and Water Conservation District	44	420	Certified	Satisfactory	Riverside
CA00796	33.90	-117.38	County, county agency, or county district	900	ERTH	High	No	1954

66.000	Woodward		South San Joaquin Irrigation District	65	49,340	Certified	Satisfactory	Stanislaus
CA00276	37.86	-120.88	Park, sanitation, utility, or water district	3,100	HYDF	Extremely High	No	1918

104.026	Wrigley Reservoir		Southern California Edison	42	62	Certified	Satisfactory	Los Angeles
CA00444	33.35	-118.35	Private company, corporation, LLC, partnership	190	ERTH	High	No	1930

844.000	Wuest		Wuest Estate Company	50	280	Certified	Satisfactory	San Diego
CA00780	32.68	-116.24	Private company, corporation, LLC, partnership	350	ERTH	Low	No	1928

63.000	Wyandotte, Lake		South Feather Water and Power Agency	46	313	Certified	Satisfactory	Butte
CA00267	39.51	-121.42	Water agency or authority	900	ERTH	High	No	1924



Jurisdictional Dams

Listed Alphabetically by Dam Name

September 2018
Page
101 of 101



Dam Number	Dam Name		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Latitude	Longitude	Owner Type	Crest Length	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built

6.046	Yarnell Debris Basin		City of Los Angeles Department of Water And Power	42	78	Certified	Satisfactory	Los Angeles
CA00099	34.31	-118.49	City, city agency, or city district	1,290	ERTH	Low	No	1963

1012.003	Yorba		County of Orange	45	1,200	Certified	Satisfactory	Orange
CA00831	33.87	-117.81	County, county agency, or county district	920	HYDF	High	No	1907

360.000	York Hill		Private Entity	38	245	Certified	Satisfactory	Colusa
CA00554	39.14	-122.45	Individual owner	670	ERTH	Significant	No	1952

58.003	Yosemite, Lake		Merced Irrigation District	53	10,323	Certified	Satisfactory	Merced
CA00241	37.38	-120.44	Park, sanitation, utility, or water district	4,750	ERTH	Extremely High	No	1888

2009.000	Yucaipa No 1		San Bernardino Valley Municipal Water District	42	92	Certified	Satisfactory	San Bernardino
CA01131	34.05	-117.05	Park, sanitation, utility, or water district	420	ERTH	High	No	1978

2009.002	Yucaipa No 2		San Bernardino Valley Municipal Water District	49	100	Certified	Satisfactory	San Bernardino
CA01132	34.05	-117.05	Park, sanitation, utility, or water district	480	ERTH	High	No	1978

2009.003	Yucaipa No 3		San Bernardino Valley Municipal Water District	35	32	Certified	Satisfactory	San Bernardino
CA01133	34.06	-117.05	Park, sanitation, utility, or water district	340	ERTH	High	No	1978

Count: 7

ATTACHMENT “3”

California Division of Safety of Dams



Photo courtesy of San Diego Water Authority

The California Division of Safety of Dams (DSOD) has jurisdiction for 1,249 dams in California. The California Water Code entrusts this authority to the Department of Water Resources, which delegates the program to the Division of Safety of Dams.

DSOD inspects each dam on an annual basis to ensure the dam is safe, performing as intended, and is not developing problems. Roughly a third of these inspections include in-depth instrumentation reviews of the dam surveillance network data. DSOD periodically reviews dams and their major appurtenances as the state-of-the-art practices advance in dam safety with respect to analysis, tools, and design requirements, as well as new findings regarding earthquake hazards and hydrologic estimates in California.

DOWNSTREAM HAZARD CLASSIFICATION

The downstream hazard classification is based solely on potential for loss of life and property should the dam fail, not the condition of the dam or its critical appurtenant structures.

RESERVOIR RESTRICTIONS

DSOD may direct or order a dam owner to operate the dam's reservoir to a specified water surface elevation level that is lower than the maximum storage level. In addition, a dam owner may self-impose a restriction as a result of an owner-initiated study that identifies a dam safety issue. As a risk reduction measure, reservoir restrictions are typically imposed for deficiencies related to the dam, spillway, low-level outlet, or other appurtenances with respect to dam safety.

CONDITION ASSESSMENT

California DSOD uses the US Army Corps of Engineers' National Inventory of Dams (NID) condition rating definitions, with additional criteria, as a guideline in assigning condition assessments.

The NID database condition assessment rating definitions, with DSOD's additional criteria, are as follows:

- **SATISFACTORY** – No existing or potential dam safety deficiencies are recognized. Acceptable performance is expected under all loading conditions (static, hydrologic, seismic) in accordance with the applicable regulatory criteria or tolerable risk guidelines
- **FAIR** – No existing dam safety deficiencies are recognized for normal loading conditions. Rare or extreme hydrologic and/or seismic events may result in a dam safety deficiency. Risk may be in the range to take further action. Additional DSOD criteria can include the following:
 - Dam has a long-standing deficiency that is not being addressed in a timely manner
 - Dam is not certified and its safety is under evaluation
 - Dam is restricted and operation of the reservoir at the lower level does not mitigate the deficiency
- **POOR** – A dam safety deficiency is recognized for loading conditions that may realistically occur. (Loading conditions refer to the stress to a dam from seismic activity or major storm events.) Remedial action is necessary. A poor rating may also be used when uncertainties exist as to critical analysis parameters that identify a potential dam safety deficiency. Further investigations and studies are necessary. The DSOD also requires that a dam with multiple deficiencies or a significant deficiency that needs extensive remedial work will be rated poor.
- **UNSATISFACTORY** – A dam safety deficiency is recognized that requires immediate or emergency remedial action for problem resolution.
- **NOT RATED** – The dam has not been inspected, is not under State jurisdiction, or has been inspected but has not been rated.

FAQ

- Should the public be concerned if the dam in their community has an “Extremely High”, “High”, or “Significant” hazard potential rating?

Answer: No. The downstream hazard classification is based on the size of the reservoir and the number of people who live downstream of a dam, not the actual condition of the dam or its critical structures.

- Where can I find flood inundation maps related to dams?

Answer: Typically, local public agencies responsible for public safety, such as city or county office of emergency services, have flood inundation maps for the dam(s) for their communities.

- Who is responsible for maintenance and repair of dams?

Answer: The legal dam owner is responsible for operations, maintenance and repair of dam and its facilities, as well as for the cost. Dam owners include Federal, State and local public agencies, utilities, as well as private landowners, water and irrigation agencies.

OUR MISSION

To protect people against loss of life and property from dam failure.

The California Water Code entrusts this regulatory power to the Department of Water Resources which delegates the program to the Division of Safety of Dams.

August 2017

www.water.ca.gov/damsafety/

ATTACHMENT “4”



TORY R. WALKER ENGINEERING
RELIABLE SOLUTIONS IN WATER RESOURCES

May 15, 2019

City of Oceanside
Development Services Department, Planning Division
Attn: Robert Dmohowski
300 North Coast Hwy
Oceanside, CA 92054

Re: Henshaw Dam Breach Analyses

Dear Mr. Dmohowski:

On May 6, 2019, I spoke before the City of Oceanside Planning Commission, making the point that, should Henshaw Dam fail, the zone of inundation would be less than a 100-year storm, for which the project is designed. The purpose for this letter is to provide supporting facts of that statement.

Don Smith, PE, Water Resources Director at Vista Irrigation District (VID), stated in my conversation with him that the ultra-conservative methodology for the most current mapping was imposed by the state legislature as a reaction to the events surrounding Oroville Dam and that the subsequent mapping was not realistic. VID is the owner of the dam.

Similarly, when I spoke with the engineer who prepared the most recent dam breach inundation study (Molly Palmer, PE, an employee of Stetson Engineers), she stated that the methodology was "incredibly conservative," leading to unrealistically high results.

As I said on May 6, I have prepared seven dam breach analyses in my career; these have all been for dams under the jurisdiction of the California Department of Water Resources, Division of Safety of Dams (DSOD). I have also written a paper on how to estimate dam breach parameters, indisputably the most critical component of these studies.

Having reviewed both the most recent dam breach study (2018) and the previous study (1991), I have concluded that the 1991 study is very conservative and that the 2018 study is impossible. The laws of physics will never bend to fit human made laws. The sole purpose for both studies is to provide guidance to emergency responders in issuing evacuation orders. These studies are not intended to set policy.

The 1991 study was required to be done using conservative federal regulations, which included ignoring the presence of the Reinforced Flow Retardation Structure (FRS) constructed on the downstream face of the dam in 1981 to address seismic risk. To quote the 1991 study report,

The study is founded on an assumed dam failure which has been postulated in compliance with Federal Regulations. Since there is no rational basis for postulating that such a failure of the dam would occur, the results presented in this report must be considered virtually incredible and do not reflect in any way on the integrity of the dam, spillway, or retardation structure.



May 15, 2019

Having reviewed the 1991 report, I concur with that statement, recognizing that the breach parameters imposed on the study by a federal agency do not align with properly estimated and probabilistic breach parameters. Nevertheless, the dam breach inundation mapping from this 1991 study indicates a flow rate at the project site less than a 100-year storm flow rate. The relevance of this is that the project is designed for a 100-year storm event.

Having also reviewed the 2018 study, I can state unequivocally that the assumptions and breach parameters imposed upon that study are not within the realm of possibility. I do not state this as hyperbole, but as an engineer and scientist working with probability theory and stochastic processes for over 35 years. This is not a critique of the engineer who prepared the study, rather of recognition of the fact that figuratively speaking she was told to do this study with both hands tied behind her back. Similar to the 1991 study, the FRS was ignored, but where the 2018 study really went far afield was the imposed assumption that the entire dam and FRS would virtually evaporate in six minutes when the dam was at full capacity. The inundation mapping at the project site for this impossible event roughly corresponds to a 500-year storm event.

It is also important to note that the dam is regularly inspected by DSOD. Additionally, the dam has 13 foundation piezometers and 10 survey monuments which are regularly monitored for any slight changes. In addition to these regular inspections and monitoring, mandatory inspections occur immediately following every minor seismic event. These precautions would allow VID time to lower the level of the dam in the highly unlikely event that the dam is deemed potentially vulnerable.

In summary, all available information and my expertise as a professional engineer and subject matter expert cause me to conclude that a 100-year storm event, not a dam breach, poses the greater risk of flooding at the project site.

Best Regards,

Tory R. Walker, PE, CFM, LEED GA
Principal

ATTACHMENT “5”



May 6th - May 11th

Reinforced Flow Retardation Structure at Henshaw Dam

Dennis S. Tarnay

Federal Energy Regulatory Commission

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Reinforced Flow Retardation Structure at Henshaw Dam

Dennis S. Tarnay

Civil Engineer, Federal Energy Regulatory Commission, Washington, D.C., U.S.A.

SYNOPSIS The Henshaw Dam is a semi-hydraulic earthfill structure. The seismic studies indicated that the dam could fail by liquefaction during a strong seismic motion. To ensure the integrity of the dam, the reservoir storage was reduced, the old spillway reconstructed, and a new reinforced flow retardation structure was built immediately downstream from the existing dam.

INTRODUCTION

The Henshaw Dam is located on the San Luis Rey River in northern San Diego County, California. It is a semi-hydraulic earthfill structure 35.5 m (110 feet) high and 594.0 m (1,950 feet) long. The dam was completed in 1923 and modified in 1928. The reservoir behind the dam has a capacity of 239,200,000 m³ (194,000 acre-feet) at elevation 2,727.0 feet above m.s.l., and receives runoff from a drainage area of 525.8 km² (203 square miles). The storage is made up by retaining the flows of the San Luis Rey River and by groundwater which is pumped into the reservoir from about 25 wells located at the upper end of the reservoir. The storage is used as domestic, municipal, and agricultural water by city of Vista and by surrounding agricultural land in northwestern San Diego County.

The safety of the Henshaw Dam was officially questioned by the Division of Dam Safety of the State of California after the hydraulically filled Lower San Fernando Dam was seriously damaged by an earthquake in 1971. It was indicated that the Henshaw Dam, which has approximately the same height as the Lower San Fernando Dam, could have similar properties as the Lower San Fernando Dam and may also fail during a large earthquake. The Henshaw Dam, similarly as the Lower San Fernando Dam, is located in a region of high seismic risk. The San Jacinto fault located 32 km (20 miles) north-easterly of Henshaw Dam has been the most active in Southern California in the past 30 years. The Elsinore fault passes adjacent to the dam and branches may pass directly under the base of the dam. Investigations and review of the recorded data indicated that the Elsinore fault may create safety hazard to the dam due to fault displacement and shaking (liquefaction) of the embankment. It was also determined that the dam could not meet current standards for dynamic safety and that in the event of a large magnitude earthquake the dam could suffer partial or total failure. There is also a chance that the fault will move during the economic life of the dam. As a result, the State of California in 1973 ordered to maintain the water elevation in the reservoir at 2,665.0

feet above m.s.l., which is equivalent to about 12,330,000 m³ (10,000 acre-feet) of water, until the dam is modified and made safe for larger storage. It was agreed that the proposed modification would include: (1) permanent reduction of the reservoir storage capacity from 240,000,000 m³ (194,000 acre-feet) to 62,000,000 m³ (50,000 acre-feet), (elevation from 2,727.0 feet above m.s.l. to elevation 2,690.0 feet above m.s.l.), or to about 1/4 of its total capacity, (2) reconstruction of the existing spillway by lowering its crest elevation from 2,727.4 feet above m.s.l. to elevation 2,690.0 feet above m.s.l., and adding a new notch and chute, and (3) construction of a new reinforced flow retardation structure immediately downstream of the dam. The dam and the flow retardation structure are shown in Figure 1 and 2.

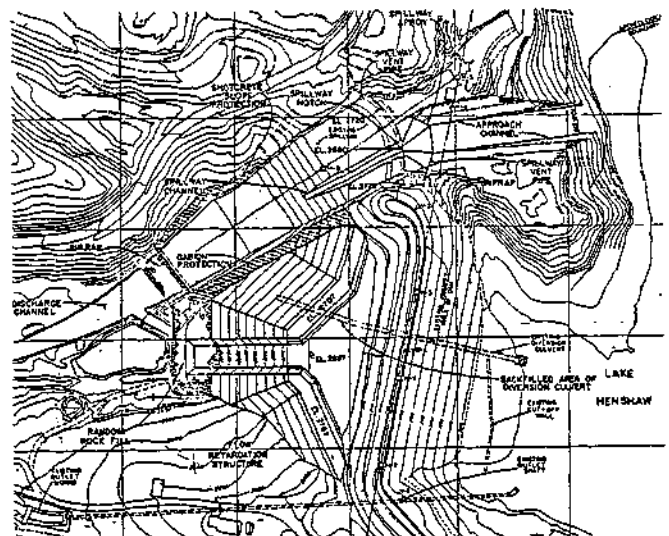


Fig. 1. Henshaw Dam - Plan

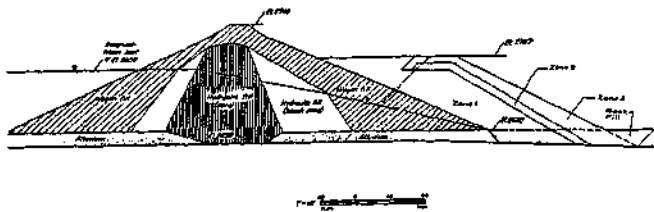


Fig. 2. Henshaw Dam - Section

GEOLOGY AND EARTHQUAKE HAZARD

The reservoir and the dam occupies part of the alluviated Warner Basin of approximately 108.0 km² (42 square miles). The basin represents a graben type structure of downdropped blocks resulting from different vertical movement along several faults. The rocks exposed and underlying the sediments of the basin are primarily granitic rocks. The bedrock in the damsite area is heavily weathered quartz diorite. Numerous pegmatites have intruded the rock, and there are several slickensided surfaces.

Several major faults were identified in the vicinity of the Henshaw Dam including the Elsinore fault on the southwest edge of the reservoir, the Agua Tibia and Aguanga faults near the north eastern edge of the Warner Basin, and the Agua Caliente, Lancaster and Hot Springs faults further to the northeast. All these faults together with other subparallel faults are collectively designated as the Elsinore fault zone which is 13 to 20 km (8 to 12 miles) wide at Lake Henshaw. The San Jacinto and San Andreas fault zones parallel the Elsinore fault zone at the distance of 35 km (22 miles) and 76 km (47 miles) respectively to the northeast. The Elsinore fault zone is one of the major faults of southern California extending from Lake Elsinore to Mexico. The potential hazards to Henshaw Dam arise from the possible effects of both strong ground motion and surface fault breaks. Ground motion could result in a major embankment failure such as that which occurred at the Lower San Fernando Dam in 1971.

The first hazard to Henshaw Dam is the possibility of a major slide into the reservoir, similar to which occurred at the Lower San Fernando Dam. The second is the possibility of piping caused by lateral or vertical movements along a fault plane cutting through Henshaw Dam.

According to Dr. J. N. Brune, professor of geophysics, University of California at La Jolla, and other experts, the Henshaw Dam is located in a region of high seismic risk. A large earthquake, which can occur very near the dam any time, could result in high ground acceleration and velocities. The granitic rocks on both sides of the fault and directly beneath the dam, can create high stresses and very efficient propagation of high frequency energy, and may cause fault slippage along a branch of the fault passing directly beneath the dam. The expected acceleration, according to Dr. Brune, could have a magnitude of 6 to 7.5 on the Richter scale.

INVESTIGATIONS

A series of geotechnical investigations were conducted to determine the geological and seismic characteristics of the region and vicinity surrounding the dam, and the material properties of the dam embankment.

The first phase of investigations included the collection and analysis of sufficient soil and geological data and seismic information to determine whether it would be necessary to carry out an extensive dynamic stability analysis of the Henshaw Dam. A soil sampling and testing program was performed to determine the characteristics of embankment materials in the dam. In addition, records from the original construction of the Henshaw Dam and subsequent modifications were collected and reviewed. Investigation of the existing dam, the foundation of the proposed flow retardation structure, the channel downstream from the spillway, and the borrow and quarry areas were conducted in several stages. The investigations included: (1) soil borings, (2) a number of laboratory tests of material from the dam, (3) a seismic refraction survey of the channel downstream of the dam, (4) test pits and bulldozer trenches in the foundation of the proposed flow retardation structure, (5) pits to define the depth of burial of the lower part of the spillway chute, and (6) borings and several laboratory tests from the vicinity of the dam.

Results of the investigations were reviewed by Dr. H. B. Seed, particularly the need for a full dynamic analysis. Subsurface investigations has confirmed that the Henshaw Dam could not meet the current safety requirements. Therefore, it was proposed not to proceed with the dynamic stability analysis of the dam, but rather continue with the investigations directed toward modifications of the Henshaw Dam.

Prior to design of the flow retardation structure, the second phase investigation went on, which included excavation of the test pits, diamond core drilling, and soil sampling. A total of 21 test pits were excavated in the foundation, the borrow and quarry areas, the lower spillway chute area, and the downstream channel. Exploration of the foundation was done by 4 angled holes to determine the extent of faulting and by 5 vertical borings in which soil sampling was done. One angle core hole was drilled in the right abutment of the dam to determine the quality of rock adjacent to the spillway, and 3 core holes were drilled in the spillway. Vertical core holes were drilled in the borrow area, in the spillway forebay, and in the quarry area located 2.4 km (1.5 miles) north of the dam. Other field and laboratory work included in-situ density test in the wagon filled material of the dam, the downstream spillway channel, and in the borrow area near the spillway. The grain size curves were developed for materials from the borrow areas, stilling basin, wagon fill and stream bed alluvium. Maximum density values were performed applying the ASTM D1557-70 method. Two types of static loading triaxial tests were performed on samples from the wagon fill, the borrow area, and the stilling basin: (1) the consolidated-drained tests with volume change measurements, and (2) the consolidated-undrained tests with pore pressure measurements.

In addition to exploration and testing, several special studies have been conducted which are directly or indirectly related to geotechnical aspects of the project. These included: (1) a study of faulting in the vicinity of the dam, (2) a report on the seismic hazard at the dam by Dr. J. N. Brune, (3) an environmental impact report which included certain considerations affecting geotechnical design, and (4) a surface mapping of the Elsinore fault zone in the vicinity of the dam by the California Division of Mines and Geology (CDMG).

On the basis of geomorphic evidence, the CDMG has dated the recency of movement on most of the fault traces at the vicinity of Lake Henshaw as Holocene age (last 11,000 years). For this reason, the segment of the fault zone near Lake Henshaw was termed as "active", and the area adjacent to the fault traces designated as a Special Study Zone in accordance with the Geologic Hazard Zones Act.

FLOW RETARDATION STRUCTURE

The new flow retardation structure is a zoned earth and rock embankment built immediately downstream of the old dam, overlying the wagon fill which forms the downstream slope of the old dam. It is a 30 m (100 feet) high and 180 m (600 feet) long stabilizing structure which, it is believed, would prevent loss of the reservoir in case that the Henshaw Dam fail during a major earthquake. The primary function of the flow retardation structure is: (1) to retain reservoir water in the event of failure of the Henshaw Dam by an earthquake, (2) to prevent catastrophic discharge of water downstream, (3) to provide added stability to the downstream slope of the old dam, and (4) to ensure resistance to, and control of piping in the old dam in the event of fault displacement. In the middle of the flow retardation structure there is a 3 m (10 feet) deep and 15 m (50 feet) wide channel armored with reinforced rockfill. In the event of a failure of the old embankment during an earthquake when the reservoir is full (62,000,000 m³ or 50,000 acre feet), this channel will safely release the water from the reservoir and prevent catastrophic flooding downstream.

Similar concept of flow through reinforced rockfill has been implemented in rockfill structures in Australia, Mexico, South Africa, and California with very good results. The structures have performed successfully also when subjected to throughflow of water during floods which have overtopped the partially completed dams.

The principal material zones in the flow retardation structure are:

- Zone 1. Random (supplementary) fill, consisting of sand, silty sands and gravelly sands filled up to elevation 2,680.0 feet above m.s.l. It would accommodate fault movement in the foundation. Total volume approximately 50,000 m³ (65,000 cubic yards).
- Zone 2. Transition zone, consisting of well graded coarse sand and gravel, filled up to elevation 2,690.0 above m.s.l.

This is the so called "self-healing" zone capable of preventing piping in case of fault offsetting. Total volume approximately 35,000 m³ (45,000 cubic yards).

- Zone 3. Rockfill with 2.5 cm (1 inch) minimum size. It is reinforced to make it stable against throughflow and overflow of water as well as deep and shallow sliding. Total volume approximately 46,000 m³ (60,000 cubic yards).

The schematic plan and sections of the flow retardation structure are shown in Figure 3, 4 and 5.

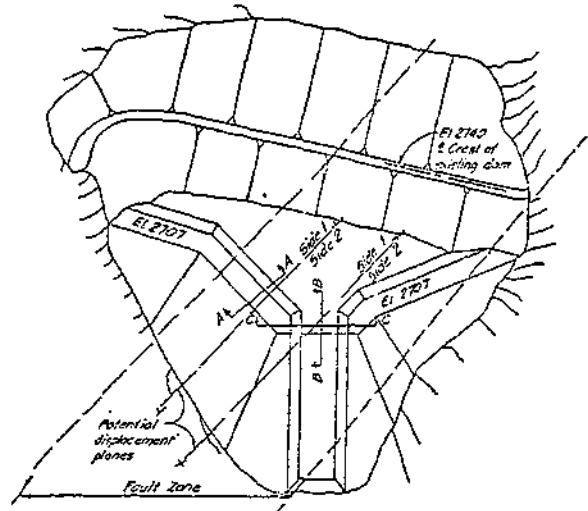


Fig. 3. Flow Retardation Structure-Plan

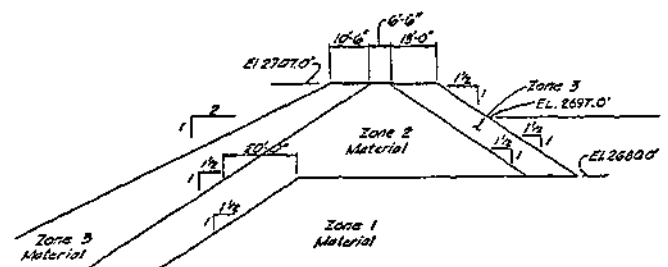


Fig. 4. Flow Retardation Structure-Section A-A

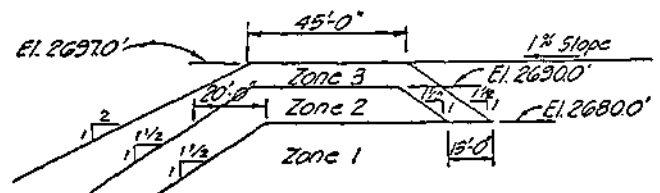


Fig. 5. Flow Retardation Structure-Section B-B

Before the final design of the flow retardation structure was outlined, a stability analysis was performed on the existing dam assuming that an earthquake had resulted in liquefaction of the hydraulic fill. The results of the analysis indicated that the slip circles with minimum safety factors do not pass through the toe of the dam, and that both upstream and downstream embankment failure could occur. Also, earlier studies had shown that loading of the downstream toe of the dam embankment by an earth or rock-fill structure would improve the stability of the downstream slope. It was also concluded that if a downstream slope failure can be prevented by a berm or flow retardation structure, then a progressive failure would develop, similar to that at Lower San Fernando Dam. The assumed failure is shown in Figure 6.



Fig. 6. Henshaw Dam-Section-Failure Simulation

The flow retardation structure was analyzed assuming 6 loading conditions. Four without and two with reinforcement using both Bishop's and the ordinary method of slices. The results indicated that the flow retardation structure would need rockfill reinforcement to bring the safety in the transition and rockfill zones to not less than 1.2. The area between the structure and the south wall of the spillway is highly erodible, therefore, it was decided that any water flowing through or over the structure should be restricted to the central area of the flow retardation structure. This condition led to the shape of the structure shown in Figure 3.

The design criteria for material properties were as follows:

Material	c' (psf)	ϕ (deg)	γ (pcf)
Wagonfill	320	35	120
Hydraulic Fill Dry	600	25	120
Hydraulic Fill Liqfd.	0	0	120
Supplementary Fill	800	34	120(130 sat.)
Processed Transition	0	38	125(135 sat.)
Processed Rock	0	45	130(140 sat.)
Alluvium	0	35	120

Other design criteria: Maximum credible earthquake of 0.6 g and a corresponding sustained acceleration of 0.2-0.3 g. Aftershock of 0.15 g. Maximum fault offset of 1.5 m (5 feet) in vertical and horizontal direction, and 2.1 m (7 feet) in diagonal or oblique direction. Factor of safety for static loading equal to 1.5 and for static plus earthquake to 1.2. Reservoir elevation at 2,690.0 feet above m.s.l. and top of the flow retardation structure at 2,700.0 feet above m.s.l.

The surface reinforcement adapted for the FRS consists of a 5 foot by 13.4 foot grid of 8 bars backed by 6 gauge by 2 inch galvanized chain link mesh, with horizontal anchor bars into the rockfill at each intersection of the surface grid bars. The horizontal anchor bars are 5 foot apart horizontally and 6 foot vertically. For calculating the need for reinforcement against deep seated sliding, the Shand and Pells (1970) method was applied using the modified version of

Bishop's simplified slip circle analysis. The modified Bishop equation was used to calculate the minimum factors of safety for a range of values (0 to 600 psf) of the resisting stress induced by the reinforcement. The proposed reinforcement is shown in Figure 7.

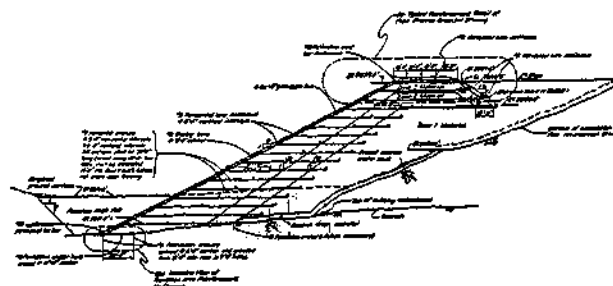


Fig. 7. Reinforcement of the FRS-Section

CONCLUSION

The reinforced flow retardation structure should stabilize the Henshaw Dam and prevent catastrophic flooding downstream of the dam during a large earthquake, which could occur any time in the vicinity of Lake Henshaw. The reinforced structure should prevent surface sloughing and revelling when overflow occurs through the embankment. It should also prevent deep seated slip circle failures in the embankment. The modification of the Henshaw Dam was completed in 1981.

ACKNOWLEDGEMENT

I would like to express my appreciation to Ph. L. Wagner of Leeds, Hill and Jewett, Inc., San Francisco, California, for his help to assist with documentation, references to literature, slides showing the construction phases of the reinforced flow retardation structure at the Henshaw Dam.

NOTE

The views presented in this paper are those of the author and not necessarily of the Federal Energy Regulatory Commission (FERC).

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ATTACHMENT “6”

Improving Seismic Safety of Dams in California

Donald H. Babbitt, M.ASCE ¹

Abstract

A search of the dam files at California's Division of Safety of Dams has revealed that at least 94 dams have been improved for seismic stability. The results of the search are tabulated and discussed. Improvements to seven of the dams are reviewed to illustrate the range of methods used and to note important factors. Design considerations in addition to liquefaction, stability, and settlement analyses are discussed. Reservoir restrictions and emergency responses are briefly covered.

Introduction

On March 12, 1928, the sudden failure of St. Francis Dam in Southern California resulted in a major disaster. Because of this failure and because of the potential risk to the general populace from a growing number of water storage dams in California, the Legislature in 1929 enacted statutes providing for the supervision over non-federal dams by the State. Before the enactment of these statutes, State supervision was limited in scope and covered only about half the dams in the State. The new laws provided for (1) examination and approval or repair of dams completed prior to the effective date of the statute, (2) approval of plans and specifications for and supervision of the construction or modification of dams and (3) supervision of operation and maintenance of dams. More than 1200 dams are currently under the supervision of the Department of Water Resources' Division of Safety of Dams.

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The San Andreas fault traverses three quarters of the State's 800 mile length, passing through its largest population centers. Numerous lesser known active and potentially active faults are dispersed throughout most of the State. Seismic stability of dams has been a concern of State engineers since as early as the 1920s. The focus at that time was on multiple arch dams. Those structures, while making very efficient use of the lightly reinforced concrete to support reservoir loads, have little resistance to cross channel motions that can be caused by earthquakes. The State was successful in using the new law to compel the owner of Lake Hodges Dam, a multiple arch structure in San Diego County, to correct this deficiency in 1936. The effort was no doubt aided by the devastating 1933 Long Beach Earthquake which killed 120 people, primarily in building failures.

Two hydraulic fill dams were damaged by the 1952 Kern County Earthquake -- Dry Canyon Dam 45 miles from the epicenter and South Haiwee 95 miles from the epicenter (Seed et al, 1978). The owner of the dams recognizing they were in areas of high seismicity, hence subject to more severe shaking, acted to stabilize the dams. A 120-foot wide rockfill berm was added to the upstream slope and a 100-foot wide berm to the downstream slope of 81-foot high South Haiwee Dam. A massive earthfill downstream buttress, 13 feet higher than the existing 66-foot high embankment, was constructed at Dry Canyon Dam.

The near disastrous performance of Lower San Fernando and the displacement of Upper San Fernando, near Los Angeles, during and immediately following the February 9, 1971 earthquake, confirmed concerns that hydraulic fill dams could be severely damaged by earthquake induced vibrations. Public interest in dam safety was renewed by the incident. Reacting to this situation, DSOD ordered the owners of the 36 known hydraulic fill dams to have their dams analyzed using the state-of-the-art Seed-Lee-Idriss dynamic analysis procedure (Jansen et al 1976). Most of the improvements discussed below are the result of those orders, initiatives of dam owners, and subsequent orders to owners of non-hydraulic fill embankments and concrete dams.

Improvement of Dams

The dam files at DSOD were researched using a very broad definition of improvement of dams for seismic stability. Ninety four improved dams were identified.

The improvements ranged from removing dams, to performing structural repairs, to restricting reservoir storage. Table 1 summarizes the improvements.

As might be expected, replacing dams, adding buttresses and berms, flattening slopes and draining and grouting foundations have been frequent improvements. Their expense has driven the other major class of improvements: lowering spillways, taking dams out of service and restricting reservoir storage. The reduced costs represent a trade off in reservoir value to the owners. Other safety deficiencies such as inadequate spillway capacities have also led to lowering spillways or taking dams out of service. The replacement of a reservoir by the tanks option has sometimes been selected to meet increased water quality standards as well as abating dam safety concerns.

Table 1-Improvements to Dams

Berms added or slopes flattened on embankments	19
Freeboard increased by adding embankment	3
Freeboard increased by lowering spillway, removing spillway gates, etc	15
Crack stopper zones added	6
Concrete dams buttressed with concrete	4
Multiple arch dams cross braced or strutted	3
Foundation grouting or drainage	8
Vibroflotation	1
Dams removed (some replaced by tanks)	4
Replacement dams constructed	9
Reservoirs maintained empty (some provide short duration flood detention)	7
Permanent storage restrictions	12
Storage restrictions until permanent improvement	36
Outlet works rehabilitations	3
Diversion conduits plugged	2
Total Improvements	132

Note: A single dam may have more than one improvement.

There has been only one use of vibroflotation and no other soil foundation improvement techniques have been used. The reason may be climatic. The construction season at most of the dams reviewed is 10 to 12 months, with high stream flows usually limited to 4 months. Also, about 25 percent of the dams reviewed are "off-stream", that is, the primary source of reservoir water is one of California's aqueduct systems which deliver water to and in drier parts of the state. These conditions mean that problem soils can usually be

removed during initial dam construction or during rehabilitation.

The analyses used to determine the need for and to design the improvements have varied as much as the improvements themselves. Finite element analyses with acceleration time histories have been used on major or high hazard embankments and on most concrete dams. At the other extreme, the potential cost of finite element analyses has led to removal or lowering spillways of small embankment dams after minimal analysis.

The following sections briefly describe improvements to specific dams to illustrate the range of methods used and to point out important considerations in designing and constructing rehabilitations.

Stevens Creek Dam

A seismic stability reevaluation of Stevens Creek Dam completed in 1978 concluded that "the dam would not meet current performance criteria if subjected to the maximum credible earthquake - Magnitude 8 1/2 on the nearby San Andreas Fault". The fault is 2.5 miles from the dam. In addition, an analysis by DSOD in 1979 concluded that the spillway capacity was inadequate.

The compacted clayey sand embankment dam, located in the western part of "Silicon Valley", was constructed in 1935. The height and crest length are 120 feet and 1080 feet, respectively. The embankment was crudely zoned to place the most impervious material near the upstream face. A cutoff to the semi-indurated conglomerate and siltstone foundation is located beneath this zone. Up to 15 feet of relatively free-draining alluvium underlies the rest of the original embankment.

An embankment rehabilitation consisting of upstream and downstream soil berms was designed to limit strain potentials determined by cyclic triaxial testing and dynamic finite element analyses (Fig.1). Strain potentials computed for the central and downstream portions of the modified embankment and the alluvium were relatively low. The strain potentials for the upstream portion of the dam and the upstream berm exceeded 20 percent. This was taken to mean the upstream areas will probably be subject to spreading and slumping during the design earthquake. Post earthquake stability analysis of the remainder of the embankment, using post cyclic triaxial test results, indicated acceptable performance. A Makdisi-Seed

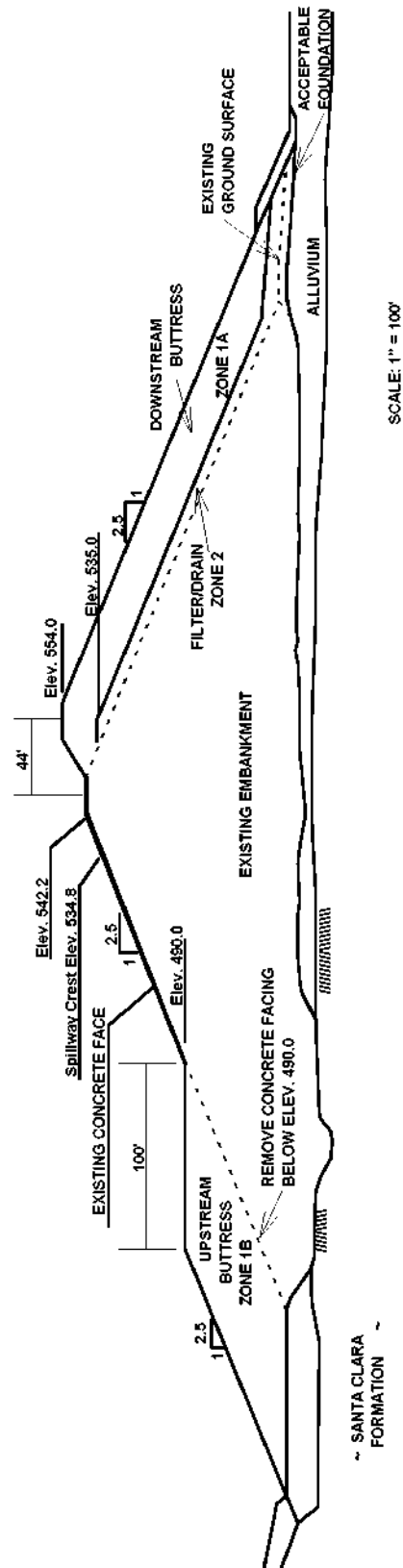


FIGURE 1 - STEVENS CREEK DAM REHABILITATION PLAN

simplified analysis indicated a total deformation of approximately 10 feet. The chimney drain between the original dam and the downstream buttress is intended to act as a crack stopper as well as to keep the buttress from becoming saturated. Note that the downstream berm is 12 feet higher than the dam crest.

The capacity of the original side channel spillway was increased by extending the weir in an "L" shape. The weathered conglomerate and siltstone excavated for spillway enlargement was used in the berms. A 50-inch diameter outlet had to be lengthened to accommodate the berms.

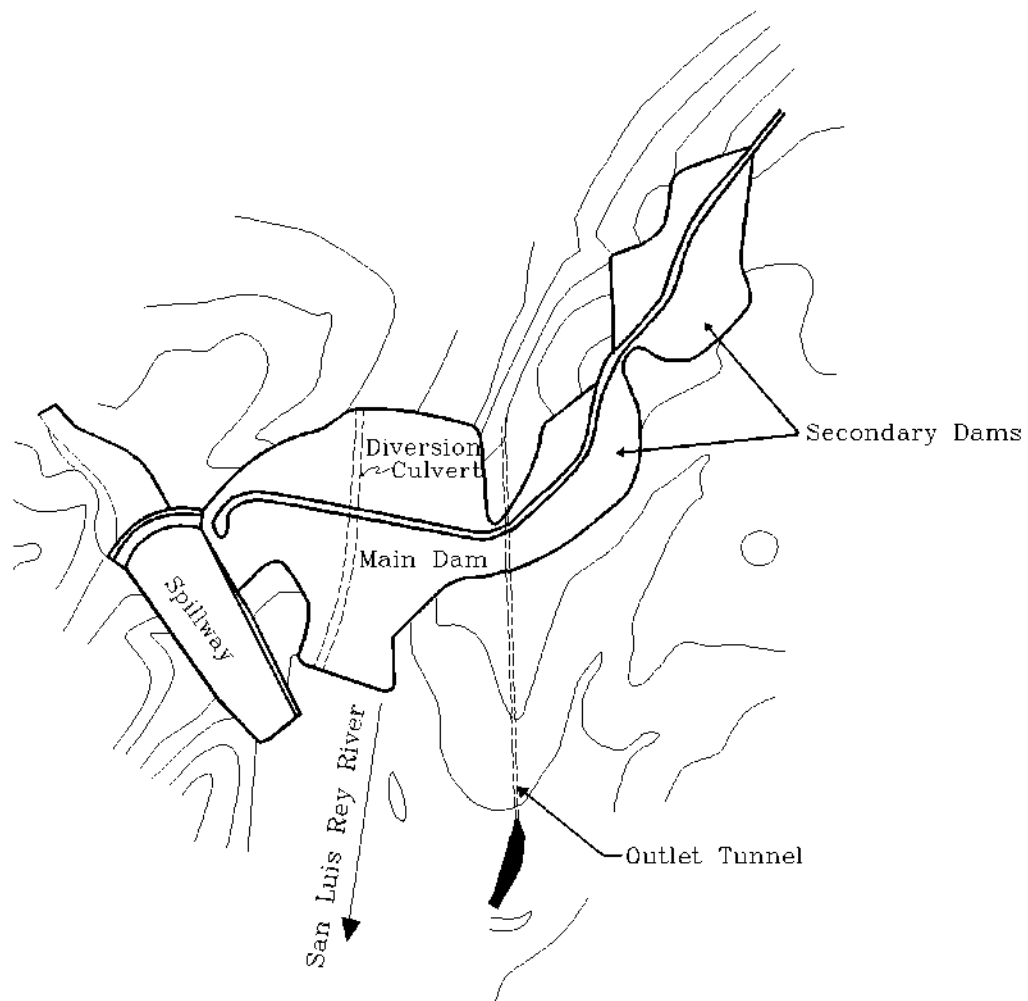
Stevens Creek Dam was 22 miles from the epicenter of the October 17, 1989, Magnitude 7.1 Loma Prieta earthquake. It was not damaged by the shaking which had an estimated peak ground acceleration of 0.35g. The reservoir was nearly empty at the time.

Henshaw Dam

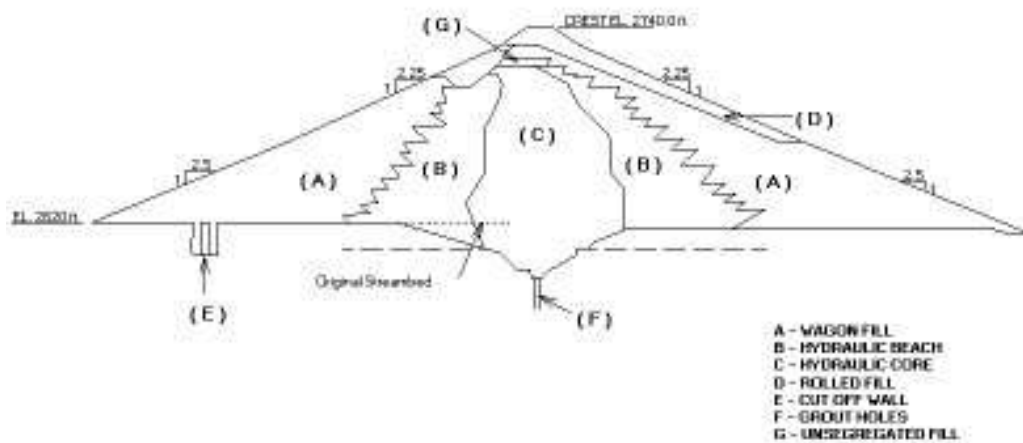
Henshaw Dam, a hydraulic fill, (Fig.2) had another serious problem. It is located in the 8 to 12 mile wide active Elsinore fault zone. Traces of the fault trend diagonally under the main dam embankment (Bischoff 1985). The fault is deemed capable of producing a Magnitude 7.0 earthquake with potential fault rupture displacements, at the dam, of up to 5 feet in either the vertical or horizontal direction and or up to 7 feet in an oblique direction.

This 120-foot high dam, constructed in the 1920s, created a 204,000 acre-foot irrigation and municipal water supply reservoir on the San Luis Rey River in San Diego County. Preliminary studies showed the relative densities of the shell materials were low enough that liquefaction could lead to failure of the dam. They also disclosed the dam would be subject to piping should movement occur on the fault traces under the embankment. Later, concern developed that fault movement could raise a significant part of the reservoir relative to the dam and lead to reservoir release should the embankment severely slump.

Alternate reservoir sites were not available on the river and the choice of construction materials was limited in the broad fault zone. Operation studies showed that a 50,000 acre-foot reservoir would meet the owner's needs. The improvements selected were to permanently reduce the reservoir capacity to 50,000 acre-feet by constructing a 37-foot deep notch, 12-feet wide at its invert, in the spillway and to strengthen

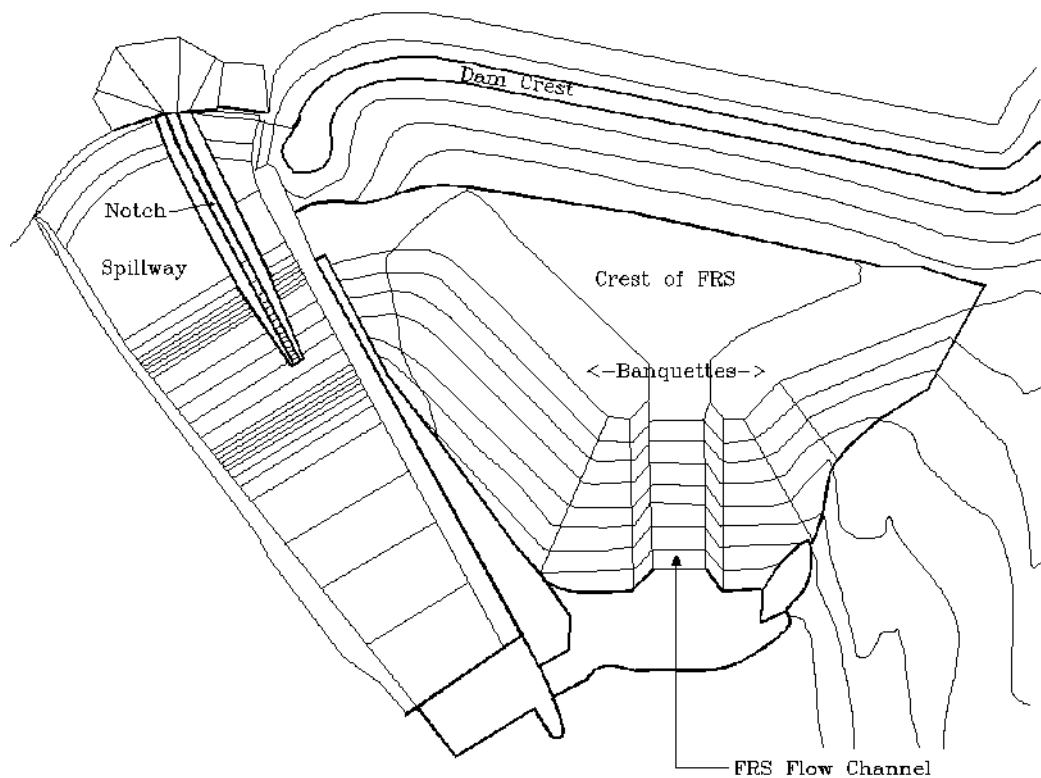


PLAN

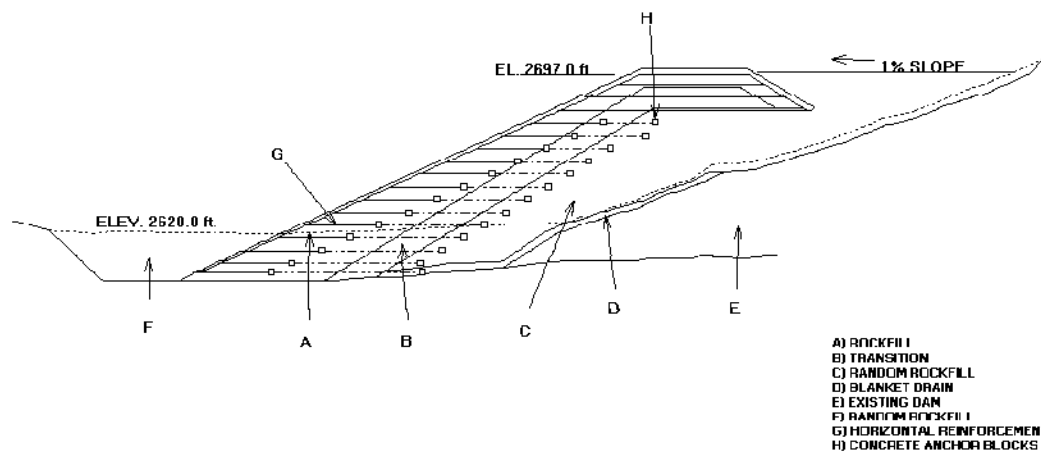


MAXIMUM SECTION

FIGURE 2 - HENSHAW DAM BEFORE MODIFICATION



PLAN



SECTION

FIGURE 3- HENSHAW DAM, FLOW RETARDING STRUCTURE (FRS)

the embankment by constructing a flow attenuating berm or Flow Retardation Structure (FRS) on its downstream face (Fig.3). The FRS also adds resistance to earthquake forces and fault movement. It was designed by pseudo-static analyses, using up to 0.3g.

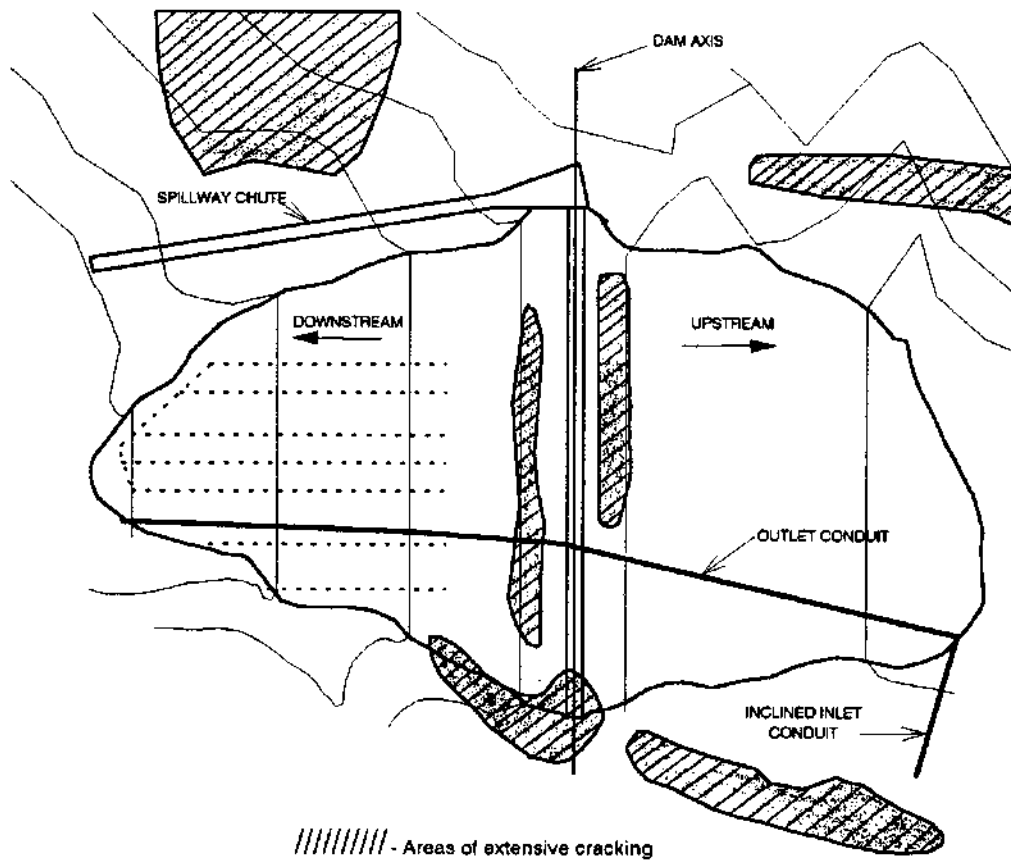
Lowering the reservoir level reduced the embankment phreatic line and the amount of material that can liquefy. Also, water is no longer impounded against the secondary dams, the slender part of the spillway and the narrowest parts of the abutments. Investigations for lowering the spillway disclosed some weaknesses in the structure, making the spillway rehabilitation a major project in itself.

The concept of the Flow Retardation Structure is to attenuate the release of water should the embankment fail by allowing it to flow through or over it. The top of the main portion of the FRS is 7 feet higher than the lowered spillway crest. The banquettes (berms) along the edges of the FRS are 10 feet higher to contain the potential overflows discussed above and moderate flood flows that might occur before repairs to earthquake damage can be completed. The surface and embedded reinforcement was designed to cope with sloughing or raveling of the rockfill under over topping or flow through conditions and to prevent deep-seated shear failure within the FRS.

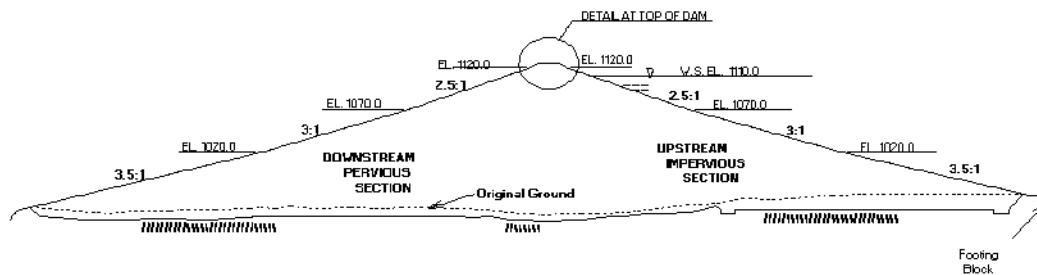
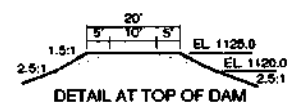
Gravel and cobbles placed in the downstream end of a 10-foot diameter diversion conduit at the end of the dam construction were excavated and a 115-foot long concrete plug was placed under the FRS to seal potential leaks caused by fault movement.

Austrian Dam

The epicenter of the Loma Prieta Earthquake was seven miles from Austrian Dam. The 200-foot high, 700-foot long embankment dam was constructed in 1949-50 on Los Gatos Creek, near the town of Los Gatos (Fig.4). The design called for an upstream impervious zone, a downstream pervious zone, and highly pervious strip drains located near the old stream channel in the downstream zone (USCOLD 1992). However, the weathered sedimentary rock at the site broke down during excavation, placement and compaction, resulting in a nearly homogeneous gravelly, clayey sand embankment, compacted to approximately 90 percent of ASTM D-1557 maximum density. Most all soils and highly weathered rock were removed from the dam footprint prior to the embankment construction. The dam is in a vee-shaped



PLAN



SECTION

FIGURE 4 - AUSTRIAN DAM

canyon in the Santa Cruz Mountains, about 2,000 feet northeast of the San Andreas fault zone.

The reinforced concrete outlet conduit, 4 feet in diameter, was constructed in a trench excavated into bedrock at the base of the left abutment. An inclined outlet facility extends up the left abutment, upstream from the dam.

The dam impounds a 6,200 acre-foot water supply reservoir. The dam crest is at elevation 1125. At the time of the earthquake the reservoir contained 700 acre-feet of water, which corresponds to a reservoir water surface at elevation 1023. Storage was low both as a result of the annual operating cycle and of three years of below average rainfall. Mid-October is the usual start of the local rainy season.

The earthquake caused a maximum settlement of 2.8 feet, with significant settlement occurring over the right three-quarters of the dam (Rodda et al 1990). Maximum downstream movement was 1.1 feet near the spillway wall on the right abutment, and maximum upstream movement was 0.4 feet at the left quarter point of the embankment. Longitudinal cracks up to 1 foot wide and 14 feet deep occurred within the upper 25 percent of the upstream and downstream faces. Shallower longitudinal cracks were found on much of the downstream face. Crest cracking was confined to the abutment contact areas. Transverse cracking and embankment separation from the spillway structure occurred to a depth of 23 feet and a maximum width of 10 inches. The separation was apparently due to a combination of soil structure interaction, embankment settlement along the very steep abutment and permanent wall deflection. A transverse crack was traced 30 feet down the left abutment, where the dam had been constructed on weathered, highly fractured rock.

The settlement and cracking at both ends of the dam crest was partially the result of low density embankment that was rapidly placed to top out the dam after the start of the 1950 rainy season. The difficulty of compacting between the spillway wing and return walls is also a probable cause of the settlement and cracking next to the spillway. Embankment construction on the poor rock on the upper left abutment was an acknowledged expedient to prevent the dam from over topping. An attempt was made to grout the foundation in this area immediately after the dam was completed.

A modified Seed-Lee-Idriss analysis for a M8.5 on the San Andreas fault was completed in 1981. The settlement prediction resulted in removal of a 2-foot high inflatable dam from the spillway. The damage by the M7.1 earthquake was probably more than inferred by the analysis, but the conditions described in the last paragraph are not modeled in such analyses.

Spillway damage consisted primarily of numerous transverse tension cracks. The structure appears to have elongated about one foot, toppling the end walls in the process. Some cutoff walls were damaged. Voids up to 6 inches wide were observed upstream from other cutoff walls. The walls of the "U" shaped section flexed inward, lifting the base of walls and adjacent portions of the floor slab up to one inch. The only damage to the outlet works consisted of the tipping of a valve actuator steel tank, located at the top of the inclined facility. Ground cracking occurred in and above the reservoir area and on the abutments.

Repairs to Austrian Dam began within days following the earthquake, so that the dam would not be over topped during the rainy season and could store water for use in 1990. Cracked embankment on the upstream face and embankment and foundation materials at the abutments were excavated and replaced with compacted embankment (Rodda and Pardini 1990). Crack stopper zones were included near the abutments (Fig.5). The grout curtain at the left abutment contact was regouted. A toe drain was installed to improve drainage from the finger drains and provide seepage monitoring during reservoir filling. The cracks in the spillway were epoxy grouted to allow immediate use if needed. The spillway and earthwork repairs were essentially complete in about an 8-week period.

The owners were only able to accomplish this work because they owned land that could be used for borrow areas and had longstanding working relationships with the contractor and major suppliers. There was fierce competition for supplies, equipment, and experienced operators after the earthquake. Access to the dam was on damaged roads.

After not filling for three years after the earthquake the reservoir peaked at 2.5 feet over the spillway crest on January 22, 1993. The repaired spillway has held together. Close surveillance of the dam has been maintained each time new post earthquake reservoir levels have been reached.

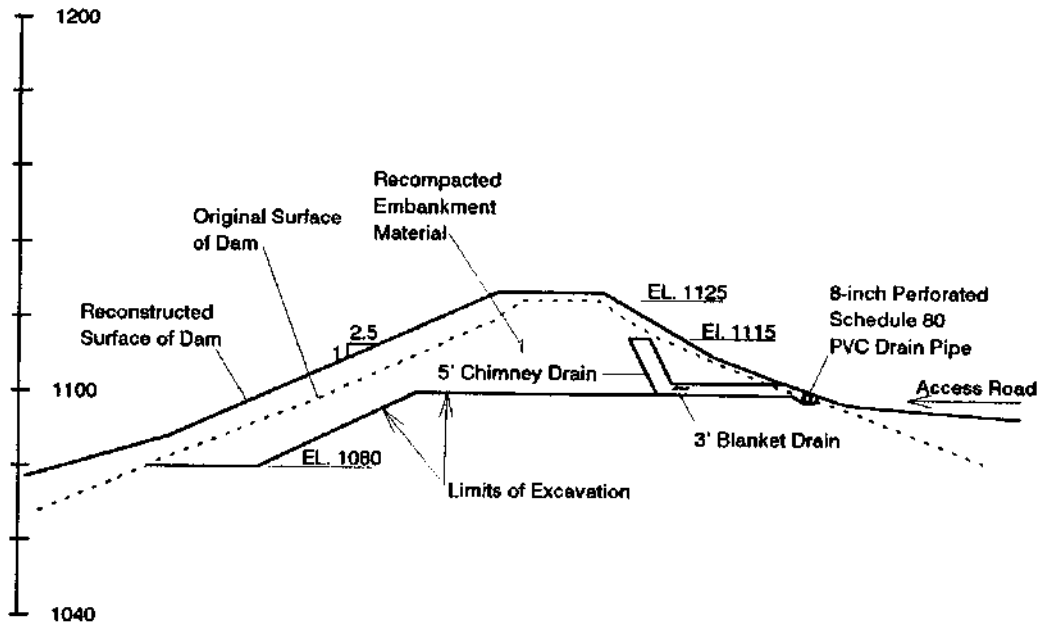


**FIGURE 5 - EXCAVATION AND REPLACEMENT OF EMBANKMENT
AT RIGHT END OF AUSTRIAN DAM**

A replacement spillway is currently under construction on the left abutment where the rock quality is much better than the right abutment. The floor is being anchored into the rock for stability. The excavated materials are being placed on the lower portion of the downstream slope of the embankment. The crack stopper zones will be extended to the spillway wall on the left abutment and across the present spillway which will be removed near the dam crest. This construction will greatly improve the geometry of the embankment-spillway and embankment-abutment contacts. Grouting will be done on both abutments and is expected to lower the embankments phreatic line.

Bear Valley Dam

The epicenter of the M6.7 June 28, 1992 Big Bear Lake Earthquake was only 8 miles from Bear Valley Dam, a former multiple arch. The reservoir was full. There was no damage to the dam, which was rehabilitated in 1989 (Denning 1993). The arch bays were filled with mass concrete at that time. The local MCE for that design of the rehabilitation was a M6 at 1 mile.

Lower Crystal Springs Dam

Lower Crystal Springs, a 145-foot high gravity arch, was constructed on San Mateo Creek 15 miles south of San Francisco in 1888. It forms a 58,000 acre-foot reservoir in the San Andreas fault valley. The active trace of the fault is 300 feet upstream and parallel to the chord of the dam. Performance of the dam in 1906 during the M8.3 Great San Francisco Earthquake was excellent. In the 1970s, the dam's seismic stability was reevaluated. The dam itself was given a clean bill of health, but some of the appurtenances are being improved. One of them is discussed here.

Post-earthquake outlet operation is considered important for system operational needs and because of the potential for splinter faulting from the nearby active fault trace. Splinter faulting is defined as movement on minor faults or other planes of weakness caused by movement on the main fault. Reservoir drawdown would be necessary if these features create seepage paths through the moderately strong, weathered abutments.

Key elements of the outlet works have been improved to assure they are available if reservoir drawdown is necessary or alternately to hold the reservoir should the outlet towers be damaged (Bureau 1985). These elements are steel pipes in tunnels under the left abutment of the dam. The pipes, 54 and 78 inches in diameter, are supported on brick and concrete cradles respectively. They were otherwise unrestrained. They have been tied down with steel straps anchored to the floors of the tunnels.

Pigeon Pass Dam

Pigeon Pass Dam, a 30-foot high, 2900-foot long clayey sand embankment, forms a 912 acre-foot flood control reservoir in semi-arid Riverside County. The foundation is alluvium of various ages. The outlet is ungated, allowing the reservoir to empty within hours after rainfall ceases on the 9 square mile drainage area.

In December 1978, transverse cracks were discovered in the embankment. The causes of the cracks were determined to be a combination of embankment shrinkage and differential foundation settlement due to hydrocompaction and possibly seismic shaking. The largest crack was repaired by excavating and placing compacted embankment. The proximity of a nearby active fault, the San Jacinto at 4 miles, dictated that

repairs include more than treating identified cracks. Cracks could rapidly reopen or new ones form in the rather brittle embankment during an earthquake, particularly where the dam is founded on cohesionless soils. A chimney drain was placed in a trench in the downstream slope to act as a crack stopper. Gallery drains were provided as outfalls from the chimney (Fig.6).

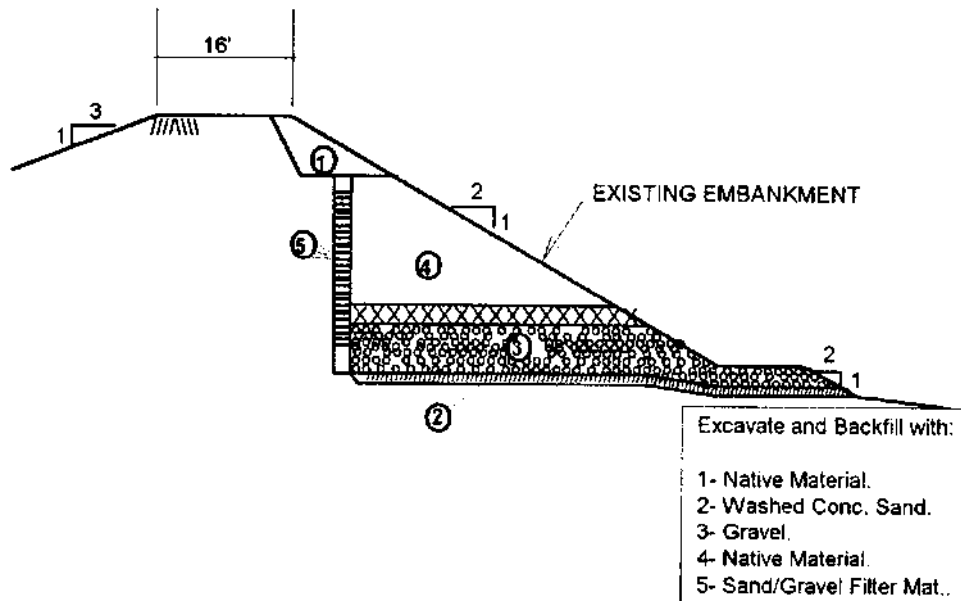


FIGURE 6 - PIGEON PASS DAM, CHIMNEY DRAIN INSTALLATION

The work was safely accomplished in a short time without the aid of trench supports. The chimney material is a well graded minus 1-1/2 inch concrete mix. It was dumped in place, wet, from ready mix trucks. The gallery material is 3/8 inch pea gravel; it is filtered by concrete sand.

Coyote Dam

Coyote Dam is a 140-foot high zoned embankment dam completed in 1936 across the known active Calaveras fault in southern Santa Clara County. The apparent active fault trace was mapped on the excavated foundation surface and a 50-inch diameter outlet conduit was aligned to avoid it. A control valve was installed at the upstream end so that the steel-lined reinforced concrete conduit would not be under pressure if it was ruptured by splinter faulting or a slight shift in the active fault trace.

When build-up of reservoir sediments after 30 years made operation of the control valve impractical

for regulation, a valve was installed on the downstream end of the conduit. However, pressurization of the conduit was restricted to times when the contents of the reservoir could be captured by Leroy Anderson Reservoir located 3 miles downstream. When, in the late 1980s, continued accumulation of sediments necessitated another outlet modification, an outlet tunnel was constructed through the right abutment just above the level of the sediments. The new outlet tunnel is 200 to 300 feet farther from the active fault trace (Fig.7). The control valves are located upstream of a splinter fault crossing the tunnel alignment so that the tunnel is free flowing when crossing this feature. The tunnel is articulated into 10-foot long segments connected by water stops through the splinter fault zone.

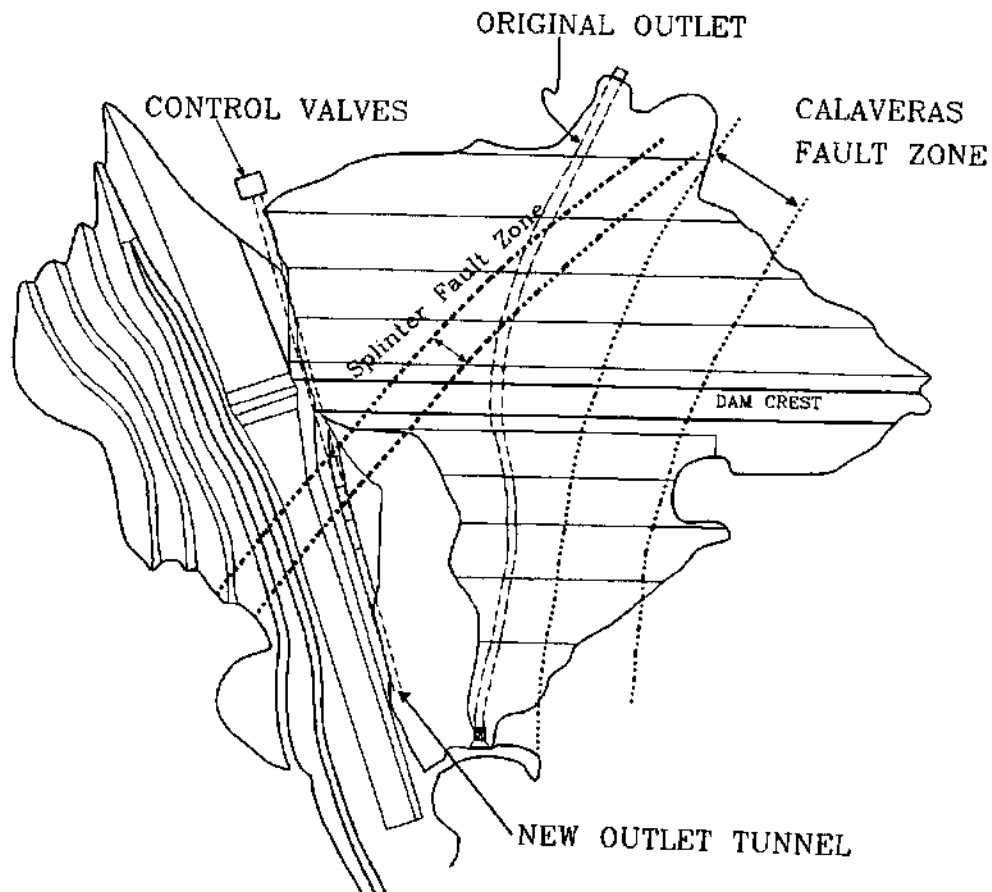


FIGURE 7 • COYOTE DAM, PLAN VIEW

While the new outlet virtually eliminates the conduit rupture hazard, DSOD is concerned about piping occurring through upper abutment and/or embankment cracking caused by fault movement. A reservoir

operation scheme is being negotiated to ameliorate this concern by minimizing the time the reservoir is nearly full. Such a scheme is possible because the dam owner has the flexibility from operating several reservoirs, which are tied to conjunctive use of a major ground water basin.

Design Considerations

The need for buttresses, slope flattening and increases in freeboard is a direct product of stability and settlement analyses. The selection of important details is less obvious. James L. Sherrard (1967) provided guidance on these details in his report to the Department of Water Resources on "How should earth dams be designed differently in regions of earthquake activity?". The use of crack stopper zones and the general concern about the vulnerability of dam crests are, in part, a product of Sherrard's study.

Dams very near or across faults present special challenges. Splinter faulting is discussed previously under Lower Crystal Springs and Coyote Dams. Regional ground movement, as occurred at Hebgen Dam in 1959, was a consideration in rehabilitating Henshaw and other dams. Leps(1989) describes design and rehabilitation of dams directly across faults.

Storage Restrictions

As noted in Table 1, temporary storage restrictions have been used to improve the safety of 21 dams. These operating restrictions are placed soon after analyses identify stability problems. They allow time to design and finance repairs, find alternate water supplies and lately, to conduct environmental studies.

Reducing the allowable reservoir storage directly reduces the damage potential should an earthquake rupture the dam. It also reduces seepage pressures in dams and foundations and eliminates liquefaction potential where drainage of problem soils is complete. The engineers who do the stability analyses usually recommend the restriction depth.

Permanent storage restrictions are being used on only 12 dams. These restrictions can be difficult to maintain. Dam operators and regulators change and documents get lost. There is pressure to lift restrictions during periods of drought and other crises. If long-term restrictions are used, the conditions at the reservoirs must make the restrictions

easy to maintain. Lowered or notched spillways are much more foolproof.

Emergency Response

California's dams have been tested by several earthquakes, the most notable being the 1971 San Fernando and the 1989 Loma Prieta. The experience has shown that dams must be made safe before earthquakes. There are too many obstacles to overcome to protect the public by detecting and treating earthquake damaged dams and implementing evacuation plans when they are needed. Some examples of actual obstacles with explanatory notes are:

Key response personnel were not available. They had been injured or their families needed them.

Communications were blocked. When telephone and radio facilities were not damaged, they were overloaded.

Access to dams was difficult. Roads and bridges are designed to lower standards than dams. They should not be expected to survive earthquakes that damage dams.

Repair materials, equipment and operators were in short supply. See "Austrian Dam".

Helicopters were not available for inspections. News media and high level officials tied them up.

However, DSOD requires that dams have gravity outlets and that their operability be regularly demonstrated. Dam owners must provide dam break inundation maps to the State's emergency services office so that local jurisdictions can prepare evacuation plans. Each of these insurance measures has proven useful in dealing with emergencies at dams in California.

Two facets of the 1971 Lower San Fernando Dam incident should be considered in determining acceptable earthquake damage to dams: (1) The reservoir behind the damaged dam had to supply a large portion of the water for Los Angeles for two weeks while severe damage to the supply aqueducts was repaired. (2) A major public awareness effort was required to gain support for constructing Los Angeles Dam, the functional replacement for Lower San Fernando Dam (Phillips and Georgeson 1973). The new dam was constructed in the old dam's basin. The old dam was repaired and the area

between the dams is maintained dry to provide double protection for the downstream area where 70,000 people were evacuated after the 1971 earthquake.

Conclusions

A wide variety of creative solutions have been used to improve the seismic stability of dams in California. Although there have been major advances in analysis techniques, the rehabilitations have not changed radically. Multiple arch dams are still being stiffened and embankment dams buttressed.

The performance of Austrian Dam during the 1989 Loma Prieta Earthquake reinforces concerns about damage to the tops of earth dams by earthquakes expressed by Sherrard.

Dams must be ready to withstand earthquakes. Provisions for emergency response should be treated as prudent insurance measures and not substitutes for pre-earthquake rehabilitation.

Reservoir storage restrictions can provide effective, rapid ways to increase dam safety, but can prove troublesome in the long term.

Acknowledgement

The author acknowledges the support of the California Department of Water Resources and its approval to publish this paper. The paper highlights the continuing efforts of the dam owners in California, their staffs, the Division of Safety of Dams, consultants, universities and others in improving the seismic stability of dams.

Disclaimer

The opinions expressed are those of the author and are not positions of the Department of Water Resources.

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ATTACHMENT “7”

**This is the original *Henshaw Dam
Failure and Inundation Study*
dated December, 1991.**

DO NOT DESTROY!

JMM James M. Montgomery



30 Corporate Park, Suite 310, Irvine,
California 92714
(714) 261-7210

Vista Irrigation District

DATE: 12/13/91

202 West Connecticut Avenue

SUBJECT Revised Henshaw Dam Inundation Study

Vista, CA 92083

Attn: Mary Ann Obergfell

Gentlemen:

The following items are: ☐ Requested

☒ Enclosed

☐ Sent separately via Fed Ex

☐ Report

☐ Specification

☐ Cost Estimate

☐ Shop Drawings

☐ Test Result

☐ Prints

☐ Test Sample

☒ Other

No. of Copies	Description
1	Final Report
30	Sets of 11 x 17" sheets

These data are submitted:

☐ At your request

☒ For your action

☐ For your approval

☐ For your files

☐ For your review

☐ For your information

General Remarks: As we discussed on the phone today, no new cross section plots are included. Please use the plots which were submitted to you on 12/5.

Very truly yours,

Encls. ☐

Copies to: File

JAMES M. MONTGOMERY,
CONSULTING ENGINEERS, INC.

111.0290

By: Steven Mano

Steven Mano

Vista Irrigation District

***Henshaw Dam Failure and
Inundation Study***

December 1991

JMM James M. Montgomery



VISTA IRRIGATION DISTRICT
HENSHAW DAM FAILURE AND INUNDATION STUDY
December 1991

James M. Montgomery, Consulting Engineers, Inc.

INTRODUCTION

The Federal Energy Regulatory Commission (FERC) has requested that the Vista Irrigation District update its Emergency Action Plan (EAP) for Henshaw Dam. One element of the EAP is the preparation of an Inundation Study which identifies downstream areas which would be flooded in the event of a dam failure. This report presents the results of the Inundation Study for Henshaw Dam, and documents potential flooded areas between the dam and the mouth of the San Luis Rey River at the Pacific Ocean in Oceanside, California.

The study is founded on an assumed dam failure which has been postulated in compliance with Federal Regulations. Since there is no rational basis for postulating that such a failure of the dam would occur, the results presented in this report must be considered virtually incredible and do not reflect in any way on the integrity of the dam, spillway, or retardation structure. An independent seismic analysis of the facilities is being performed concurrently with this analysis.

PROJECT AUTHORIZATION

The Vista Irrigation District (District) retained James M. Montgomery, Consulting Engineers, Inc. (JMM) to prepare the Henshaw Dam Inundation Study. The project was authorized by contract between the District and JMM, dated October 22, 1991.

PURPOSE

The purpose of the Henshaw Dam Inundation Study is to develop inundation maps for areas downstream of Henshaw Dam, based on a hypothetical failure of the dam. The inundation maps will be used by the District to update the EAP for the dam. These maps could also be useful to San Diego County and the City of Oceanside in preparing or updating EAP's for other affected downstream areas.

SCOPE OF WORK

The scope of work for the inundation study includes the analyses necessary to develop estimated inundation areas, depths, and times of peak flood using FERC-approved methodologies. The analyses conducted as part of the study included the following:

1. Select failure criteria for the hypothetical dam failure.
2. Generate the failure hydrograph to breach the dam.
3. Generate the downstream base flow in San Luis Rey River.
4. Route the failure hydrograph utilizing the Modified Puls storage routing method within the U.S. Army Corps of Engineers' HEC-1 Flood Hydrograph Package.

The products of the inundation study include inundation maps, computer output documentation, and this report describing and summarizing the analyses performed.

PROJECT DESCRIPTION

The following paragraphs describe the basic features of Henshaw Dam and the project study area.

Location

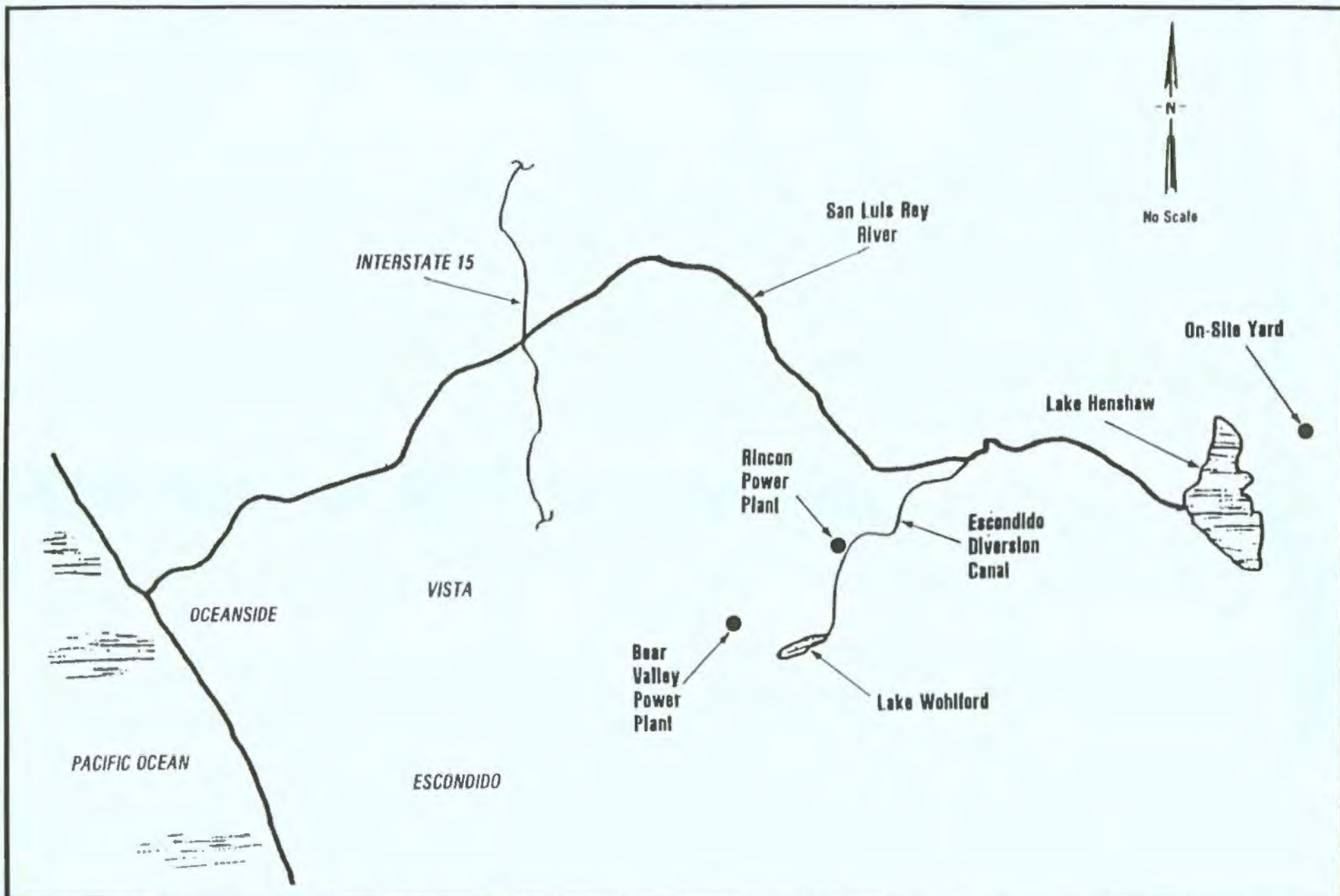
Henshaw Dam is located at Lake Henshaw, near the intersection of State Highway 76 and County Route S7 in San Diego County. The San Luis Rey River feeds Lake Henshaw. Figure 1 depicts the location of Lake Henshaw and the San Luis Rey River. The river flows in a westerly direction from the dam through unincorporated San Diego County. It parallels State Highway 76 from the dam site downstream to the City of Oceanside and terminates approximately 51.0 miles downstream from the dam at Oceanside Harbor where it empties into the Pacific Ocean.

Physical Characteristics

Construction of the original dam was begun in 1922. The dam was completed to an elevation of 2730 feet in 1923; the spillway had an elevation of 2720 feet. In 1928, the dam was raised to an elevation of 2740 feet, with a new spillway elevation of 2727 feet. The storage capacity was approximately 198,000 acre-feet. However, in 1981, a notch was cut into the spillway, reducing its elevation to 2690 feet and the reservoir storage capacity to approximately 50,000 acre-feet. A cross section of Henshaw Dam and a reservoir storage curve are shown in Figures 2 and 3, respectively. Physical characteristics of Henshaw Dam are presented below:

DAM

Reservoir Capacity (at spillway invert)	50,000 acre-feet
Reservoir Area (at spillway invert)	2,100 acres
Upstream Drainage Area	206 square miles
Downstream Channel	San Luis Rey River
Function	Storage for water supply Incidental flood control
Construction	Earthfill and hydraulic fill
Maximum Height	123 feet
Crest Elevation (parapet wall)	2743 feet
Crest Elevation (original 1923 dam)	2730 feet
Crest Elevation (raised 1928 dam)	2740 feet
Crest Length (including spillway & saddles)	2185 feet



JMM James M. Montgomery

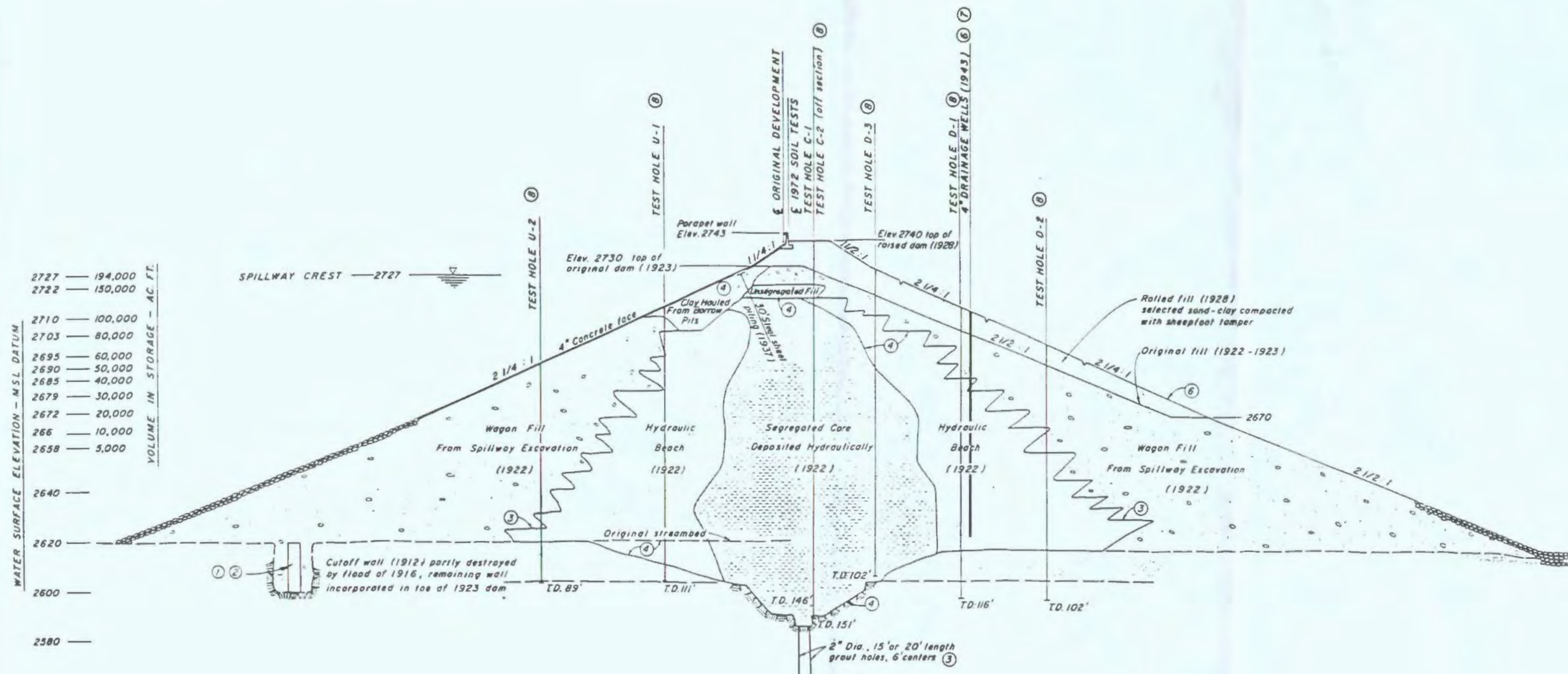


8110 La Jolla Shores Drive, Suite 200
La Jolla, California 92037

VISTA IRRIGATION DISTRICT - HENSHAW DAM FAILURE AND INUNDATION STUDY

VICINITY MAP

FIGURE 1



20 0 20 40
Scale in Feet

FIGURE 2

CHRONOLOGY

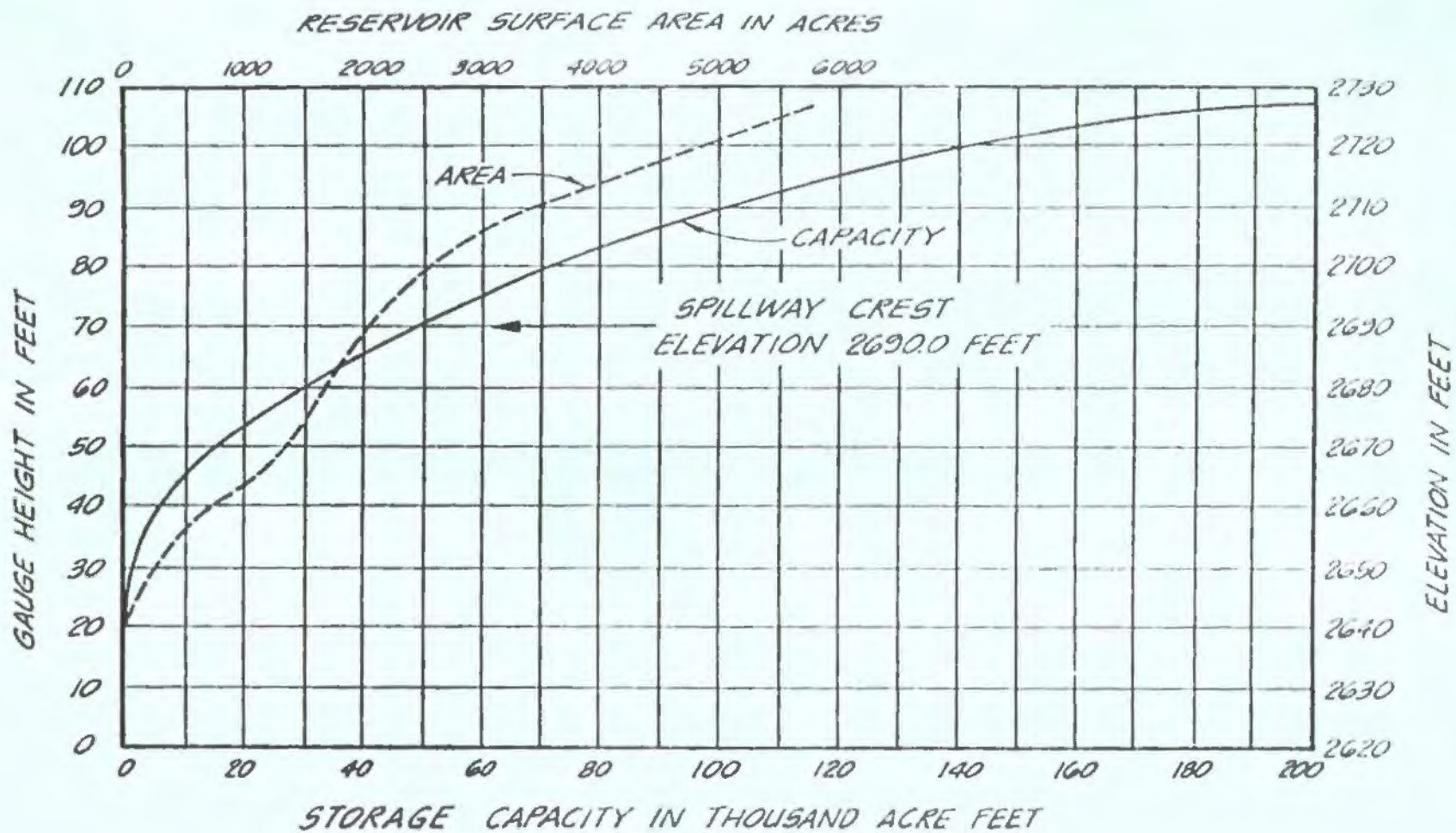
- 1914 Constructed cutoff wall for proposed dam 200 ft. upstream of present dam. Outlet tunnel constructed.
- 1916 Flood destroyed part of cutoff wall. Work halted by war.
- 1922 Construction of Henshaw Dam begun.
- 1923 Dam completed to elevation 2730; spillway 2720.
- 1927-28 Dam raised to elevation 2740; new spillway 2727.
- 1937 Installed sheet piling to control seepage.
- 1943 Installed wells and airlift pumps for unwatering downstream shell.
- 1972 Began studies and soil tests to analyze earthquake hazard.

DRAWING REFERENCES

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- ② May 20, 1922 J.R. Lippincott, "General Plan of Henshaw Dam"
- ③ Aug. 30, 1923 E.N.R. Vol. 91, No. 9, Fig. 3 and text in "Rapid Construction of Earth-Fill Dam in California" by Chas. H. Richards
- ④ Aug. 1937 George Cromwell, "Henshaw Dam, Typical Section"
- ⑤ Oct. 1938 Galston, Code and Hill - Leeds and Barnard "Reinforcement of Concrete Slab at Joint"
- ⑥ Apr. 1942 Leeds, Hill, Barnard and Jewett "Henshaw Dam, Prop. Unwatering System"
- ⑦ Jan. 27, 1943 George Cromwell, "Henshaw Dam, Maximum Section"
- ⑧ 1972 Lead, Hill and Jewett, Inc. Exploration Program.

VISTA IRRIGATION DISTRICT SECTION OF HENSHAW DAM SHOWING STAGES OF DEVELOPMENT

LEEDS, HILL AND JEWETT, INC.
Schenectady, N.Y. 12309



Source: Vista Irrigation District

JMM James M. Montgomery



8110 La Jolla Shores Drive, Suite 200
La Jolla, California 92037

VISTA IRRIGATION DISTRICT - HENSHAW DAM FAILURE AND INUNDATION STUDY

AREA-CAPACITY CURVE FOR HENSHAW DAM

FIGURE 3

SPILLWAY

Spillway Location	Right abutment of Henshaw Dam
Crest Elevation (bottom of notch)	2690.0 feet
Crest Type	Overflow weir with a notch
Spillway Capacity (at dam crest elevation)	83,350 cfs

The reservoir is filled primarily by surface water, supplemented by groundwater pumped from 25 wells in the Warner groundwater basin.

In addition to the dam and spillway, there is a flow retardation structure which was constructed in the early 1980's as an integral part of the downstream face of the dam. This is shown in Figure 4. The retardation structure is comprised of dropped rock with wire revetment reinforcement. The reinforced rockfill embankment was designed to capture overtopping or failure flows and to act as a sieve in slowly releasing the captured flows. The sill of the retardation structure is higher than the spillway notch. Although the flow retardation structure adds stability to the downstream dam embankment, any catastrophic event (e.g., earthquake) large enough to cause the main portion of the dam to fail would also cause this integral portion of the downstream face to fail. Although there is no rational basis to assume such a failure would occur, Federal procedures require an assumption of this kind for dam failure studies. Therefore, this analysis assumes the flow retardation structure will fail along with the rest of the dam. Any storage volume behind the retardation structure is negligible, and will not affect routing of an outflow hydrograph caused by a dam failure.

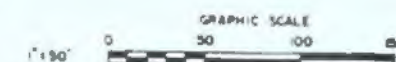
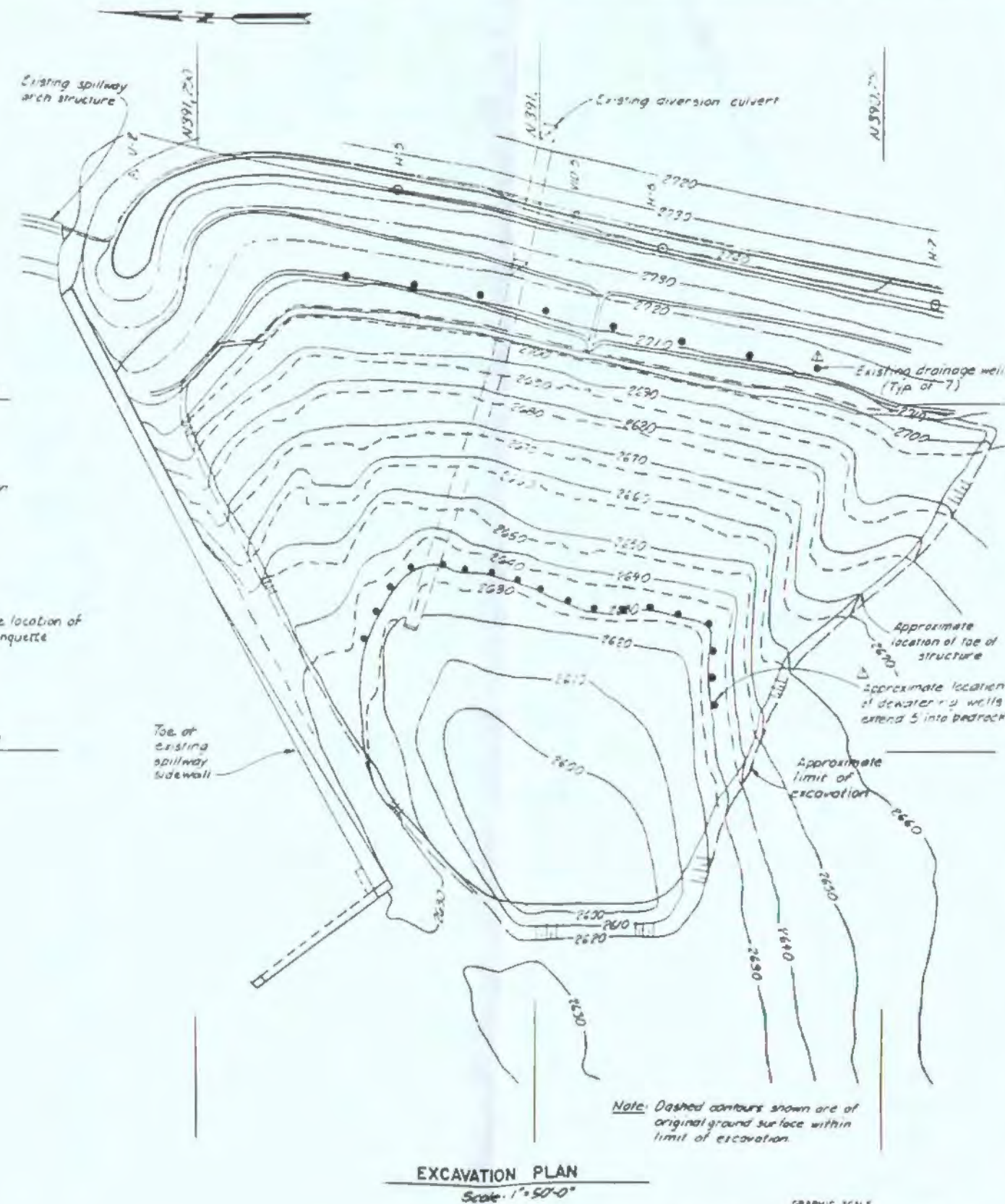
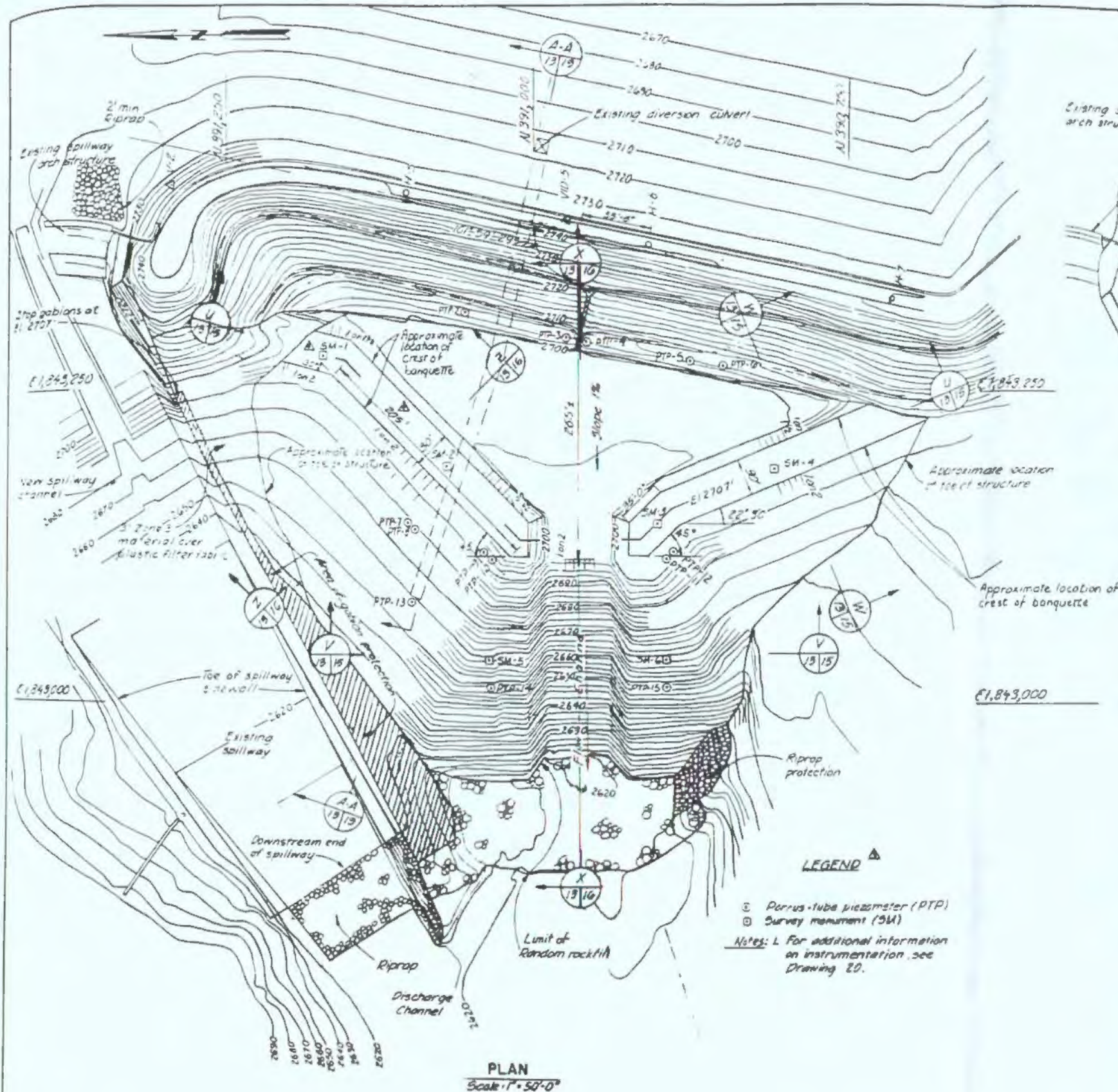
Floodplain Characteristics

The San Luis Rey River floodplain between Henshaw Dam and the Pacific Ocean exhibits great variability in development patterns. The initial 12 miles below the dam consist of a narrow, steep canyon. From the confluence with Paradise Creek (near the Rincon Indian Reservation), the San Luis Rey River becomes considerably less steep and the floodplain widens out as it crosses the Pauma Valley in the vicinity of the Pala Indian Reservation. The streamcourse follows State Highway 76. There are no major stream crossings or constrictions between the dam site and the Interstate Highway 15 crossing near Pala Mesa Village. The embankments for the I-15 crossing represent a major floodplain constriction, especially in the left (south) overbank. Downstream of the I-15 crossing, the San Luis Rey River remains relatively wide and flat as it flows through Bonsall and Oceanside. There are large areas of active gravel mining operations in the streambed between I-15 and Oceanside. Levees have been constructed along the reach between Interstate Highway 5 and the ocean outfall to prevent flooding in the Oceanside Harbor area.

PRIOR STUDIES

An inundation study for Henshaw Dam was prepared by Leeds, Hill and Jewett, Inc. in 1973-1974. However, due to the lack of available documentation and the potential differences in assumptions and analysis, the methodology utilized in that study is no longer considered current for performing inundation studies.

No other studies or investigations for the hypothetical failure of Henshaw Dam were identified.



RIJ	As built	11-4-81	THOMAS A. LANE	JOHN D. BUCKLEY	LEEDS, HILL AND JEWETT, INC.	VISTA IRRIGATION DISTRICT	FO02-15
RIJ	Revised layout of S. Banquette, Revised 64-1	4-21-81	THOMAS A. LANE	JOHN D. BUCKLEY	CONSULTING ENGINEERS	HENSHAW DAM MODIFICATIONS	FO02-15
NCW	Added instrumentation details	7-25-80	THOMAS A. LANE	JOHN D. BUCKLEY	SAN FRANCISCO	FLOW RETARDATION STRUCTURE	FO02-15
RIJ	Revised drainage notes and locations	7-25-80	THOMAS A. LANE	JOHN D. BUCKLEY		PLANS	FO02-15
RIJ	Revised prior to bid	7-2-80	THOMAS A. LANE	JOHN D. BUCKLEY			FO02-15

FIGURE 4

HYDROLOGIC METHODOLOGY

Dam Breach Hydrograph

The failure hydrograph at Henshaw Dam was developed in accordance with FERC guidelines and addenda. The failure mode of this hydraulic fill dam is assumed to be erosion (sudden and partial failure). The breach is assumed to be parabolic in shape. A triangular-shaped failure hydrograph was assumed, with maximum outflow occurring at the time when one-half the 50,000 acre-foot capacity remains in the reservoir. It was assumed that the initial reservoir storage at the time of the hypothetical failure would be at maximum reservoir capacity, at the spillway elevation (2690.0 feet). This is referred to as the "sunny day" scenario (a dam with a full reservoir fails for reasons other than flooding). This scenario was selected because it is considered to be conservative for EAP purposes since downstream population would likely be least prepared for a dam failure.

The maximum outflow has been defined according to the methods developed by the California Office of Emergency Services (OES), "Revised Sequence of Steps in Inundation Map Preparation", August 1991. Past inundation studies performed by JMM for other dams using an earlier version of this procedure have been approved by FERC. The maximum outflow is calculated as follows:

$$Q_{\max} = CH^{2.5}, \text{ where } C = \text{Dam Breach Coefficient} \\ H = \text{Depth of Water at one-half reservoir capacity}$$

A dam breach coefficient (C) of 5 is appropriate for a parabolic breach with top width approximately three times the depth. This value was assumed for Henshaw Dam. The elevation at the reservoir bottom is at approximately 2620.0 feet and the spillway elevation is at 2690.0 feet. Using the reservoir storage curve provided by Vista Irrigation District (Figure 3), the reservoir capacity at the spillway elevation is approximately 50,000 acre-feet. One-half of this capacity is 25,000 acre-feet. From Figure 3, the depth of water (H) in the reservoir at a capacity of 25,000 acre-feet is approximately 57 feet. From the above equation, the maximum outflow from the hypothetical failure is defined as follows:

$$Q_{\max} = (5)(57)^{2.5} \\ Q_{\max} = 122,647 \text{ cfs}$$

In accordance with OES criteria, this maximum outflow was compared to the actual historical dam failure curve, based on the following equation:

$$Q_{\max} = 65H^{1.85}, \text{ where } H = \text{Depth of water in reservoir at time of failure}$$

From Figure 3, the depth of water (H) at the time of the hypothetical failure (at maximum capacity) is 70 feet. Therefore, the maximum outflow based on the dam failure curve is:

$$Q_{\max} = (65)(70)^{1.85} \\ Q_{\max} = 168,401 \text{ cfs}$$

This flow compares reasonably well with the 122,647 cfs computed above; therefore, the flow based on the OES methodology is adopted.

Assuming the outflow hydrograph to be in the shape of an isosceles triangle with the peak outflow at the mid-point, as dictated by California OES criteria, the hydrograph time duration (T) is defined as follows:

$$t = 0, \quad Q = 0 \text{ cfs}$$

$$t = T/2 \quad Q = 122,647 \text{ cfs}$$

$$t = T, \quad Q = 0 \text{ cfs}$$

The hydrograph volume (V) is equal to the reservoir capacity, assuming no reservoir inflow occurs at the time of the hypothetical dam failure. Therefore, T is derived as follows.

$$V = 50,000 \text{ acre-feet} \times 43,560 \text{ square feet/acre} = 2,178,000,000 \text{ cubic feet}$$

$$V = 1/2 bh$$

$$V = 1/2 TQ_{\max}$$

$$T = 2V/Q_{\max}$$

$$T = 2(2,178,000,000 \text{ cubic feet})/122,647 \text{ cfs}$$

$$T = 35,517 \text{ seconds} = 591.94 \text{ minutes} = 9.87 \text{ hours}$$

Sensitivity of Methodology

To test the possibility of developing a greater outflow hydrograph, an alternate condition was considered. Typically, the worst-case scenario is a "sunny day" condition (i.e., a dam with a full reservoir fails for reasons other than flooding). For the "sunny day" scenario, downstream development would likely be least prepared for a dam failure. Conditions at Henshaw Dam were analyzed to ensure that the "sunny day" scenario would in fact be the worst case.

The alternative considered was an overtopping condition due to imposing the Probable Maximum Flood (PMF) on a full reservoir. Data provided by Vista Irrigation District indicates that the PMF inflow to the reservoir is 198,200 cfs. The improved spillway capacity at the dam crest elevation (2740 feet) is 83,350 cfs. Since the improved spillway was designed to pass the PMF flow, the magnitude of the PMF outflow at the spillway would be less than 83,350 cfs. Furthermore, it is seen that the improved spillway will prevent the dam from overtopping during the assumed PMF flow. As a result, the PMF outflow is considerably less than the assumed failure hydrograph developed in the previous section.

Channel Routing

The routing of the dam failure hydrograph was accomplished using the U.S. Army Corps of Engineers' HEC-1 Flood Hydrograph Package computer program. The model was developed for the San Luis Rey River, from Lake Henshaw downstream to the Pacific Ocean. The Modified Puls routing method was the basis of the program calculations. It is based on storage-discharge and discharge-elevation relationships. The program determined these relationships for each reach from user-input typical cross sections, channel and overbank roughness coefficients, energy grade line (i.e., channel bed) slopes, and reach lengths, using the assumption of normal depth.

The cross sections were obtained using the best available 7.5-Minute Series U.S. Geological Survey Topographic Quadrangles, which have contour intervals of 20 to 40 feet. Plots of the cross sections used in the channel routing are appended to the end of this report; cross section locations are shown on the inundation maps. In HEC-1, cross section definition is limited to eight pairs of station/elevation data. Plots of the cross sections used in the HEC-1 analysis are appended to the end of this report.

The channel and floodplain roughness characteristics were determined from a field inspection of the potential inundation area, and reflect existing development as of November 1991. Urban floodplain roughness coefficients were determined based on methods developed by the USGS and recommended by the Corps of Engineers (Hejl, 1977). Lengths and slopes were taken from the USGS Topographic Maps.

A copy of the HEC-1 summary output is appended to the end of this report. A copy of the full HEC-1 printout is in Vista Irrigation District's files.

San Luis Rey River Base Streamflow

FERC guidelines do not specify the methods to be used in applying a concurrent base streamflow to the failure hydrograph downstream of the dam. However, the California OES criteria specifies a "10-year average maximum" streamflow be used in the breach analyses. An investigation of streamflow data for the San Luis Rey River revealed that daily flow data was available for six USGS gaging stations between Lake Henshaw and the Pacific Ocean. However, only two of the stations (at Oceanside and near Bonsall) have sufficient periods of record for the base streamflow analysis. The 10-year average maximum streamflow analysis at these two stations is summarized in Tables 1 and 2, below.

In determining the 10-year average maximum streamflows at these two stations, USGS annual maximum mean daily flows were averaged for consecutive 10-year periods. The consecutive period with the highest average was utilized for the baseflow.

To determine base streamflows in areas upstream of the gage near Bonsall, a unit discharge analysis was performed to interpolate flows. The drainage area at Lake Henshaw is 206 square miles. Therefore, unregulated drainage area at the station near Bonsall is 307 square miles. The unit discharge is 7.74 cubic feet per second per square mile. Applying this value to the drainage areas at the remaining four gaging stations results in weighted 10-year average maximum streamflows near Moosa Canyon, at Bonsall, at Couser Canyon, and near Pala. This analysis is summarized in Table 3. For the reach between the confluence with Paradise Creek and Henshaw Dam, a base streamflow of 0 cfs was assumed, consistent with the practice of making no releases from Henshaw Dam as long as there is significant streamflow in the San Luis Rey River below Paradise Creek.

Therefore, a nominal flow of between 0 and 3,700 cfs was assumed to be the base streamflow in the San Luis Rey River at the time of the hypothetical dam failure. It should be noted that this base streamflow will likely have a minimal effect on the study results due to the magnitude of the maximum outflow of 122,647 cfs based on the hypothetical failure of the dam.

INUNDATION AREAS

The inundation areas determined from the output of the HEC-1 computer model at each cross section were mapped on 7.5-Minute Series USGS Topographic Quadrangles and are presented as Maps B1 through 11 at the end of this report. Between cross sections, inundation boundaries were interpolated based on the contours.

TABLE 1
10-YEAR BASEFLOW AT BONSAI

Station: San Luis Rey River nr Bonsall
Gage No.: 11041000

Drainage Area: 513 sq mi
Period of Record: 1930 - 1980 (51 yr)

<u>Water Year</u>	<u>Month</u>	<u>Annual Maximum Discharge (cfs)</u>	<u>10-Year Average Flow (cfs)</u>	
1930	May	339	-	
1931	Feb	97	-	
1932	Feb	2,940	-	
1933	Jan	138	-	
1934	Feb	46	-	
1935	Feb	212	-	
1936	Feb	231	-	
1937	Feb	7,780	-	
1938	Mar	9,660	-	
1939	Feb	341	2,178	1930 - 1939
1940	Feb	279	2,172	
1941	Dec	2,140	2,377	Maximum (1932 - 1941)
1942	Mar	393	2,122	
1943	Jan	2,080	2,316	
1944	Feb	555	2,367	
1945	Mar	272	2,373	
1946	Dec	1,810	2,531	
1947	Mar	35	1,757	
1948	Dec	18	792	
1949	Jan	4.4	759	
1950	-	0	731	
1951	-	0	517	
1952	Mar	801	558	
1953	Nov	1.2	350	
1954	-	0	294	
1955	Jan	0.10	267	
1956	-	0	86	
1957	-	0	82	
1958	Apr	789	160	
1959	-	0	159	
1960	Feb	0.20	159	
1961	-	0	159	
1962	Jan	0.40	79	
1963	-	0	79	
1964	Nov	0.20	79	
1965	-	0	79	
1966	Nov	832	162	
1967	Dec	1,540	316	
1968	Mar	148	252	
1969	Feb	3,160	568	
1970	Mar	200	588	
1971	Dec	80	596	
1972	Dec	51	601	
1973	Mar	122	613	
1974	Jan	619	675	
1975	Apr	108	686	
1976	Feb	210	624	
1977	Jan	142	484	
1978	Jan	3,740	843	
1979	Mar	3,560	883	
1980	Oct	2.1	863	1971 - 1980

TABLE 2
10-YEAR BASEFLOW AT OCEANSIDE

Station: San Luis Rey River at Oceanside
Gage No.: 11042000

Drainage Area: 558 sq mi
Period of Record: 1913 - 1990 (59 yr)

<u>Water Year</u>	<u>Month</u>	<u>Annual Maximum Discharge (cfs)</u>	<u>10-Year Average Flow (cfs)</u>	
1930	May	263	-	
1931	-	0	-	
1932	Feb	2,190	-	
1933	Jan	111	-	
1934	-	0	-	
1935	Feb	259	-	
1936	Feb	84	-	
1937	Feb	7,930	-	
1938	Mar	11,300	-	
1939	Dec	292	2,243	1930 - 1939
1940	Feb	376	2,254	
1941	Mar	1,320	2,386	
1942	Dec	205	2,188	
1947	-	0	2,177	
1948	-	0	2,177	
1949	-	0	2,151	
1950	-	0	2,142	
1951	-	0	1,349	
1952	Mar	242	244	
1953	Nov	0.10	214	
1954	-	0	177	
1955	-	0	45	
1956	-	0	24	
1957	-	0	24	
1958	Apr	662	90	
1959	-	0	90	
1960	-	0	90	
1961	-	0	90	
1962	-	0	66	
1963	-	0	66	
1964	-	0	66	
1965	-	0	66	
1966	Nov	139	80	
1967	Dec	1,700	250	
1968	Mar	77	192	
1969	Feb	3,340	526	
1970	Mar	264	552	
1971	Dec	24	554	
1972	Dec	38	558	
1973	Mar	132	571	
1974	Jan	349	606	
1975	Apr	132	620	
1976	Feb	123	618	
1977	Jan	194	467	
1978	Jan	3,000	760	
1979	Sep	12,400	1,666	
1980	Feb	9,080	2,547	
1981	Mar	552	2,600	
1982	Mar	3,210	2,917	
1983	Mar	5,380	3,442	
1984	Dec	1,590	3,566	
1985	Dec	327	3,586	
1986	Feb	1,360	3,709	Maximum (1977 - 1986)
1987	Jan	146	3,705	
1988	Jan	288	3,433	
1989	Dec	92	2,203	
1990	Feb	78	1,302	1981 - 1990

TABLE 3
10-YEAR AVERAGE MAXIMUM BASEFLOW ANALYSIS

There are only two gaging stations on San Luis Rey River with adequate periods of record to perform the 10-year average maximum baseflow analysis required by the CA OES guidelines. These are the stations at Oceanside and near Bonsall. A CSM (cfs per square mile) analysis was performed for these stations in order to interpolate flows at the stations with inadequate records. Since 206 sq mi of drainage area is regulated by Henshaw Dam, the CSM analysis is based on the unregulated drainage area. This analysis is summarized below:

DA (sq mi)	Station Name	Station Number	Q10 (avg max) (cfs)	Unregulated DA (sq mi)*	Unit Q (cfs/sq mi)
558	SLR River @ Oceanside	11042000	3,709	352	10.54
513	SLR River nr Bonsall	11041000	2,377	307	7.74

* Excludes 206 sq mi tributary to Lake Henshaw (at USGS gage sta. 11035000)

Inadequate periods of record were found for four gaging stations located between Bonsall and Lake Henshaw. The unit discharge analysis for the station near Bonsall is used to interpolate 10-year average maximum baseflow values at these four stations:

DA (sq mi)	Station Name	Station Number	Unregulated DA (sq mi)*	Unit Q (cfs/sq mi)**	Q10 (avg max) (cfs)	Q10 (avg max) Rounded to Nearest 100 cfs	Incremental Increase fr/ Previous (cfs)
499	SLR River bl Moosa Cyn nr Bonsall	11040700	293	7.74	2,268	2,300	400
456	SLR River @ Bonsall	11040500	250	7.74	1,935	1,900	700
364	SLR River - Couser Cyn nr Pala	11039800	158	7.74	1,223	1,200	300
317	SLR River nr Pala	11038500	111	7.74	859	900	900
-	Upstream of Paradise Creek	-	-	-	0	0	0

* Excludes 206 sq mi tributary to Lake Henshaw (at USGS gage sta. 11035000)

** Based on CSM analysis at gaging station near Bonsall (at USGS gage sta. 11041000)

FLOOD WAVE ARRIVAL TIMES

For the purposes of this analysis, flood peak arrival time (at any point along the inundation path) is defined as the time from the beginning of the dam breach at Henshaw Dam to the time when the peak of the dam failure hydrograph arrives at downstream locations. Flood peak arrival times at each cross section were determined from the hydrographs presented in the HEC-1 output. The resulting arrival times are also presented on the inundation maps. It is noted that all flood wave arrival times include the 4.94 hours required for the peak reservoir outflow to be generated after initiation of a dam failure.

The *flood time* is time required for the flood hydrograph discharge to exceed the channel bank capacity. Flood times have been computed for each cross section. These times are measured along the rising limb of the hydrograph, from the initiation of the dam breach to the time when the channel bank elevation is exceeded. Similarly, the *deflood time* is measured along the falling limb of the hydrograph, from the initiation of the dam breach to the time when the flood waters recede below the level of the channel bank. Both the *flood time* and *deflood time* are presented on the maps at each cross section. Where the 10-year base streamflow exceeds the channel capacity, a flood time of zero is shown on the maps. Where the channel contains the entire flood scenario, no flood or deflood time is shown.

The flood times are much shorter than the flood peak arrival times at many cross sections, indicating that overbank flooding would begin to occur significantly earlier than the time when the flood peak arrives.

SUMMARY

The following is a scenario of what may occur after a hypothetical catastrophic event causes Henshaw Dam to fail:

1. The hypothetical erosional dam failure results in a maximum outflow of approximately 123,000 cfs, occurring 5 hours after the breach occurs, when one-half the volume of the reservoir still remains. The reservoir empties completely in approximately 10 hours after the breach begins. The failure flood water from Lake Henshaw flows downstream in the San Luis Rey River a distance of approximately 51 miles to the Pacific Ocean.
2. The 14-mile reach of the San Luis Rey River between the dam site and the confluence with Paradise Creek is relatively steep. Therefore, the inundation area in this reach is generally confined to a topwidth of less than 1,000 feet. The peak flow arrives at the confluence with Paradise Creek approximately 6 hours after the initial breach.
3. Downstream of the confluence with Paradise Creek, the San Luis Rey River becomes much flatter. The inundation area expands to cover a topwidth of 2,000 to 3,000 feet. A portion of the Rincon Indian Reservation is inundated in the vicinity of Valley Center Road. The peak flow arrives at the unincorporated community of Pala (26 miles downstream of the dam) at approximately 7 hours after the initial breach; it reaches the I-15 crossing (32 miles downstream of the dam) at about 8 hours after the initial breach. The bridge at I-15 is not overtopped by the peak flow.
4. Downstream of I-15, the inundation area becomes even wider, covering a topwidth of 3,000 to 4,000 feet. Downstream of the community of Bonsall, the inundation area topwidth narrows to a range between 1,000 to 2,000 feet. The peak arrival time at Bonsall (37 miles downstream of the dam) is approximately 9 hours after the initial breach.
5. Downstream of Bonsall, the inundation area widens as it passes through the City of Oceanside. The maximum topwidth approaches 7,000 feet. Residential and commercial

TABLE 4
DAM BREACH INUNDATION DATA

<u>Reach Number</u>	<u>Stationing (feet below dam)</u>	<u>Peak Flow (cfs)</u>	<u>Maximum Water Surface Elevation (ft)</u>	<u>Left Overbank "n" value</u>	<u>Channel "n" value</u>	<u>Right Overbank "n" value</u>
1	39+20	121,759	2,659.6	0.08	0.10	0.08
2	105+20	121,265	2,603.2	0.08	0.10	0.08
3	165+20	120,658	2,524.0	0.08	0.10	0.08
4	219+20	120,453	2,472.6	0.09	0.09	0.08
5	292+20	120,075	2,368.1	0.08	0.10	0.08
6	336+20	119,869	2,259.9	0.08	0.10	0.08
7	424+20	119,672	2,141.9	0.08	0.10	0.08
8	493+20	119,531	2,014.6	0.08	0.10	0.08
9	513+20	119,484	1,878.7	0.08	0.10	0.08
10	563+20	119,442	1,634.1	0.08	0.10	0.08
11	631+20	119,336	1,169.6	0.08	0.10	0.08
12	681+20	119,248	990.6	0.08	0.10	0.08
13	745+20	118,929	922.6	0.08	0.10	0.08
14	823+20	119,213	863.8	0.08	0.06	0.08
15	883+20	119,028	849.2	0.08	0.06	0.08
16	933+20	118,718	818.5	0.07	0.07	0.08
17	991+20	118,551	787.9	0.08	0.07	0.09
18	1065+20	118,249	757.9	0.07	0.06	0.09
19	1113+20	118,147	700.2	0.08	0.05	0.07
20	1157+20	118,017	695.4	0.08	0.06	0.08
21	1203+20	117,920	639.8	0.08	0.08	0.08
22	1268+20	117,775	521.6	0.08	0.08	0.08
23	1338+20	117,662	452.1	0.08	0.06	0.08
24	1398+20	117,436	392.8	0.07	0.06	0.07
25	1447+20	117,516	361.1	0.08	0.07	0.08
26	1497+20	117,310	337.0	0.08	0.05	0.08
27	1567+20	117,168	315.2	0.08	0.06	0.10
28	1607+20	116,844	300.8	0.07	0.07	0.07
29	1679+20	116,652	283.5	0.08	0.05	0.08
30	1705+20	117,286	266.1	0.08	0.09	0.08
31	1719+20	117,229	256.6	0.05	0.09	0.05
32	1776+20	116,791	240.2	0.08	0.09	0.08
33	1900+20	116,279	205.3	0.08	0.08	0.08
34	1964+20	115,975	182.8	0.08	0.08	0.08
35	2036+20	116,099	167.1	0.08	0.06	0.08
36	2136+20	115,643	154.3	0.08	0.09	0.08
37	2204+20	115,405	129.1	0.08	0.10	0.08
38	2314+20	114,864	107.3	0.05	0.08	0.04
39	2408+20	114,068	75.5	0.10	0.07	0.07
40	2486+20	113,877	54.6	0.15	0.08	0.07
41	2590+20	111,554	39.8	0.12	0.09	0.07
42	2634+20	111,367	34.5	0.08	0.10	0.08
43	2669+20	111,276	36.0	0.10	0.08	0.10
44	2672+20	111,282	38.4	0.15	0.10	0.15
45	2683+20	111,220	28.4	0.15	0.10	0.03
46	2684+70	111,226	28.8	0.15	0.10	0.08
47	2690+50	111,158	24.1	0.15	0.10	0.07
48	2692+70	111,170	25.0	0.15	0.10	0.07

areas along the river are inundated in the vicinity of the community of San Luis Rey. The Oceanside Airport is also inundated. The peak arrives at the North River Road crossing (46 miles downstream of the dam) approximately 11 hours after the initial breach; the peak arrives at the airport (48 miles downstream of the dam) approximately 12 hours after the initial breach.

6. Downstream of the airport, the inundation area narrows to a width of approximately 1,000 feet as the river approaches the I-5 crossing. The bridge at I-5 is not overtopped by the peak flow. Downstream of I-5, the inundation area widens to include some developed areas, including the parking lot on the north side of the river. The AT&SF railroad bridge downstream of I-5 is slightly overtopped by the flood waters. The peak arrival time at the ocean (51 miles downstream of the dam) is approximately 13 hours after the initial breach. The Coast Highway crossing (at the beach) will be washed out by the flood waters.

Table 4 summarizes the Henshaw Dam downstream inundation results.

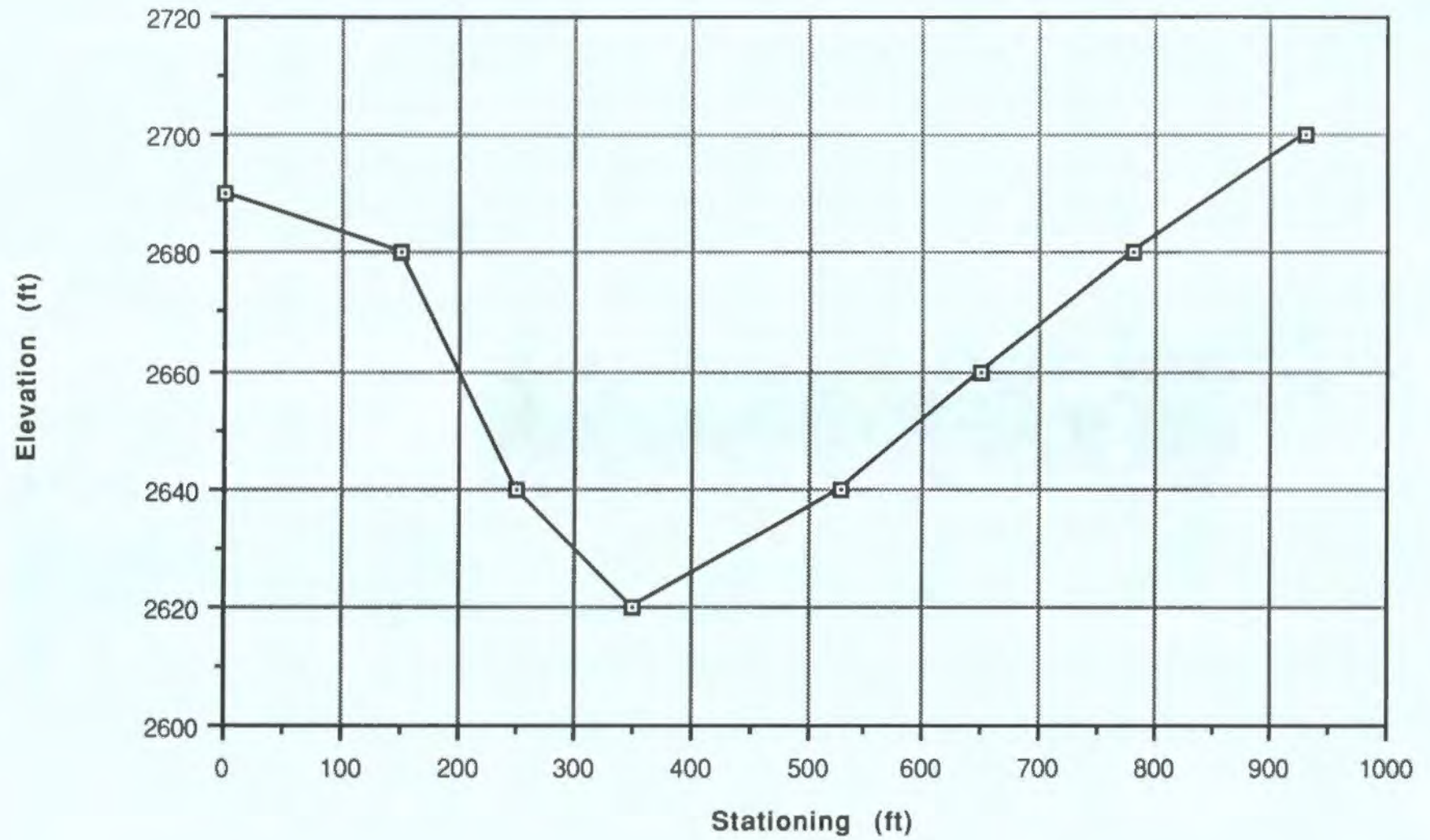
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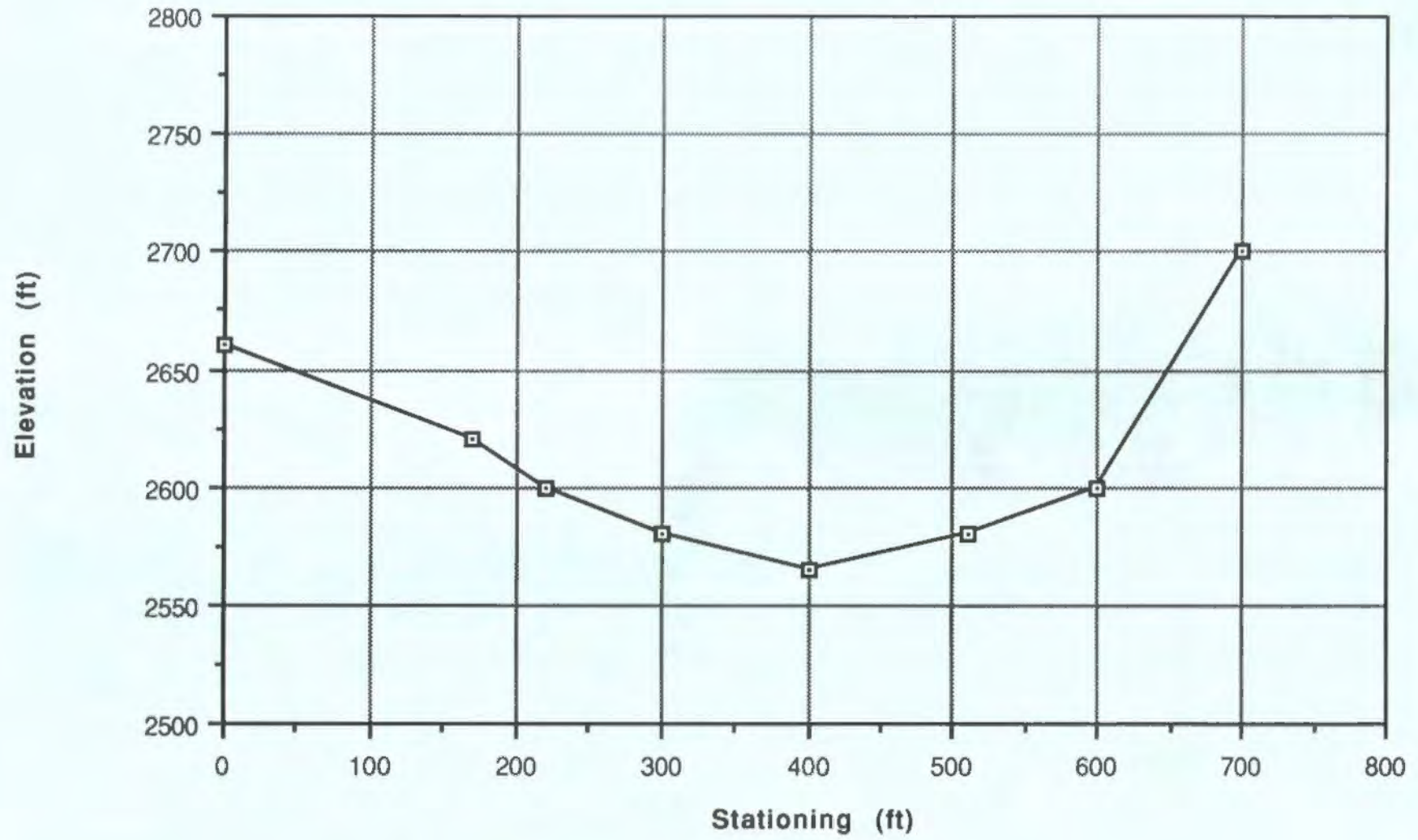
Cross Sections



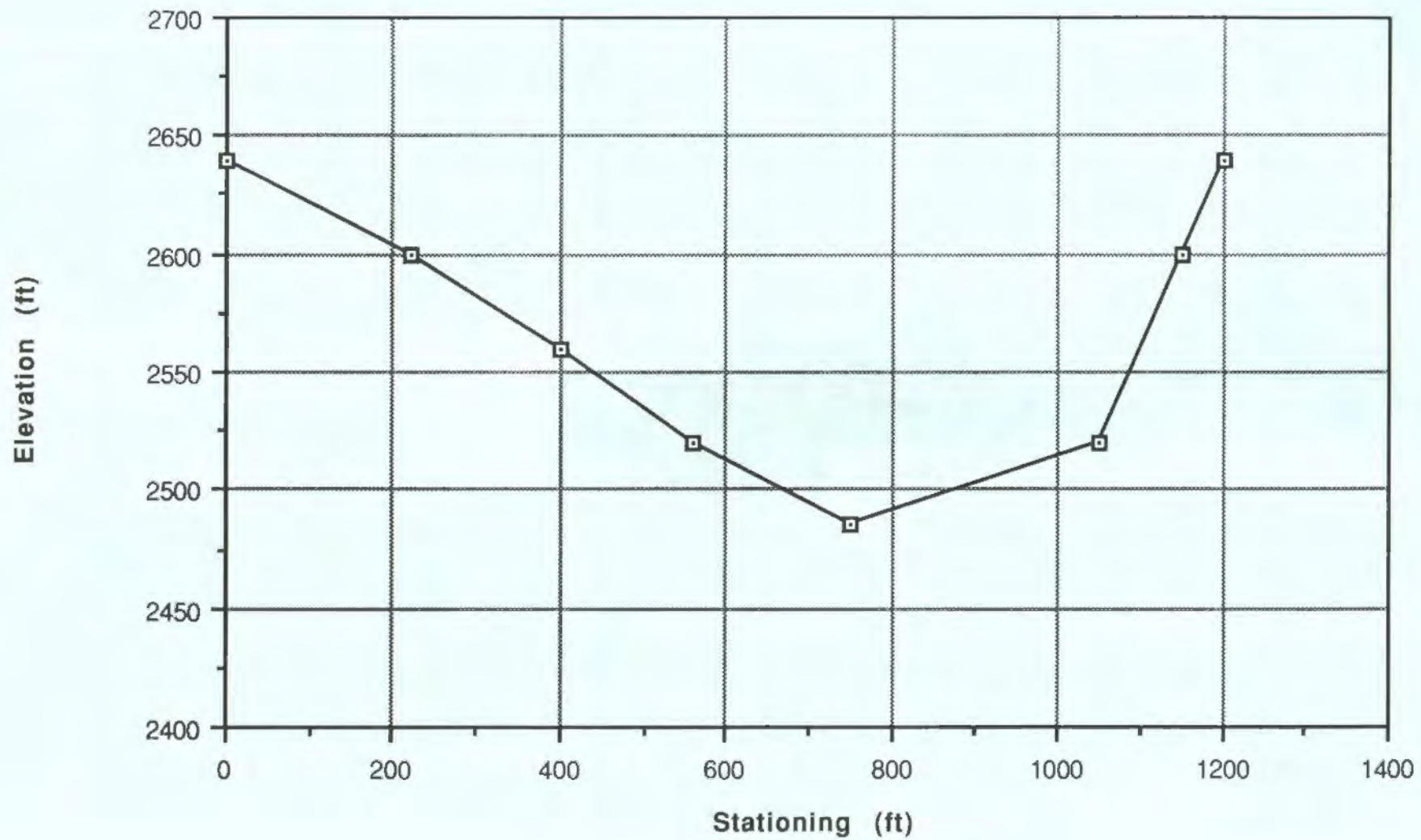
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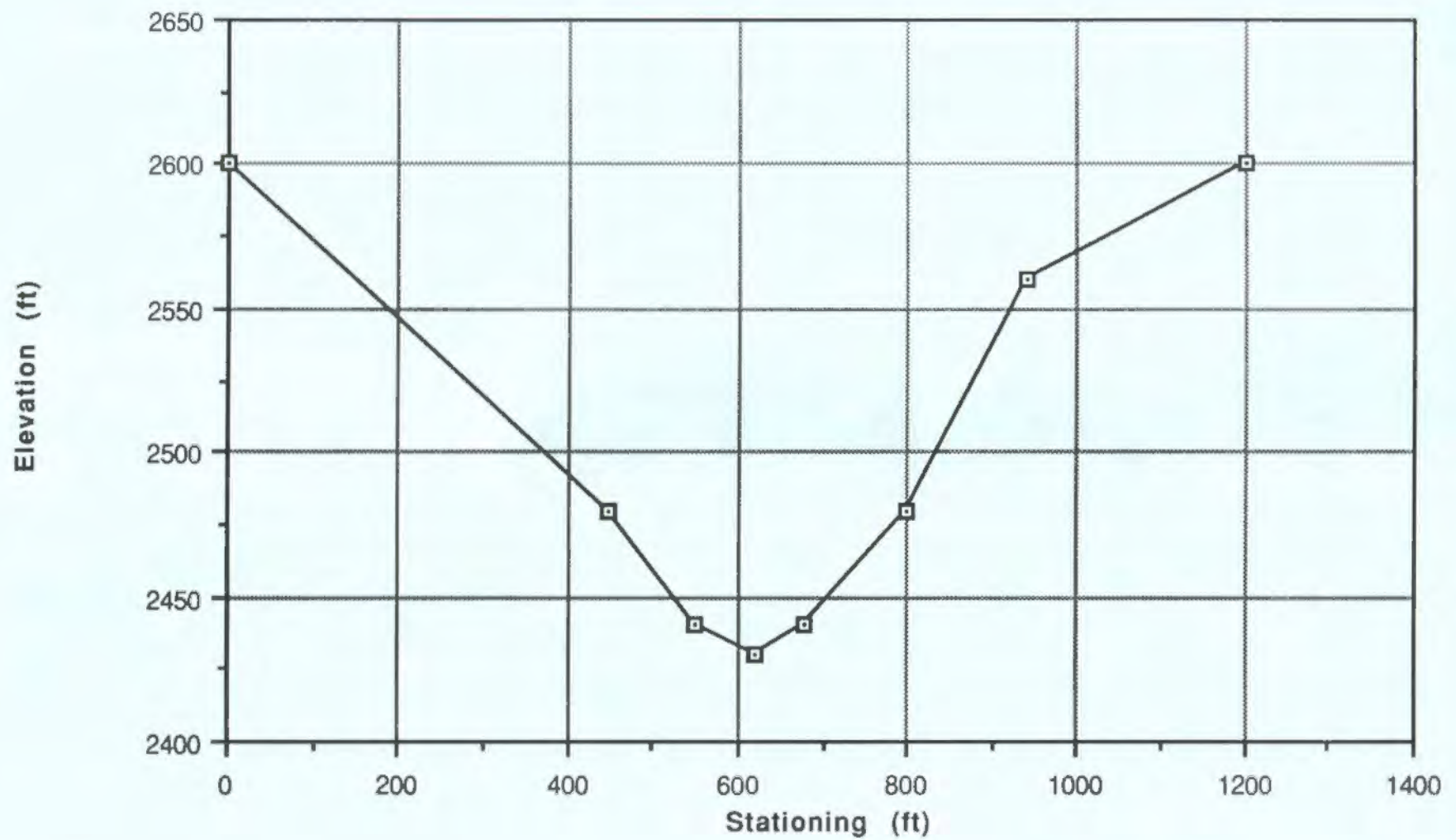
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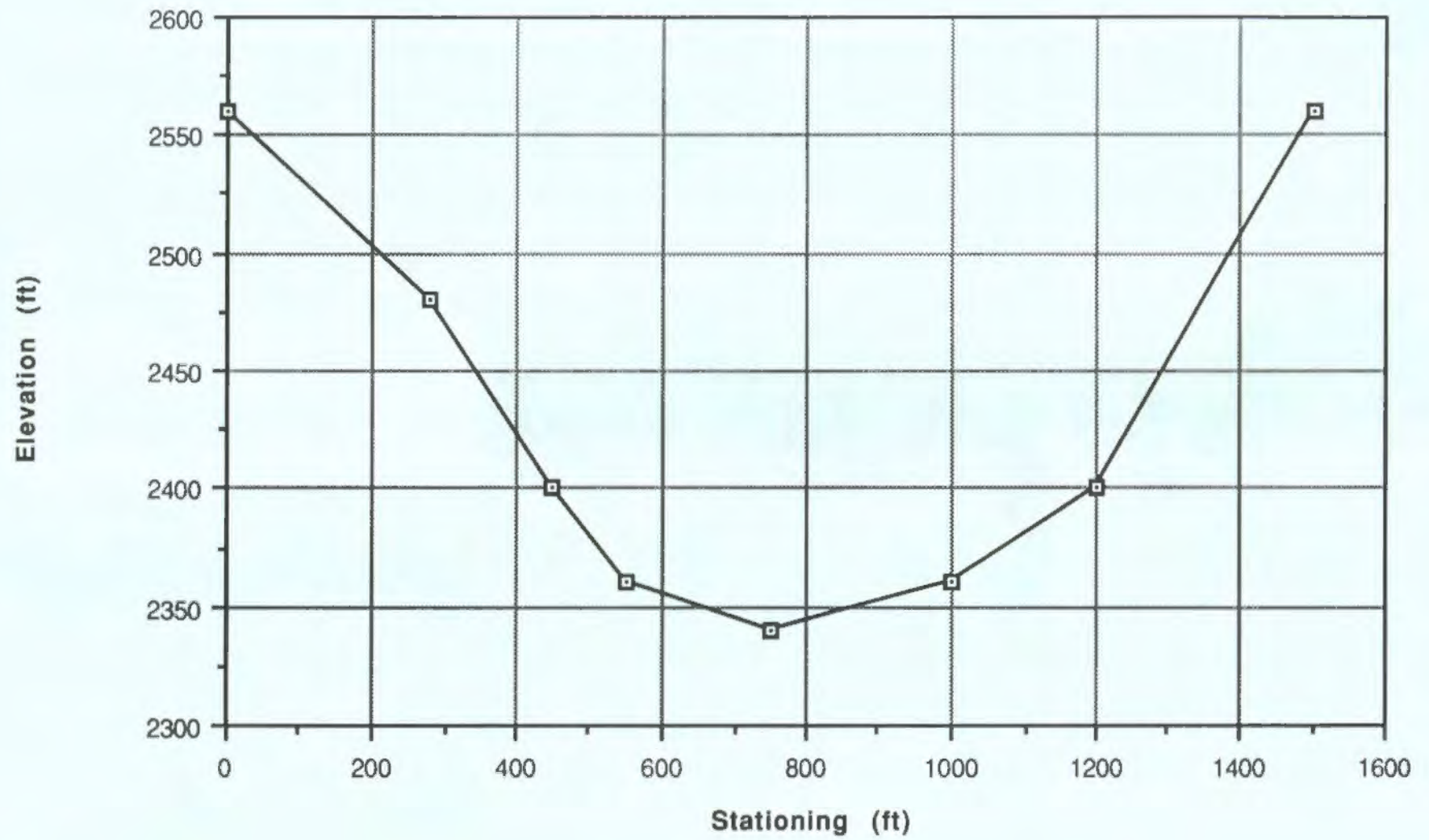
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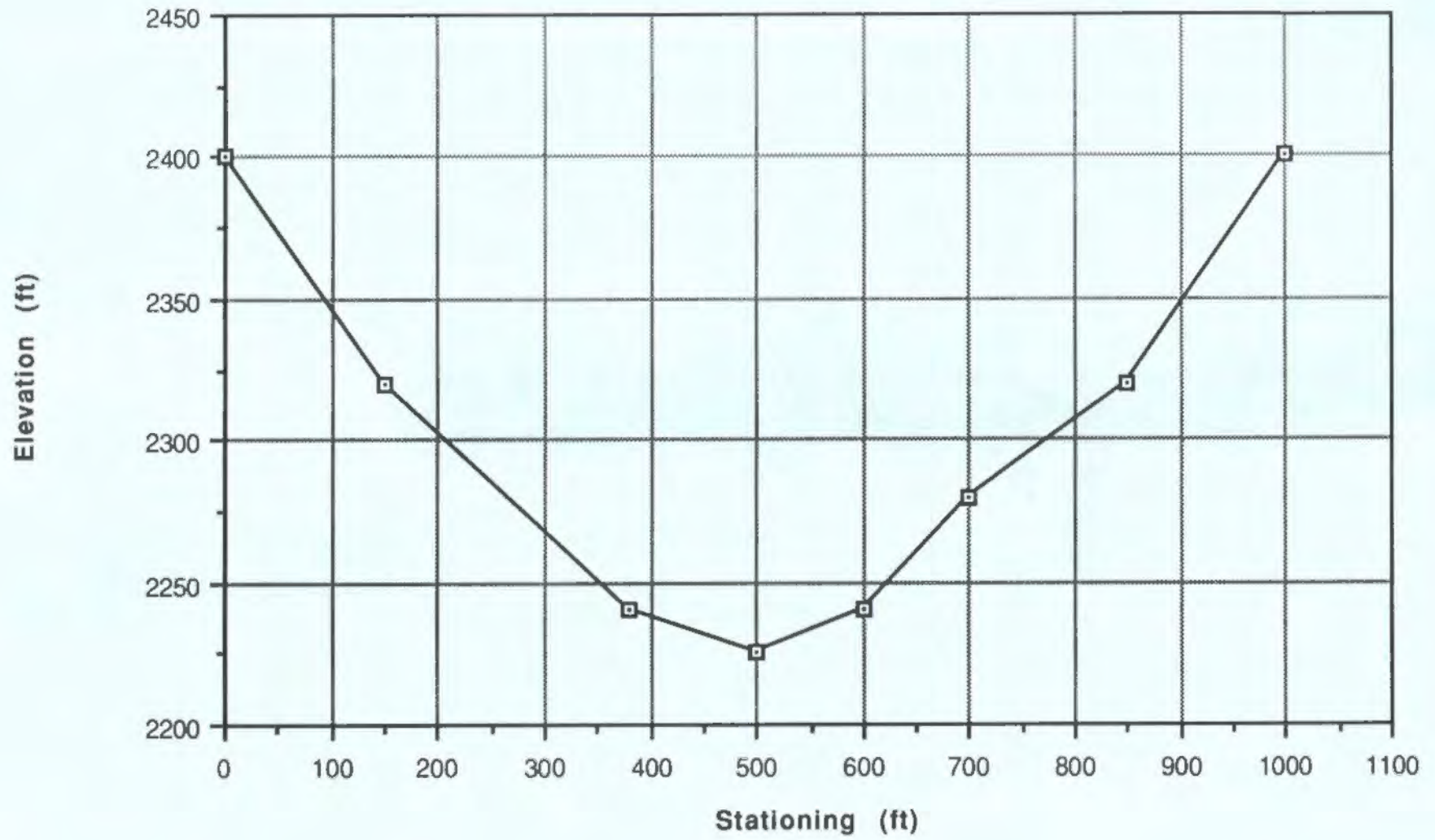
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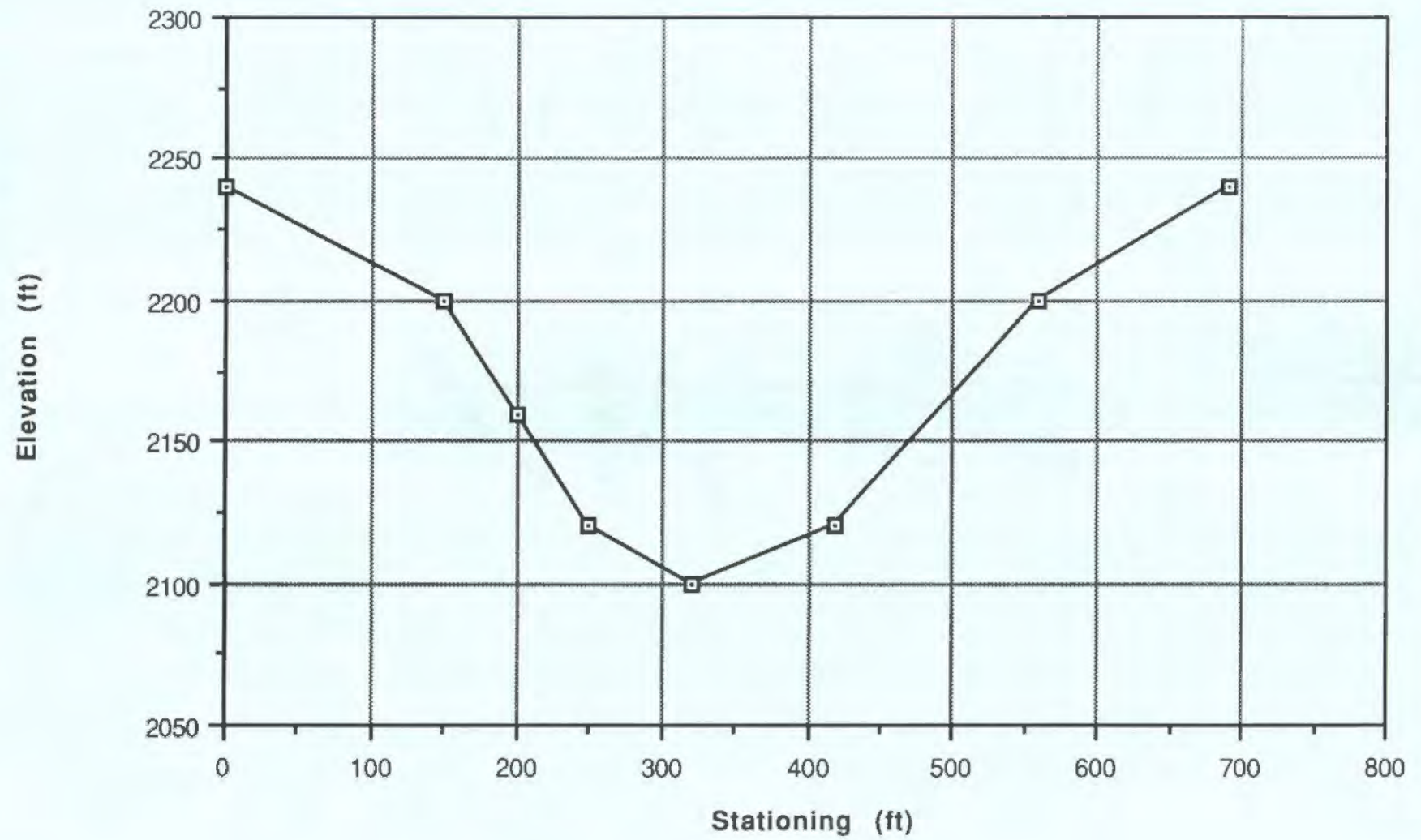
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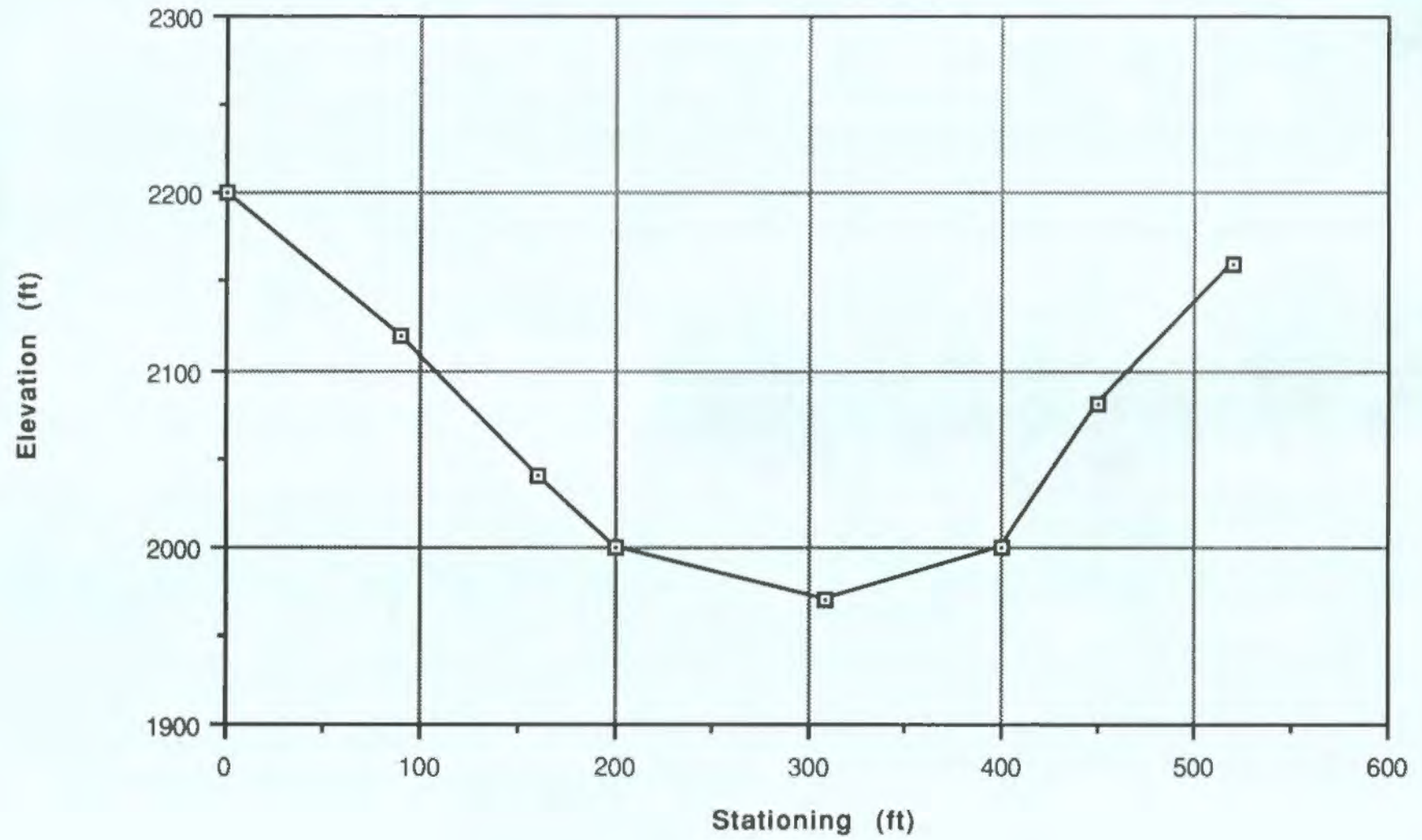
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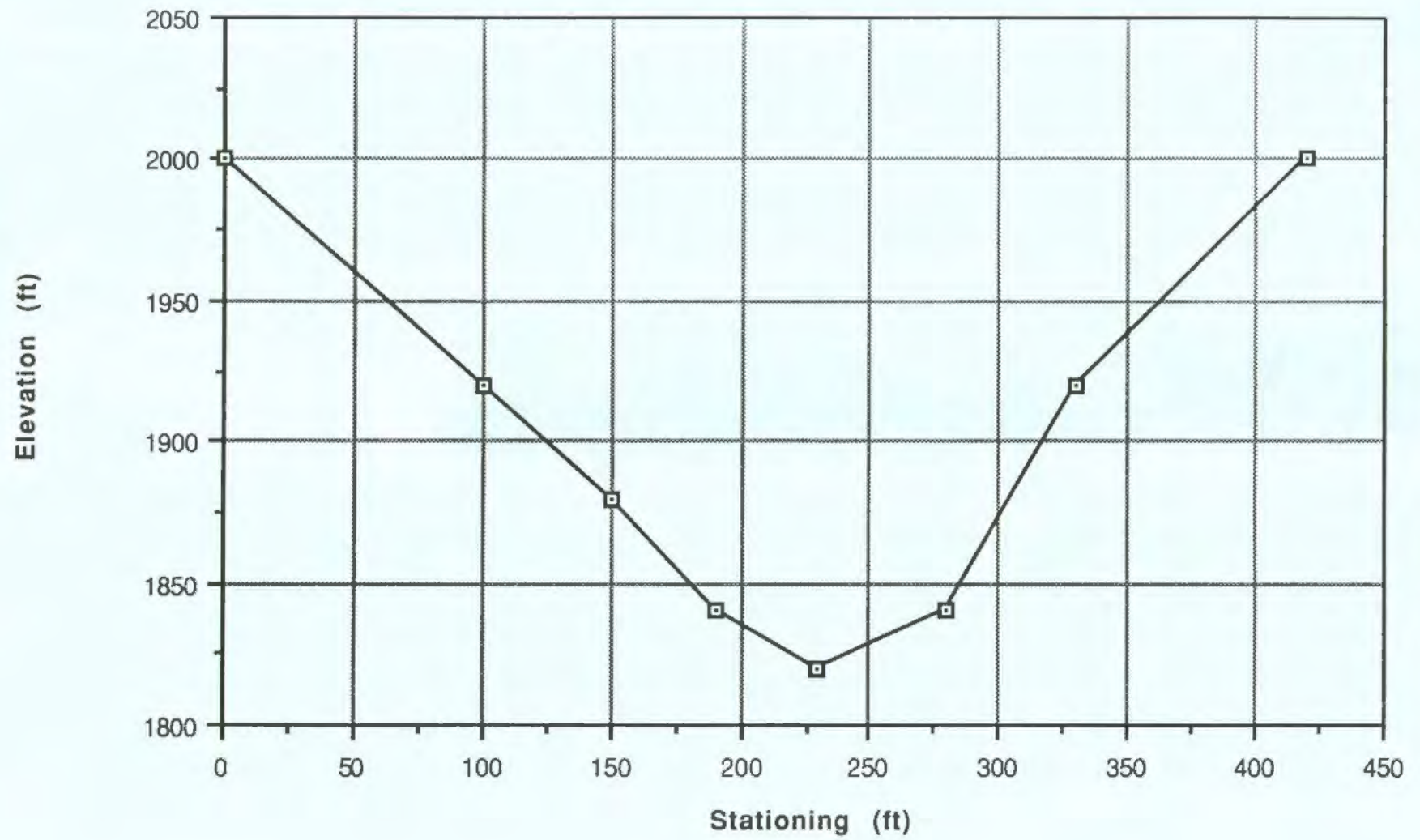
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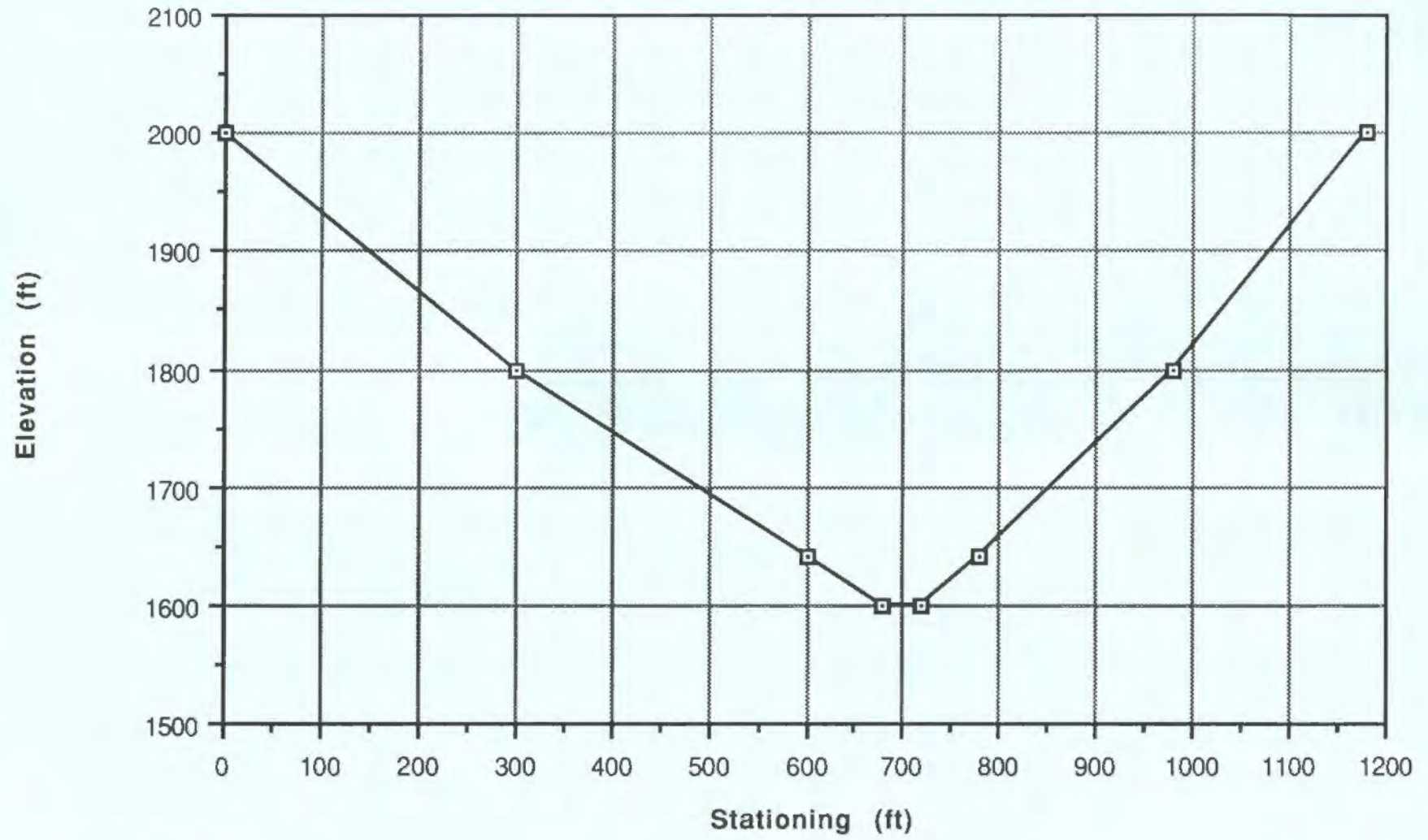
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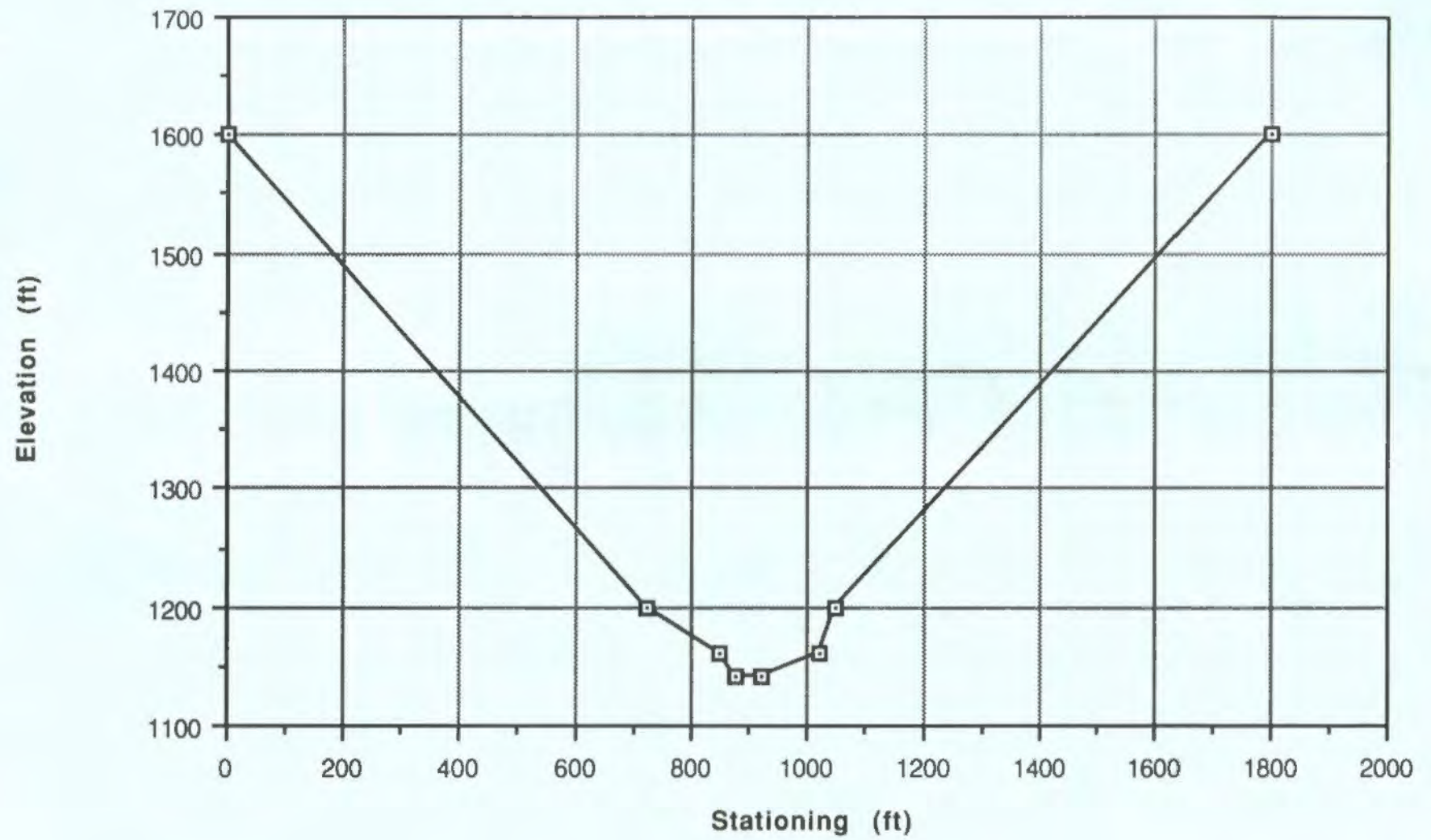
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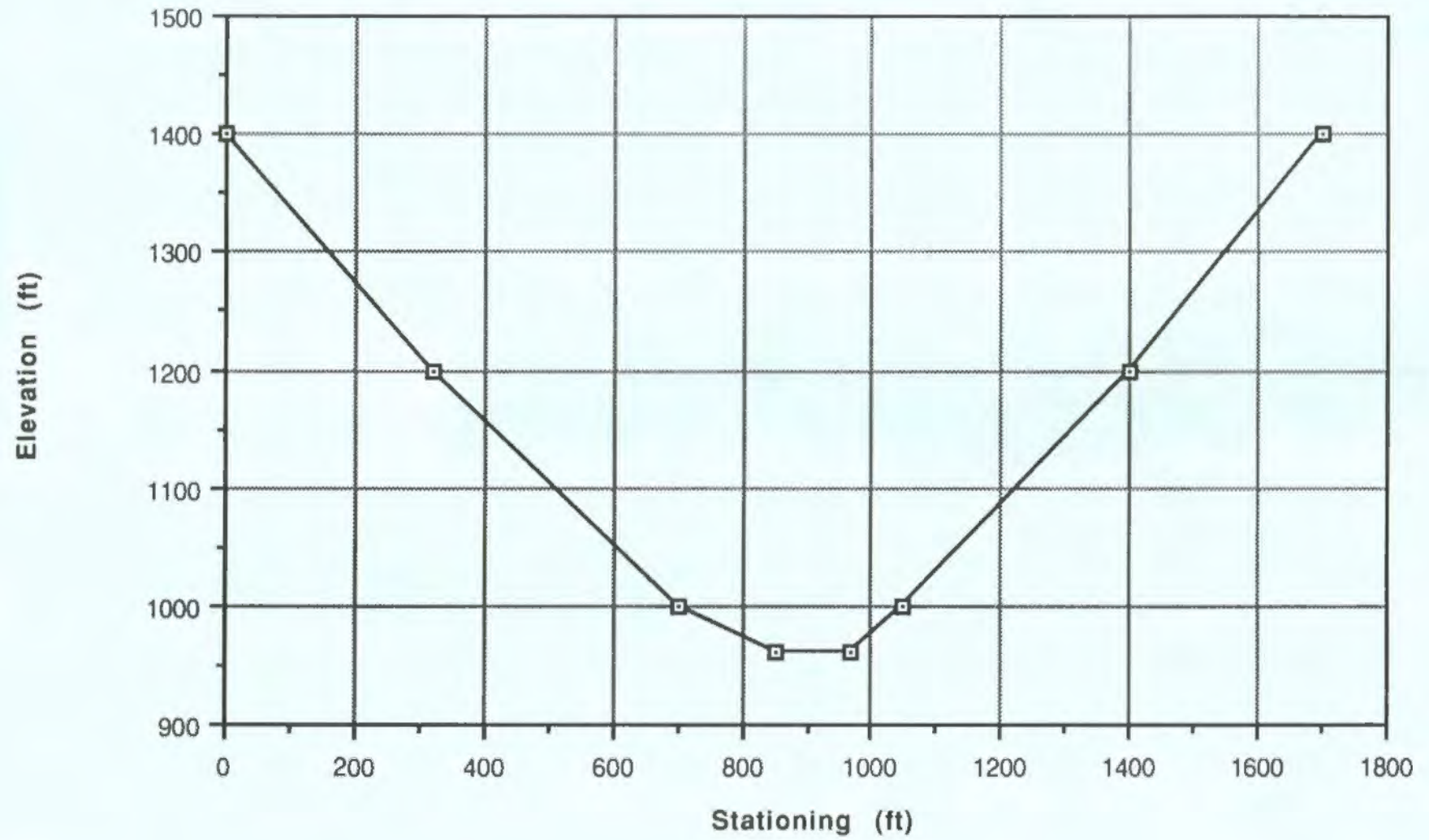
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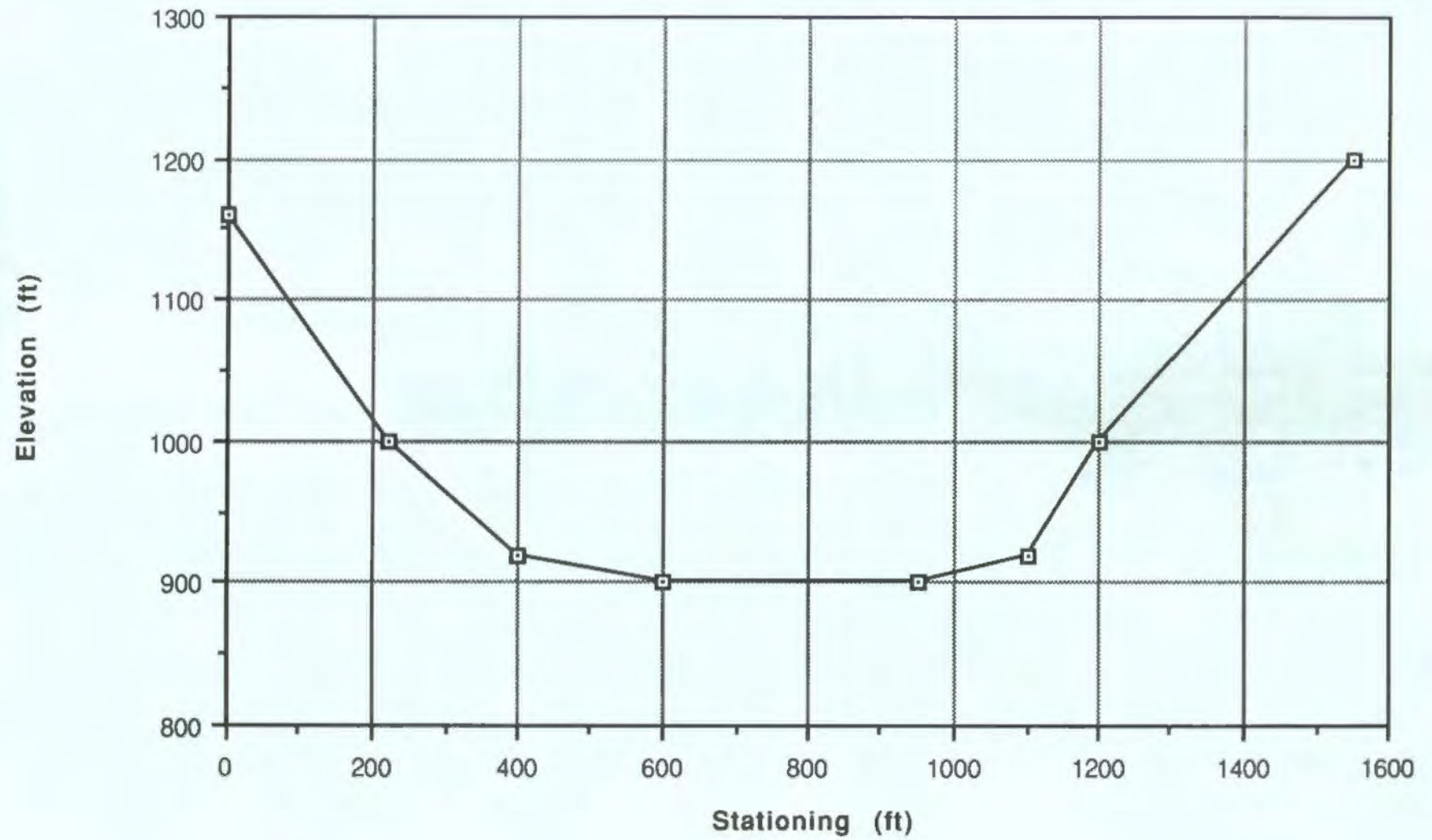
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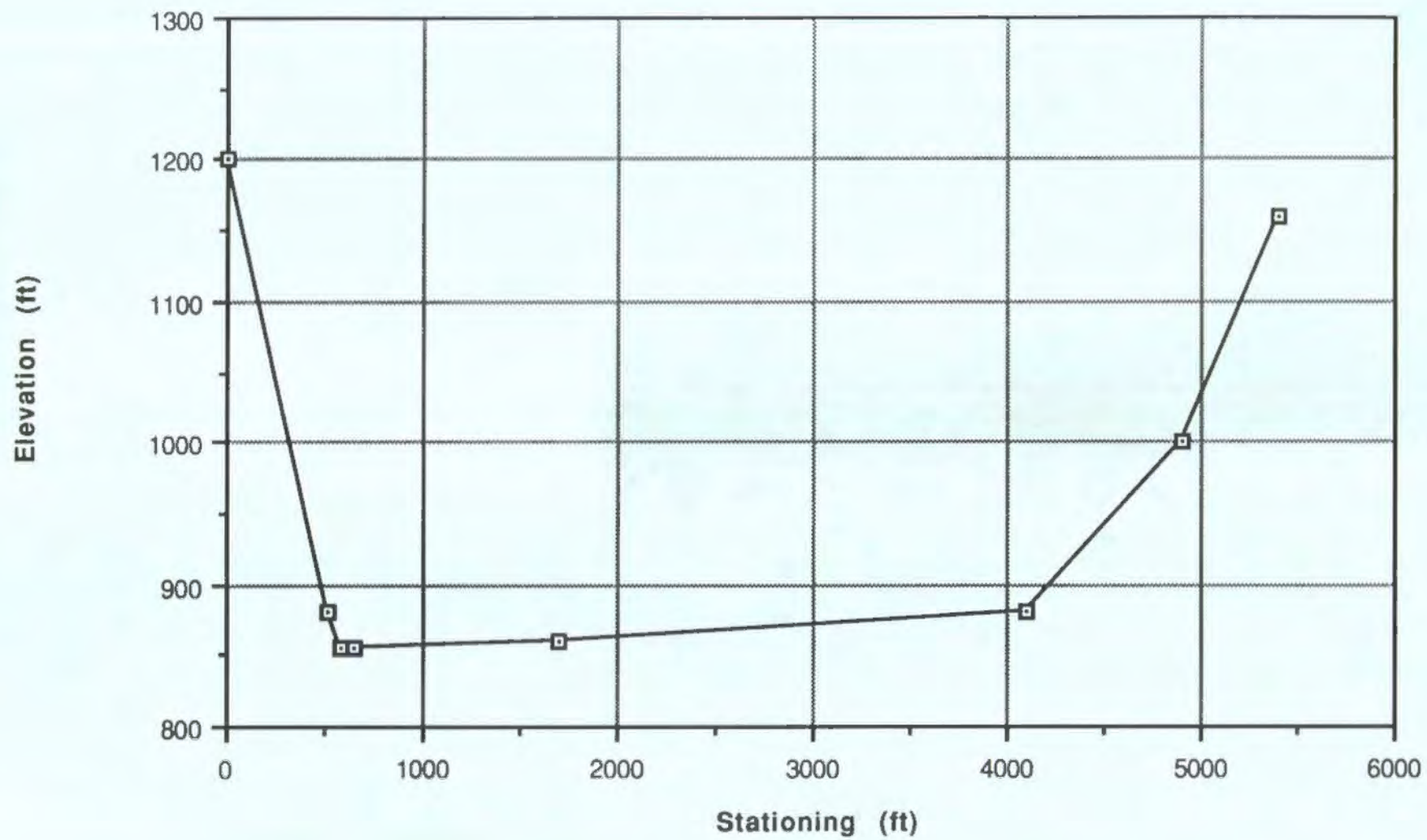
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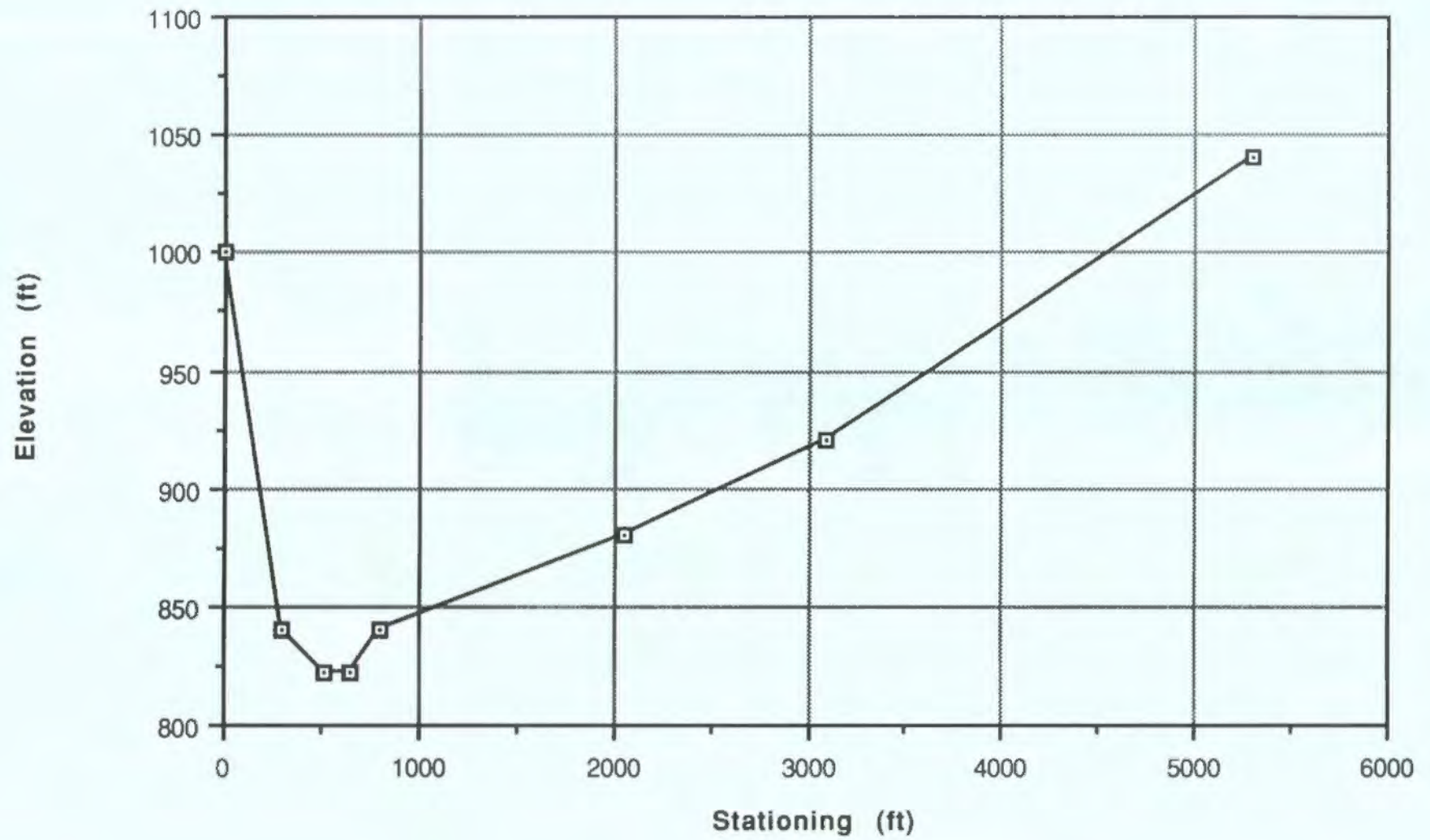
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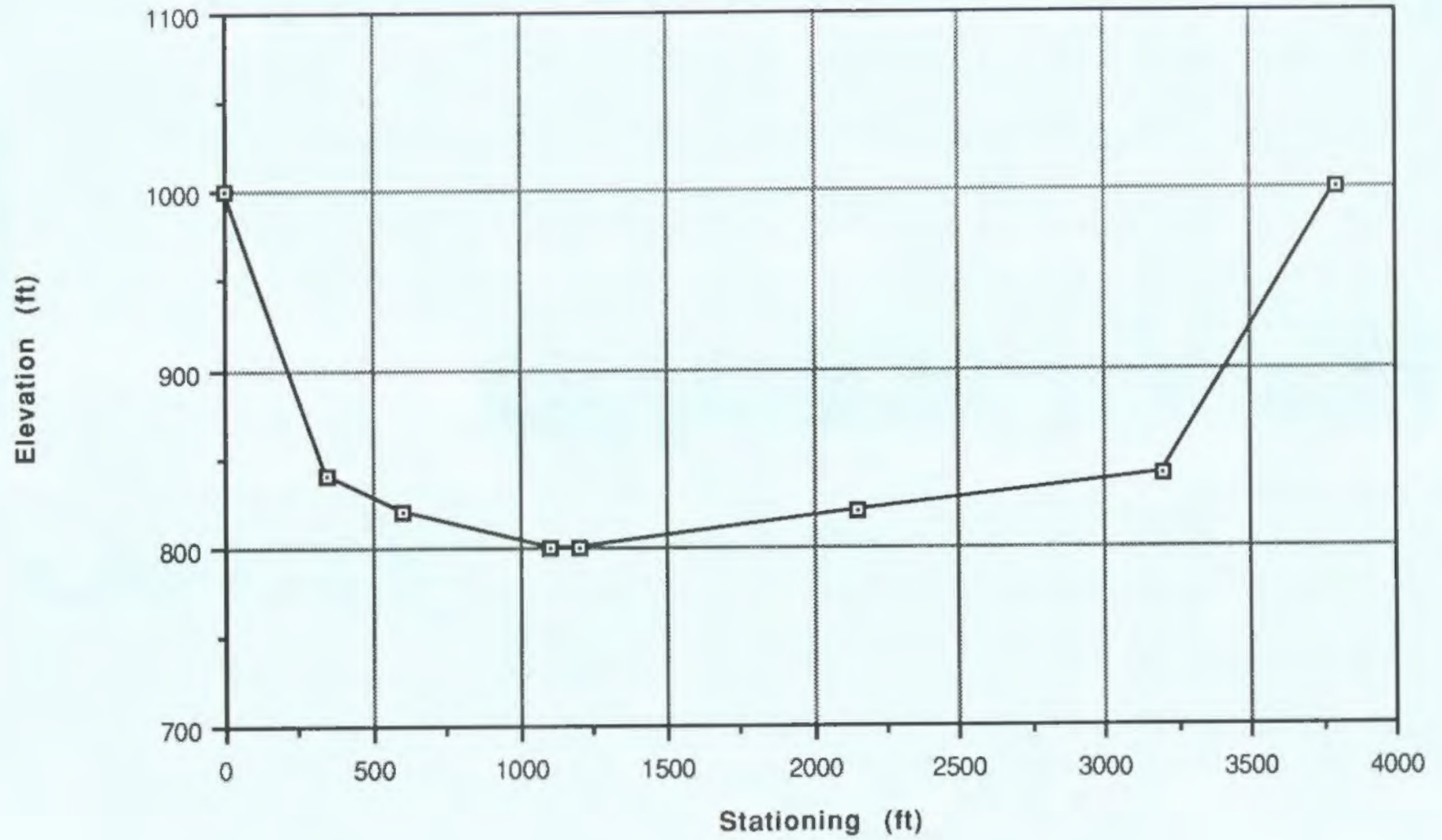
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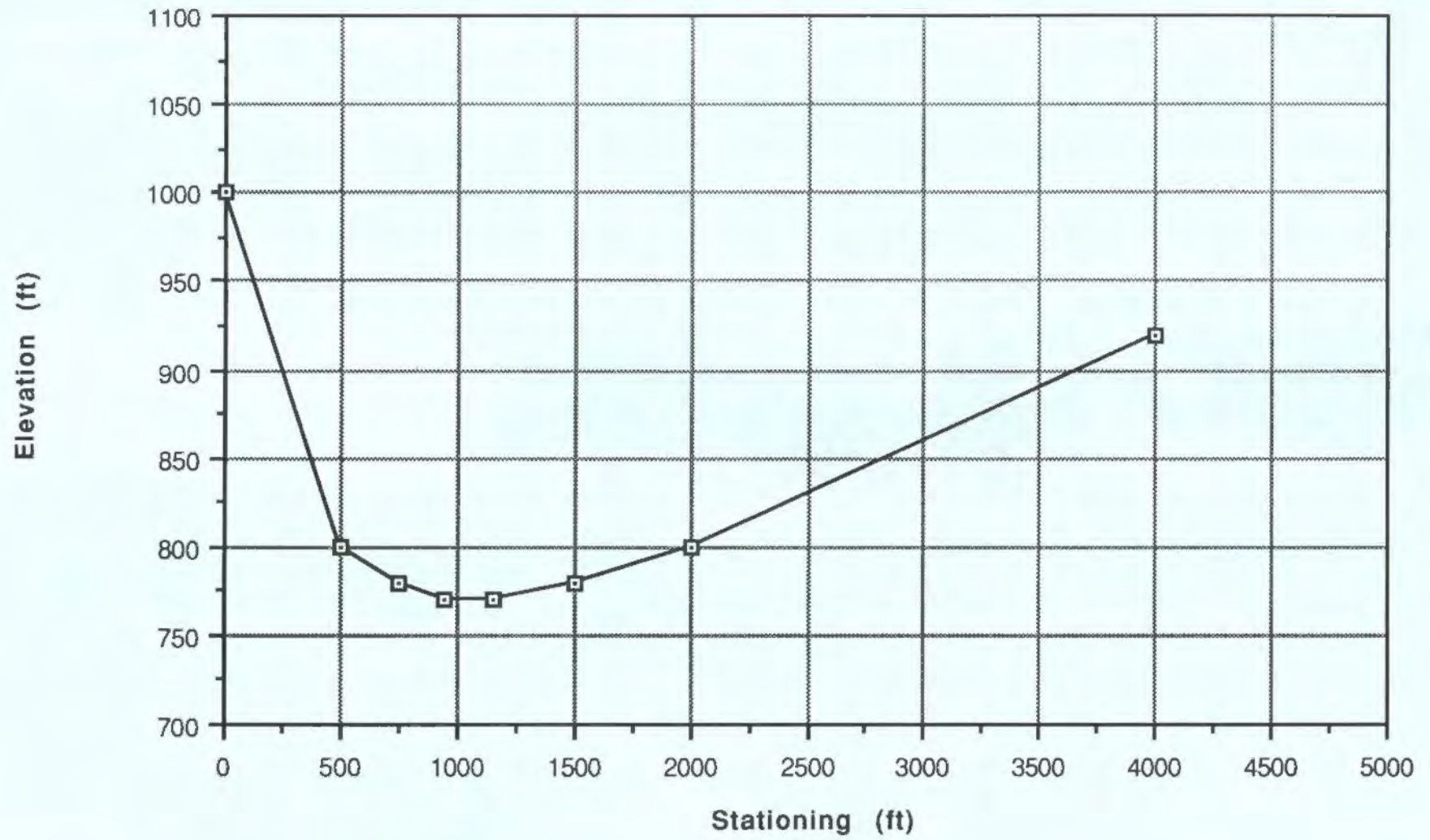
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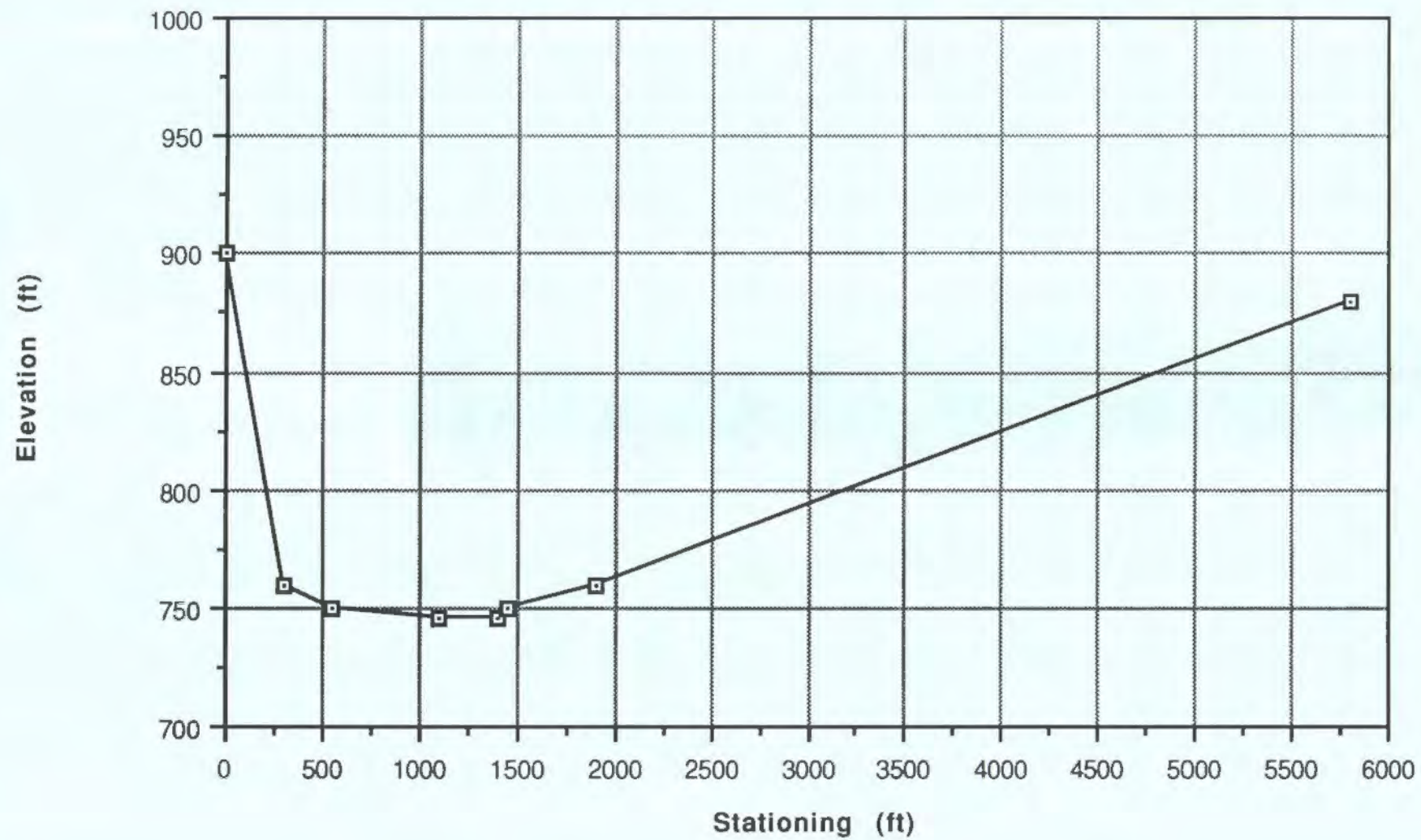
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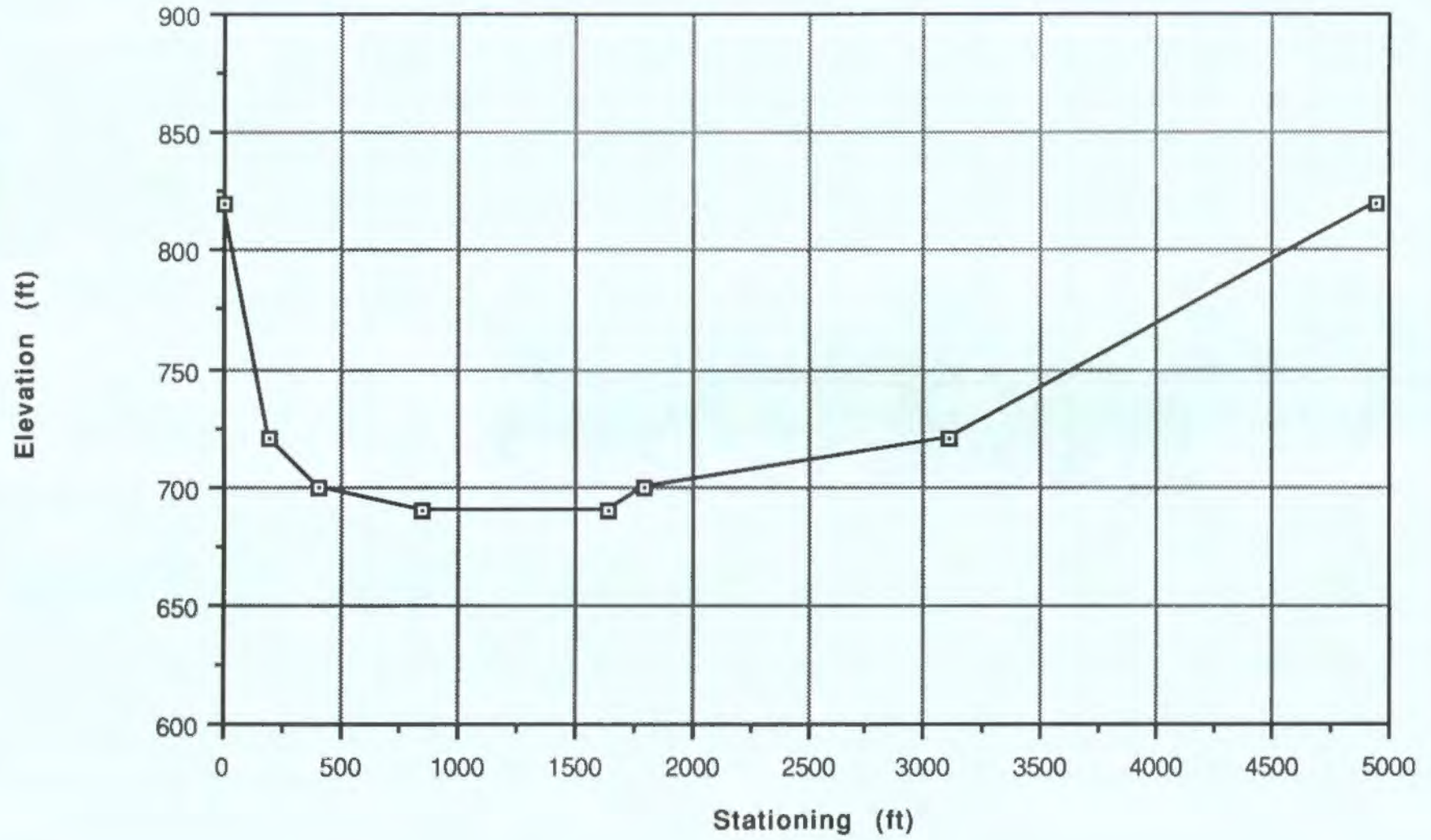
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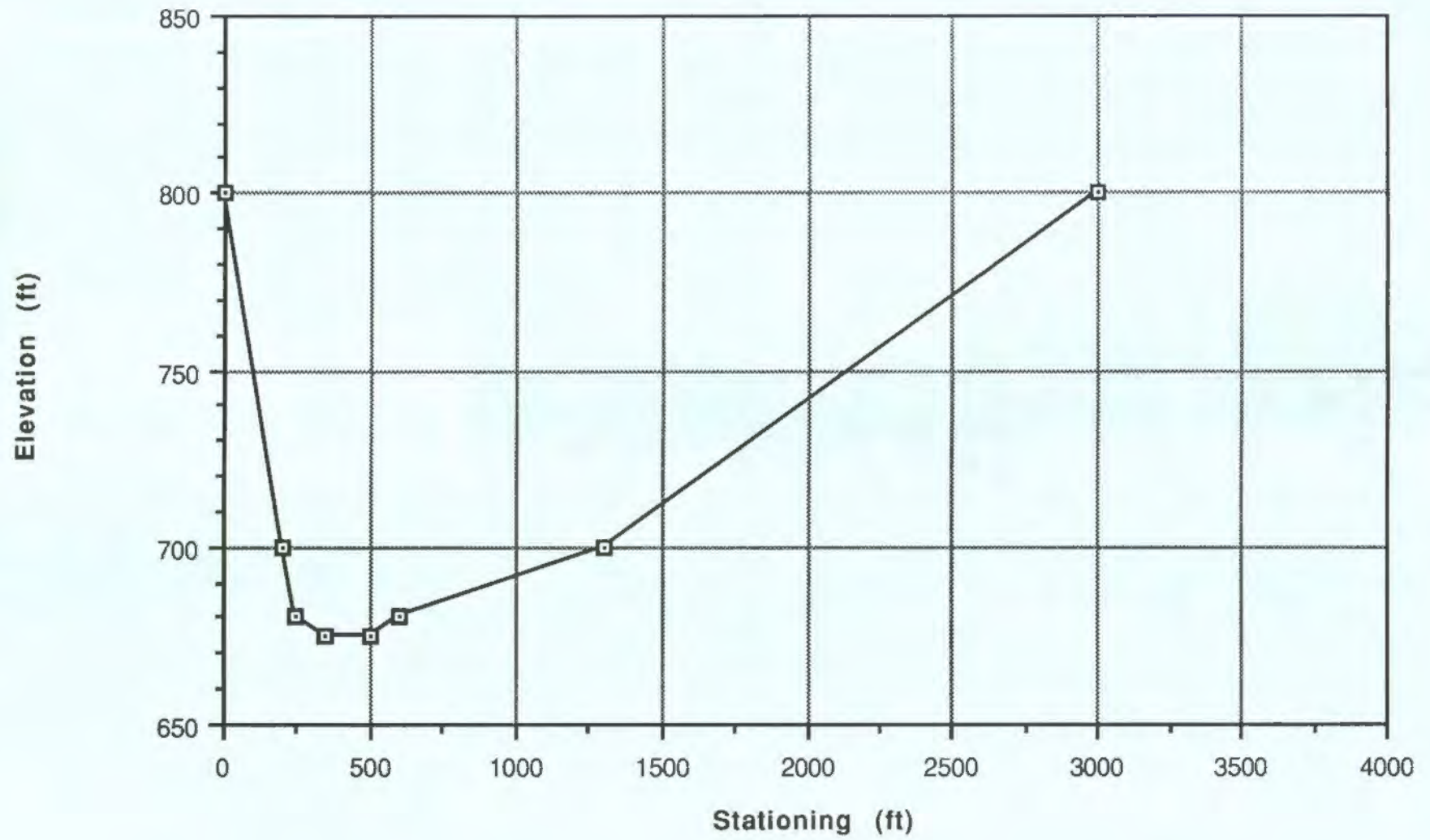
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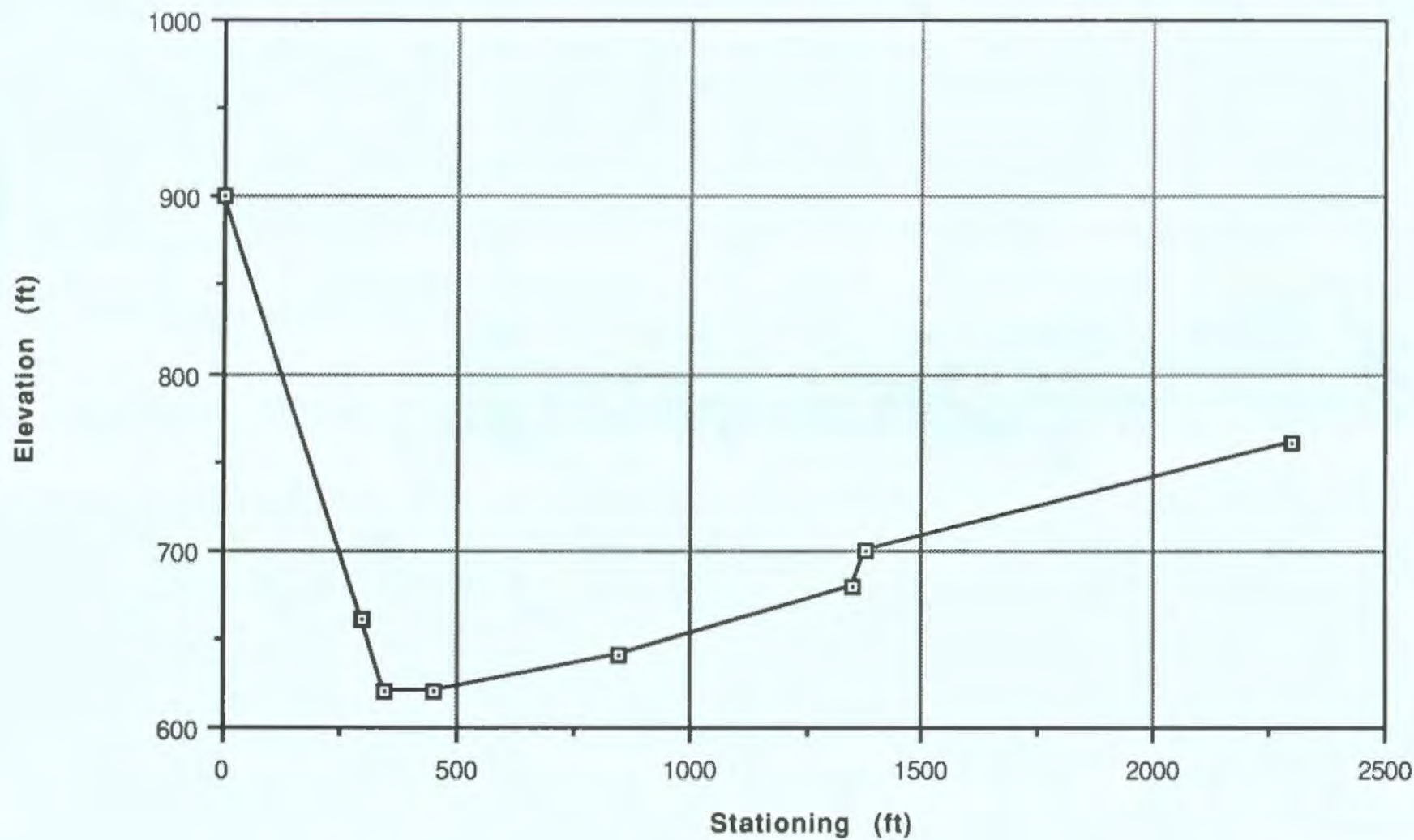
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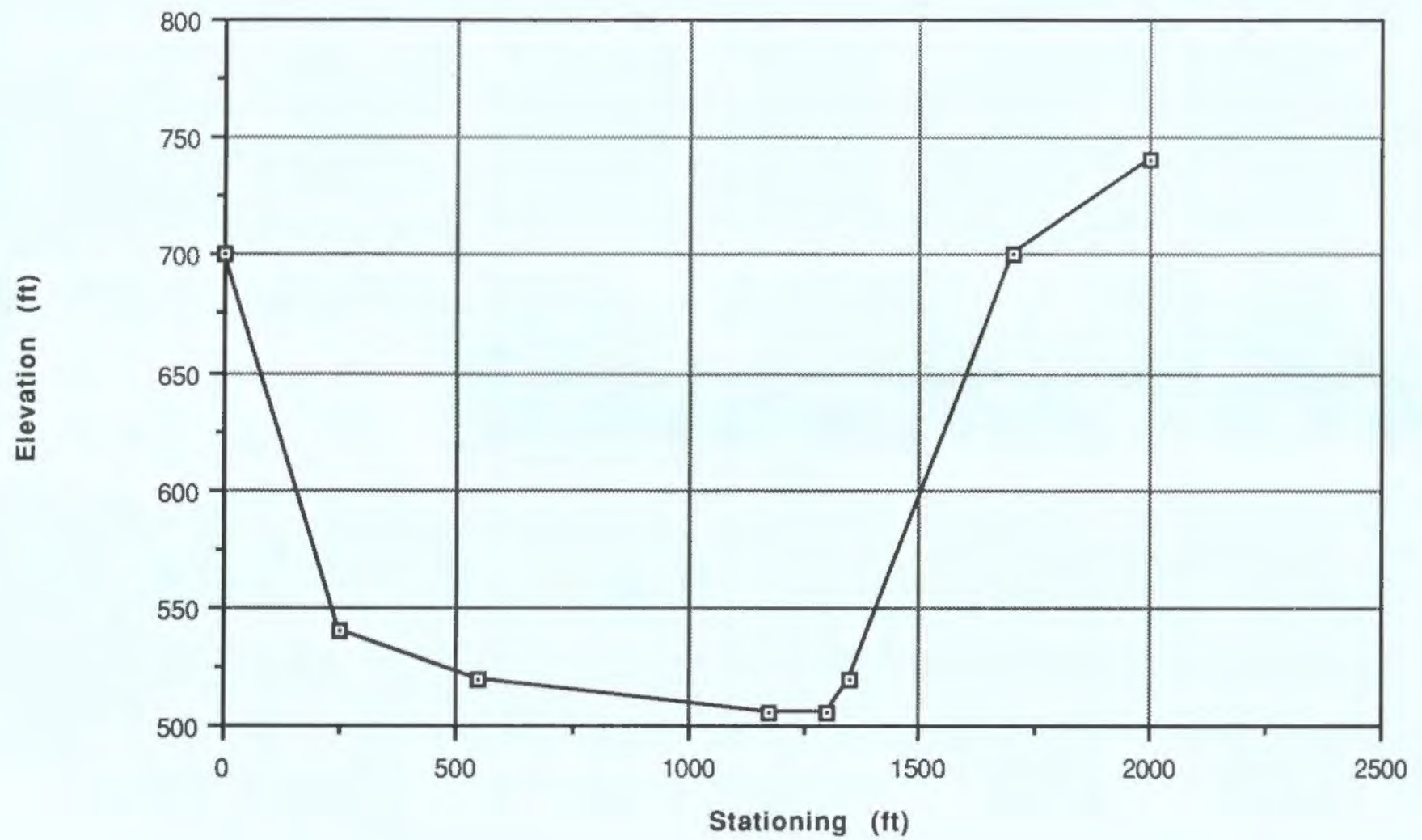
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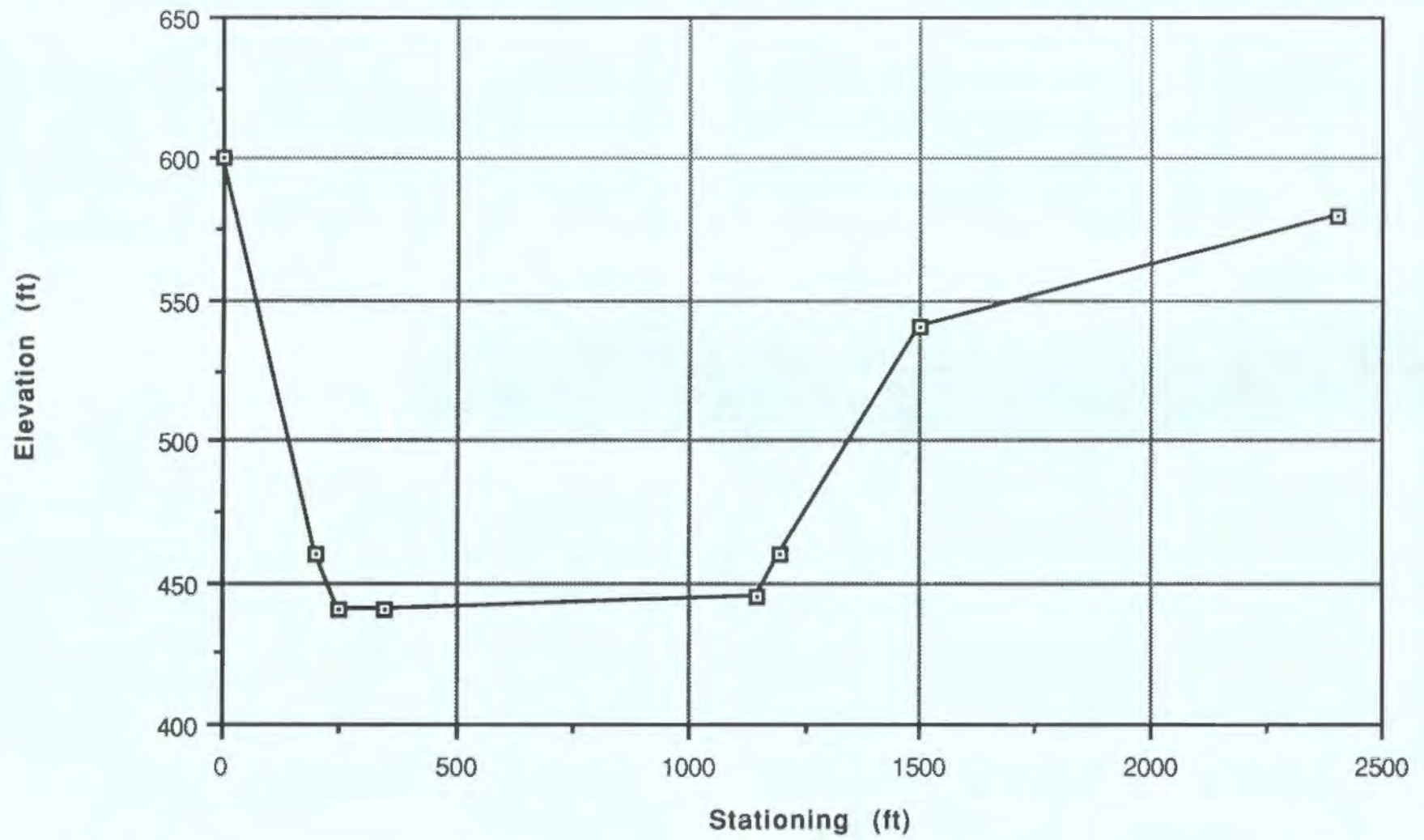
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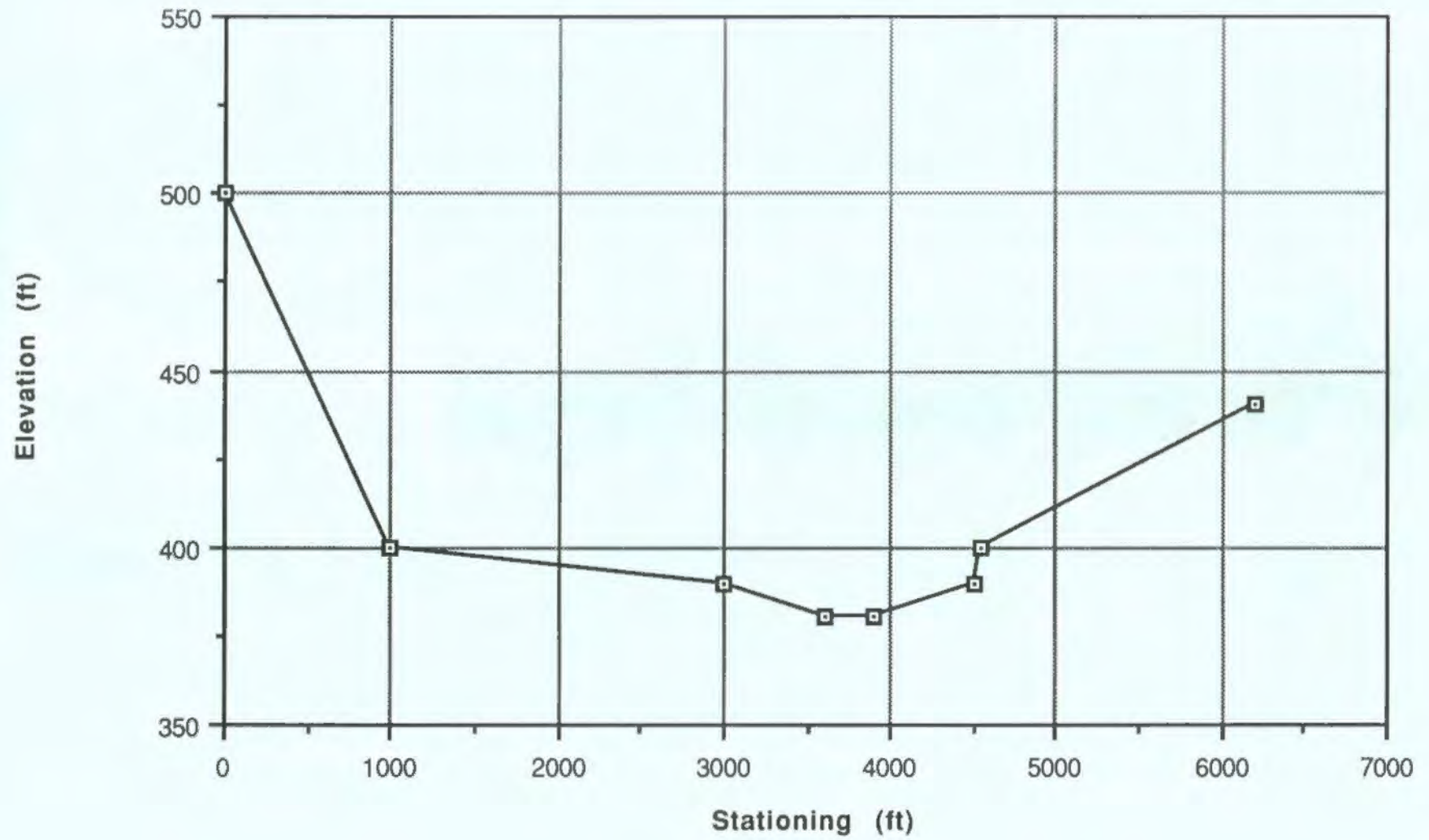
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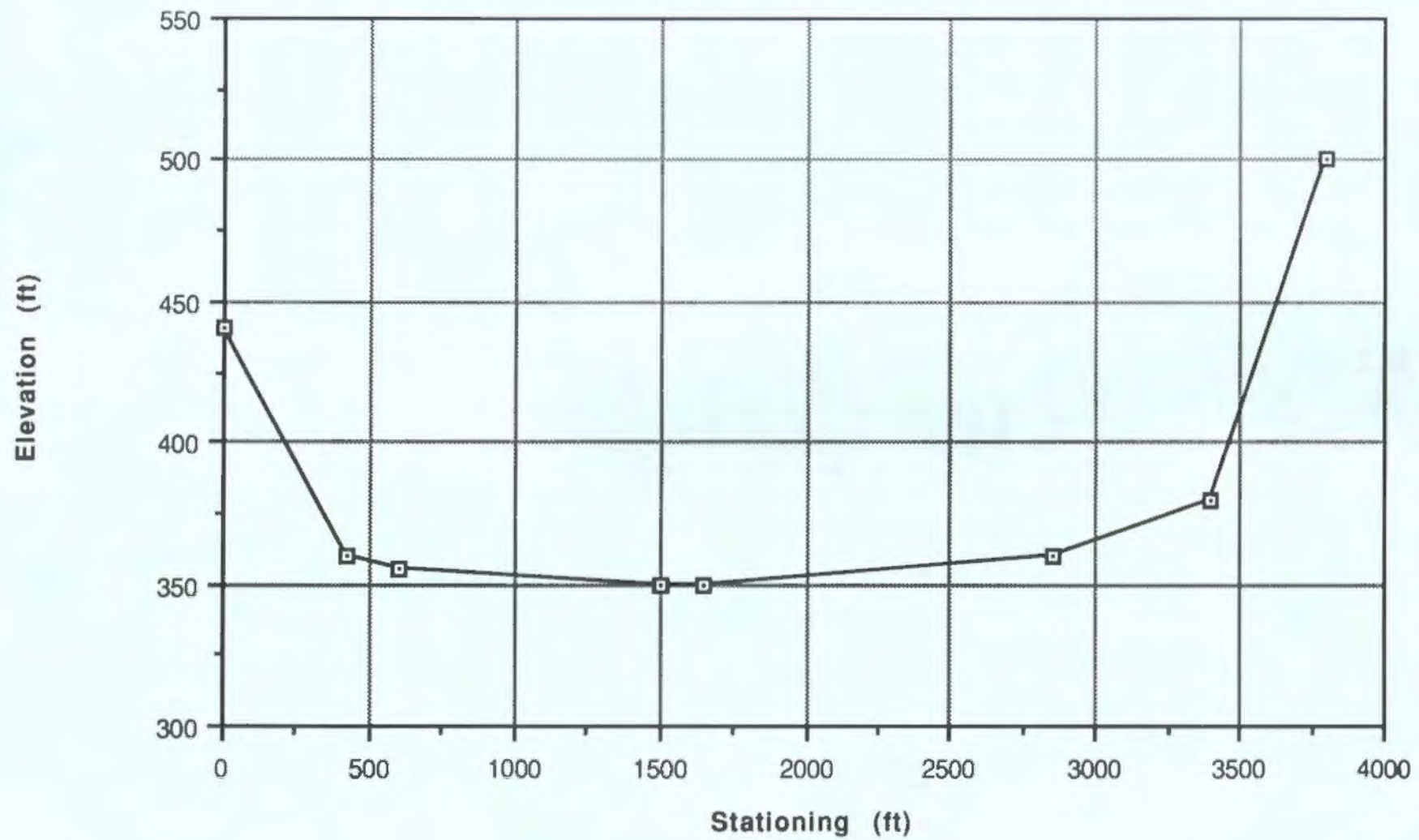
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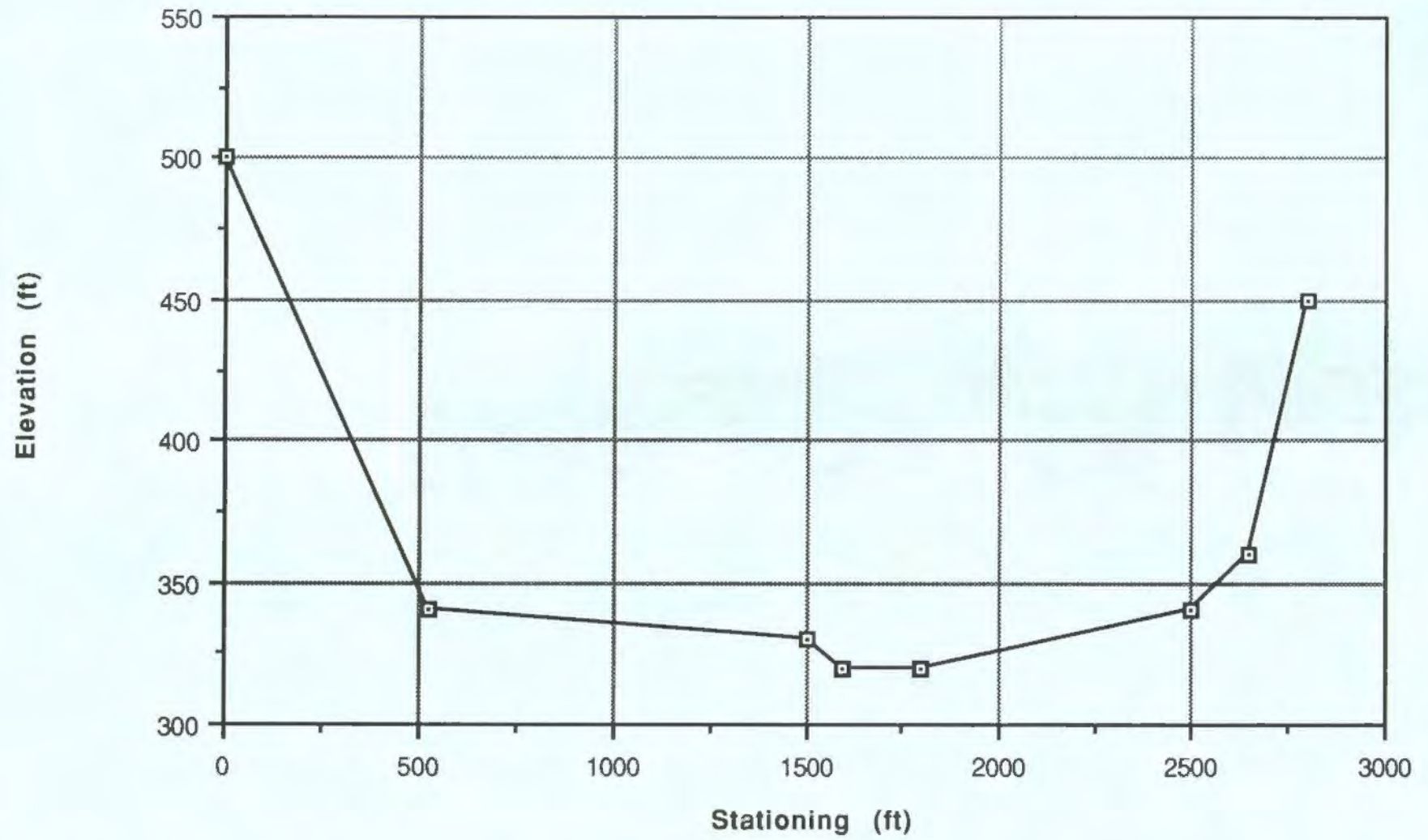
Reach 24



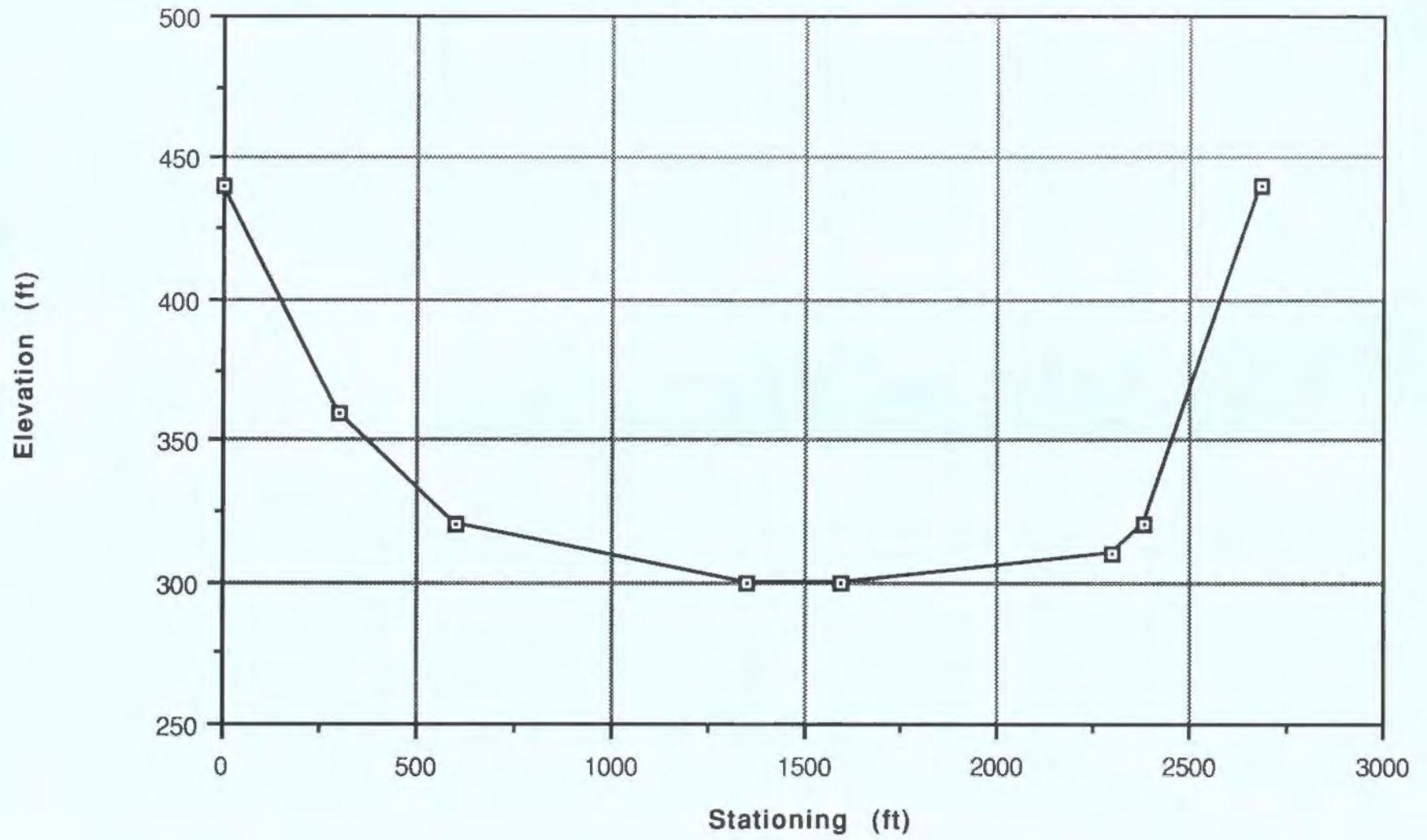
Reach 25



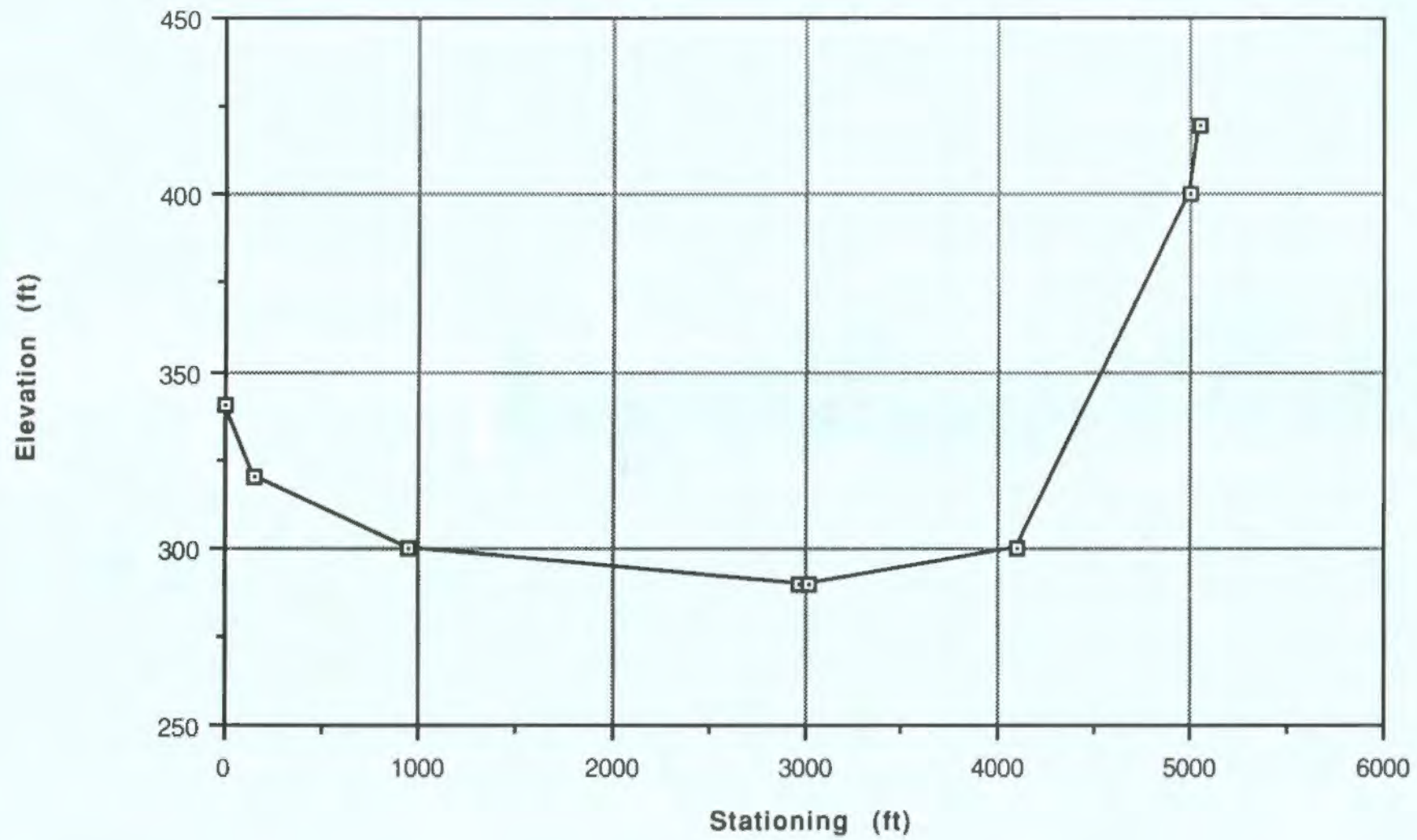
Reach 26



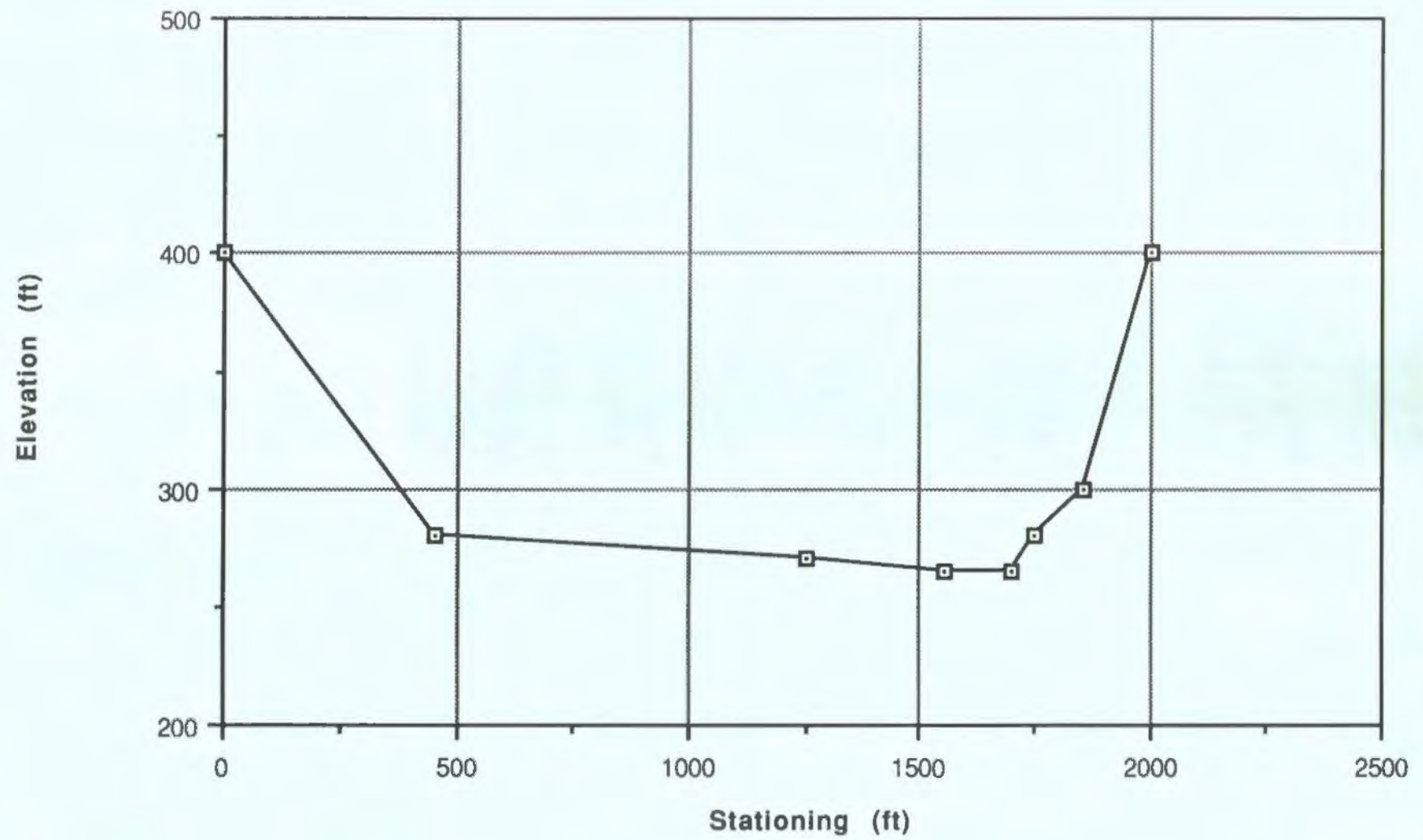
Reach 27



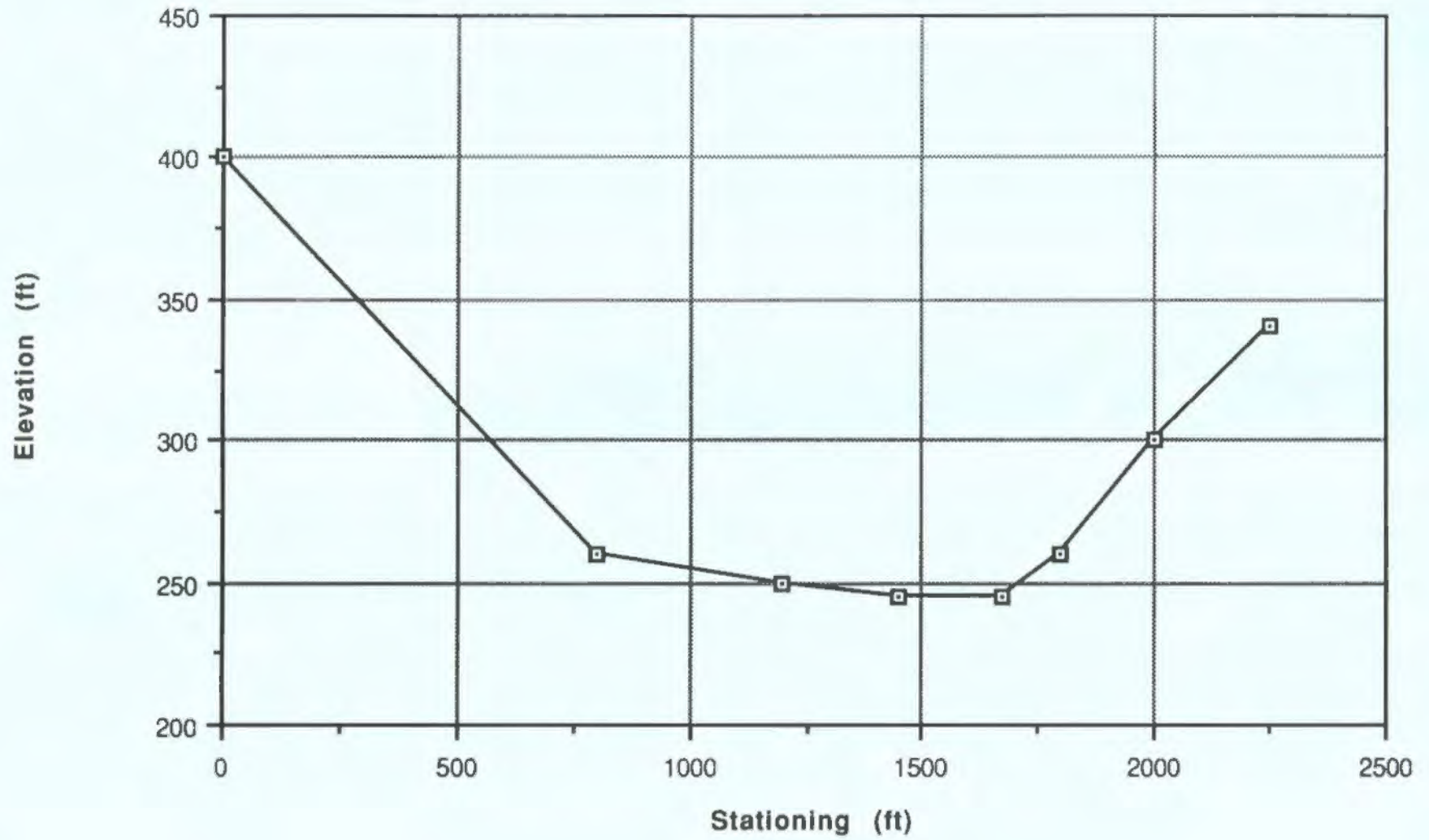
Reach 28



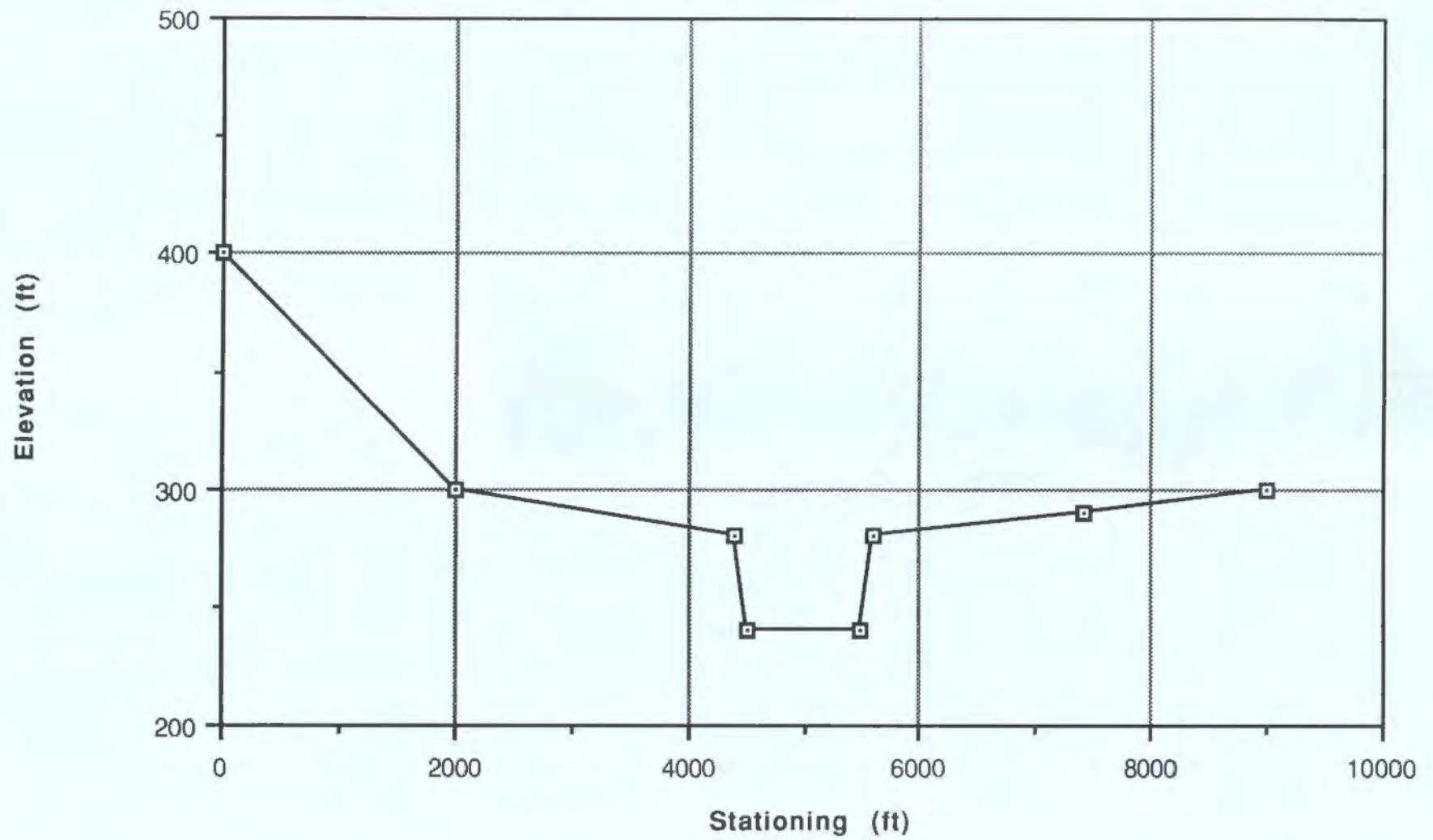
Reach 29



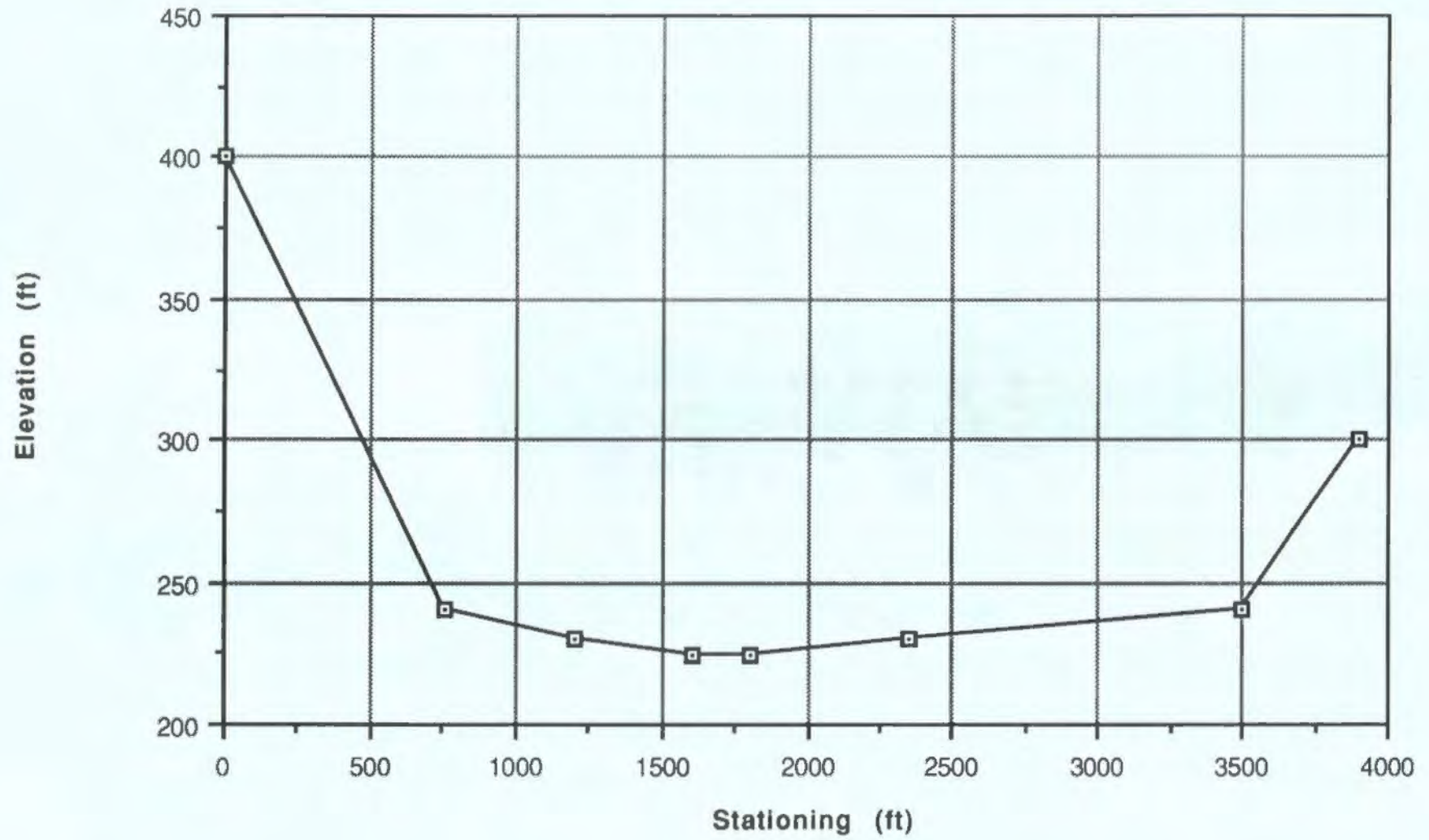
Reach 30



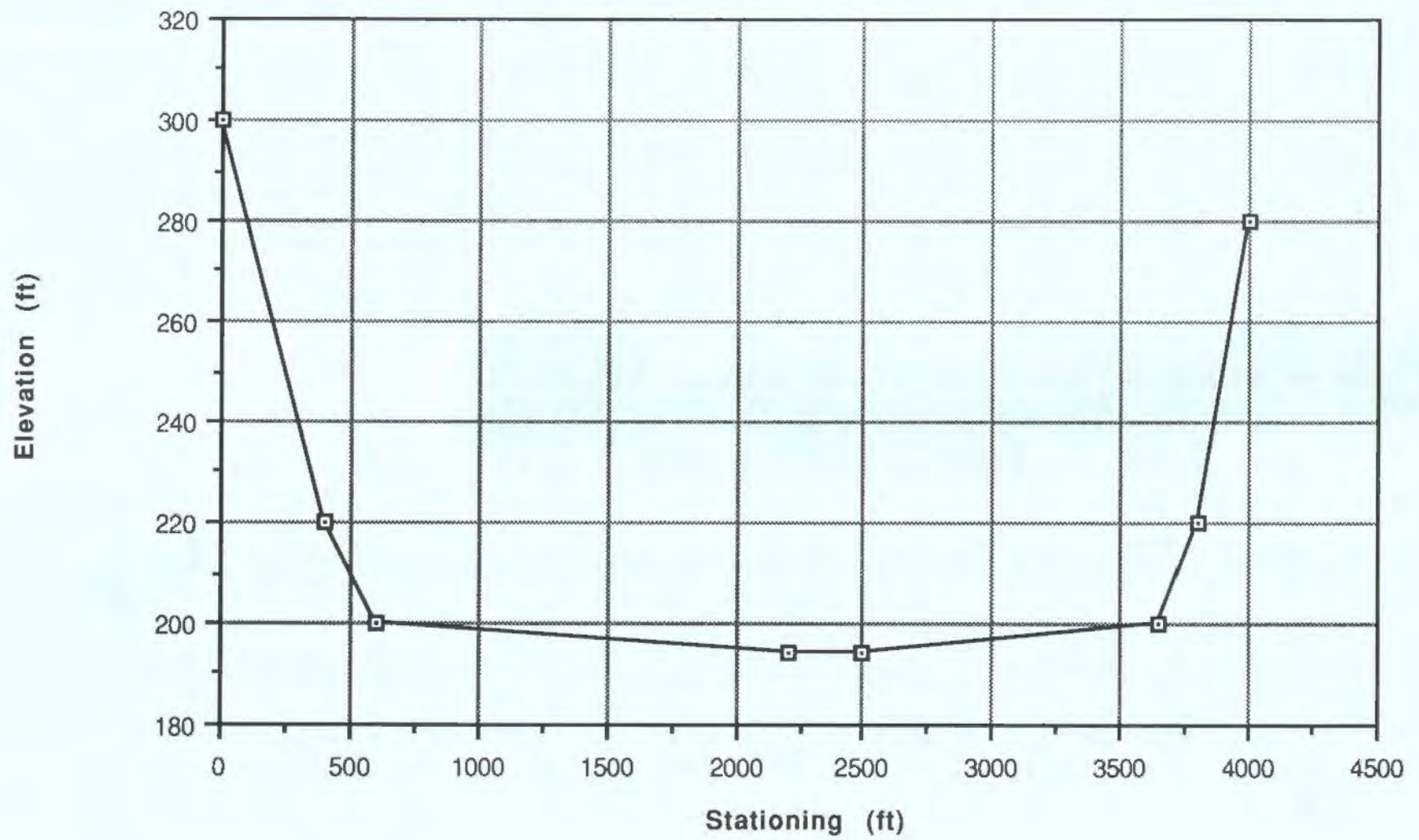
Reach 31



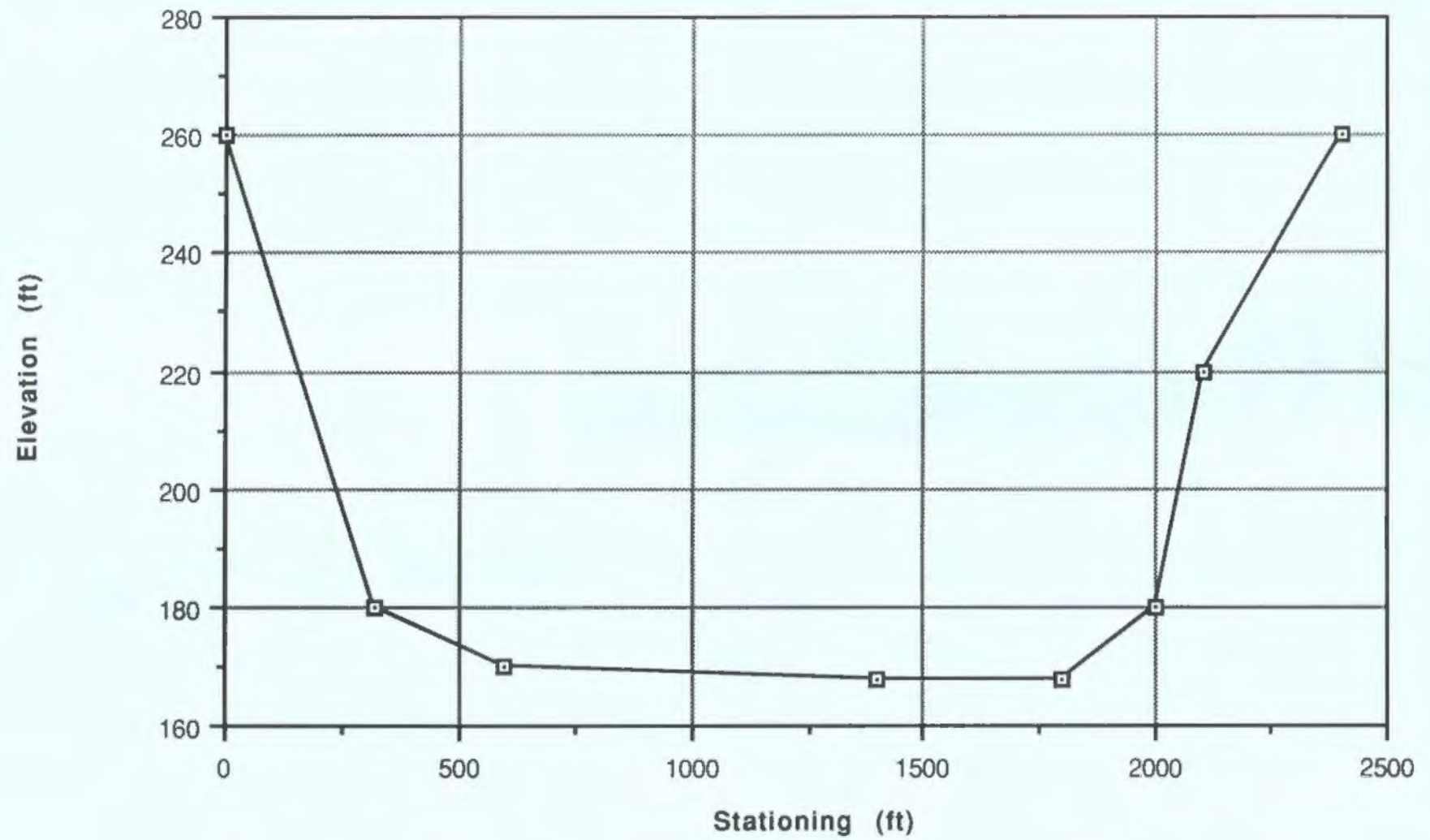
Reach 32



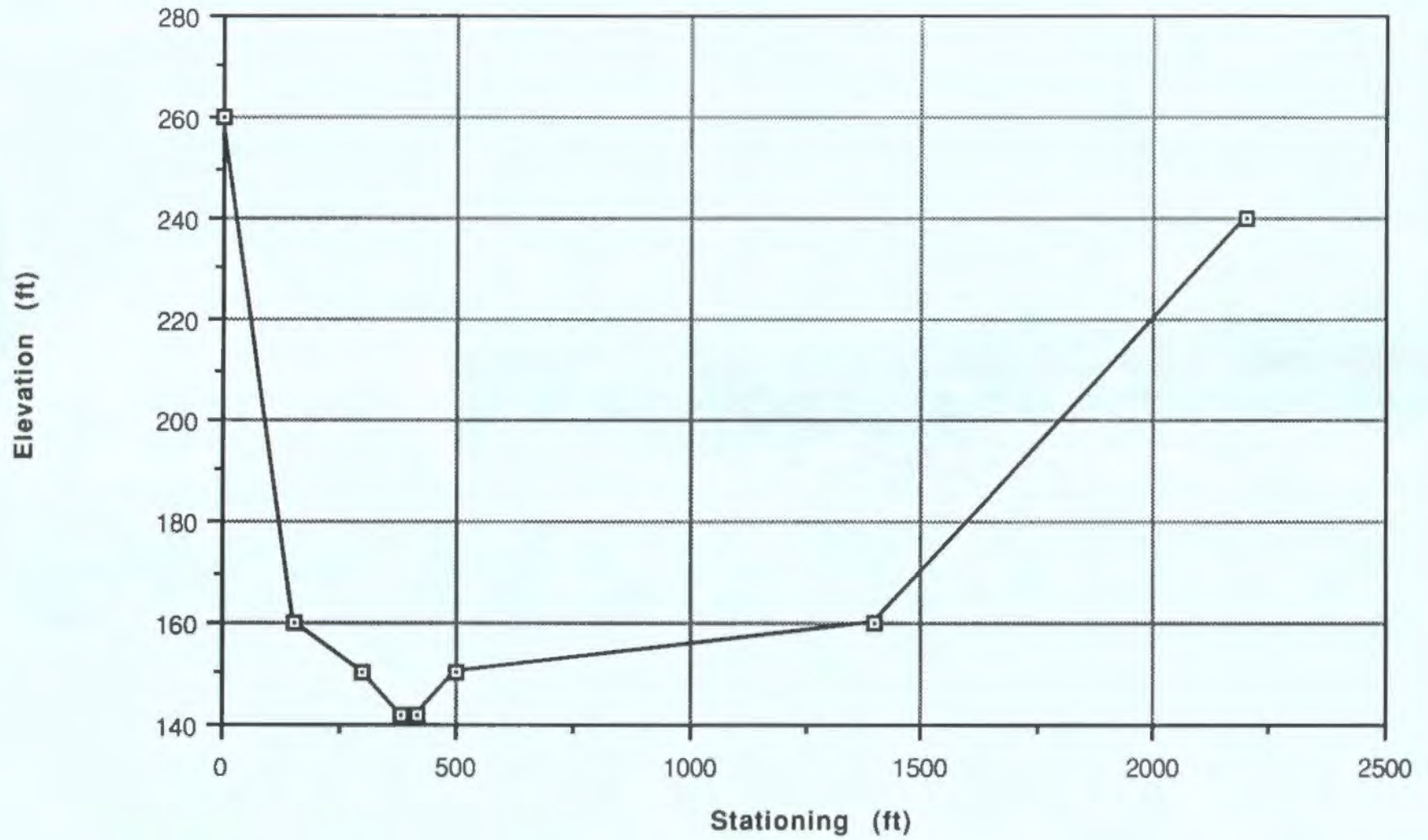
Reach 33



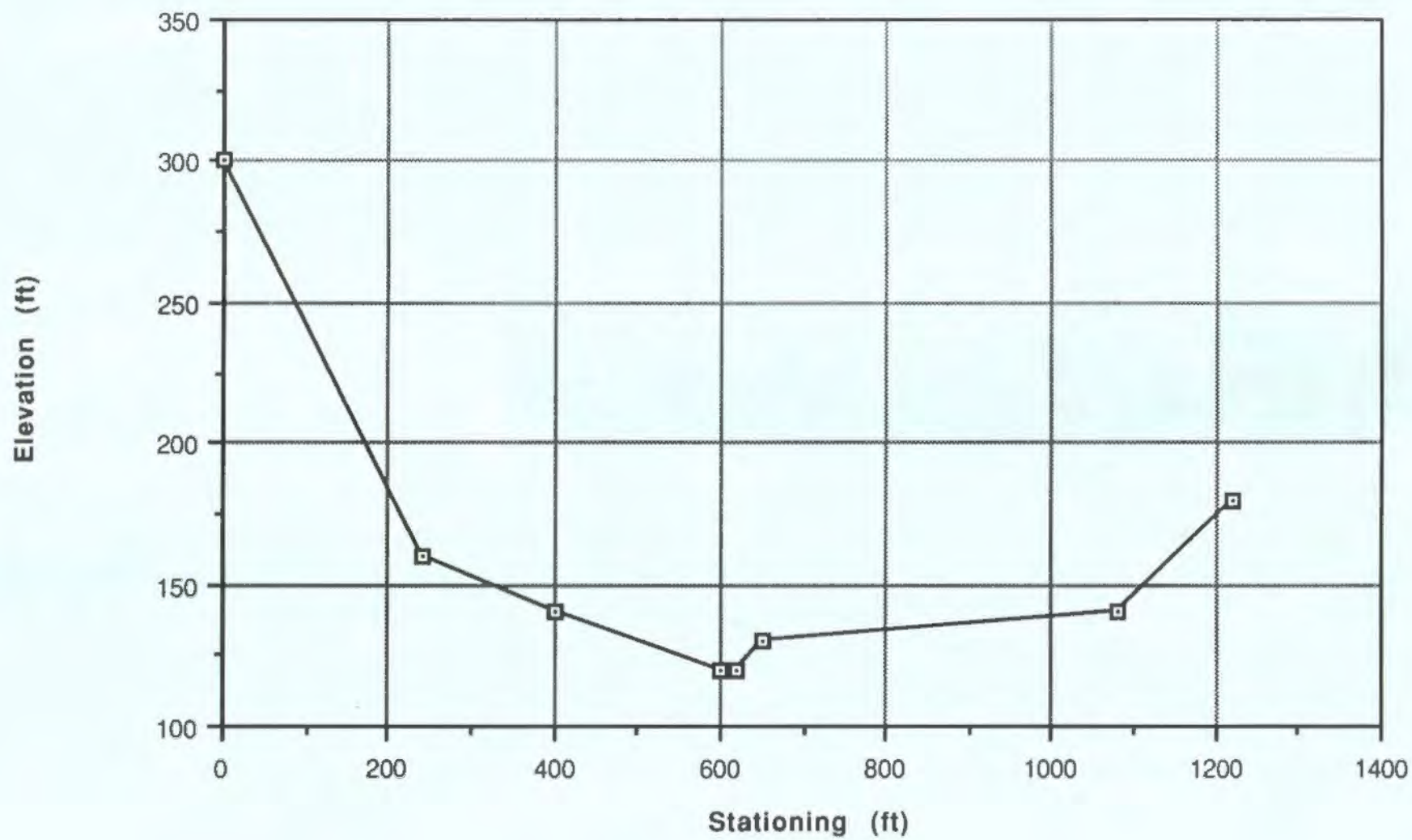
Reach 34



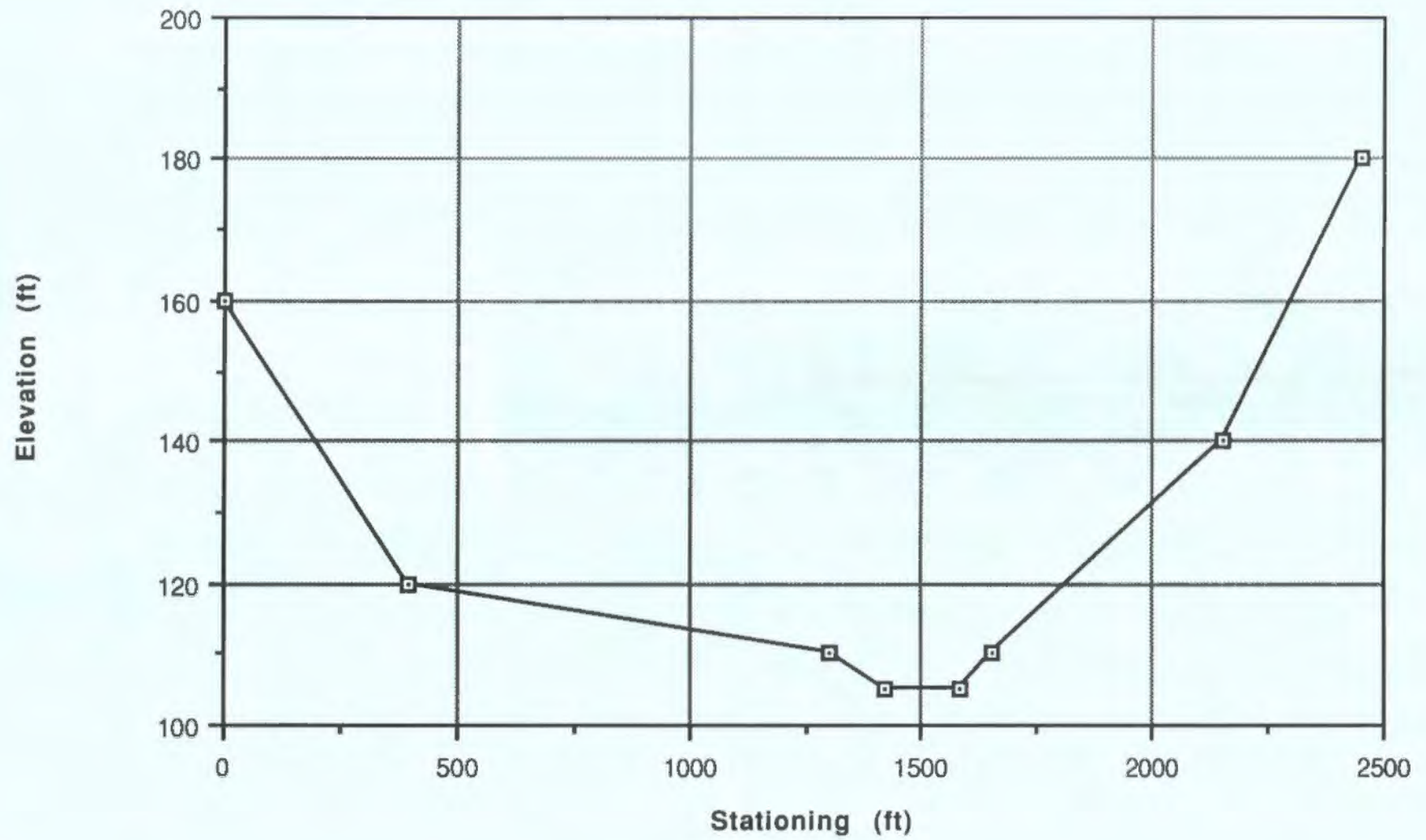
Reach 35



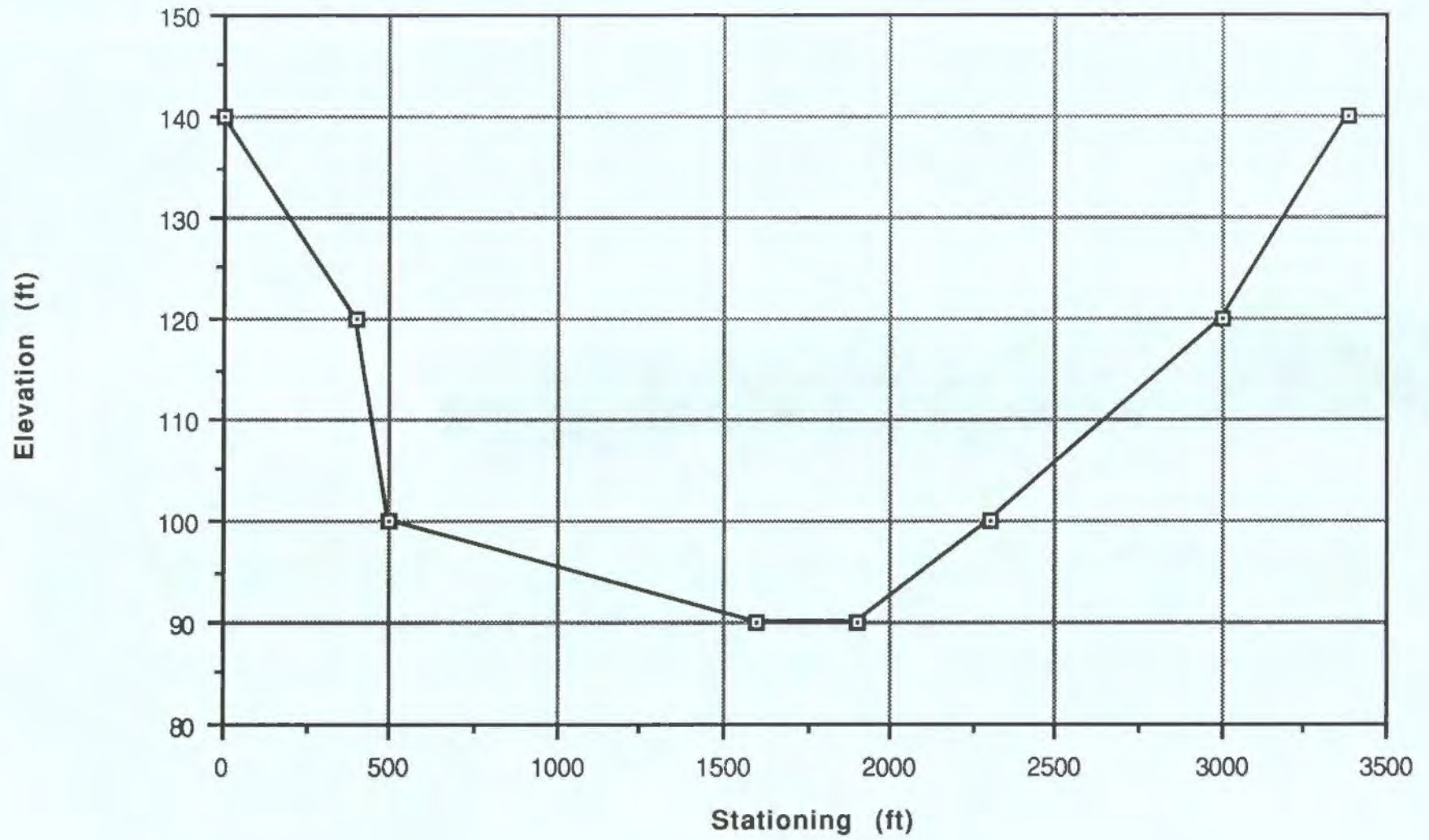
Reach 36



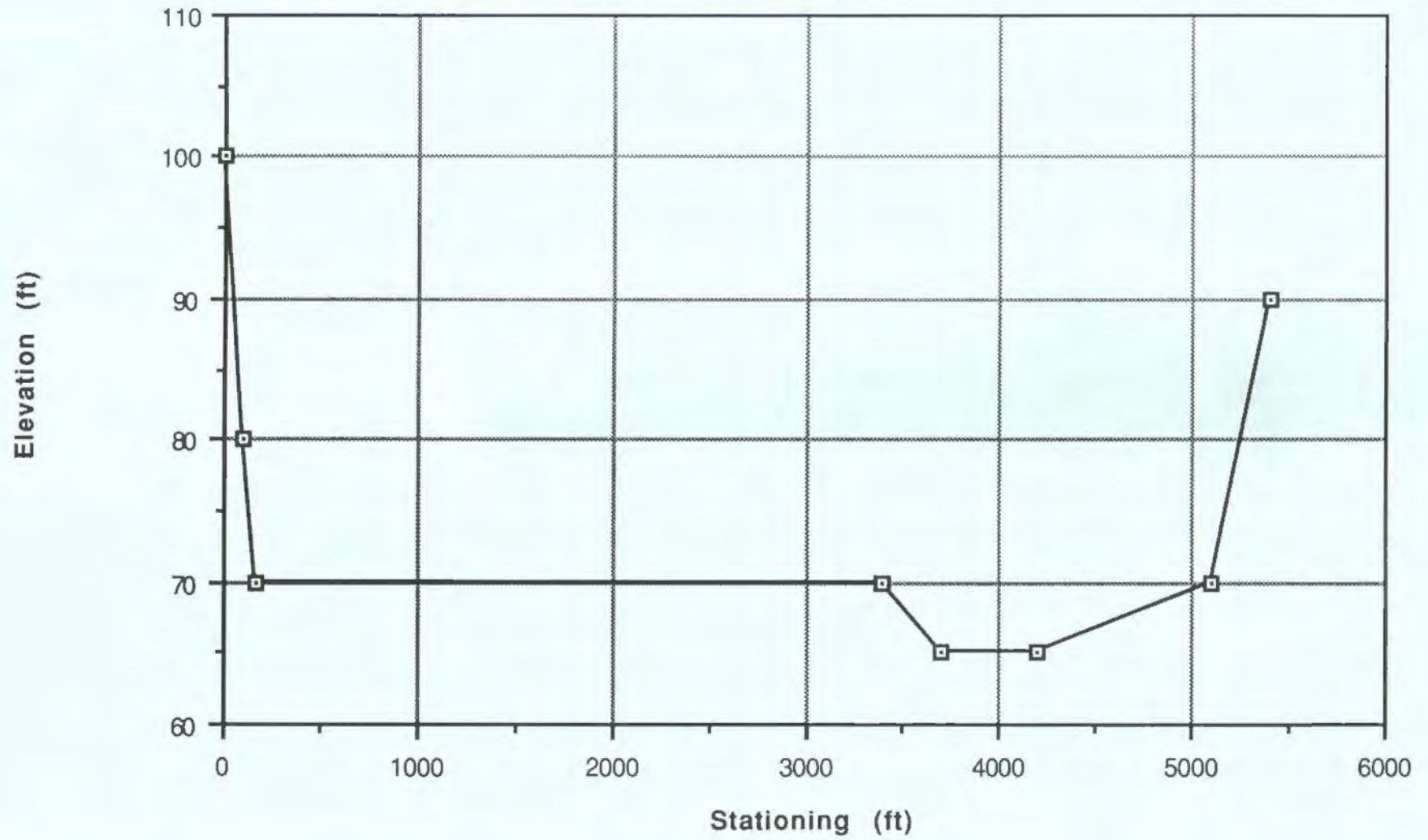
Reach 37



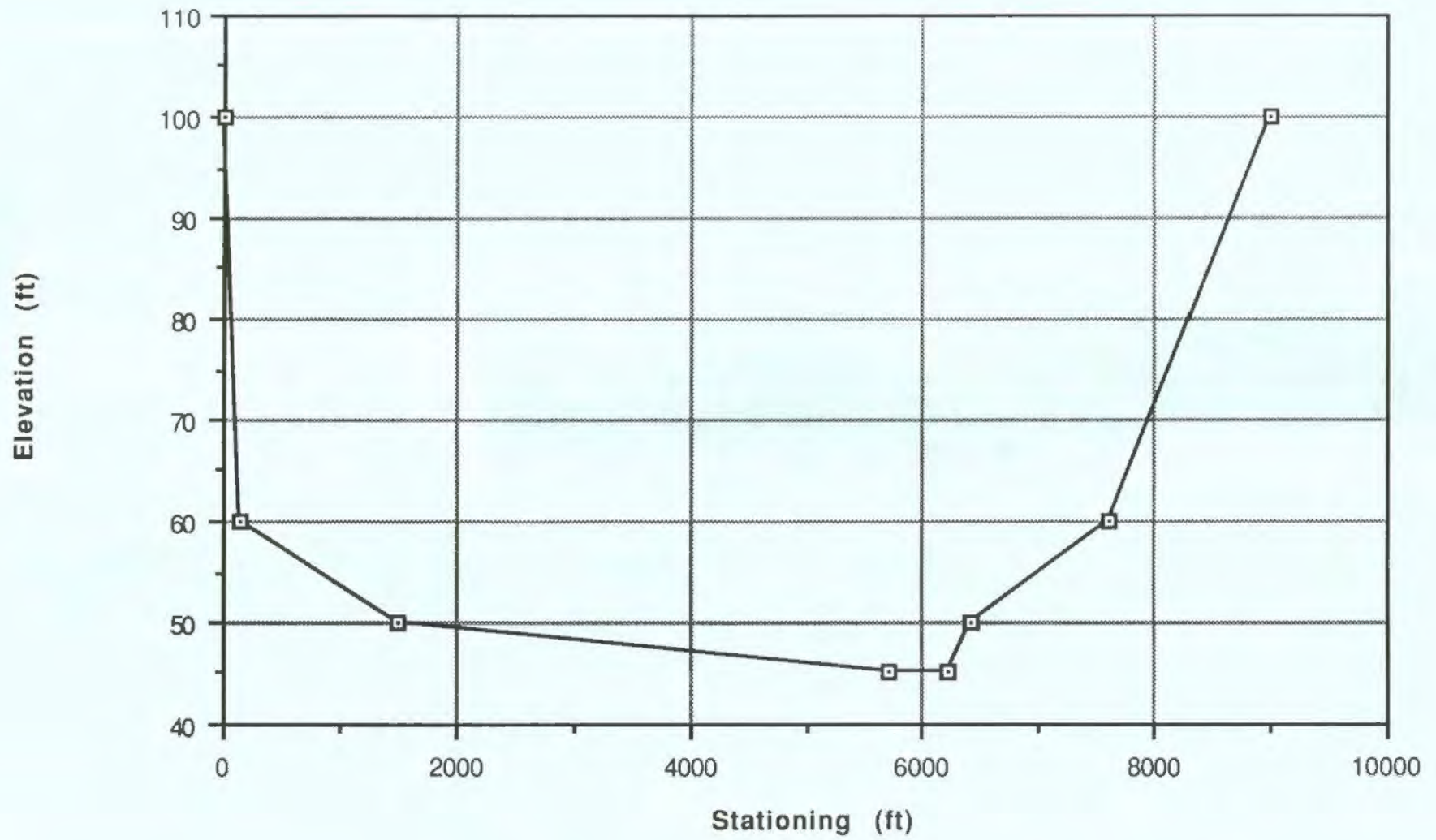
Reach 38



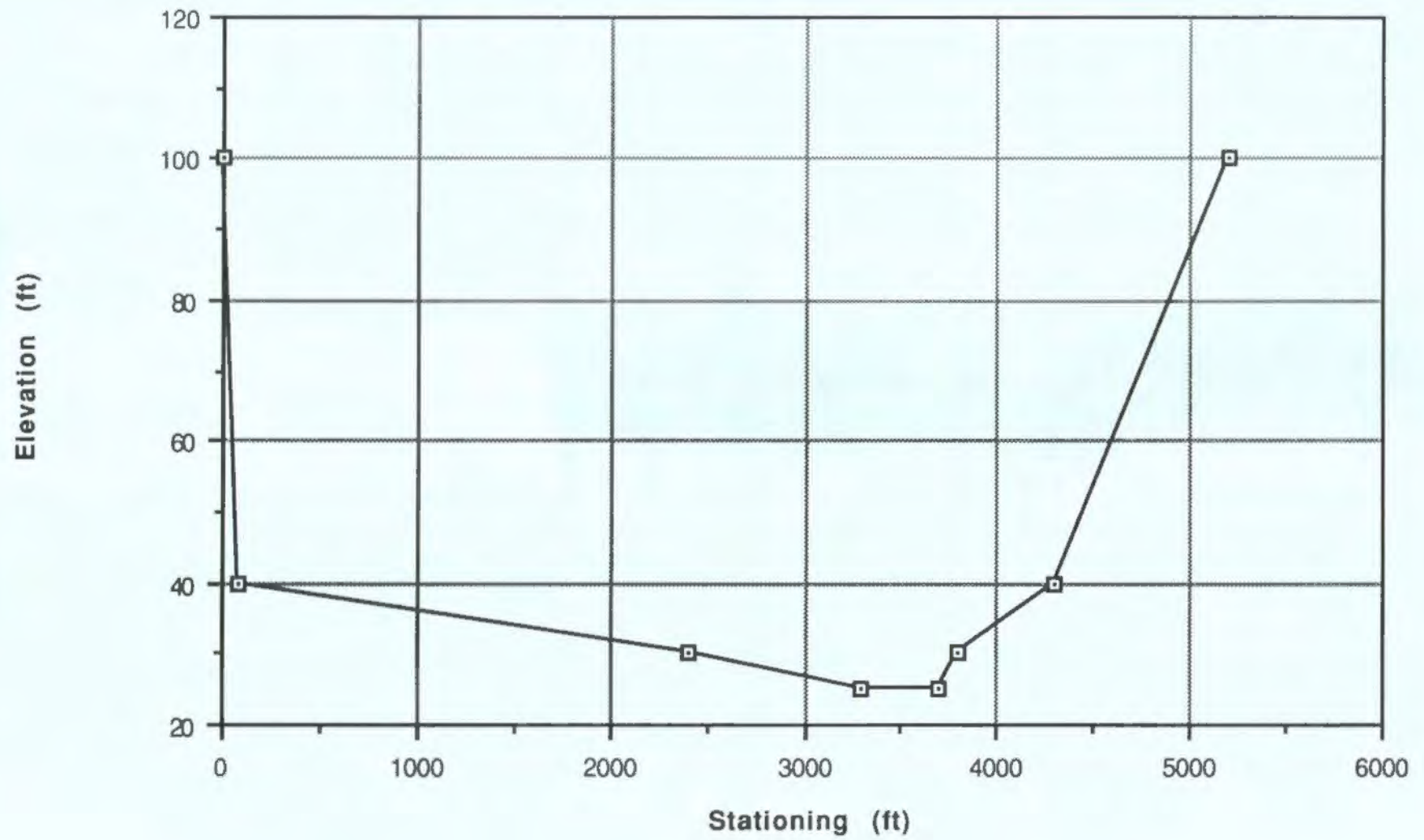
Reach 39



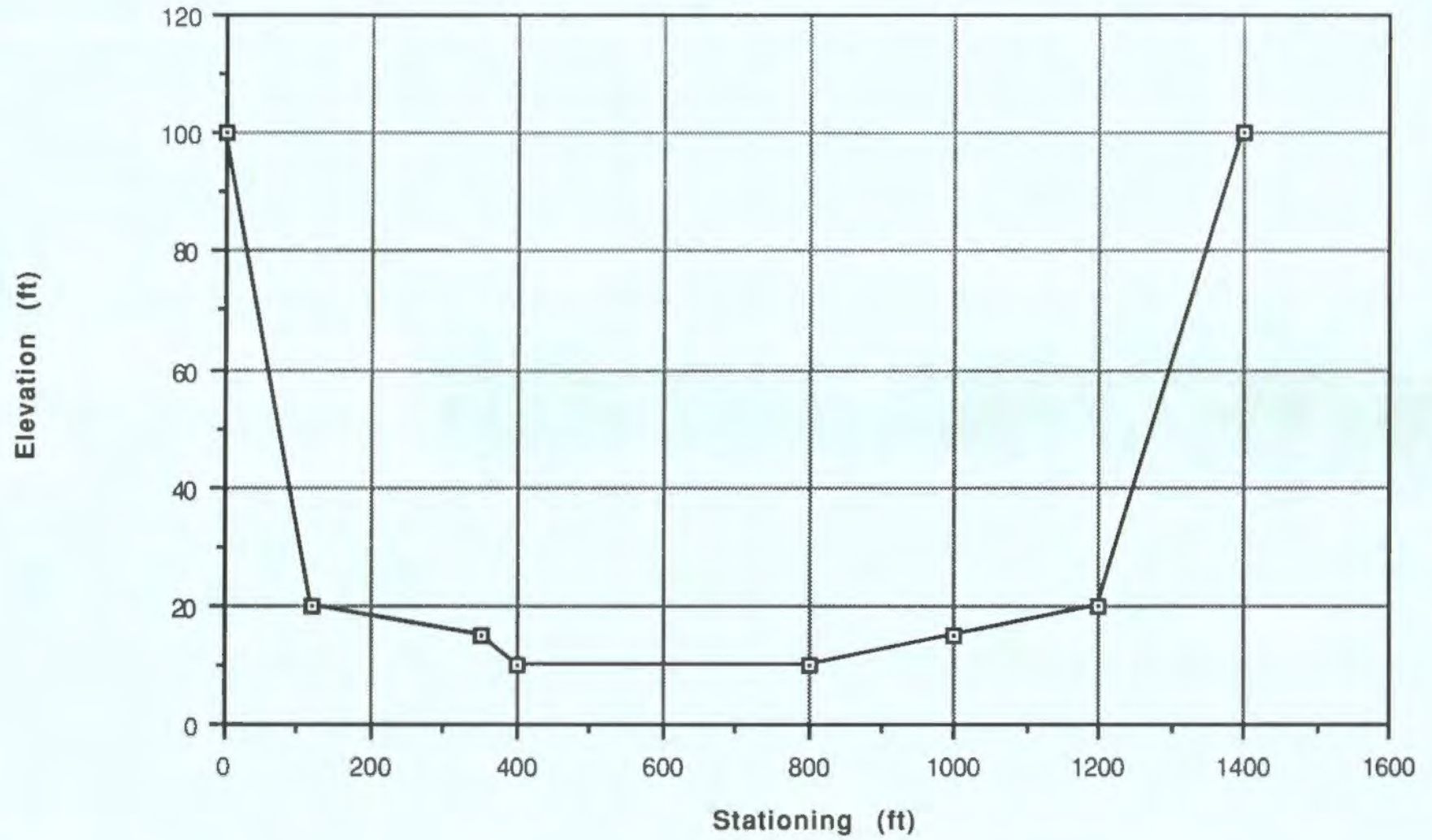
Reach 40



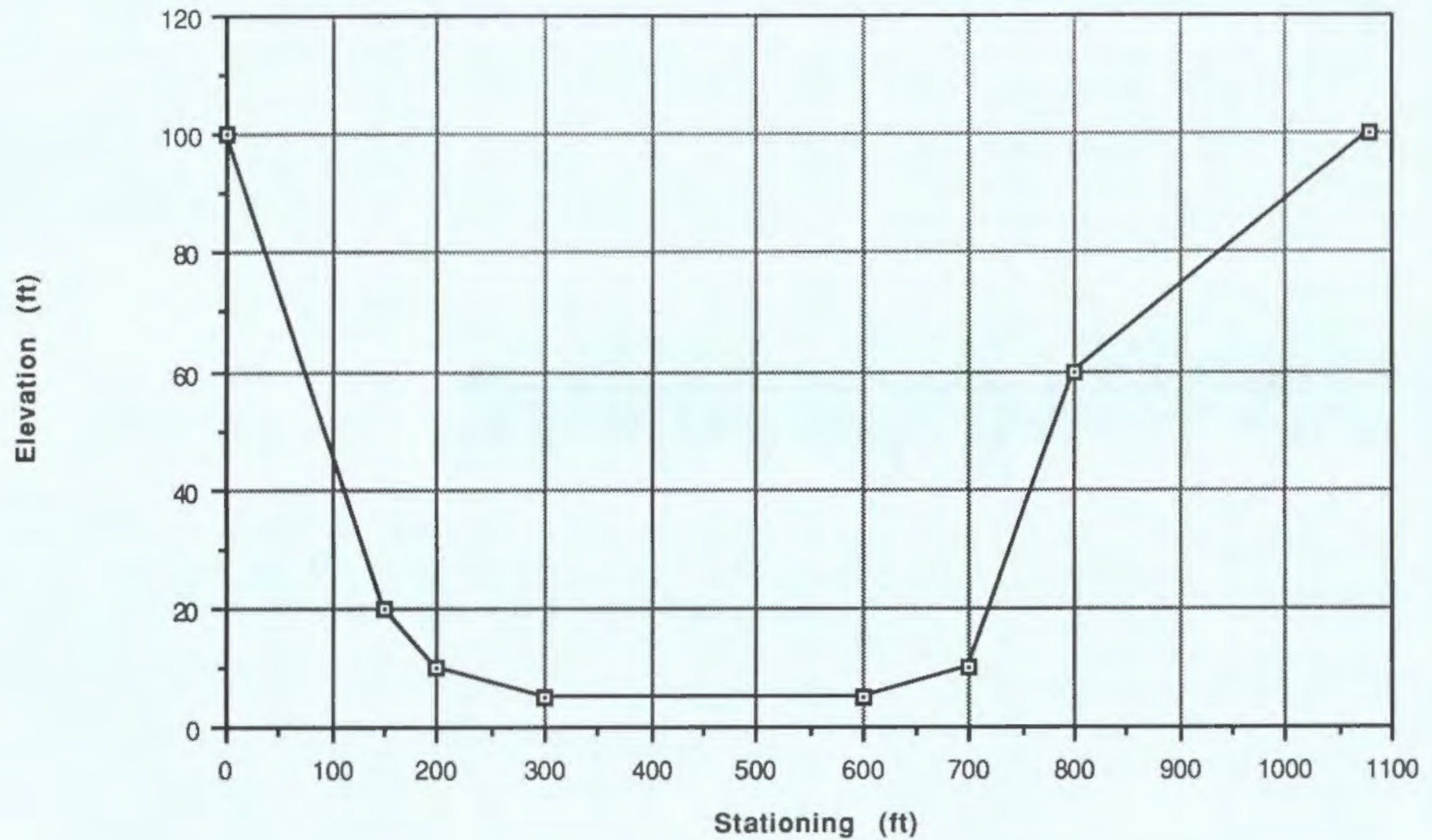
Reach 41



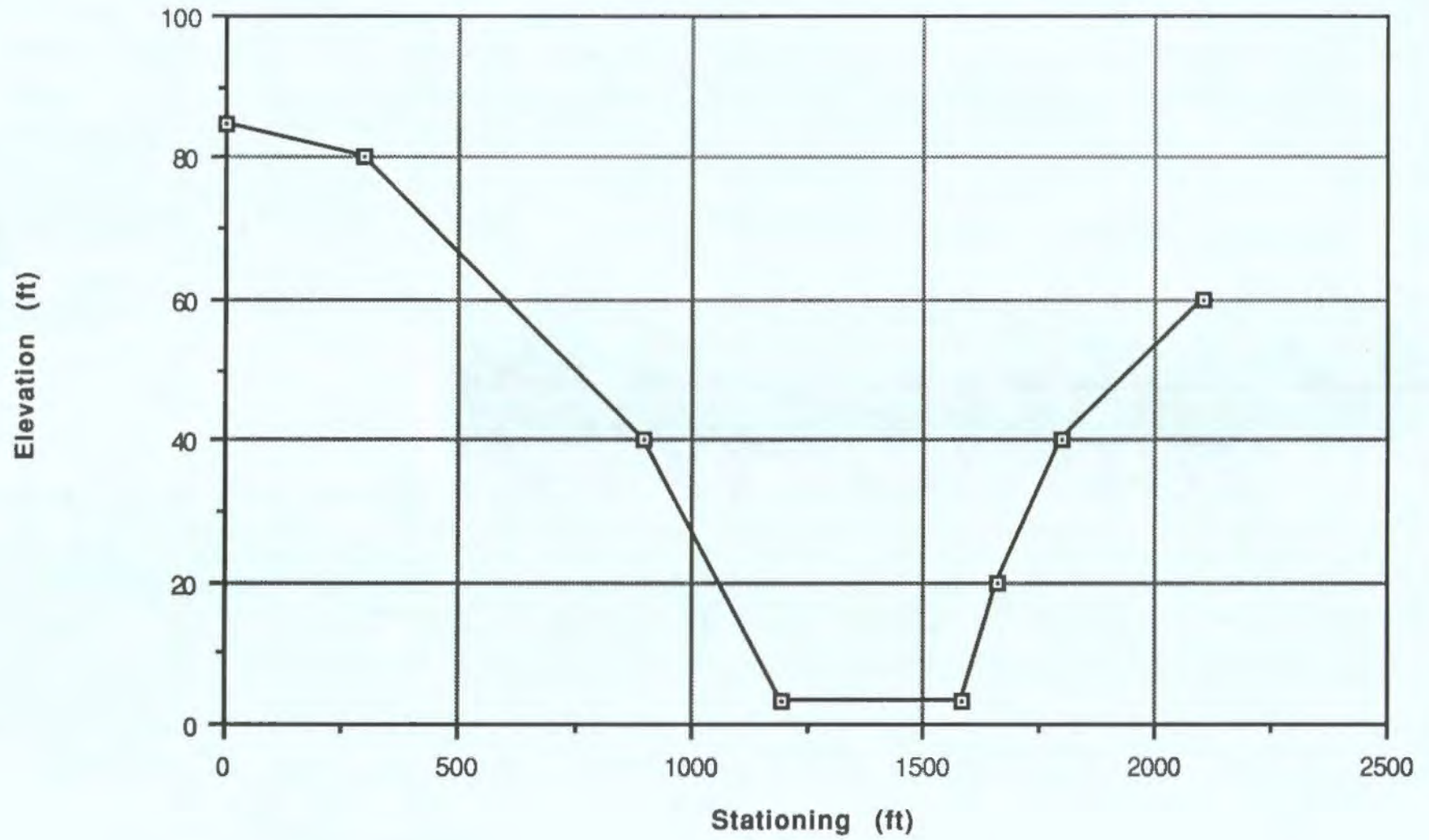
Reach 42



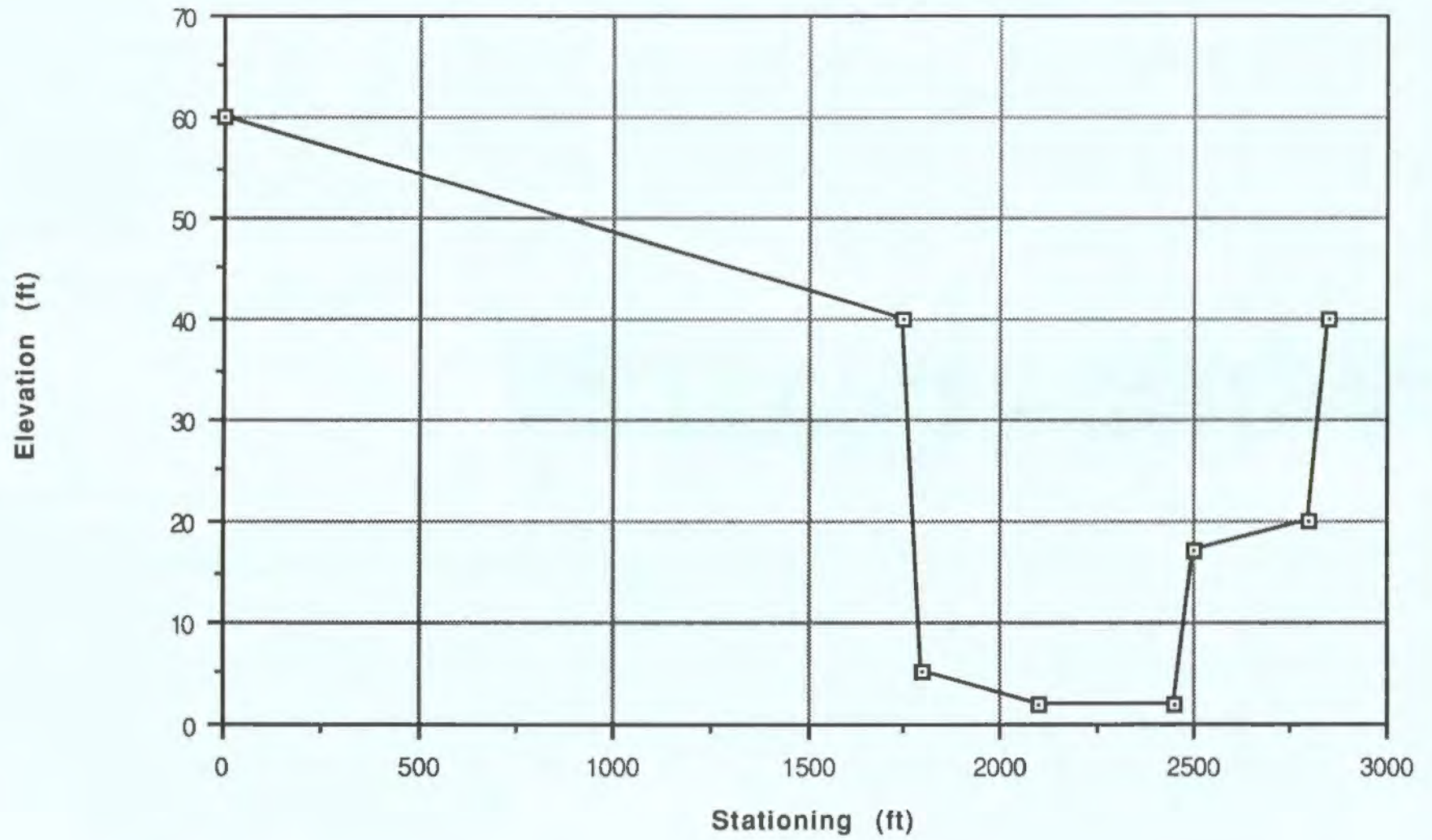
Reach 43



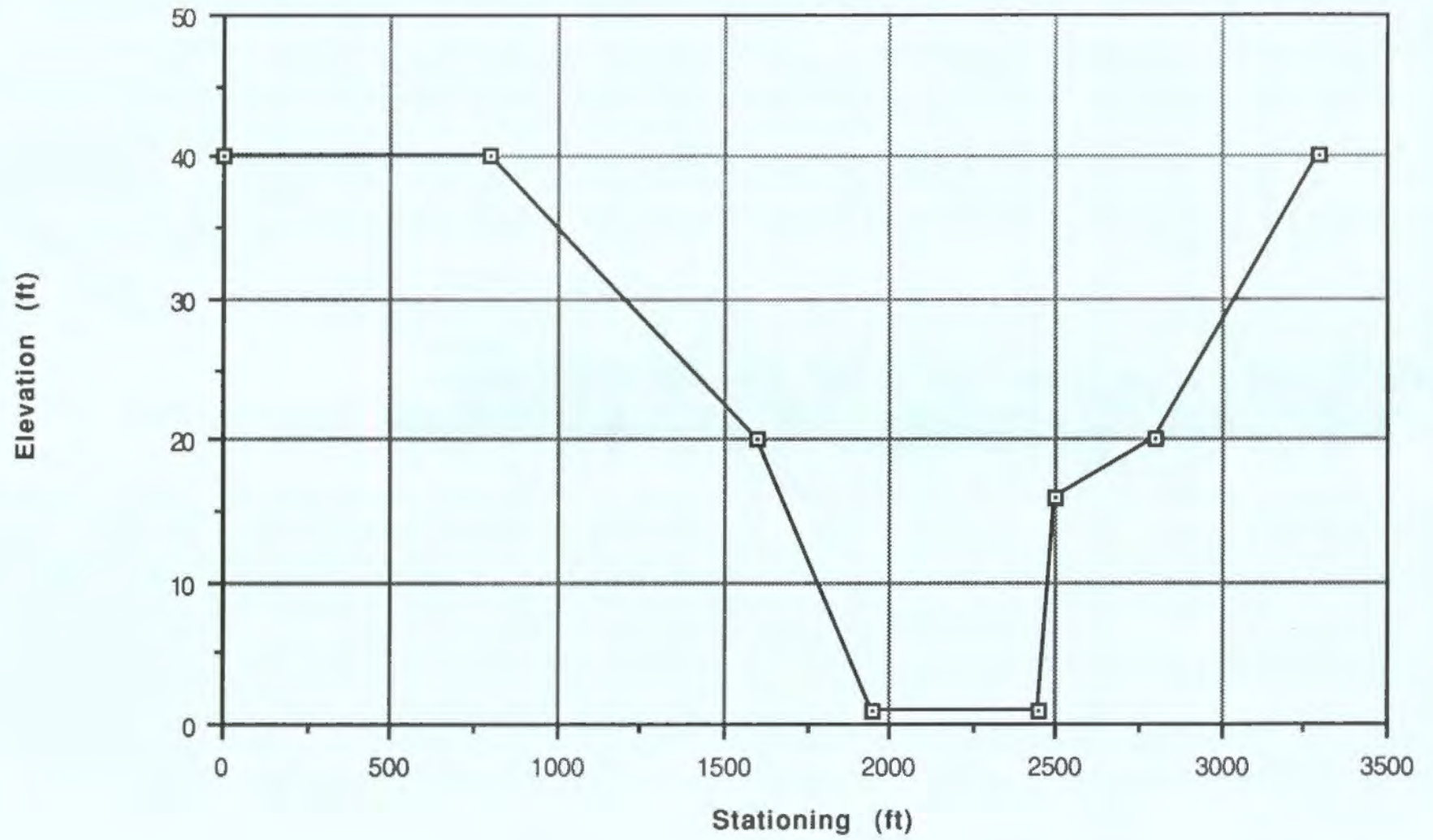
Reach 44



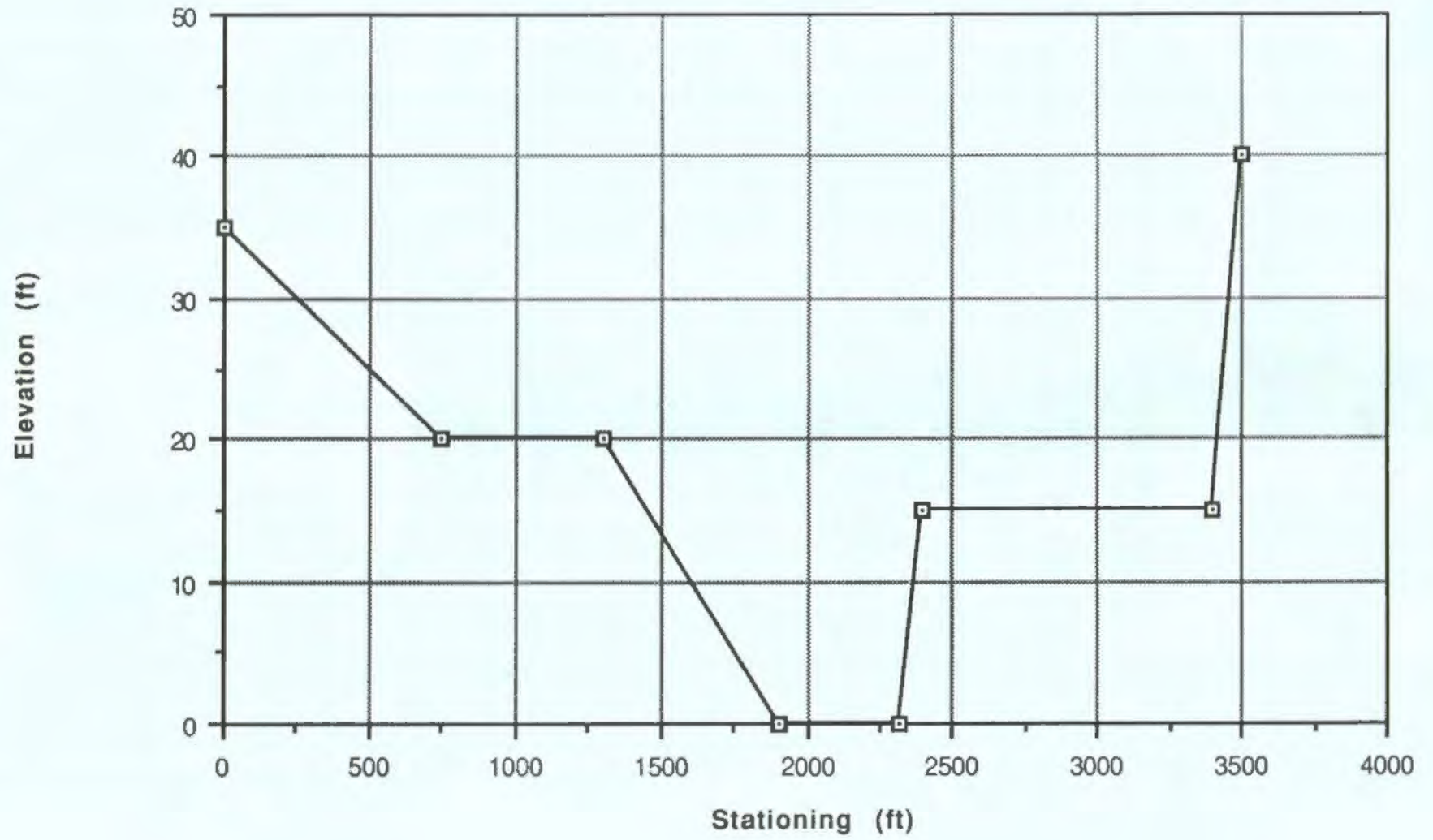
Reach 45



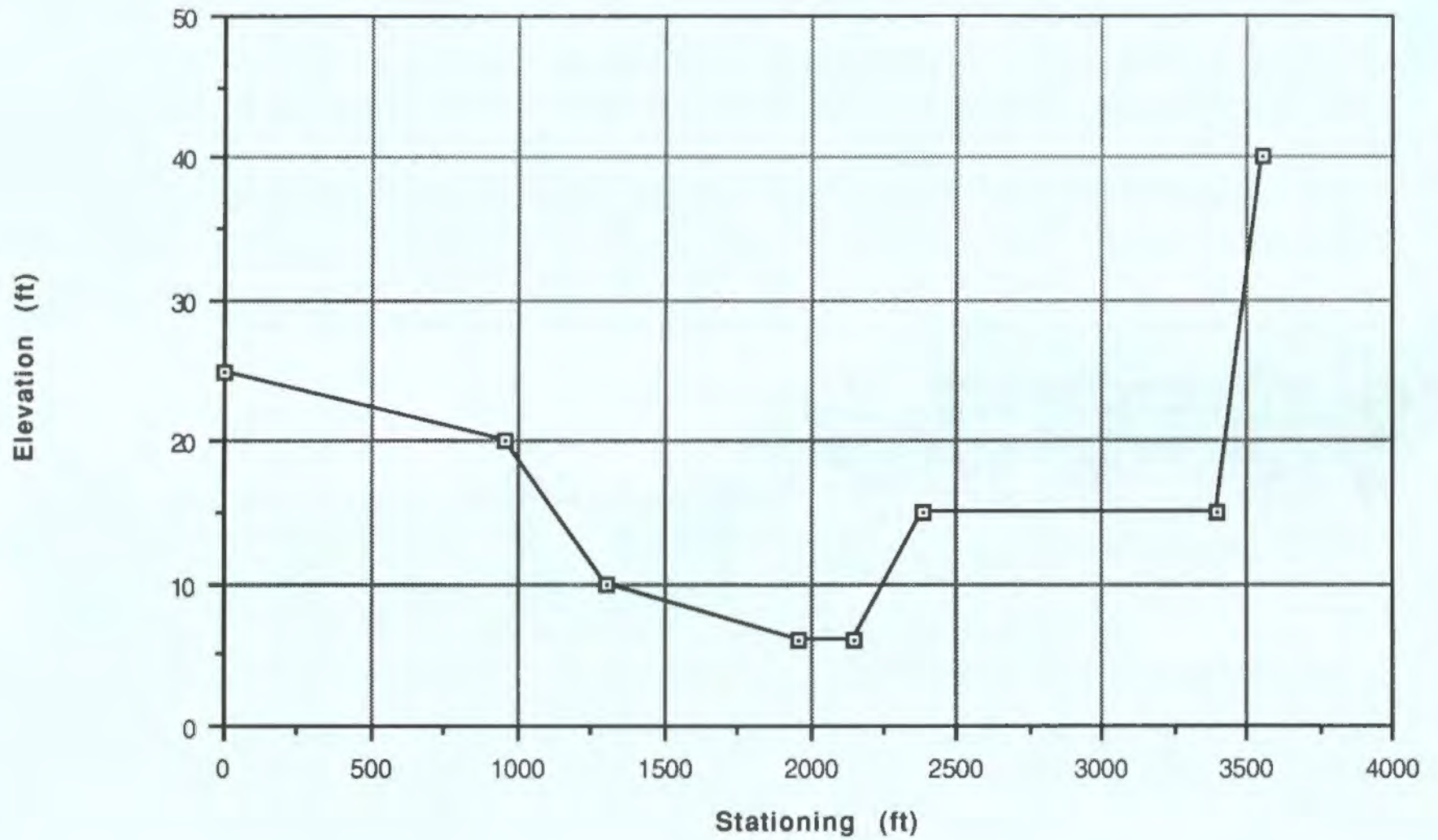
Reach 46



Reach 47



Reach 48



HEC-1 Printout




```
*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
*   FEBRUARY 1981
*   REVISED 02 AUG 88
*
* RUN DATE 12/12/1991 TIME 17:18:14
*
*****
```

```
*****
*
* U.S. ARMY CORPS OF ENGINEERS
* THE HYDROLOGIC ENGINEERING CENTER
*   609 SECOND STREET
*   DAVIS, CALIFORNIA 95616
*
*****
```

```

X   X XXXXXXX XXXXX      X
X   X X      X      X   XX
X   X X      X      X   X
XXXXXXX XXXX  X      XXXXX X
X   X X      X      X   X
X   X X      X      X   X
X   X XXXXXXX XXXXX      XXX

```

```

::::::::::::::::::::::::::::::::::::::::
::::::::::::::::::::::::::::::::::::::::
::: Full Microcomputer Implementation :::
::: by                                     :::
::: Haestad Methods, Inc.               :::
:::                                     :::
::::::::::::::::::::::::::::::::::::::::
::::::::::::::::::::::::::::::::::::::::

```

37 Brookside Road * Waterbury, Connecticut 06708 * (203) 755-1666

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
 THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
 NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
 DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
 KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

```

LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
1         ID      *****
2         ID      **
3         ID      **  VISTA IRRIGATION DISTRICT  **
4         ID      **  HENSHAW DAM FAILURE AND INUNDATION STUDY  **
5         ID      **
6         ID      **  James M. Montgomery, Consulting Engrs., Inc.  **
7         ID      **  "Sunny Day" Condition w/Reservoir Full  **
8         ID      **  Normal Depth (Modified Puls) Channel Routing  **
9         ID      **  November 1991  **
10        ID      **
11        ID      *****
12        ID
13        ID      Time Increment = 3 minutes
14        ID      Data File Name = HENSHAW1.SUM
15        ID      Output File Name = HENSHAW1.SM1
16        ID
17        IT      3      0      0      300
18        IN      296
19        IO      5

20        KK      BREACH
21        KM      Breach at Henshaw Dam (dam failure Qmax = 122,647 cfs)
22        KM      Breach Hydrograph based on OES procedures
23        QI      0  122647 0.00001      0      0

24        KK      1
25        KM      ROUTE OUTFLOW FROM DAM THROUGH REACH 1
26        RS      2      FLOW      -1
27        RC      .08      .10      .08      3920      .0102
28        RX      0      150      250      350      530      650      780      930
29        RY      2690      2680      2640      2620      2640      2660      2680      2700

30        KK      2
31        KM      ROUTE THROUGH REACH 2
32        RS      3      FLOW      -1
33        RC      .08      .10      .08      6600      .0121
34        RX      0      170      220      300      400      510      600      700
35        RY      2660      2620      2600      2580      2565      2580      2600      2700

36        KK      3
37        KM      ROUTE THROUGH REACH 3
38        RS      2      FLOW      -1
39        RC      .08      .10      .08      6000      .01
40        RX      0      220      400      560      750      1050      1150      1200
41        RY      2640      2600      2560      2520      2485      2520      2600      2640

42        KK      4
43        KM      ROUTE THROUGH REACH 4
44        RS      2      FLOW      -1
45        RC      .08      .09      .08      5400      .0111
46        RX      0      450      550      620      680      800      940      1200
47        RY      2600      2480      2440      2430      2440      2480      2560      2600

```

LINE	ID	1	2	3	4	5	6	7	8	9	10
48	KK	5									
49	KM		ROUTE THROUGH REACH 5								
50	RS	2	FLOW	-1							
51	RC	.08	.10	.08	7300	.0185					
52	RX	0	280	450	550	750	1000	1200	1500		
53	RY	2560	2480	2400	2360	2340	2360	2400	2560		
54	KK	6									
55	KM		ROUTE THROUGH REACH 6								
56	RS	1	FLOW	-1							
57	RC	.08	.10	.08	4400	.0193					
58	RX	0	150	380	500	600	700	850	1000		
59	RY	2400	2320	2240	2225	2240	2280	2320	2400		
60	KK	7									
61	KM		ROUTE THROUGH REACH 7								
62	RS	3	flow	-1							
63	RC	.08	.10	.08	8800	.0216					
64	RX	0	150	200	250	320	420	560	690		
65	RY	2240	2200	2160	2120	2100	2120	2200	2240		
66	KK	8									
67	KM		ROUTE THROUGH REACH 8								
68	RS	2	FLOW	-1							
69	RC	.08	.10	.08	6900	.0217					
70	RX	0	90	160	200	310	400	450	520		
71	RY	2200	2120	2040	2000	1970	2000	2080	2160		
72	KK	9									
73	KM		ROUTE THROUGH REACH 9								
74	RS	1	FLOW	-1							
75	RC	.08	.10	.08	2000	.02					
76	RX	0	100	150	190	230	280	330	420		
77	RY	2000	1920	1880	1840	1820	1840	1920	2000		
78	KK	10									
79	KM		ROUTE THROUGH REACH 10								
80	RS	1	FLOW	-1							
81	RC	.08	.1	.08	5000	.0833					
82	RX	0	300	600	680	720	780	980	1180		
83	RY	2000	1800	1640	1600	1600	1640	1800	2000		
84	KK	11									
85	KM		ROUTE THROUGH REACH 11								
86	RS	1	FLOW	-1							
87	RC	.08	.1	.08	6800	.0556					
88	RX	0	720	850	880	920	1020	1050	1800		
89	RY	1600	1200	1160	1140	1140	1160	1200	1600		

LINE	ID	1	2	3	4	5	6	7	8	9	10
90	KK	12									
91	KM	ROUTE THROUGH REACH 12									
92	RS	2	FLOW	-1							
93	RC	.08	.1	.08	5000	.02					
94	RX	0	320	700	850	970	1050	1400	1700		
95	RY	1400	1200	1000	960	960	1000	1200	1400		
96	KK	13									
97	KM	ROUTE THROUGH REACH 13									
98	RS	3	FLOW	-1							
99	RC	.08	.1	.08	6400	.0071					
100	RX	0	220	400	600	950	1100	1200	1550		
101	RY	1160	1000	920	900	900	920	1000	1200		
102	KK	BASE									
103	KM	10-year average maximum baseflow									
104	QI	900	900	900	900	900					
105	KK										
106	KM										
107	HC	2									
108	KK	14									
109	KM	ROUTE THROUGH REACH 14									
110	RS	5	FLOW	-1							
111	RC	.08	.055	.075	7800	.0045					
112	RX	0	520	580	650	1700	4100	4900	5400		
113	RY	1200	880	855	855	860	880	1000	1160		
114	KK	15									
115	KM	ROUTE THROUGH REACH 15									
116	RS	4	FLOW	-1							
117	RC	.08	.06	.08	6000	.0048					
118	RX	0	300	520	650	800	2050	3100	5300		
119	RY	1000	840	822	822	840	880	920	1040		
120	KK	16									
121	KM	ROUTE THROUGH REACH 16									
122	RS	3	FLOW	-1							
123	RC	.07	.065	.08	5000	.0048					
124	RX	0	350	600	1100	1200	2150	3200	3800		
125	RY	1000	840	820	800	800	820	840	1000		
126	KK	17									
127	KM	ROUTE THROUGH REACH 17									
128	RS	4	FLOW	-1							
129	RC	.08	.065	.09	5800	.0049					
130	RX	0	500	750	950	1150	1500	2000	4000		
131	RY	1000	800	780	770	770	780	800	920		

LINE	ID	1	2	3	4	5	6	7	8	9	10	
132	KK	18										
133	KM		ROUTE THROUGH REACH 18									
134	RS	4	FLOW	-1								
135	RC	.07	.06	.09	7400	.0061						
136	RX	0	300	550	1100	1400	1450	1900	5800			
137	RY	900	760	750	745	745	750	760	880			
138	KK	19										
139	KM		ROUTE THROUGH REACH 19									
140	RS	3	FLOW	-1								
141	RC	.08	.05	.07	4800	.0059						
142	RX	0	200	400	850	1650	1800	3100	4950			
143	RY	820	720	700	690	690	700	720	820			
144	KK	20										
145	KM		ROUTE THROUGH REACH 20									
146	RS	2	FLOW	-1								
147	RC	.08	.06	.08	4400	.0061						
148	RX	0	200	250	350	500	600	1300	3000			
149	RY	800	700	680	675	675	680	700	800			
150	KK	21										
151	KM		ROUTE THROUGH REACH 21									
152	RS	1	FLOW	-1								
153	RC	.08	.08	.08	4600	.0267						
154	RX	0	300	350	450	850	1350	1380	2300			
155	RY	900	660	620	620	640	680	700	760			
156	KK	22										
157	KM		ROUTE THROUGH REACH 22									
158	RS	2	FLOW	-1								
159	RC	.08	.08	.08	6500	.0175						
160	RX	0	250	550	1180	1300	1350	1700	2000			
161	RY	700	540	520	505	505	520	700	740			
162	KK	23										
163	KM		ROUTE THROUGH REACH 23									
164	RS	3	FLOW	-1								
165	RC	.08	.06	.08	7000	.0108						
166	RX	0	200	250	350	1150	1200	1500	2400			
167	RY	600	460	440	440	445	460	540	580			
168	KK	24										
169	KM		ROUTE THROUGH REACH 24									
170	RS	3	FLOW	-1								
171	RC	.07	.06	.07	6000	.0067						
172	RX	0	1000	3000	3600	3900	4500	4550	6200			
173	RY	500	400	390	380	380	390	400	440			

[illegible]

LINE	ID	1	2	3	4	5	6	7	8	9	10
216	KK	30									
217	KM	ROUTE THROUGH REACH 30									
218	RS	2	FLOW	-1							
219	RC	.08	.09	.08	2600	.0045					
220	RX	0	800	1200	1450	1670	1800	2000	2250		
221	RY	400	260	250	245	245	260	300	340		
222	KK	31									
223	KM	ROUTE THROUGH REACH 31									
224	KM	Interstate Highway 15									
225	RS	1	FLOW	-1							
226	RC	.05	.09	.05	1400	.0045					
227	RX	0	2000	4400	4520	5480	5600	7400	9000		
228	RY	400	300	280	240	240	280	290	300		
229	KK	32									
230	KM	ROUTE THROUGH REACH 32									
231	RS	5	FLOW	-1							
232	RC	.08	.09	.08	5700	.0028					
233	RX	0	760	1200	1600	1800	2350	3500	3900		
234	RY	400	240	230	224	224	230	240	300		
235	KK	33									
236	KM	ROUTE THROUGH REACH 33									
237	RS	10	FLOW	-1							
238	RC	.08	.08	.08	12400	.0032					
239	RX	0	400	600	2200	2500	3650	3800	4000		
240	RY	300	220	200	194	194	200	220	280		
241	KK	34									
242	KM	ROUTE THROUGH REACH 34									
243	RS	5	FLOW	-1							
244	RC	.08	.08	.08	6400	.0030					
245	RX	0	320	600	1400	1800	2000	2100	2400		
246	RY	260	180	170	168	168	180	220	260		
247	KK	BASE									
248	KM	10-year average maximum baseflow									
249	QI	400	400	400	400	400					
250	KK										
251	KM										
252	HC	2									
253	KK	35									
254	KM	ROUTE THROUGH REACH 35									
255	RS	6	FLOW	-1							
256	RC	.08	.06	.08	7200	.0031					
257	RX	0	150	300	380	420	500	1400	2200		
258	RY	260	160	150	142	142	150	160	240		

LINE	ID	1	2	3	4	5	6	7	8	9	10
259	KK	36									
260	KM	ROUTE THROUGH REACH 36									
261	RS	8	FLOW	-1							
262	RC	.08	.09	.08	10000	.0029					
263	RX	0	240	400	600	620	650	1080	1220		
264	RY	300	160	140	120	120	130	140	180		
265	KK	BASE									
266	KM	10-year average maximum baseflow									
267	QI	100	100	100	100	100					
268	KK										
269	KM										
270	HC	2									
271	KK	37									
272	KM	ROUTE THROUGH REACH 37									
273	RS	7	FLOW	-1							
274	RC	.08	.1	.08	6800	.0020					
275	RX	0	400	1300	1420	1580	1650	2150	2450		
276	RY	160	120	110	105	105	110	140	180		
277	KK	38									
278	KM	ROUTE THROUGH REACH 38									
279	RS	11	FLOW	-1							
280	RC	.05	.08	.04	11000	.0020					
281	RX	0	400	500	1600	1900	2300	3000	3380		
282	RY	140	120	100	90	90	100	120	140		
283	KK	39									
284	KM	ROUTE THROUGH REACH 39									
285	RS	9	FLOW	-1							
286	RC	.1	.07	.07	9400	.0021					
287	RX	0	100	170	3400	3700	4200	5100	5400		
288	RY	100	80	70	70	65	65	70	90		
289	KK	BASE									
290	KM	10-year average maximum baseflow									
291	QI	1300	1300	1300	1300	1300					
292	KK										
293	KM										
294	HC	2									
295	KK	40									
296	KM	ROUTE THROUGH REACH 40									
297	RS	8	FLOW	-1							
298	RC	.15	.08	.07	7800	.0018					
299	RX	0	150	1500	5700	6200	6400	7600	9000		
300	RY	100	60	50	45	45	50	60	100		

LINE	ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
301	KK 41
302	KM ROUTE THROUGH REACH 41
303	RS 11 FLOW -1
304	RC .12 .09 .07 10400 .0024
305	RX 0 80 2400 3300 3700 3800 4300 5200
306	RY 100 40 30 25 25 30 40 100
307	KK 42
308	KM ROUTE THROUGH REACH 42
309	RS 5 FLOW -1
310	RC .08 .1 .08 4400 .0016
311	RX 0 120 350 400 800 1000 1200 1400
312	RY 100 20 15 10 10 15 20 100
313	KK 43
314	KM ROUTE THROUGH REACH 43
315	RS 4 FLOW -1
316	RC .1 .08 .1 3500 .0015
317	RX 0 150 200 300 600 700 800 1080
318	RY 100 20 10 5 5 10 60 100
319	KK 44
320	KM ROUTE THROUGH REACH 44
321	KM Interstate 5 Freeway
322	RS 1 FLOW -1
323	RC .15 .1 .15 300 .0015
324	RX 0 300 900 1200 1580 1660 1800 2100
325	RY 85 80 40 3 3 20 40 60
326	KK 45
327	KM ROUTE THROUGH REACH 45
328	RS 1 FLOW -1
329	RC .15 .10 .03 1100 .0014
330	RX 0 1750 1800 2100 2450 2500 2800 2850
331	RY 60 40 5 2 2 17 20 40
332	KK 46
333	KM ROUTE THROUGH REACH 46
334	KM Santa Fe Railroad
335	RS 1 FLOW -1
336	RC .15 .10 .08 150 .0014
337	RX 0 800 1600 1950 2450 2500 2800 3300
338	RY 40 40 20 1 1 16 20 40
339	KK 47
340	KM ROUTE THROUGH REACH 47
341	RS 1 FLOW -1
342	RC .15 .1 .07 580 .0014
343	RX 0 750 1300 1900 2320 2400 3400 3500
344	RY 35 20 20 0 0 15 15 40


```
*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
*   FEBRUARY 1981
*   REVISED 02 AUG 88
*
* RUN DATE 12/12/1991 TIME 17:18:14
*
*****
```

```
*****
*
* U.S. ARMY CORPS OF ENGINEERS
* THE HYDROLOGIC ENGINEERING CENTER
*   609 SECOND STREET
*   DAVIS, CALIFORNIA 95616
*
*****
```

```
*****
**
** VISTA IRRIGATION DISTRICT
** HENSHAW DAM FAILURE AND INUNDATION STUDY
**
** James M. Montgomery, Consulting Engrs., Inc.
** "Sunny Day" Condition w/Reservoir Full
** Normal Depth (Modified Puls) Channel Routing
** November 1991
**
*****
```

Time Increment = 3 minutes
Data File Name = HENSHAW1.SUM
Output File Name = HENSHAW1.SM1

19 IO

OUTPUT CONTROL VARIABLES

IPRNT	5	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0.	HYDROGRAPH PLOT SCALE

IT

HYDROGRAPH TIME DATA

NMIN	3	MINUTES IN COMPUTATION INTERVAL
IDATE	1 0	STARTING DATE
ITIME	0000	STARTING TIME
NQ	300	NUMBER OF HYDROGRAPH ORDINATES
NDDATE	1 0	ENDING DATE
NDTIME	1457	ENDING TIME
ICENT	19	CENTURY MARK

COMPUTATION INTERVAL .05 HOURS
TOTAL TIME BASE 14.95 HOURS

ENGLISH UNITS

DRAINAGE AREA	SQUARE MILES
PRECIPITATION DEPTH	INCHES
LENGTH, ELEVATION	FEET
FLOW	CUBIC FEET PER SECOND
STORAGE VOLUME	ACRE-FEET
SURFACE AREA	ACRES
TEMPERATURE	DEGREES FAHRENHEIT

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD			BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
		6-HOUR		24-HOUR	72-HOUR				
HYDROGRAPH AT	BREACH	122233.	4.95	85352.	40472.	40472.	.00		
ROUTED TO	1	121759.	5.00	85338.	40472.	40472.	.00	2659.57	5.00
ROUTED TO	2	121265.	5.05	85316.	40472.	40472.	.00	2603.22	5.05
ROUTED TO	3	120658.	5.15	85273.	40472.	40472.	.00	2523.98	5.15
ROUTED TO	4	120453.	5.25	85256.	40472.	40472.	.00	2472.56	5.25
ROUTED TO	5	120075.	5.35	85204.	40472.	40472.	.00	2368.07	5.35
ROUTED TO	6	119869.	5.40	85186.	40472.	40472.	.00	2259.92	5.40
ROUTED TO	7	119672.	5.50	85163.	40472.	40472.	.00	2141.89	5.50
ROUTED TO	8	119531.	5.55	85145.	40471.	40471.	.00	2014.56	5.55
ROUTED TO	9	119484.	5.55	85144.	40471.	40471.	.00	1878.66	5.55
ROUTED TO	10	119442.	5.60	85137.	40471.	40471.	.00	1634.06	5.60
ROUTED TO	11	119336.	5.65	85108.	40471.	40471.	.00	1169.59	5.65
ROUTED TO	12	119248.	5.70	85087.	40471.	40471.	.00	990.61	5.70
ROUTED TO	13	118929.	5.85	84991.	40470.	40470.	.00	922.57	5.85
HYDROGRAPH AT	BASE	900.	.05	900.	900.	900.	.00		
2 COMBINED AT		119829.	5.85	85891.	41370.	41370.	.00		
ROUTED TO	14	119213.	6.10	85839.	41369.	41369.	.00	863.82	6.10
ROUTED TO	15	119028.	6.20	85804.	41367.	41367.	.00	849.24	6.20
ROUTED TO	16	118718.	6.35	85770.	41363.	41363.	.00	818.50	6.35
ROUTED TO	17	118551.	6.50	85753.	41357.	41357.	.00	787.88	6.50
ROUTED TO	18	118249.	6.65	85691.	41344.	41344.	.00	757.92	6.65
ROUTED TO	19	118147.	6.75	85601.	41333.	41333.	.00	700.17	6.75
ROUTED TO	20	118017.	6.85	85545.	41317.	41317.	.00	695.38	6.85
ROUTED TO	21	117920.	6.90	85468.	41308.	41308.	.00	639.82	6.90
ROUTED TO	22	117775.	7.00	85337.	41286.	41286.	.00	521.59	7.00
ROUTED TO	23	117662.	7.10	85153.	41253.	41253.	.00	452.12	7.10
ROUTED TO	24	117436.	7.25	85032.	41186.	41186.	.00	392.79	7.25

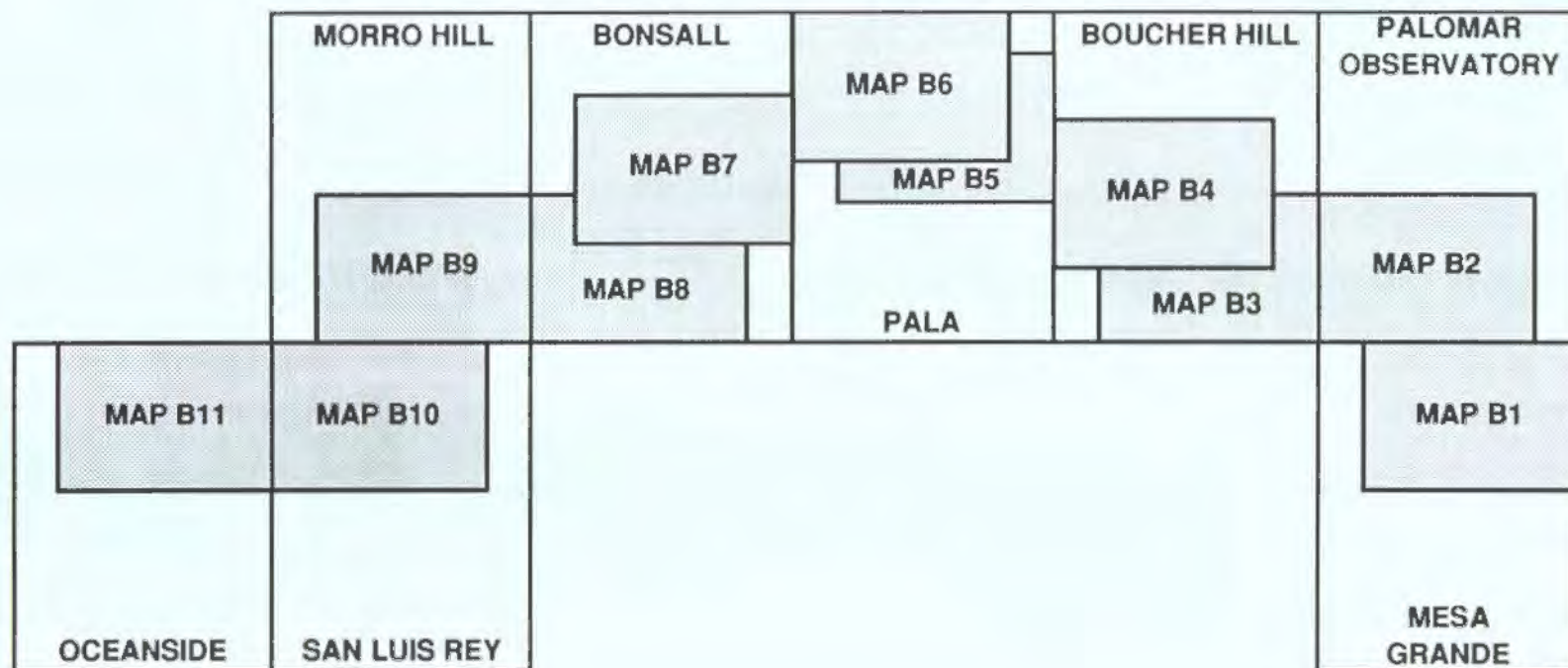
HYDROGRAPH AT	BASE	300.	.05	300.	300.	300.	.00		
2 COMBINED AT		117736.	7.25	85332.	41486.	41486.	.00		
ROUTED TO	25	117516.	7.35	85044.	41390.	41390.	.00	361.08	7.35
ROUTED TO	26	117310.	7.50	84930.	41312.	41312.	.00	337.04	7.50
ROUTED TO	27	117168.	7.65	84770.	41062.	41062.	.00	315.23	7.65
ROUTED TO	28	116844.	7.80	84513.	40807.	40807.	.00	300.81	7.80
ROUTED TO	29	116652.	8.00	84301.	40415.	40415.	.00	283.48	8.00
HYDROGRAPH AT	BASE	700.	.05	700.	700.	700.	.00		
2 COMBINED AT		117352.	8.00	85001.	41115.	41115.	.00		
ROUTED TO	30	117286.	8.10	84915.	40928.	40928.	.00	266.07	8.10
ROUTED TO	31	117229.	8.10	84850.	40826.	40826.	.00	256.58	8.10
ROUTED TO	32	116791.	8.40	84419.	40104.	40104.	.00	240.17	8.40
ROUTED TO	33	116279.	8.85	83132.	38017.	38017.	.00	205.27	8.85
ROUTED TO	34	115975.	9.05	82548.	37118.	37118.	.00	182.76	9.05
HYDROGRAPH AT	BASE	400.	.05	400.	400.	400.	.00		
2 COMBINED AT		116375.	9.05	82948.	37518.	37518.	.00		
ROUTED TO	35	116099.	9.25	82389.	36691.	36691.	.00	167.09	9.25
ROUTED TO	36	115643.	9.60	81858.	35453.	35453.	.00	154.29	9.60
HYDROGRAPH AT	BASE	100.	.05	100.	100.	100.	.00		
2 COMBINED AT		115743.	9.60	81958.	35553.	35553.	.00		
ROUTED TO	37	115405.	9.85	81179.	34156.	34156.	.00	129.10	9.85
ROUTED TO	38	114864.	10.30	75174.	31607.	31607.	.00	107.32	10.30
ROUTED TO	39	114068.	10.90	67049.	28346.	28346.	.00	75.51	10.90
HYDROGRAPH AT	BASE	1300.	.05	1300.	1300.	1300.	.00		
2 COMBINED AT		115368.	10.90	68349.	29646.	29646.	.00		
ROUTED TO	40	113877.	11.60	60347.	26434.	26434.	.00	54.62	11.60
ROUTED TO	41	111554.	12.45	50995.	22681.	22681.	.00	39.77	12.45
ROUTED TO	42	111367.	12.65	47856.	21421.	21421.	.00	34.51	12.65
ROUTED TO	43	111276.	12.75	46022.	20686.	20686.	.00	35.99	12.75
ROUTED TO	44	111282.	12.75	45819.	20604.	20604.	.00	38.38	12.75

ROUTED TO	45	111220.	12.80	45068.	20302.	20302.	.00	28.42	12.80
ROUTED TO	46	111226.	12.80	44942.	20252.	20252.	.00	28.78	12.80
ROUTED TO	47	111158.	12.85	44347.	20013.	20013.	.00	24.11	12.85
ROUTED TO	48	111170.	12.85	44105.	19916.	19916.	.00	25.01	12.85

*** NORMAL END OF HEC-1 ***
NORMAL END OF HEC-1

Inundation Maps





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VISTA IRRIGATION DISTRICT - HENSHAW DAM FAILURE AND INUNDATION STUDY

MAP INDEX

ATTACHMENT “8”

DAM FAILURE ANALYSIS AND INUNDATION MAPPING FOR HENSHAW DAM

STATE DAM NO. 69.002
NATIONAL DAM NO. CA00283
SAN DIEGO COUNTY, CALIFORNIA

INUNDATION TECHNICAL STUDY REPORT



OCTOBER 5, 2018



PREPARED FOR:
VISTA IRRIGATION DISTRICT
VISTA, CA

PREPARED BY:
STETSON ENGINEERS INC
CARLSBAD, CA

SUBMITTED TO:
DEPARTMENT OF WATER RESOURCES
DIVISION OF SAFETY OF DAMS

SACRAMENTO, CA



Northern California • Southern California • Arizona • Colorado • Oregon

TABLE OF CONTENTS

INTRODUCTION AND STUDY SUMMARY	4
1. DAM NAME	5
2. DAM LOCATION	5
3. AFFECTED AREAS	5
4. HYDROLOGIC, METEOROLOGIC, AND TOPOGRAPHIC FEATURES	6
5. ENGINEERING DESCRIPTION	8
6. KEY ELEVATIONS	9
7. RESERVOIR STORAGE CAPACITY CURVE	10
8. SPILLWAY RATING CURVE	11
9. TERRAIN DATA USED	12
10. MODELED FAILURE SCENARIOS	13
10.1 Main Dam	14
10.2 Outlet Tunnel Critical Appurtenant Structure	15
11. MODELING METHODOLOGY	16
11.1 Modeling Software	16
11.2 Model Configuration	16
11.2.1 Baseflow and Tides	17
11.2.2 Spatial Grid Resolution and Hydraulic Structures	18
11.2.3 Storage Capacity Curve in Model	18
11.2.4 Manning's <i>n</i>	19
11.2.5 Downstream Extent of Inundation Boundary	21
11.2.6 Model Timestep and Duration	21
11.2.7 Breach Parameters- Main Dam	21
11.2.8 Breach Parameters- Outlet Tunnel	23
11.3 Model Sensitivity and Stability	24
11.3.1 Breach Parameters	24
11.3.2 Manning's <i>n</i> Sensitivity	25
11.4 Model Output and Results	25
11.4.1 Main Dam Sunny Day Failure Summary	26
11.4.2 Outlet Tunnel Sunny Day Failure Summary	27
11.5 Model Limitations	28
12. LIST OF DIGITAL FILES INCLUDED WITH SUBMITTAL	29
REFERENCES	30

LIST OF TABLES

Table 1	Dam Elevations and Vertical Datum	9
Table 2	Comparison of Capacity Curves for Lake Henshaw	11
Table 3	Manning's <i>N</i> Categories and Values	19
Table 4	Inundation Maps Submitted with Sunny Day Failure Scenario	26
Table 5	Main Dam Sunny Day Failure- Electronic Files Submitted	29
Table 6	Outlet Tunnel Sunny Day Failure	30

LIST OF FIGURES

Figure 1	Dam Location Map	7
Figure 2	Reservoir Storage Capacity Curve for Lake Henshaw	11
Figure 3	Spillway Discharge Curve	12
Figure 4	Extent of Terrain Data (DEM) Used in Model	13
Figure 5	Breach Hydrograph for Main Dam Sunny Day Failure Scenario	15
Figure 6	Breach Hydrograph for Outlet Tunnel Sunny Day Failure Scenario	16
Figure 7	Graph of Daily Discharge on San Luis Rey River, Station 11042000, 1998 through 2018	17
Figure 8	Two-Dimensional Flow Area Used in the Model	18
Figure 9	Excerpt of Spatially-Varying Manning's N Layer	20
Figure 10	Screen Capture of Breach Parameters Used for Sunny Day Piping Failure in HEC-RAS 5.03	23
Figure 11	Typical Cross-Section of Outlet Tunnel (from Leeds, Hill and Jewett, 1980b)	24

ATTACHMENTS

Attachment 1. Inundation Maps for Main Dam

Inundation Map Book Showing Flood Wave Arrival Time and Maximum Flood Depth

Inundation Map Book Showing Flood Wave Arrival Time and Maximum Velocity

Attachment 2. Inundation Maps for Outlet Tunnel

Inundation Map Book Showing Flood Wave Arrival Time and Maximum Flood Depth

Inundation Map Book Showing Flood Wave Arrival Time and Maximum Velocity

Attachment 3. Disc with Electronic Files

INTRODUCTION AND STUDY SUMMARY

Senate Bill 92 added Sections 6160 and 6161 to the California Water Code that became effective on June 27, 2017, requiring owners of State-regulated dams, except those classified as low hazard, to prepare Emergency Action Plans (EAPs) containing inundation maps for emergency preparedness.

The Department of Water Resources (DWR) has classified jurisdictional dams in California into four risk categories:

“Low Hazard Potential. Dams assigned the low hazard potential classification are those where failure or mis-operation of the dam system would result in no probable loss of human life and low economic and/or environmental losses. Losses are expected to be principally limited to the owner's property.

Significant Hazard Potential. Dams assigned the significant hazard potential classification are those dams where failure or mis-operation of the dam system would result in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or other significant impacts.

High Hazard Potential. Dams assigned the high hazard potential classification are those where failure or mis-operation of the dam system will probably cause loss of human life.

Extremely High Hazard Potential. Dams assigned the extremely high hazard potential classification are dams that would otherwise be classified as high hazard dams, but where failure or mis-operation of the dam system would probably cause considerable loss of human life and would affect an inundation area with a population of 1,000 persons or more, or where critical facilities could be impacted.” (excerpted from Title 23 §335.4)

Section 6161 of the Water Code requires that owners of Significant Hazard, High Hazard, and Extremely High Hazard potential dams prepare or update inundation maps. EAPs for dams in the Extremely High Hazard Potential category were due to the California Office of Emergency Services (Cal OES) by January 1, 2018. EAPs for the High Hazard Potential are by January 1, 2019, and EAPS for Significant Hazard are due January 1, 2021. Inundation maps must first be submitted to DSOD for review and approval, and only approved inundation maps should be contained within the EAPs that are submitted to Cal OES.

DWR published regulations governing the preparation of inundation maps within Title 23, Division 2, Chapter 1, Article 6 of the California Code of Regulations. Emergency regulations were initially adopted on October 19, 2017, and subsequently modified and re-adopted in April 2018 and again in July 2018. This study has been prepared to comply with the

emergency regulations re-adopted on July 18, 2018, as currently reflected in the California Code of Regulations.

Vista Irrigation District (VID) owns and operates one jurisdictional dam, Henshaw Dam, which impounds Lake Henshaw. VID serves more than 129,000 customers, with a service area encompassing the entire City of Vista, unincorporated areas of the County of San Diego, and a small portion of the City of San Marcos (HDR, 2018).

Henshaw Dam is classified as a High Hazard Potential dam. Lake Henshaw stores local runoff from the San Luis Rey River watershed and groundwater pumped from the Warner Basin aquifer (California groundwater basin 9-08; DWR, 2004). Water stored in Lake Henshaw is used by VID, the City of Escondido, and the Rincon Band of Indians.

This report describes the analysis and modeling completed to satisfy the emergency regulations for inundation mapping resulting from failure of the Henshaw Dam. This technical memorandum has eleven sections, which follow the same numbering as the list of required items in §335.12(a) of the emergency regulations.

1. DAM NAME

The subject of this study is Henshaw Dam which impounds Lake Henshaw. Henshaw Dam is a hydraulic fill dam originally constructed in 1922 and modified in 1981. The California state dam number is 69.002 and the national dam number is CA00283. The dam has an outlet tunnel, which is a critical appurtenant structure per §335.2(a)(2) of the emergency regulations. The dam has a notched spillway which is not a critical appurtenant structure. See section 10 for a discussion of critical appurtenant structures.

2. DAM LOCATION

Henshaw Dam is located in San Diego County, California. The coordinates of the middle of the dam crest are 33.2402 N, -116.7631 W (North American Datum of 1983 [NAD83]). The dam is located in Section 10 of Township 11S, Range 2E (San Bernardino Base and Meridian). Figure 1 shows the location of the reservoir, spillway notch, and outlet tunnel.

3. AFFECTED AREAS

Henshaw Dam is located on unincorporated land in San Diego County about 30 miles east of the City of Vista. Flooding from a dam failure at Henshaw Dam has the potential to inundate portions of the following communities:

- San Diego County (unincorporated areas)

- La Jolla Indian Reservation
- Rincon Indian Reservation
- Pauma Valley (an unincorporated community)
- Pala Reservation
- Bonsall (a census-designated community)
- City of Oceanside
- Marine Corps Base Camp Pendleton

Figure 1 shows the location of Henshaw Dam and the listed communities.

4. HYDROLOGIC, METEOROLOGIC, AND TOPOGRAPHIC FEATURES

Lake Henshaw is located in southern California in a mild, Mediterranean climate zone. The average annual temperature is about 60 degrees Fahrenheit. Summers are warm and dry; winters are cool and mild. The majority of annual precipitation occurs during the months of November through April. Average annual precipitation at Lake Henshaw is about 21 inches per year, with areas upstream averaging up to 26 inches per year. Areas downstream of the dam receive much less precipitation, with an average of about 11 inches per year near Oceanside Marina (PRISM, 2016).

Henshaw Dam is located on the San Luis Rey River. The San Luis Rey River watershed has a total drainage area of 560 square miles. Approximately 210 square miles are upstream of Henshaw Dam, and 350 square miles are downstream of the dam.

Henshaw Dam is located at an elevation of about 2,700 ft, referenced to the North American Vertical Datum of 1988 (NAVD88). Elevations upstream of Henshaw Dam range from 2,700 ft NAVD88 to over 6,500 ft NAVD88, with average elevation of about 3,900 ft NAVD88.

Lake Henshaw regulates flow on the San Luis Rey River. Flows released from Lake Henshaw are diverted from the San Luis Rey River through the Escondido Canal Diversion Dam, which is located about 10 river miles downstream of Henshaw Dam. Consequently, below this point, the San Luis Rey River is dry much of the time, except after significant winter storms. For example, during the recent drought, the river had zero flow for more than three and a half years as measured near the mouth at Oceanside (USGS Gage No. 11042000; USGS, 2018a).



FIGURE 1

5. ENGINEERING DESCRIPTION

Henshaw Dam is a hydraulic fill dam originally constructed in 1922. The dam has a main dam section and two adjacent saddle dams. The main dam height is 123 ft. The dam impounds Lake Henshaw, which had an original capacity of 194,000 acre-feet (ac-ft). The original spillway structure has a crest at 2,723 ft NAVD88¹. The top of the dam is at an elevation of about 2,743 ft NAVD88. The main dam was constructed with a diversion culvert through the main dam. This culvert was used to pass water during construction, but was subsequently filled with hydraulic fill and capped with concrete. An outlet tunnel was also constructed that releases water from the reservoir into the San Luis Rey River channel downstream.

After the original dam was built, seismic investigations revealed that Henshaw Dam was subject to liquefaction failure due to proximity to fault zones. The dam was subsequently modified in 1981 to address the seismic risk. The capacity of the dam was reduced to about 50,000 ac-ft. A flow retarding structure (FRS) was constructed on the downstream face of the dam to attenuate flows in the event of a sudden collapse. At the same time, a notch was constructed in the original spillway to provide overflow capacity at a lower elevation of 2,693 ft NAVD88. When the reservoir capacity was reduced, the two saddle dams became situated in the freeboard zone. They no longer impound water.

The current barrier height of the dam is 73 ft, as measured from the maximum water surface at the spillway of 2,693 NAVD88 to the downstream toe elevation of 2,620 ft NAVD88. The outlet tunnel is used to release water into the San Luis Rey River. The tunnel is a 5-ft wide by 7-ft tall arched tunnel, with a length of about 900 ft. It discharges into a concrete box structure, and then the San Luis Rey River. The tunnel has a 48-inch butterfly valve and a 48-inch slide gate.

The existing spillway consists of an ogee crest weir with a 60-ft-wide upstream approach channel. The newer notched spillway section was cut into the original spillway. The total spillway length is about 575 ft. Flows discharge into a plunge pool at the bottom of the spillway.

The dam's outlet tunnel is a critical appurtenant structure per the definition in §335.2(a)(2) of the emergency regulations. The spillway notch, diversion culvert, and saddle dams are not critical appurtenant structures. See Section 10 for rationale on these determinations.

The dam has thirteen foundation piezometers and ten survey monuments which are regularly monitored. The dam and its appurtenances are regularly inspected by DSOD.

¹ All elevations described in this section and used in this study's modeling are in NAVD88. See Section 6 for a discussion of the different datums and conversions.

Lake Henshaw stores runoff from the San Luis Rey River watershed, which has an area of about 210 square miles upstream of the dam. The reservoir is also used to store groundwater pumped from the Warner Basin aquifer (California groundwater basin 9-08; DWR, 2004). Flows are released from Lake Henshaw through the outlet tunnel and then re-diverted at a diversion dam downstream. The Escondido Diversion Dam, located 9.8 river miles downstream of Henshaw Dam, was built in 1924 and is 16 ft high. The dam diverts water into the Escondido Canal, which is approximately 14 miles long and has an operating capacity of about 60 cfs (Atkins, 2012). The canal terminates at Lake Wohlford, where water is stored and released via the Bear Valley Pipeline to the Escondido-Vista Water Treatment Plant at Lake Dixon (HDR, 2018). The Canal is owned and operated by the City of Escondido. VID has rights to half the capacity of the Canal and pays half of Escondido's cost to operate and maintain the Canal.

6. KEY ELEVATIONS

Key elevations for dam features are listed in Table 1. Three columns of data are shown: the first column gives key dam elevations as presented in the construction drawings. The second column gives corresponding elevations in NGVD29, which is the datum used in a 1996 bathymetric survey. The third column contains elevations in NAVD88, which is the datum used in the inundation modeling in this study. A shift of 0.6 ft was established in the 1996 survey (BHA, 1996) to convert from the construction datum to NGVD29. An additional shift of +2.4 ft was applied to convert from NGVD29 to NAVD88, using the North American Vertical Datum Conversion (VERTCON) program provided by the National Geodetic Survey (NGS, 2018), and verified using the NAVD88-based digital elevation model (DEM) used in this study (see Section 9). In this study, all model parameters, model elevations, and model results are referenced to NAVD88.

TABLE 1 DAM ELEVATIONS AND VERTICAL DATUM

Location	Elevation		
	(ft, Construction Datum)¹	(ft, NGVD29)²	(ft, NAVD88)³
Crest	2,740.0	2,740.6	2,743.0
Upstream Toe of Dam	2,617.0 ⁴	2,617.6	2,620.0
Downstream Toe of Dam	2,617.0 ⁵	2,617.6	2,620.0
Spillway Notch Crest	2,690.0	2,690.6	2,693.0

1. Elevations as shown in 1981 construction modification drawings (Leeds, Hill and Jewett, 1980b)

2. Shift of +0.6 ft established in bathymetric study (BHA, 1996)

3. Shift of +2.4 ft based on Vertcon conversion program (NGS, 2018).

4. Estimated from historical dam drawing (Harlan Tait, 1991).

5. Estimated minimum downstream toe elevation, per DSOD, consistent with a dam barrier height of 73 ft and a maximum water level at the spillway crest elevation of 2,690.0 ft, construction datum.

7. RESERVOIR STORAGE CAPACITY CURVE

The historical Lake Henshaw capacity given in construction drawings was 50,000 ac-ft at the current spillway elevation of 2,693 ft NAVD88 (Harlan Tait, 1991). BHA completed a detailed bathymetric survey and capacity curve for Lake Henshaw in 1996 which showed a larger capacity of 51,774 ac-ft at the spillway elevation.

The pink line in Figure 2 shows the storage in Lake Henshaw in acre-feet and the corresponding water surface elevation in ft NAVD88, as given in the 1996 study. The 1996 capacity curve indicated that sedimentation occurred after construction of the dam, so adjustments were made to the curve to replace the sediment with water storage, such that the entire historical volume of the lake would be simulated as water in the dam failure analysis.

Table 2 is a comparison of capacity curves. At an elevation of 2,661.0 ft NAVD88, the historical curve showed a capacity of 5,000 ac-ft, while the 1996 curve showed 3,392 ac-ft. This difference of 1,608 ac-ft was estimated as the sediment volume that accrued between construction and the 1996 study. This value was then added to the 1996 capacity to create a curve for this study's model. At elevations 2,667.0 ft NAVD88 and higher, the 1996 curve showed a greater storage volume than the historical curve, likely due to more detailed survey methods. At these elevations, the sedimentation volume of 1,608 ac-ft was added to the 1996 storage value to get a value for inundation modeling purposes. See the calculations and notes in Table 2.

The blue curve in Figure 2 is the full historical lake volume without sedimentation. This curve was used in the inundation model in this study. The curve used in the model has a maximum storage of 53,382 ac-ft at the spillway elevation of 2,693 ft NAVD88.

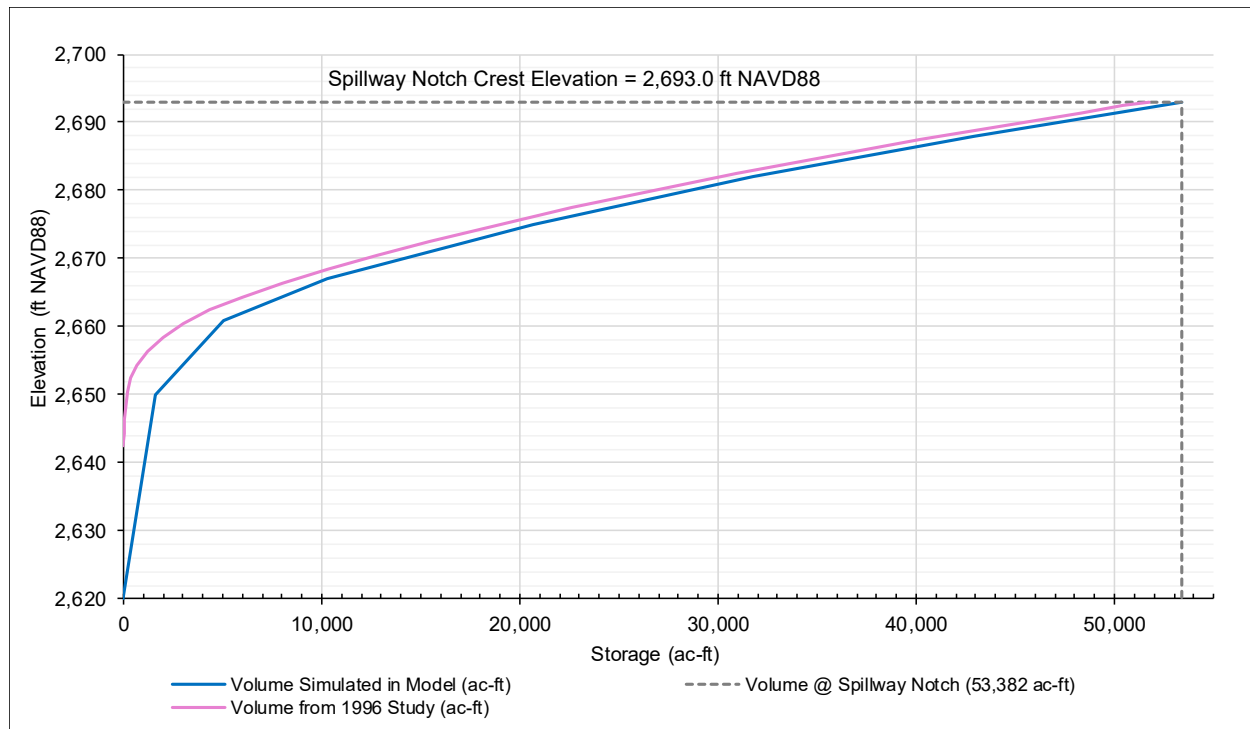


FIGURE 2 RESERVOIR STORAGE CAPACITY CURVE FOR LAKE HENSHAW

TABLE 2 COMPARISON OF CAPACITY CURVES FOR LAKE HENSHAW

Elevation (ft, construction datum)	Elevation (ft NGVD29)	Elevation (ft NAVD88)	Volume, historical curve (ac-ft)	Volume, 1996 Curve (ac-ft)	Difference Between Curves (ac-ft)	Volume Simulated in Model (ac-ft)	Notes
2690.0	2690.6	2693.0	50,000	51,774	1,774	53,382	1, 2
2685.0	2685.6	2688.0	40,000	41,351	1,351	42,959	1, 2
2679.0	2679.6	2682.0	30,000	30,173	173	31,781	1, 2
2672.0	2672.6	2675.0	20,000	19,063	-937	20,672	1, 2
2664.0	2664.6	2667.0	10,000	8,633	-1,367	10,241	1, 2
2658.0	2658.6	2661.0	5,000	3,392	-1,608	5,000	3, 4
2617.0	2617.6	2620.0	0	0	0	0	4

1. The detailed bathymetric survey (BHA, 1996) showed a larger reservoir volume at this elevation than in historical estimates (Harlan Tate, 1991).
2. Volume for model is the 1996 surveyed volume plus estimated sedimentation of 1,608 ac-ft (volume of sedimentation below 2661 ft NAVD88, as surveyed in 1996)
3. Difference between surveyed volumes is estimated sedimentation (1,608 ac-ft)
4. Volume for model is the historical reservoir volume according to the historical capacity (Harlan Tait, 1991)

8. SPILLWAY RATING CURVE

The spillway rating curve for the notched spillway was provided by VID with elevations in the construction datum. Elevations were adjusted to NAVD88 using a shift of +3.0 ft. Figure 3 shows the spillway discharge curve.

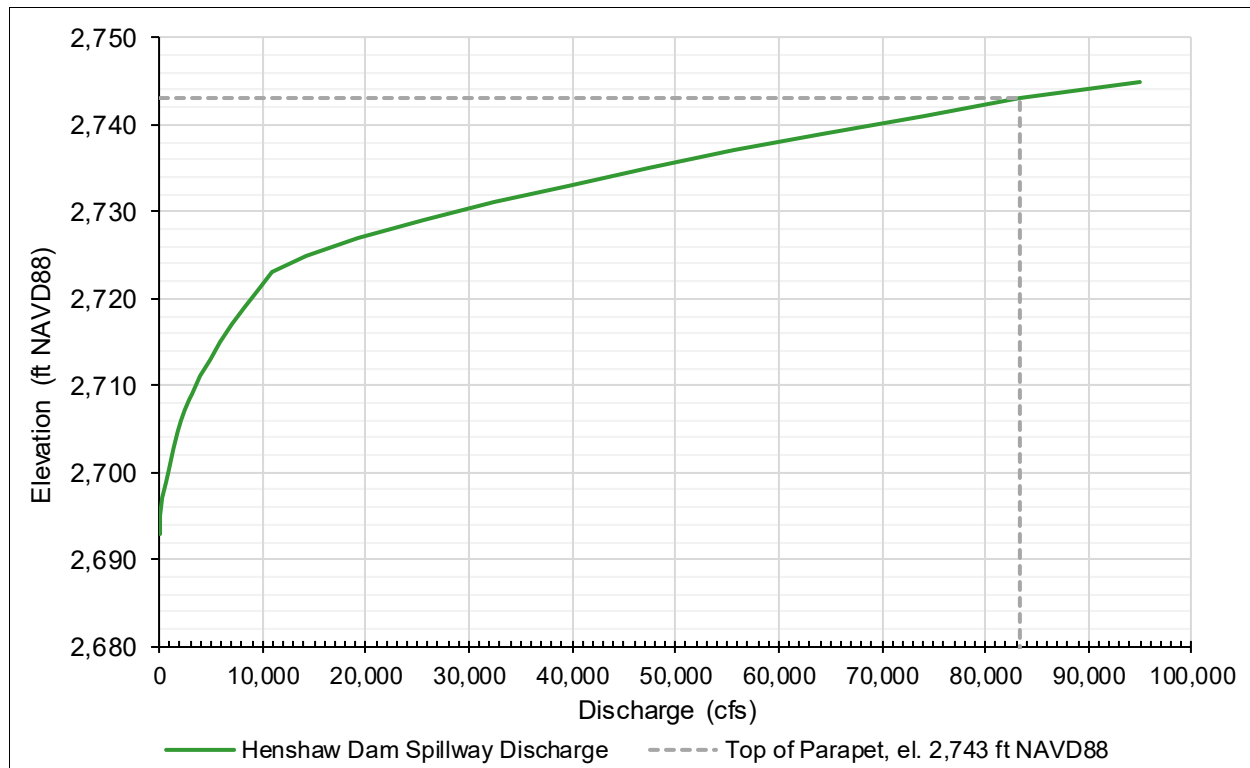


FIGURE 3 SPILLWAY DISCHARGE CURVE

9. TERRAIN DATA USED

This study utilized high-resolution DEM data developed from Light Detection and Ranging (LIDAR) data, which was obtained from the County of San Diego in June 2018. The data used were the highest-resolution data available for the study area. The Federal Emergency Management Agency (FEMA) collected this data as part of the program for Risk Mapping, Assessment, and Planning (Risk MAP). LiDAR data for San Diego County were collected in October and November of 2015. The County of San Diego provided this data with the following attributes (FEMA 2016):

- Resolution: 2.5 ft
- Projection: State Plane California VI
- Linear units: US Survey Ft
- Horizontal Datum: North American Datum 1983
- Vertical Datum: North American Vertical Datum of 1988
- Vertical units: US Survey Ft

Geospatial data layers received from San Diego County were re-projected to California Teale Albers projection to conform to submittal requirements in the DSOD draft regulations [§335.10(d)]. The extent of the terrain data is shown in Figure 4.

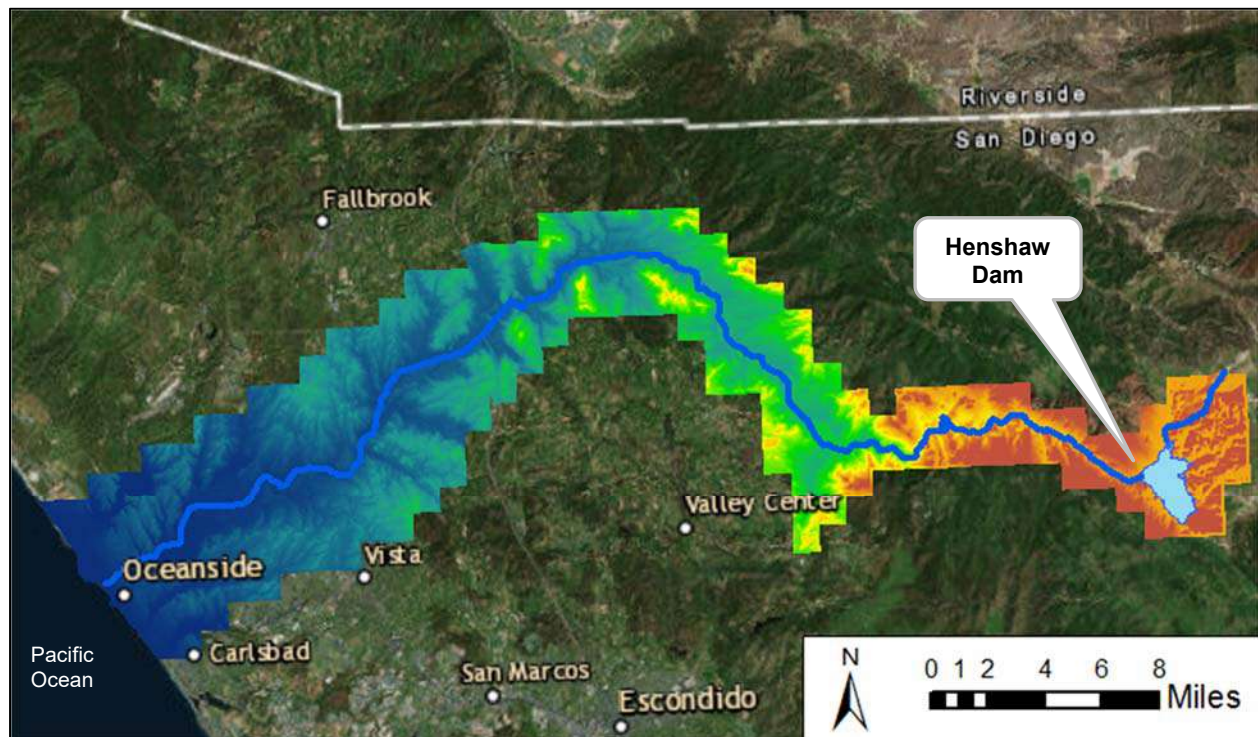


FIGURE 4 EXTENT OF TERRAIN DATA (DEM) USED IN MODEL

10. MODELED FAILURE SCENARIOS

Sunny day failure scenarios were completed for Henshaw Dam. There are no jurisdictional dams upstream or downstream on the San Luis Rey River, so no sequential failures were assessed.

Stetson assessed dam appurtenances to determine if they are critical appurtenant structures according to the definition in §335.2(a)(2) of the emergency regulations.

Two saddle dams. Not critical appurtenant structures. The saddle dams were constructed when the original dam was built in 1922. When water in the reservoir is at or below the spillway notch crest elevation of 2,693 ft NAVD88, the saddle dams do not impound any water. Because the saddle dams do not impound any water under a sunny day failure scenario, they are not critical appurtenant structures.

Diversion culvert. Not critical appurtenant structure. The diversion culvert runs through the main dam. It was used during original construction of the dam to pass water. It was then filled with hydraulic fill and plugged with concrete. Any failure at this location, such as a piping

failure resulting from erosion around the culvert, would be equivalent to a main dam failure. Therefore, the diversion culvert is not a critical appurtenant structure.

Spillway and spillway notch. Not critical appurtenant structures. The original spillway was constructed in 1922. A 1980 geotechnical report shows that the spillway was constructed on original ground within granitic bedrock and outside of the stream alluvium (Figure 6 from Leeds, Hill and Jewett, 1980a). The original spillway was constructed with a top crest elevation of 2,723 ft NAVD88, with abutments extending down to about 2,704 ft NAVD88. The original spillway does not impound any water in a sunny day failure scenario and is therefore not a critical appurtenant structure.

The spillway notch was constructed in 1981. The notch was cut into the existing spillway, and an approach channel was created upstream of the notch. The notch, with a crest elevation of 2,693 ft NAVD, was constructed at a lower elevation than the original dam abutments (~2,704 ft NAVD88). According to the geotechnical study (Figure 6 from Leeds, Hill and Jewett, 1980a), the notch was constructed in original granitic bedrock. Because of this, there is no alluvium or embankment fill below the notch. Additionally, the notch is not subject to an overtopping failure under sunny day conditions. The spillway notch is not a critical appurtenant structure.

Outlet tunnel. Critical appurtenant structure. The outlet tunnel is located south of the main dam. The tunnel was constructed within the existing bedrock south of the main dam (Figures 6 and 7 from Leeds, Hill and Jewett, 1980a). The outlet tunnel is a critical appurtenant structure because it is a control structure that impounds the same reservoir as the dam. Failure at this structure would be a mis-operation or equipment failure that results in the gate and valve being opened in an uncontrolled manner. Because the outlet tunnel is constructed through original ground made of granite, an embankment failure or piping failure is not assumed here.

Sunny day failure scenarios were modeled for the main dam and outlet tunnel. The breach hydrographs for each scenario are below.

10.1 Main Dam

A sunny day failure of the main dam was simulated with a water surface elevation at the maximum of 2,693 ft NAVD88. The breach was simulated with the entire historical volume of the reservoir as water. The breach hydrograph is shown in Figure 5. The peak flow of 796,000 cfs occurs six minutes after the beginning of the breach, when the breach reaches full width and height. The flow rate then declines as the reservoir drains through the breach. The decline is not sharp because the upstream and downstream toes of the dam are at similar elevations (2,620 ft NAVD88; see Table 1). The area under the curve represents about 53,400 ac-ft, which is approximately equal to the maximum historical storage volume developed for the model (see

Table 2). See section 11.2 for additional information about breach parameters and model assumptions.

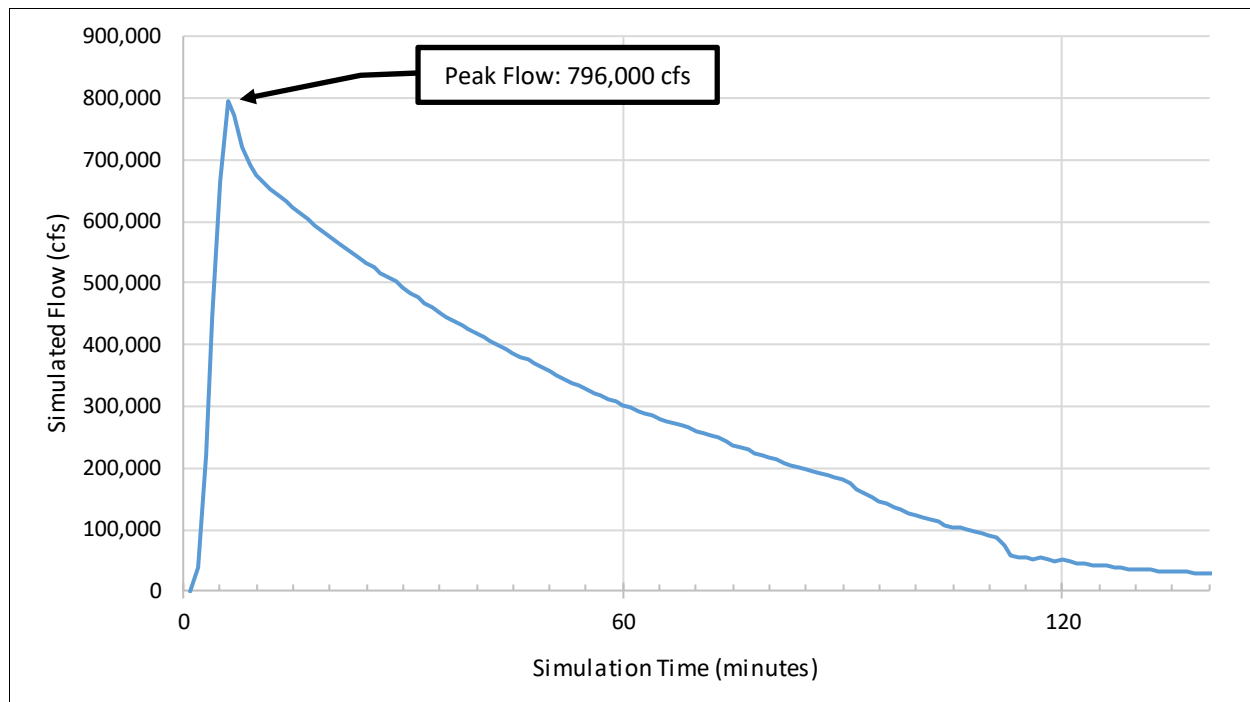


FIGURE 5 BREACH HYDROGRAPH FOR MAIN DAM SUNNY DAY FAILURE SCENARIO

10.2 Outlet Tunnel Critical Appurtenant Structure

A sunny day failure of the outlet tunnel was simulated with a water surface elevation at the maximum of 2,693 ft NAVD88. A mis-operation or equipment failure was simulated during which the outlet tunnel was fully open with uncontrolled flow. The outlet tunnel is approximately 5.0 ft wide by 7.5 ft tall with a curved top. Figure 6 shows the outflow hydrograph simulated in the model. The peak flow of 1,140 cfs occurs at the beginning of the simulation when the water surface in the reservoir is at its maximum. The flow rate slowly declines as the water level in the reservoir drops. Because the outlet tunnel is constructed through original bedrock, not through the dam, no embankment failure was simulated. See section 11.2 for additional information about breach parameters and model assumptions.

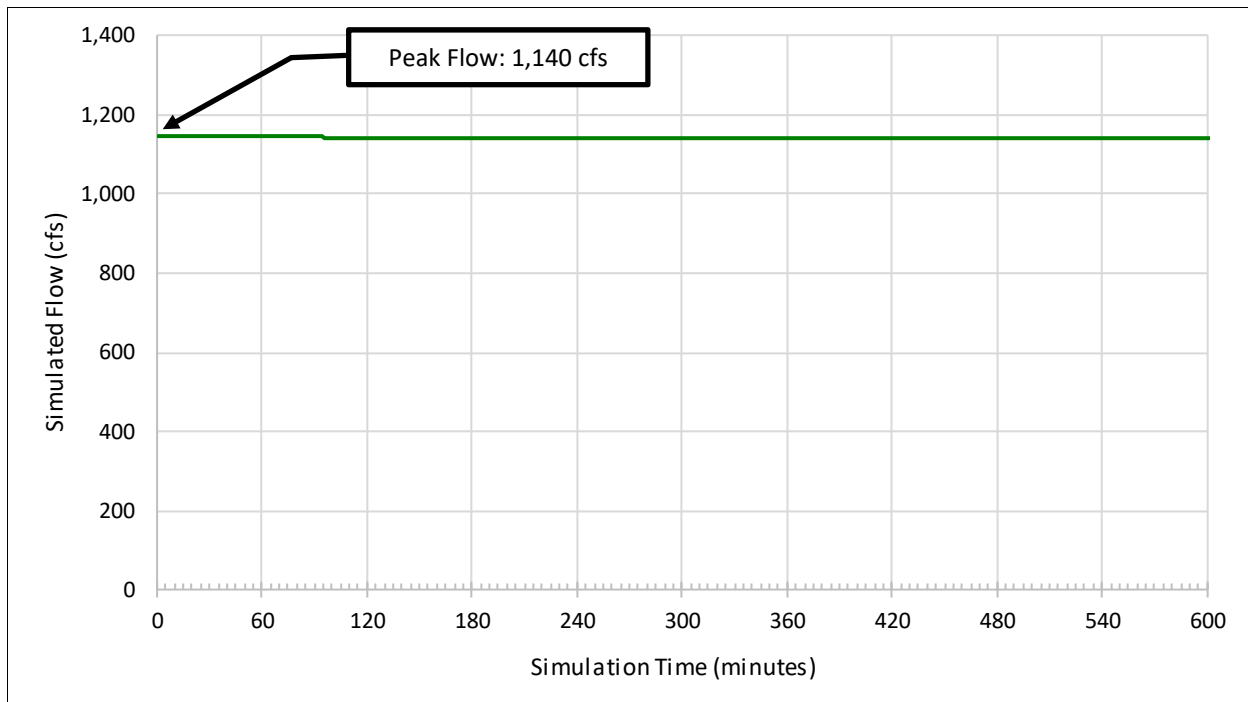


FIGURE 6 BREACH HYDROGRAPH FOR OUTLET TUNNEL SUNNY DAY FAILURE SCENARIO

11. MODELING METHODOLOGY

A sunny data failure scenario was simulated per the DSOD emergency regulations [§335.12(c)]. For the main dam, piping failure mode was selected as the most likely failure mode for a sunny day. For the outlet tunnel, a mis-operation/equipment failure was simulated.

11.1 Modeling Software

This study utilized the Hydrologic Engineering Center River Analysis System (HEC-RAS) version 5.03, released September 2016. HEC-RAS is distributed and maintained by the United States Army Corps of Engineers, Institute for Water Resources. HEC-RAS is an open-channel hydraulic model capable of steady and unsteady state analyses. HEC-RAS was selected because it has been an industry-standard hydraulic model for over two decades. It is widely used and freely distributed. With the recent addition of two-dimensional (2D) capabilities (added in version 5 in 2016), the model can be used to simulate unsteady 2D flow over a floodplain. HEC-RAS also has built-in dam breach capabilities for simulating a variety of failure scenarios. The HEC-RAS inundation model for this study is 2D.

11.2 Model Configuration

The model was configured to simulate sunny day failure scenarios for the main dam and outlet tunnel as described below.

11.2.1 Baseflow and Tides

Baseflow was assumed to be zero in the San Luis Rey River. Typically, the river is dry a significant portion of the year, including late spring, summer, and fall. For example, sample daily discharge from the San Luis Rey River gage at Oceanside (USGS gage 11042000) is shown in Figure 7 for 1998 through 2017. The sunny day failure scenario was assumed to occur when flow in the river is negligible.

The DEM showed a sandbar at the end of the estuary which closes off the estuary from the ocean. The sandbar elevation is higher than the high tide elevation in this area. The sandbar was assumed to remain intact in the model. Though high flows of the dam failure would likely scour the sandbar down, it was left in place in the model as a conservative assumption. The model showed that the high flows of the main dam breach would overtop the sandbar and flow into the ocean. A tidal elevation of 5.3 ft NAVD88 was assumed based on local tidal records maintained by the National Oceanic and Atmospheric Administration (NOAA). The Mean Higher High Water (MHHW) level was used as the initial water surface elevation in Oceanside Marina. Use of the MHHW level is recommended by federal agencies for downstream boundary conditions in riverine flood studies (i.e. FEMA, 2009; FEMA, 2016).

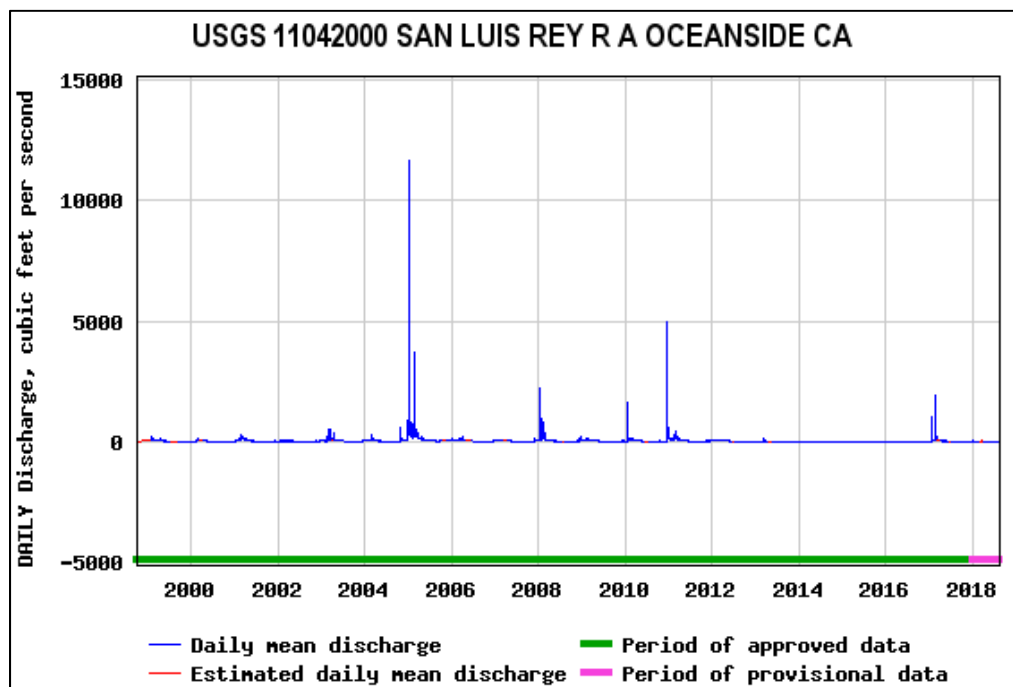


FIGURE 7 GRAPH OF DAILY DISCHARGE ON SAN LUIS REY RIVER, STATION 11042000, 1998 THROUGH 2018

11.2.2 Spatial Grid Resolution and Hydraulic Structures

The flood wave corridor downstream of the dam was represented with a 2D flow area, with a regular grid size of 100 ft. Some grid areas were refined with smaller grid sizes to better capture smaller features. For example, the channel downstream of the outlet tunnel was refined with a smaller grid size, as shown in Figure 8.

Hydraulic structures along the San Luis Rey River were not added to the model geometry, as they were assumed to be clogged during a flood event, offering negligible conveyance capacity. Thus the “bare earth” DEM was used directly at road crossings downstream of the dam.

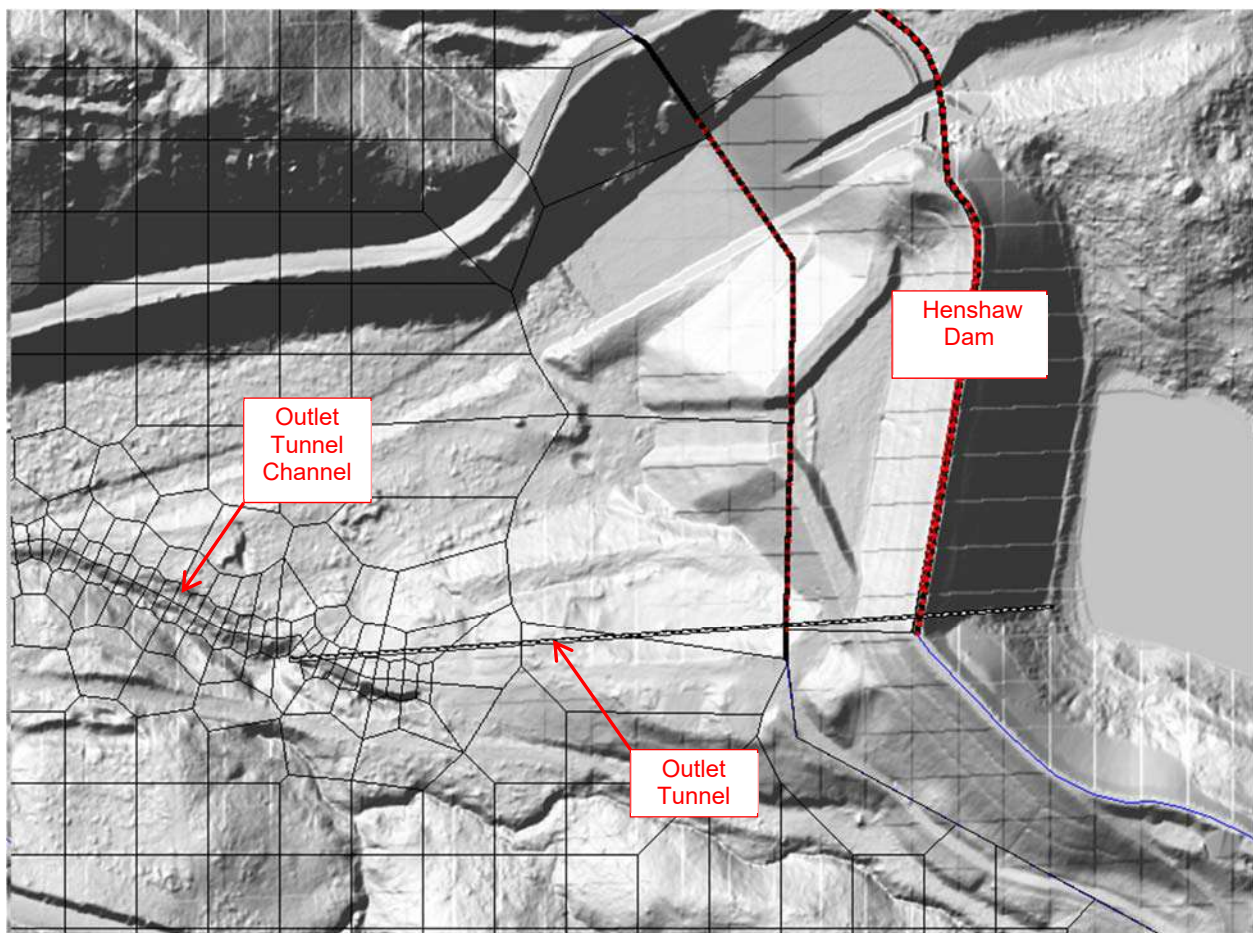


FIGURE 8 TWO-DIMENSIONAL FLOW AREA USED IN THE MODEL

11.2.3 Storage Capacity Curve in Model

The volume of water impounded by Henshaw Dam was simulated with a one-dimensional storage-area (S-A) curve that matched the blue elevation-storage curve in Figure 2.

Reservoir bathymetry was not directly built into the model because available bathymetric data do not account for the entire historical volume of the reservoir. A bathymetric survey produced in 1996 includes sediment at the bottom of the reservoir that accrued after construction. To best represent the entire volume of the reservoir as water, a one-dimensional storage area curve was used. Development of this curve and consideration sediment is described in Section 7.

11.2.4 Manning's n

GIS layers of land use and vegetation for San Diego County (SANDAG 2010; 2016) were used to develop a spatially-varying representation of floodplain land cover. Different types of land cover were assigned different Manning's n roughness values to be used in the HEC-RAS 2D model.

The vegetation layer provided a better representation of ground cover than the land use layer: the riparian corridor along the San Luis Rey River was clearly defined in the vegetation layer, and natural areas were distinguished from developed areas. General categories of vegetation were defined, and each polygon was grouped into one of three categories: developed areas; grasses and scrub; and trees and riparian vegetation.

The vegetation layer did not have roadways and paved surfaces clearly delineated; to address this, roadway, parking lot, and highway polygons from the land use layer were exported and assigned a Manning's n value. In the HEC-RAS model, the spatially-varying n layer was created using both the roads layer and the vegetation layer, with the roads layer receiving higher priority for assignment of n value.

For each general category, ranges of Manning's n values were selected from standard values presented in the literature, including the U.S. Environmental Protection Agency's Storm Water Management Model Reference Manual (Rossman and Huber, 2016) and the HEC-RAS user manual (Brunner, 2016). Table 3 lists the Manning's n categories and ranges.

TABLE 3 MANNING'S N CATEGORIES AND VALUES

Manning's n Category	Source of Manning's n	Range of Manning's n	Selected Manning's n
Developed Areas	'Suburban residential land use' from Rossman and Huber (2016)	0.03 - 0.08	0.03
Grasses and scrub	'Dense grass' from Rossman and Huber (2016)	0.06-0.12	0.06
Trees and riparian vegetation	'Shrubs and bushes' from Rossman and Huber (2016)	0.08-0.18	0.08
Roads	'Asphalt' in Brunner (2016); 'Asphalt or concrete paving' and 'Concrete pavement' in Rossman and Huber (2016)	0.013 – 0.020	0.014

To choose a Manning's n value from within the published ranges, a generalized sensitivity test was conducted in the model. Three scenarios were examined, each with a constant n across the model grid: in all three scenarios, other parameters were held constant. Results showed that the overall inundation extents were not highly sensitive to change in Manning's n . For example, in the narrow canyon areas just downstream of Henshaw Dam, the inundation boundary was not significantly affected by changes in n . However, results showed that arrival times were impacted by changes in n value, with lower n values producing faster arrival times. Accordingly, to be conservative for emergency response planning, n values in the lower end of the ranges in Table 3 were selected.

The selected Manning's n values in Table 3 were then applied to the vegetation polygons for each category. This polygon layer was then intersected with the model grid to assign Manning's n values to each grid cell. Figure 9 is an excerpt of the spatially-varying Manning's n layer used in the HEC-RAS model. The excerpt covers the area from the dam and west about fifteen river miles along the San Luis Rey River. The dark green areas show trees and the riparian corridor. Light green areas are grass and scrub, and yellow areas are developed. Red polygons are the roadways that were defined from the land use layer. In general, major roadways were defined in the land use layer, but some sections of smaller roads and dirt roads are not delineated as roadways; corrections to the land use layer were outside the scope of this study.

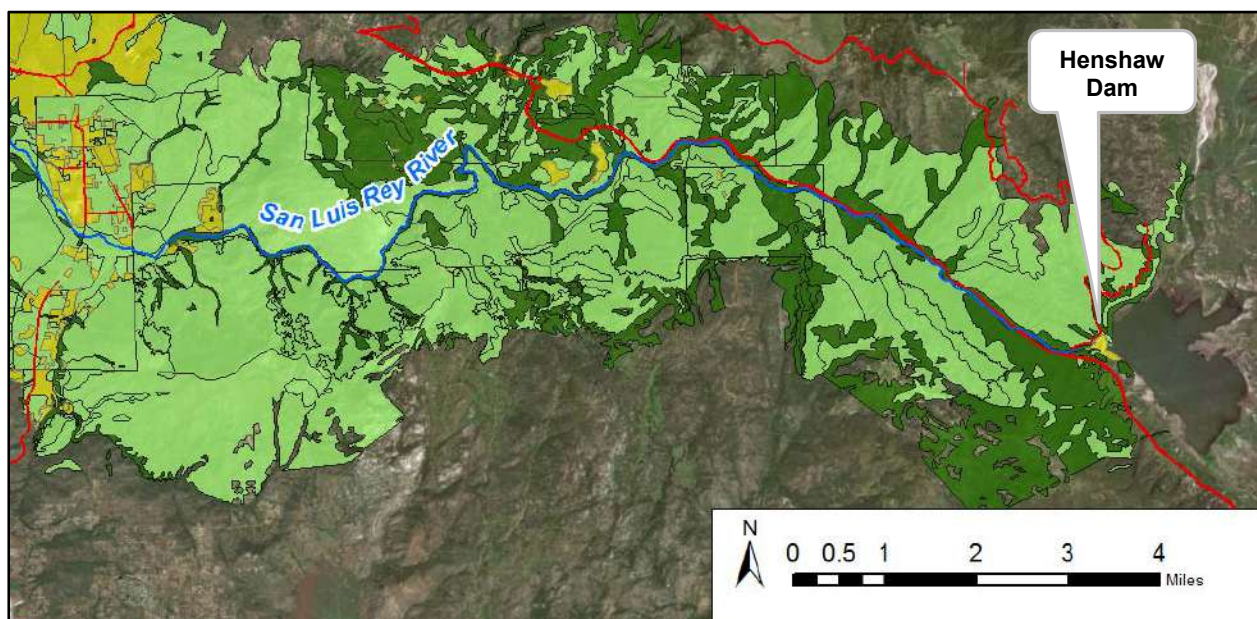


FIGURE 9 EXCERPT OF SPATIALLY-VARYING MANNING'S N LAYER
RED = ROADS; YELLOW = DEVELOPED AREAS; LIGHT GREEN = GRASSES AND SCRUB; DARK GREEN = TREES AND RIPARIAN CORRIDOR

11.2.5 Downstream Extent of Inundation Boundary

The model domain extends from Henshaw Dam to the Pacific Ocean. DEM terrain data were available for this entire area (Figure 4). The model was run for this entire domain, and the resulting output files and inundation maps cover the entire area from Lake Henshaw to the ocean. This follows recommendations for determining downstream model extent in FEMA P-946 (2013; Section 8.1.1).

11.2.6 Model Timestep and Duration

The model was simulated with a 1-second time step, with results output every 1 minute. The model was run with a duration of 72 hours. This time period was sufficient to capture the maximum inundation, maximum velocity, maximum depth, flood arrival time, and deflood time of the flood wave from Henshaw Dam to the ocean.

11.2.7 Breach Parameters- Main Dam

Breach parameters were selected for the piping failure mode using guidance from FEMA P-946 (2013) as specified in the emergency regulations [§335.12(c)]. Breach parameters were selected to represent a reservoir failure at the maximum possible storage elevation, for the full height of the dam, and with an impoundment consisting entirely of water.

Breach parameters were selected from Table 9-3 of FEMA P-946 (FEMA, 2013). Breach formation time was selected as 0.1 hours (6 minutes). This is the fastest value given in the range of typical values. The average breach width was selected as five times the dam height of 123 ft, resulting in an average width of 615 ft. Together, breach formation time and width are the most important parameters in determining breach size and timing; conservative values were used to simulate a complete and nearly instantaneous loss of the dam. The FRS on the downstream face of the dam was assumed to breach along with dam, therefore providing no flood attenuation.

Other criteria were selected as typical and appropriate for a hydraulic fill embankment. The center station of the failure was located at the center of the dam crest. The side slopes were assumed to have a 0.5:1 horizontal to vertical ratio. Sensitivity tests were performed with different side slopes and the inundation results did not change significantly. With side slopes of 0.5:1 and an average breach width of 615 ft, the top breach width exceeds the dam width of 650 ft, resulting in simulation of a breach of nearly the entire dam width. The breach bottom elevation was estimated as 2,620 ft (NAVD88), based on the downstream toe elevation. This elevation was also selected as the initial elevation for the piping failure.

HEC-RAS 5.0.3 was used with the ‘User Entered Data’ breach method. In addition to the above-described parameters, the model requires two flow coefficients during the breach of the dam structure: a piping coefficient and a breach weir coefficient. The piping coefficient is used

when the failure initiates as pressurized orifice flow through the eroded areas around the pipe. The weir coefficient is used in the next phase of failure when the embankment has been eroded down to the water level in the reservoir and is acting as an open-channel weir. HEC-RAS guidance document TD-39 (Brunner, 2014) provides typical coefficients. A value of 2.6 was selected for the weir coefficient². This value is typical of a broad-crested weir shape, which would be appropriate for an earthen dam failure with medium to very large storage volumes upstream (Brunner, 2014). An orifice piping coefficient of 0.5 was selected.

HEC-RAS also has two options for simulating the progression of the failure from the pressurized orifice stage to the open-channel weir stage: linear and sine wave. The sine wave option was utilized for this study; the model did not show significant differences in results between the two methods. The user-entered breach parameters required by HEC-RAS are shown in Figure 10.

² Both the weir and piping coefficients are dimensionless.

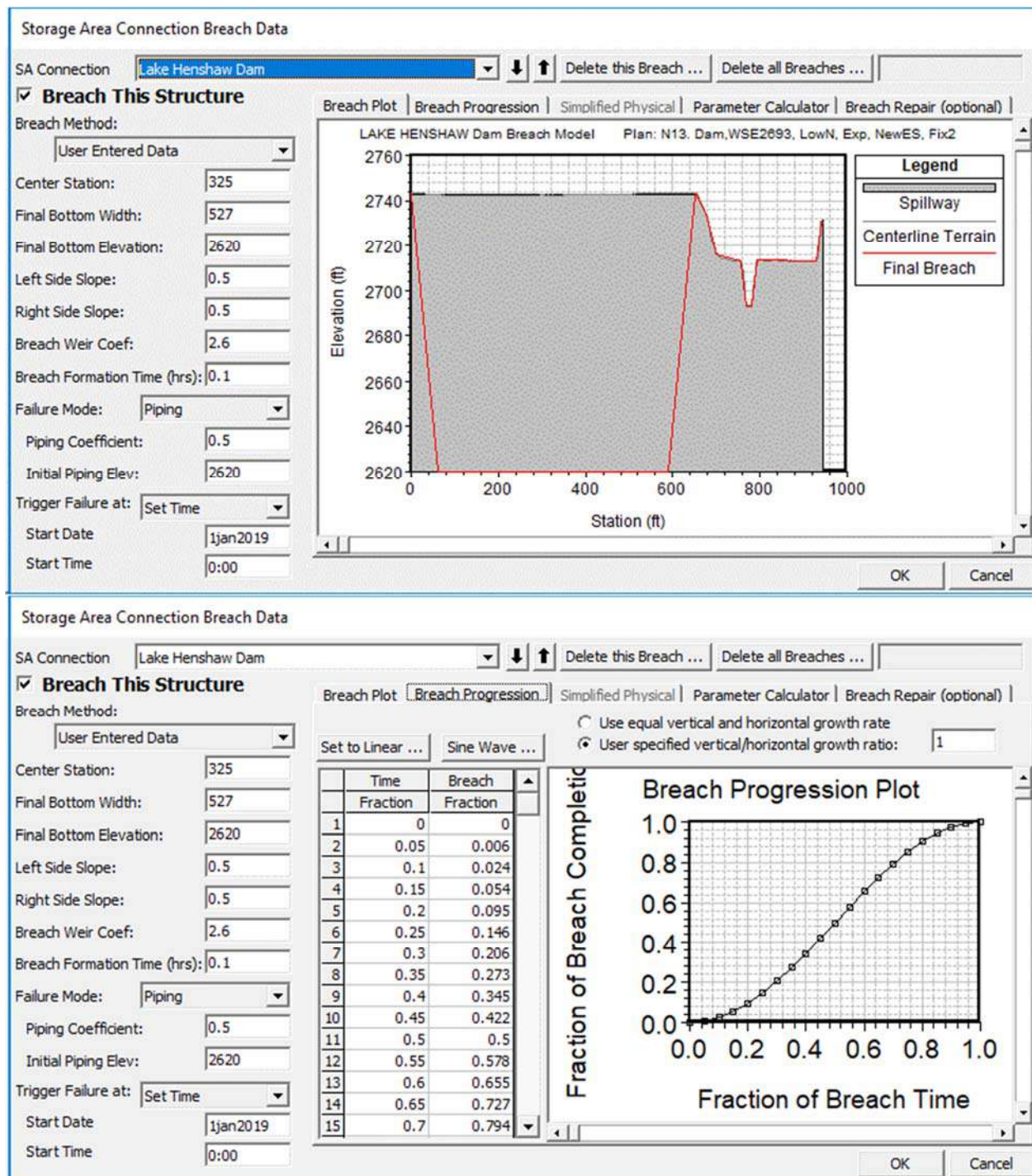


FIGURE 10 SCREEN CAPTURE OF BREACH PARAMETERS USED FOR SUNNY DAY PIPING FAILURE IN HEC-RAS 5.03

11.2.8 Breach Parameters- Outlet Tunnel

The outlet tunnel failure was assumed to occur as uncontrolled flow through the outlet tunnel due to mis-operation or equipment failure. Because the tunnel was constructed through original bedrock, no embankment failure was simulated. The outlet tunnel conduit was simulated in HEC-RAS as a release through a 5-ft wide and 7.5-ft high box culvert. This size was estimated

per a typical cross-section in the as-built drawings (VID, 1979), shown in Figure 11 . The cross-sectional area of the culvert simulated in the model is slightly greater than the cross-sectional area shown in the as-built, making the simulation more conservative. From the as-builts, the bottom elevation of the inlet tunnel was established at 2,633.9 ft NAVD88, with the outlet tunnel exit at a bottom elevation of 2,631.4 ft NAVD88 (VID, 1979). Flow was then simulated through the outlet tunnel using a Manning's n of 0.011 for a concrete culvert.

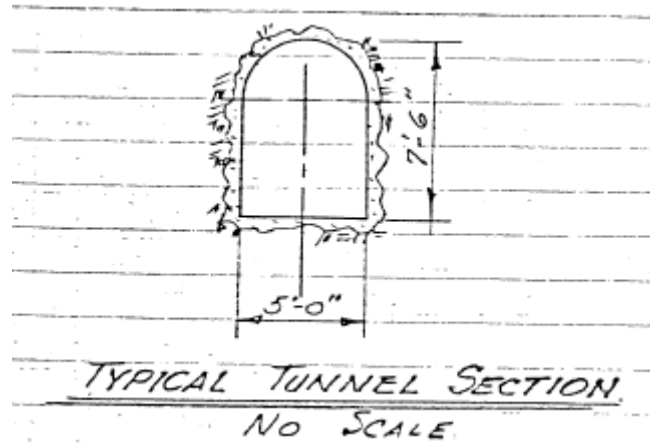


FIGURE 11 **TYPICAL CROSS-SECTION OF OUTLET TUNNEL (FROM LEEDS, HILL AND JEWETT, 1980B)**

11.3 Model Sensitivity and Stability

This section describes adjustments that were made in the modeling in response to sensitivity testing, model bugs, and computing time.

11.3.1 Breach Parameters

Several model simulations were conducted to test sensitivity of breach parameters. The main dam breach was run with breach times of 0.1 and 1 hours. Results showed high sensitivity of the model to breach time. The 0.1-hour breach time produced an inundation area that was significantly larger than the 1-hour breach time. Arrival time of the flood wave was also highly dependent on the breach time, with the shorter breach time leading to shorter arrival times. Breach width sensitivity was not tested, since the selected breach width represents the entire width of the dam. The model was not sensitive to changes in side slope or breach formation pattern.

Because the upstream toe of the model was set at an elevation similar to the downstream toe, the model showed some instability on the tail of the main dam breach hydrograph, continuing to generate flow out of the reservoir even after the reservoir would really be drained.

This error may be neglected, since it does not affect the peak flow, arrival time, maximum velocity, or maximum depth results. The full volume of the reservoir (53,400 ac-ft) was simulated through the breach in the first 140 minutes of the simulation, correctly representing the draining of the entire reservoir.

11.3.2 Manning's n Sensitivity

As discussed in section 11.2.3, Stetson conducted several sensitivity tests of the model to Manning's n values: three constant Manning's n values were tested for the entire model grid area: $n=0.03$, $n=0.06$, and $n=0.09$. These simulations showed that a smaller Manning's n tended to produce faster arrival times. The changes were significant: for example, at the Interstate 5 bridge in Oceanside, lowering the Manning's n from 0.09 to 0.06 caused arrival times to shorten by 2.7 hours. Changes in Manning's n did not significantly affect the inundation boundary. In the narrow canyons, inundation extents did not change appreciably. In the flatter areas of the model, near Pauma Valley, Pala, and Oceanside, larger n values created slightly larger inundation extents; however, the differences were not significant. To support emergency planning efforts, Manning's n values were selected to be conservative about arrival times while still simulating appropriate inundation extents. Since changes in Manning's n significantly affected arrival times, but only changed inundation extents in minor ways, the values in the lower end of the typical Manning's n ranges were selected (see also Section 11.2.4 and Table 3).

11.4 Model Output and Results

After all model parameters were finalized, the HEC-RAS model results were prepared to meet the requirements of the emergency regulations for a technical study with inundation mapping. The HEC-RAS output files were post-processed into usable data. Results included:

- Inundation area boundary (vector)
- Flood wave arrival time (raster)
- Maximum depth (raster)
- Peak velocity (raster)

For both the main dam and the outlet tunnel failure, inundation boundary and flood wave arrival times were generated with depth criteria of 1 ft. For each scenario, the flood arrival time raster was then used to generate arrival time contours. Contours were manually delineated using the raster data as the source. Auto-generated contours were not practical because the terrain data are complex. For the first 30 minutes after the breach, contours were created every 3 minutes. After 30 minutes, contours were prepared at 6-minute intervals. These intervals exceed the recommended standards of 5 minutes and 10 minutes in FEMA P-946 (2013; Table 11-2).

For the main dam breach, arrival times range from within three minutes (just downstream of the dam) to over 6 hours at the mouth in Oceanside. For the outlet tunnel failure, arrival times are about six minutes just downstream of the dam and 45 minutes at the 2-river-mile location.

Two inundation maps were prepared for each failure scenario. The first map shows arrival contours on top of a raster of maximum flood wave depth. The second map shows arrival contours on top of a raster of maximum velocity. The attached maps are listed in Table 4.

On all inundation maps, the inundation boundary is not drawn as a line on the map, but is represented by the limit of the first color band (“1-5 ft” for depth or “0-5 ft/sec” for velocity). The outer limit of this band is equal to the 1-ft inundation boundary. Aerial imagery used in the maps is from 2016. The information shown on the inundation maps is approximate and should be used as a guideline for emergency response and preparation purposes. Because the data in the maps were processed to show inundation and velocities within the 1-ft depth boundary, some disconnected areas of inundation are visible on the map. Flow between these areas occurred with maximum depth less than 1 ft.

TABLE 4 INUNDATION MAPS SUBMITTED WITH SUNNY DAY FAILURE SCENARIO

Attachment No.	Title	Contents	Number of Sheets	Scale
1	Main Dam – Arrival Time and Max Depth	Flood Arrival Time Contours and Maximum Flood Wave Depth	57	1:6000
1	Main Dam – Arrival Time and Max Velocity	Flood Arrival Time Contours and Maximum Velocity	57	1:6000
2	Outlet Tunnel – Arrival Time and Max Depth	Flood Arrival Time Contours and Maximum Flood Wave Depth	2	1:6000
2	Outlet Tunnel – Arrival Time and Max Velocity	Flood Arrival Time Contours and Maximum Velocity	2	1:6000

11.4.1 Main Dam Sunny Day Failure Summary

The main dam failure simulated in the model and depicted in the inundation maps would cause severe flooding. As indicated by the reservoir’s classification as a High Hazard Potential dam, the risk to human life and structures is significant.

To aid in emergency response planning, major road crossings were assessed for inundation/overtopping potential during the dam failure³. The model results were reviewed, and simulated water surface elevations (WSEs) were compared to road elevations in the DEM.

³ The analysis performed is preliminary and assessments at road crossings are based on estimated data. Bridge and road elevations were estimated and no survey work was completed. Additional work would need to be completed to examine bridge capacities and roadway elevations (with surveyed data) to complete a comprehensive high water analysis at all crossings. The modeling tools developed here could be expanded to support this work.

Bridges and roads that are likely to be overtopped are indicated on the inundation maps. Major crossings and streets are labeled. In this failure scenario, several major roads and bridges would be overtopped. Structures and residences in Pauma Valley, Pala, and Oceanside would be inundated. Large segments of the Highway 76 roadway would be inundated, along with several bridges. The Interstate 15 and 5 bridges over the San Luis Rey River would not be overtopped, though there would still be a significant hazard risk at those locations due to high velocities and debris loads. At some bridges, model results showed that portions of the bridge deck may be inundated, i.e. the ends of the bridge would be flooded but the center of the deck, at a higher elevation, would not. In these cases, the bridges are shown as having potential for ‘partial inundation’.

The Escondido Diversion Dam at river mile 9.8 would be overtopped and possibly blown out. The first 1,300 feet of the Escondido Canal would be inundated. The canal structure would very likely be compromised and potentially clogged with debris. At around river mile 10.1, the canal would no longer be inundated. At the location of the Escondido Diversion Dam and Canal, the San Luis Rey River has steep canyon walls and a steep reach slope. In the main dam sunny day failure scenario, the flood wave would recede within about three hours of arrival. During this time, water from the flood wave may travel through the canal, potentially overtopping the sides of the canal. The canal may be expected to run at capacity for about three hours. Water that overtops the canal sides would flow back into the San Luis Rey River channel.

The main dam failure simulation, which has a short breach time, resulted in recession times⁴ generally less than 24 hours after the breach. In the steep canyon reaches downstream of the dam (river miles 0 through 12.5), the flood wave would generally recede within three hours of arrival. In flatter areas downstream, including Pauma Valley, Pala, and Oceanside, recession times would be three to ten hours after arrival of the flood wave. There are two areas in Oceanside where recession times could be longer, and they are marked on the maps (Panels 47 and 48) as requested in the emergency regulations [§335.14(d)(16)].

11.4.2 Outlet Tunnel Sunny Day Failure Summary

The peak flow generated in the outlet tunnel failure was 1,140 cfs. The 2-year flood is usually a reasonable estimate of bank-full flow in a channel, or flow that would be confined to the main channel. FEMA P-946 guidance (FEMA, 2013) states that regional regression equations can be used to estimate the 2-year flood to determine if the flow will be confined to the downstream channel. The USGS Streamstats program was used to obtain estimates of the 2-year flood on the San Luis Rey River downstream of Henshaw Dam. The 2-year peak flow on the reach of the river near Henshaw Dam is 1,350 cfs, while the 2-year peak flow near the mouth of

⁴ Recession output was generated with a 1 ft depth criterion, similar to the inundation boundary and arrival times.

the river near Oceanside is 2,400 cfs (USGS, 2018b). The maximum simulated flow through the outlet tunnel of 1,140 cfs is less than the 2-year flood, indicating that the outlet tunnel flow would be confined to the main channel.

No road crossings or bridges would be overtopped in this scenario. The inundation maps for this scenario were prepared for the first two river miles to demonstrate the limited extent of flooding. Downstream of this location, a note was added to the inundation map (Panel 2) to indicate that high flows may continue beyond that location but would be confined within the channel. This complies with emergency regulations sections 335.14(c) and 335.14(d)(14).

11.5 Model Limitations

For this study, an approach was adopted to select reasonable, yet conservative, parameters to simulate an instantaneous, complete loss of the dam. The aim was to create an inundation map that provides a comprehensive estimate of where inundation may occur, to enable emergency planners and responders to adequately plan for and react to an emergency.

As discussed in Sections 11.2.4 and 11.3.2, the Manning's n values used in this study were selected after three sensitivity runs were completed; values were selected and applied spatially to polygons representing different vegetation and land cover. This increases model accuracy compared to using constant n values in a model.

Breach parameters were estimated to be conservative. Within the reasonable range of values for the model, a larger breach size and shorter breach time were selected to be conservative in modeling the inundation area and arrival time.

Per DSOD emergency regulations, failures were simulated with a water surface at the maximum possible storage elevation, a breach of the full height of the dam or critical appurtenant structure, and with an impoundment consisting entirely of water. All model results and inundation maps follow these assumptions.

For the main dam failure, if a breach were to occur more slowly and/or with a smaller breach size, the flood wave characteristics would be different. The FRS on the downstream face of the dam is intended to slow and attenuate a breach of the main dam. The slower/smaller breach scenario would have a smaller peak flow arriving later. A slower-arriving flood wave with more attenuation would also mean longer recession times.

The HEC-RAS model described here was not calibrated to measured peak flow data as would be done in a wet-weather flood study. A dam break scenario – a large, unsteady, release of water from a dam – is a hypothetical event that has never occurred at this location, and accordingly cannot be compared to any measured conditions. Any data that do exist would be

valid for lower flows confined within the main channel; these values would not be valid for calibrating flow over the floodplain.

The model is subject to certain limitations dictated by computing time and parameter uncertainty. A model grid size of 100 ft was used throughout most of the model area, which does not capture all ground features. Though efforts were made to add refinements and breaklines in key areas, not all topographic features could be finely represented in the model.

The DEM layer used in the model was not modified to include passage structures at road crossings along the San Luis Rey River. This does not affect arrival time or peak flows, but may affect recession times.

12. LIST OF DIGITAL FILES INCLUDED WITH SUBMITTAL

Per §335.16(a) of the emergency regulations, geospatial results of the model have been included with this submittal. The electronic output files, included on a disc as Attachment 3 to this study report, are listed in Table 5 for the main dam and Table 6 for the outlet tunnel. Electronic files in the attachment have been organized using the suggested data structure in FEMA P-946 (2013).

On the inundation maps included as Attachments 1 and 2, raster output files were processed and clipped to the 1-ft inundation boundary, such that maps only show results within the 1-ft boundary. The raster files listed in Tables 5 and 6 (arrival time, maximum depth, and maximum velocity) contain the complete model output, prior to processing and clipping.

TABLE 5 MAIN DAM SUNNY DAY FAILURE- ELECTRONIC FILES SUBMITTED				
Title/Description	File Type	File Name	Projection	Units
Inundation area boundary	GIS Vector Shapefile	Inundation_Boundary_1ft_V1.shp	NAD83 Teale Albers	ft
Flood wave arrival time	GIS Raster TIFF	Arrival Time V1.vrt	NAD83 Teale Albers	ft
Maximum depth	GIS Raster TIFF	Max Depth V1.vrt	NAD83 Teale Albers	ft
Peak velocity	GIS Raster TIFF	Max Velocity V1.vrt	NAD83 Teale Albers	ft

TABLE 6 OUTLET TUNNEL SUNNY DAY FAILURE

Title/Description	File Type	File Name	Projection	Units
Inundation area boundary	GIS Vector Shapefile	Inundation_Boundary_1ft_Outlet_V1.shp	NAD83 Teale Albers	ft
Flood wave arrival time	GIS Raster TIFF	Arrival Time - Outlet V1.vrt	NAD83 Teale Albers	ft
Maximum depth	GIS Raster TIFF	Max Depth - Outlet V1.vrt	NAD83 Teale Albers	ft
Peak velocity	GIS Raster TIFF	Max Velocity - Outlet V1.vrt	NAD83 Teale Albers	ft

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ATTACHMENT “9”

