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V. 101, 1928, p. 553. High dams discussed at ASCE meeting. On p. 622 views of Henny and Wiley. On p. 657 geology. Also (e) on p. 607, 643, 808, 906, also (1) on p. 746. and v. 102, p. 324.
V. 103, 1929, p. 204. Bull Run Dam, 200' gravity arch. Design, grouting, drains, field joint treatment.
V. 104, 1930, p. 606. Morris (Pine Canyon) Dam designed to resist earthquakes.
V. 106, 1931, p. 431. D. C. Henny on uplift, cracks, heat control.
V. 112, 1934, p. 33, Safe Harbor project. Design assumptions. Uplift. Ice pressure. Gates and heating.
V. 113, 1934, p. 823, Morris Dam. Str. gravity 328' high. Uplift. Earthquake design, Stress tabulation. Expansion joints. Many other details, 4 pp.*

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V. 58, 1907, p. 398. Wegmann on "The Design of New Croton Dam." Ref. to old design methods on pp. 403-411. On P. 444 discussion by Cain.
V. 95, 1931, p. 129. High dams, by Wiley and Henny.

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V. 92, 1924, p. 1020. No arch action in gravity-arch dams, by Jakobsen. Also, ~~1~~ vol. 93, p. 193 (Jorgenson).
V. 98, 1927, p. 842. Bull Run Dam. Grav.-arch 200' high. Also V. 103, 1929, p. 204 and 628 and V. 104, p. 286.
V. 100, 1928, p. 444. Pardee Dam. Grav-arch 358' high. Also p. 707.

IV (references cont'd)

V. 100, 1928, p. 663. Owyhee Dam. Grav.arch 405' high. Design assumptions. Many details of gates, etc.*

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June 25, 1927, p. 36. Shaver Lake Dam, straight gravity.*

CIVIL ENGINEERING

1931, p. 243, Bagnell Dam, straight gravity, 148' high.*
1933, p. 309, Norris Dam.*

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V. 19, 1888, p. 6. Quaker Bridge Dam (later re-named New Croton Dam). Also p. 20, 74, 81, 98, 139 (earthquake disc.), 163, 272, 539, 187, 232, 253, 270, 512 (by Will. Cain). Also V. 20, p. 344, 349, 428, 389, 431, 446, 485, 513.
V. 15, 1886, p. 65. Vyrnwy Dam, England*. Also p. 338. Also V. 20, p. 502; V. 21, p.100; V. 22, p. 297; V. 28, p. 146, 156.
V. 16, 1886, p. 418. Gileppe Dam, Belgium*

## GRAVITY SPILLWAYS

TRANSACTIONS AM. SOC. OF CIVIL ENGINEERS

V. 94, 1930, p. 777, Keokuk Dam spillway measurements
V. 95, 1931, p. 316, Wilson Dam spillway measurements

ENGINEERING NEWS-RECORD

V. 80, 1918, p. 631. Uplift from hyd. jump, by Lane (1)
V. 98, 1927, p. 500. Velocity of approach (Also p. 826; vol.95,p.470).
V. 102, 1929, p. 106. Plant on Chippewa River.* Spillway cantilevered upstream.

CIVIL ENGINEERING

1931, p. 243, Bagnell Dam spillway with tilting apron.
1933, p. 386, Discharge through tainter gate openings. (Also p.531,627,690).
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Morris Dam, Calif. Engr. News-Record, V. 113, 1934, p. 823 (good)

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8. Earthquakes and Earthquake Design

Abbreviations
(e) Editorial
(l) Letter to editor
(m) Mathematical
(n) Brief notice
* Article illustrated by drawings or charts (not photos)
p Page

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V. 98, 1933, p. 418. Earthquake stresses in dams, by Westergaard.

V. LIX (Dec. 1907). p. 245, Effect of the earthquake on water work structures.

ENGINEERING NEWS-RECORD

V. 95, 1925, p. 183. Tokyo earthquake 1923. Amplitude, acceleration, vertical movement.

V. 100, 1928, p. 650. Design of earthquake-proof buildings, by Dewell. In 1906 on Market Street in San Francisco the estimated horizontal acceleration was from 0.02g to 0.08g. Estimate of earthquake force. Cont'd on p. 699.

V. 104, 1930, p. 606. Morris (Pine Canyon) Dam, Pasadena, Calif. designed to resist earthquake. Designed for 0.1g acceleration. With reservoir empty tension at downstream toe is 50 p.s.i. which was not considered important. Claims that in sandy ground horizontal acceleration can reach 0.4 g.

V.107, 1931, p. 725. Disign of earthquake-proof rock-fill dams in Chili. Gravel cushion. Laminated reinforced concrete slab. Also (l) on p. 1013, andV. 108., p. 560.

V. 109, 1932, p. 218. Three dams in San Adureas fault zone, San Francisco peninsula, in 1906 earthquake. Crystal Springs Dam, built 1890, 147' high, concrete. Axis parallel to fault line. No cracks. Upper Crystal Springs Dam, built 1877, 85' high, earth-fill. Fault line passes under dam. Fence along road on top moved horizontally 8'. No apparent damage to dam, although numerous cracks. No water pressure at time of quake. San Andreas earth dam 85' high somewhat damaged by small longitudinal cracks. Slight repairs. Also (l) on p. 385 by D. C.Henny who visited the dams soon after the earthquake. He claims that "clean gravel would subside back into crack and re-establish contact."

V. 110, 1933, Apr. 6, pl 442. Three accelerographs of the Southern California eqrthquake. For the first 7 or 8 seconds accelerations reached as high values as from 0.3 to 1.0g. This did not prove as destructive, however, as later shocks of nominal amounts which leads to the conclusion that the natural period of vibration of a structure and its possible resonance with the earthquake motion are the important factors. Also (e) on p. 444.

V. 110, 1933, June 22, p. 804. Earthquake motions measured. For horizontal acceleration up to 0.3 g. and for vertical acceleration up to 0.07 g. A correction in vol. 111, p. 68. Also (n) on p. 853.

V. 111, 1933, Dec. 28, p. 779. Studies of earthquake action. Records from Los Angeles where the instruments rested on rock, show accelerations not greater than 7% of gravity (refers to June 22 issue, 1933, p. 804). (Also (e) on p. 792.)

ENGINEERING NEWS-RECORD

V. 113, 1934, July 5, p. 14, New laws, new ordinance and state-wide checking of buildings in California. Building codes require from 7-1/2 to 10% resistance to lateral forces. Also (e) on p. 21. On p. 35 design of joists. On p. 344 design of smoke stack.

V. 113, 1934, Dec. 27, p. 823-827. Morris Dam, City of Pasadena water-supply, Calif. This as a straight gravity dam, 328' high which has been designed to resist an earthquake shock with an acceleration of one-tenth gravity. The hydrodynamic effect due to the dam oscillating against the still water in the reservoir was also considered. "The natural period of vibration for Morris Dam as a whole has been calculated as being 0.16 sec. or less. The more destructive earthquakes are usually the ones with fairly large amplitudes and longer periods, and the smaller tremblors are usually associated with the shorter periods such as this. Also, there is plenty of evidence that earthquakes do not have a constant period of vibration, even for a short period of time, so that the probability of resonance to any degree seems remote".

"As to vertical acceleration, it has been shown that this has no overturning effect upon a dam, because the weight of the dam and water are both effectively changed at the same time in the same proportion. The vertical acceleration does, however, cause a slight effect upon the unit stresses."

V. 116, 1936, Apr. 2, p. 494. During an after shock on Oct. 31, 1935, (main shock on Oct. 18) an accelerograph for the Montana earthquake showed a horizontal acceleration of 0.13 g. The vertical accelerations generally show 2/3 of the horizontal components. The registering apparatus was set up 5 miles from the epicenter.

V. 117, 1936, July 2, p. 10. Earthquake-proof earth dams. The Coyote dam of California has an impervious core of 60' top width and slopes 2:1 both upstream and downstream. That in itself constitutes a stable section under normal conditions. The freeboard is 21'. Outside the impervious fill are heavy clean, round gravel sections, topped by rock-fill. The finished slopes on both sides are 3:1, 3.5:1, 4:1 from top down.

CIVIL ENGINEERING.

1934, p. 524. Tepuxtepec rock-fill dam, Mex., 123' high. Flexible apron for earthquakes.

JOURNAL AMERICAN CONCRETE INSTITUTE

V. 32, 1935--36, p. 233. Earthquake design, by Creskoff.

MILITARY ENGINEER

1937, p. 335. Tabulation of destructive earthquakes in U. S. Seismic force. Recommendations for design by J. J. Creskoff.

SEISMOLOGICAL SOCIETY OF AMERICA

Bulletin, V. 19, 1929, No. 3, p. 143. Design of Morris Dam to resist earthquakes, 0.1 g selected as max. acceleration. Also in V. 21, 1931, No. 3, p. 204.

J. J. Creskoff - "Earthquake and wind design". Suggested rationalization. Engr. News-Record, Nov. 1, 1934. p. 553.

References

## V.- SINGLE-ARCH DAMS

Abbreviations:

c-a-a: Constant-angle-arch dam
c-r-a: Constant-radius-arch dam
(l): Letter to editor
(m): Mathematical
(e): Editorial

TRANSACTIONS AM. SOC. OF CIVIL ENGINEERS

V. 53, 1904, p. 89. Lake Cheesman Dam, gravity-arch.
p. 108 & 155. Cantilever and arch action.
p. 141. Navier's formula.
p. 150. Zola Dam (1843), 120' high, 205' long, radius 158', thickness at base 42', at top 19'., Old Bear Valley Dam, 64' high, radius 335', thickness at base 20', at top 3.17'.
p. 159. Cantilever and arch action (An. d.P. & Ch., 1866, 1876, 1877 by Delocre and Pelletreau).
p. 169. Movements of masonry dam, by Intze (in Z.d.V.D.I. 1895 and abstracted briefly in Eng. News 1896, Jan. 30).
p. 183. Six-Mile Creek dome dam at Itaca, N.Y. 30' high, by Williams.
V. 78, 1915, p. 685. The constant-angle arch dam, by L. R. Jorgensen, (basic paper). On p. 724 ref. by Wegmann.
V. 83, 1919-20, p. 316, Improving arch action in arch dams, by L. R. Jorgensen.
V. 83, 1919-20, p. 574. East Canyon Creek Dam, Utah.
V. 84, 1921, p. 1. Gravity and arch action, by F. A. Noetzli (basic paper).
V. 85, 1922, p. 233. The circular arch under normal loads by Will Cain (m) (basic paper).
V. 85, 1922, p. 288. The relation between deflection and stresses in arch dams by Noetzli.
V. 85, 1922, p. 344. Timber arch dams near Ithaca, N. Y.
V. 92, 1928, p. 1512. Graphical solution of Cain's formulas by Fowler (basic paper).
V. 93, 1929, p. 1191. Trial load method.
V. 93, 1929 p. 1623. Load distribution in arch dams, by Sutherland.
V. 95, 1931, p. 533, Laminated arch dam, by F. A. Noetzli.
V. 95, 1931, p. 613. Plastic flow in concrete arches.
V. 99, 1934, p. 897. Deflection and temperature in a trial-load arch dam.
V. 100, 1935, p. 185. Model of Calderwood Dam.

Proceedings A.S.C.E., Dec. 1937, p. 1851. Earthquake stresses in an arch dam.

Single-Arch Dams, Cont'd. - 2

ENGINEERING NEWS-RECORD

V. 79, 1917, p. 253. Spaulding constant-angle arch dam. Also V.85,1920,p.1020.

V. 79, 1917, p. 1066. Eagles Nest Dam, N.M., 155' radius, 140' high.

V. 80, 1918, p. 876. Crowley Creek Dam, Oregon, constant-radius-arch, 70' high

V. 82, 1919, p. 681. Gibralter Dam, Calif., c-r-a 175' high*. Also V. 84., 1920, p. 1003.

V. 84, 1920, p. 421. Kerkhoff, c-a-a dam, 108' high.

V. 92, 1924, p. 981. Constant-angle-arch dam in So. Africa, 195' high.

V. 93, 1924, p. 128, Montejaque c-a-a dam, 223' high. Also (e) on p. 126.

V. 94, 1925, p. 315. Lake Humphreys, c-r-a dam, 96' high.

V. 96, 1926, p. 331. Gerber Dam, Calif., c-a-a, 75' high. Ref. Recl. Era, Dec. 1925.

V. 96, 1926, p. 778. Mormon Flat Dam, Ariz., c-a-a, 210' high.

V. 97, 1926, p. 616. Failure of two arch dams. Also V. 96, 1926, p. 172.

V. 97, 1926, p. 828. Stevenson Creek test dam. Also p. 313, 642, 974, 1010; V. 96, p. 494; V. 98, p. 450.

V. 98, 1927, p. 609. Cushman Dam No. 1, Wash.

V 100, 1928, p. 631. Toltec Dam, N. M., c-r-a, 78' high.

V. 101, 1928, p. 268. Canadea Dam, N. Y., c-a-a, 140' high, brick face. Also p. 267, 412, 710.

V. 102, 1929, p. 894. Waterville Dam, c-a-a, 200' high*.

V. 103, 1929, p. 320. Diablo Dam, Wash. (Construction)

V. 103, 1929, p. 569. A c-a-a dam on Freye Creek, Ariz., 100' high. Also see V. 104, p. 36 for setting form points.

V. 103, 1929, p. 954. Calderwood Dam, Tenn.

V. 104, 1930, p. 284, Ashland Dam, Oregon, c-a-a, 112' high, horizontal joint*

V. 105, 1930, p. 594. Eleven-Mile Dam, Denver, c-r-a, 112' high*.

V. 106, 1931, p. 141. Trail-load method "explained" by Westergaard (almost impossible to understand).

V. 106, 1931, p. 831. Cat Creek Canyon Dam, Nov., c-a-a, 120' high*.

V. 106, 1931, p. 998. Gibson Dam, c-r-a, 195' high*.

Single-Arch Dams, Cont'd -5

ENGINEERING NEWS-RECORD (Cont'd.)

V. 107, 1931, p. 46. Hogan Dam, Calif., c-a-a*.

V. 107, 1931, p. 144. Deadwood Dam, c-r-a.

V. 107, 1931, p. 217. Big Tujunga Dam, Calif., c-a-a.

V. 116, 1936, p. 151. Spaulding Dam, c-a-a. Ref. to ER 8/9/13, p. 150; EN 12/11/13, p. 1158; E 11/25/20. p. 1020.

V. 116, 1936, p. 725. Thin arch dam near Phoenix, Ariz. 57' high*.

V. 118, 1937, p. 385. Seminoe Dam, Wyoming. c-r-a, 261' high.

ENGINEERING NEWS

V. 19, 1888, p. 270. Old Bear Valley Dam, Calif., 64' high*. Also p. 272, 513, 517; also V. 22, 1889, p. 484, 512, 517.

V. 20, 1888, p. 324, Sweetwater Dam, Calif.*

V. 38, 1897, p. 397. Arch dam, 10' thick under 640' head in mine.

V. 54, 1905, Aug. 10, p. 141-144 "Investigation of stresses in high masonry dams of short span," by Wheeler and Wisner. Division of the water load between arches and cantilevers. Applied to Pathfinder Dam, Wyoming.

V. 66, 1911, p. 220, Crowley Creek c-r-a, Oregon.

V. 68, 1912, Aug. 1, p. 208. Poisson's ratio, by Jorgensen. Max. for concrete found to be 0.25. Here proposed 0.2.

V. 68, 1912, p. 155. "The constant-angle-arch dam, by L. R. Jorgensen, Explanation of the principle."

ENGINEERING RECORD

V. 67, 1913, p. 353. Timber arch dam, 36' high.

WESTERN CONSTRUCTION NEWS

Mar. 10, 1926, p. 29. Garber Dam, c-a-a, with 4' closure sections*.

Aug. 25, 1926, p. 43. Gibson Dam, c-r-a.

Oct. 10, 1926, p. 89. Bowman South arch dam, c-r-a, 103' high.

Apr. 10, 1927, p. 47. Comparison between sections of arch dams (superimposed).

Apr. 25, 1927, p. 41. Bullards Bar Dam, Calif., c-a-a*.

May 25, 1927, p. 38. Melones Dam, Calif., c-r-a*.

WESTERN CONSTRUCTION NEWS (cont'd.)

June 10, 1927, p. 42. Lost Creek Dam, c-a-a*.

Aug. 25, 1927, p. 52. Diablo Dam, Wash., c-a-a*. Also 1929, p. 254*.

Sept. 10, 1927, p. 35, Analysis of arch dams by Cains formulas, by Pearce.

Nov. 25, 1927, p. 44. Big Santa Anita Dam, Calif., c-a-a*.

1928, p. 256. Cushman Dam, No. 1, Wash., c-a-a.

1928, p. 394. Van Giesen Dam, c-a-a, 90' high*.

1928, p. 426, Calles Dam, Mex., c-a-a*.

1929, p. 78. Max. stresses in arch dams tabulated by Houk

1929, p. 612. Hogan Dam, Calif. c-a-a, overhang*.

1930, p. 300. Mormon Flat Dam, Ariz., c-a-a*.

1930, p. 320. Horse Mesa Dam, Airz., c-a-a*.

1930, p. 322. Stewart Mountain Dam, Aris., c-a-a*.

1930, p. 509. Juncal Dam, c-a-a, 180' high*.

1930, p. 583. Cushman Dam No. 2, Wash., c-r-a, 240' high.

1931, p. 150. Gibson Dam, c-r-a, or variable radius, 195' high*.

1931, p. 243. Big Tujunga Dam, 251' high, c-a-a*.

1932, p. 451. Old arch dams in Austria, by Noetzli.

1933, p. 455. Trial load method, by Houk.

CIVIL ENGINEERING

1931, p. 1009. Calles Dam, c-a-a, 208' high with buttressed abutments, using trial-load method for design.*.

1933, p. 272, Arizona Code. Temperature allowance.

1933, p. 347. Arch Dam Committee, abstract of recommendations for design of arch dams.

1933, p. 606. Calderwood Dam, c-a-a. Grouting contraction joints and foundations*. (Good)

1935, p. 296. Hogan Dam, c-a-a, 115' high. Overhang. Grouting of joints.

Single-Arch Dams, Cont'd. -5

MILITARY ENGINEER

1933, p. 420. Cat Creek Dam, c-a-a, 115' high*.

1935, p. 167. Mareges Falls Dam, France, c-a-a, 300' high. Lower part indented for free movement. Overhang about 20'*.

RECLAMATION ERA

V. 22, 1931, p. 175. Deadwood Dam, c-r-a, 160' high. Spillway section in center with 140' drop to a concrete apron*.

1937, p. 83. Trial-load method in popular terms.

JOURNAL AMERICAN CONCRETE INSTITUTE

V. 27, 1931, p. 1. Arch dam design, by L. Jorgensen. Many dams, formulas*.

HYDRAULIC ENGINEERING

Dec. 1928, p. 734. Distribution of major stresses in arch dams, by Fredrick Vogt.

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V. 106, 1936, April 25, p. 1176, Twin Falls hydro project on Snake River, Idaho A 14'-6" high and 510' long arch dam on a horizontal sliding joint.

# VI - MULTIPLE-ARCH DAMS

## TRANSACTIONS AM. SOC. OF CIVIL ENGINEERS

V. 49, 1902, p. 103, Discussion by Wegmann. Ref. to EN 9/9/98, Belubula Dam, So. Wales, 1898, brick, 60' high.

V. 75, 1912, p. 877. Stresses in buttresses.

V. 81, 1917, p. 850, Multiple-arch dams, by Jorgensen. On p. 899, Ref. to Trans. Int. Eng. Congress, 1915, Waterways and Irri. p. 719, for Meer Alum Dam.

V. 85, 1922, p. 886, Lake Eleanor Dam.

V. 87, 1924, p. 276. Jakobsen, Noetzli and others, discussions & p. 342

V. 89, 1926, p. 713. Multiple-arch dams on Rush Creek, repairs.

V. 87, 1924, p. 402, & V. 88, 1925, p. 1316. Cave Creek multiple-arch dam 120' high on glacial drift.

## ENGINEERING NEWS-RECORD

V. 79, 1917, p. 253, Rock Creek multiple-arch-dam, 30' high, 1050' long.

V. 80, 1918, p. 455, Mountain Dell Dam 100' high, 3-hinged arches. For raising, see V. 98, 1927, p. 530.

V. 82, 1919, p. 720, Hodges Dam.

V. 83, 1919, p. 464, Lake Eleanor Dam, by McIntosh (basic paper).

V. 88, 1922, p. 623, Foundation pressures in multiple-arch-dams. Also (1) on p. 1009, and V. 89, p. 78,450.

V.79, 1917, p. 217, Island Lake Dam, Minn. Multiple-arch-spillway, 12' high.

V. 90, 1923, p. 820, A 200' multiple-arch-dam in Italy.

V. 92, 1924, p. 182. Gleno Dam failure, Italy. Also (e) on p. 181 and photo on p. 33. Also p. 486, 1018 and (1) on p. 501, 627, and V. 94, p. 146 and V. 93, p. 213.

V. 95, 1925, p. 22, Gem Lake Dam disintergrates. Also (1) on p. 194, 232, 396, 606.

V. 95, 1925, p. 710, Tidone multiple-arch-dam in Italy, 170' high.

V. 100, 1928, p. 180, Lake Pleasant Dam, 170' high, hollow buttresses".

V. 102, 1929, p. 275. Troubles with Lake Pleasant Dam. Also p. 257.

V. 103, 1929, p. 579, Florence Lake Dam.

V. 103, 1929, p. 994. Big Dalton Dam

V. 110, 1933, p. 59. Hamilton multiple-arch-dam, Texas, 154' high.

V. 116, 1936, p. 867. Lake Pleasant Dam reinforced*.

V. 117, 1936, p. 644, Hodges Dam reinforced*. Also (e) on p. 656. Ref. to ENR 4/10/19, p. 720.

Multiple-Arch-Dams Cont'd -2

WESTERN CONSTRUCTION NEWS

1926, Mar. 25, p. 34. Lake Pleasant multiple-arch dam with hollow buttresses. Also 12/10/27, p. 26*. Also 1929, p. 199.

1926, Nov. 25, p. 23, Little Rock multiple-arch-dam. Cracks in the buttresses*.

1927, July 25, p. 36. Florence Lake multiple-arch-dam 150' high, with 50' buttress spacing*.

1927, Oct. 25, p. 44. Big Dalton multiple-arch-dam, 165' high*. Hollow buttresses on 60' centers.

1930, p. 508. Juncal multiple-arch-dam, 50' high, buttresses 36' c.c.

1936, p. 137, Bartlett Dam, Ariz. to be 270' high. Also 1937, p. 204.

1936, p. 286, Lake Pleasant Dam, Ariz., 250' high being reconditioned.

CIVIL ENGINEERING

1933, p. 329, Multiple-arch-dam form work. Also (1) on p. 337.

1933, p. 272. Ariz. Code. Temperatures allowance. Stress allowance.

1936, p. 83, Victoria Dam, 4 bays, 73 c.c. buttresses upstream slope 45°, arches on the 180° central angle. Intrados cylinders constant radius 34'-9". Extrados conical.

## VI - AMBURSEN DAMS

### TRANSACTIONS AM. SOC. OF CIVIL ENGINEERS

V. 81, 1917, p. 907. - 1100. The reconstruction of Stony River dam.

V. 96, 1932, p. 666. Buttress dam of equal strength. In the discussion, Noetzli mentions 4 dams which have contraction joints in the buttresses.

V. 77, 1914, p. 1069. The failure of Stony River dam, by Wegmann.
V. 84, 1921 Tirso Dam, Italy, 208' high

### ENGINEERING NEWS-RECORD

V. 79, 1917, p. 628. Twin City 30' ambursen dam on pervious foundation, precast slabs.

V. 82, 1919, p. 1251. Twin City ambursen dam. Also (1) in v. 83, p. 437.

V. 99, 1927, p. 264. Bristol Dam 60' high.

V. 99, 1927, p. 994. Pit No. 4 Calif. ambursen dam on sand and gravel."

V. 100, 1928, p. 892. Mount Union Dam, 44' high.*

V. 103, 1929, p. 46. Stony Gorge Dam.

V. 105, 1930, p. 690. Rodriguez Dam.*

V. 107, 1931, p. 634. Thief Valley Dam. Reinf. concrete buttress slab*. (Also in Reclam. Era, 1932, p. 194.)

### WESTERN CONSTRUCTION NEWS

1928, p. 490, Stony Gorge Dam.*

### CIVIL ENGINEERING

1931, p. 387. Ambursen type dams and other types, by Ambursen Dam Co. Expansion joints in the buttresses. (Good)

# EARTH DAMS

(Mostly rolled-fill dams)

## TRANSACTIONS A.S.C.E.

V. 74, 1911, p. 38 - Dams built by Bureau of Reclamation

## ENGINEERING NEWS

V. 29, 1893, p. 346 - An 85' dam in N.M. Puddling of core executed by herd of goats.

## ENGINEERING NEWS-RECORD

V. 78, 1917, p. 596 - Settlement of two dams in Puerto Rico.
V. 79, 1917, p. 52 - Mammoth Dam, Utah, failure.
V. 80, 1918, p. 366 - Sherbourne Lakes Dam. Corewall of screened gravel, grouted rock paving on upstream face.
V. 85, 1920, p. 26 - Belle Fourche Dam, S.D. Trouble with concrete facing.
V. 85, 1920, p. 689 - Minatare Dam, Neb. Trouble with concrete facing.
V. 87, 1921, p. 890. Tieton Dam, Wash. Concrete cutoff over 100' deep. Also V. 97, 1926, p. 544, and V. 80, p.p. 745, 758.
V. 89, 1922, p. 92 - Wanaque Dam, 90' deep cutoff. Also V. 95, 1925, p. 252.
V. 93, 1924, p. 477 - Baiwoe Dam, Calif. Facing damaged by waves.
V. 94, 1925, p. 737 - Encino Dam oil facing.
V. 96, 1926, p. 155 - Soft Maple Dam, 140' high, on glacial drift, Leakage.
V. 96, 1926, p. 642 - Mystic Lake Dam. Leakage stopped by grouting. Also V. 98, 1927, p. 900, leakage stopped by grouting.
V. 100, 1928, p. 199 - Draining a sliding hillside.
V. 105, 1930, p. 954 - Sampling etc.
V. 106, 1931, p. 359 - Cellular core walls in earth dams. A dam in Mexico 100' high on clay. A dam in Maine with a 115' deep cutoff wall. See also (1), on p. 494, 622.
V. 106, 1931, p. 998 - Echo dam in Utah, rolled fill, 150' high. A 12' high reinforced concrete key wall, chute spillway with stilling basin. Tunnel and outlet tower.
V. 108, 1932, p. 761 - Broadmoor Dam, Colo., has facing of steel plate with welded joints. See also (c) on p. 751 with reference to another steel-faced dam in Colorado, built in 1901. Also (1) in Vol. 109, 1932, p. 113, 233, 505, 657, more details of steel-faced dams and references to old articles.
V. 109, 1932, p. 466--Alexander Dam in the Hawaiin Islands. Dam was built as hydraulic fill and failed partially in 1930. The reconstructed dam is 140' high. Article describes an intricate system of drainage of the zone downstream from the core. Discussion of materials used in the dam. Also information on core pressure, coefficient of shear and a comparison with other dams. Also (c) on p. 478 and (1) on p. 787, failure comparable to earlier failure of the Necaxa and Calaveras dams.
V. 110, 1933, p. 50 - Still Creek Dam, Pa. A 90' high rolled-fill dam with chute spillway. A reinforced concrete intake tower is buttressed against ice pressure. 2 - 36" cast iron pipes are placed in the fill. A 10-mile long 30" pipe is coated with bitumastic enamel. Article describes the application of bitumastic enamel.

ENGINEERING NEWS-RECORD (Cont'd)

V. 111, 1933, p. 33 - El Capitan Dam in California, hydraulic fill, 217' high. A 53' deep concrete cutoff in the foundations. Article gives mechanical analysis curves for a number of dams. Drainage of the fill is effected by 3 - 6' x 7' reinforced concrete tunnels extending 150' upstream from the downstream toe wall. Side-channel spillway.

V. 112, 1934, p. 810 - Bouquet Canyon Dam, Calif. Rolled-fill, 185' high, containing 3,000,000 cu. yds.

V. 114, 1935, p. 35 - Fort Peck Dam. Spliced steel sheet piling driven to about 150'. Also plan and geological profile.

V. 114, 1935, p. 343 - San Gabriel Dam No. 2 rockfill dam, 255' high has settled 12'. Due to torrent al rain, the concrete facing has cracked beyond repair. Also (e) on p. 360, and (n) on p. 607, and (1) on p. 461, 683.

V. 114, 1935, p. 836 - Repairs of San Gabriel Dam No. 2, rockfill.

V. 115, 1935, p. 211 - El Vado Dam, gravelfill, 175' high, faced with welded steel plates. Cutoff wall excavated to great depth by mining method. Chute spillway with chute lined with steel plates.

V. 115, 1935, p. 279 - Fort Peck Dam. A series of articles covering 28 pp. Complete description of hydraulic-fill operations. Tunnel construction, spillway excavation, concreting gate structure and gates. Also (e) on p. 309. Also safety methods on p. 327.

V. 116, 1936, p. 240 - Clear Creek Dam, Ark., rolled-fill dam, 80' high, 1 million cu. yds. Foundation is shale. Outlet works consist of a circular tower and reinforced concrete conduit 12' x 10' which is hinged at the invert. Chute spillway in sandstone.

V. 116, 1936, p. 882 - Quabbin Dike, hydraulic-fill, 135' high, 2,100,000 cu. yds. on glacial till. Sluicing of borrow materials. Collecting basins. Pumping. Transportation of dry materials to hog boxes on the abutments.

V. 117, 1936, p. 10 - Coyote Dam "earthquake proof".

V. 117, 1936, p. 105 - Fort Peck Dam. A series of articles describing the dam, progress made in building the dam, tunnels, shafts, and the spillway. Also (e) on p. 132, also p. 188, dredges for hydraulic-fill operations. Also p. 386, dredging records. Also p. 238, tunnel construction. Also p. 274, grouting of the tunnels. Also p. 295, spillway gate structure and spillway chute paving.

V. 118, 1937, p. 195 - Ralston Creek Dam, rolled-fill, 200 ft. high. Foundation is shale. Cutoff trenches. Concrete keywall. A 10' diameter tunnel and control works. Description of compaction.

V. 118, 1937, p. 367 - Inland Dam, Ala., 195' high. Peculiar design. Morning-glory spillway, 20' diameter.

V. 120, 1938, p. 15 - Pine View Dam. This is a rolled-fill dam, 68' high with a gated chute spillway. Foundation conditions were considered very poor requiring cutoff walls into rock and grouting. This is a well-writen article on 6 pp.

V. 120, 1938, p. 709 - Quabbin Dam, hydraulic-fill, 170' high. Material pumped to hog box then transported by belt conveyors to the embankment. Also (e) on p. 706.

V. 126, 1941, p. 44 - Mud Mountain Dam, Wash. Catch basins are used to divert flow in gulley above the dam from very small drainage area. Also p. 136, impervious fill placed unbr a tent (n). Also p. 371, oil burners used to dry the fill materials (f).

ENGINEERING NEWS-RECORD (Cont'd.)

V. 126, 1941, p.392 - Clayter Dam, Va., very deep cutoff in one abutment.
V. 126, 1941, p. 408 - Mud Mountain Dam has been redesigned as rockfill with an earth core. After the contract was let on the original design, it was discovered that the fill material in the borrow area was too plastic to be satisfactory. The re-designed structure will have a central zone of impervious rolled-fill with shells on both sides of dumped rock. The height of the dam will be 425' and it will contain 2,100,000 cu. yds. of fill. The rockfill will be washed with water using approximately 50% more water than fill. The rolled-fill materials will be hauled by rail to the dam site and dried in a specially constructed plant. Then the fill will be placed under a large tent.

Two tunnels already built. Spillway of ski-jump type, capacity 139,000 c.f.s. Paving 2' thick joints with copper water stops. For details of tent, see p. 452. Also v. 129, p. 282.
V. 127, 1941, p. 426 - Merriman Dam, earthfill. Tight cutoff to bedrock effected by means of reinforced concrete caissons 12' x 45', sunk through as much as 160' of silt, clay, sand, gravel, and boulders.
V. 127, 1941, p. 808 - Knightsville Dam in Connecticut. Hydraulic fill, 160' high; 1,200,000 cu. yds. of hydraulic fill and 120,000 cu. yds. of rolled-fill. Article describes hydraulic operations and gives curves of materials sizes. Description of core pool control.
V. 129, 1942, p. 170 - Sepulveda Dam in Calif., Article describes handling of wet borrow materials. Crowding water out of excavated river channel pockets. Settlement gages. Compaction results.
V. 129, 1942, p. 435 - Santa Fe Dam, California, handling of material. A central impervious zone on very steep slopes. Outer gravel shells, containing maximum 6" stone. Article describes segregation of the pervious material by use of grizzlies. Article also describes types of trucks used for hauling and operations on the fill.
V. 136, 1946, p. 29 - Kingsley Dam, new riprap, troubles with old.
V. 136, 1946, p. 470 - Saluda Dam, strengthening.
V. 136, 1946, p. 504 - Bid on Wolf Creek Dam.
V. 136, 1946, p. 986 - Puddled clay as cutoff for levees.
V. 137, 1946, p. 230 - Davis Dam.
V. 137, 1946, p. 238 - Wellpoints.
V. 138, 1947, p. 386 - Pressure relief wells.
V. 138, 1947, p. 246 - Pressure relief wells at Fort Peck and Sardis Dams.
V. 138, 1947, p. 351 - Research. Also pp. 378,381,472,524,603,655,737 (Good).
V. 138, 1947, p. 396 - Anderson Ranch Dam.

CIVIL ENGINEERING

V. 1, 1931 - Brooks Hollow Dam. Cutoff.
V. 4, 1934 - Calero Dam, Selecting materials.
V. 8, 1938, p. 377 - Cajalco Dam, Calif. Rolled-fill, 210' high, 2,170' long. Article describes construction, excavation and stripping, compaction, testing of embankment materials, moisture control and pressure grouting using bentonite.
V. 9, 1939, p. 7 - Steel facings on earth dams.
V. 9, 1939, p. 27 - Deer Creek Dam. Rolled-fill, 155' high, on sand and gravel with a 75' deep open trench to rock with keywall.

CIVIL ENGINEERING (Cont'd.)

V. 9, 1939, 349 - Sardis Dam, Miss. Hydraulic-fill dam, 105' high to contain approx. 17,000,000cu. yds. of fill. One single conduit through the dam of the inverted egg-shaped type, 18.25' high, 7500 c.f.s. capacity, controlled by 4 - 6' x 12' broome gate. Spillway chute designed to be 400' wide, founded on sand, located about 1 mile from the dam. Floor thickness about 5' in the chute and 8' in the stilling basin. Also (1) on p. 499, chute spillway for Guernsey Dam, Wyoming.

V. 10, 1940, p. 623 - Kingsley Dam, Nebraska, hydraulic-fill. Maximum height 160', 2 miles long. On sand alluvium foundation for 10' to 120' overlying a consolidated denseclayey silt. Total 26,000,000 cu. yds. of fill of which 11% is core. Earth blanket, minimum 3' thick extending from the core to 1500' upstream. Concrete cutoff wall in right abutment. Character of borrow materials. Sluicing by hog box and pipelines.

WESTERN CONSTRUCTION NEWS

1931, p. 63 - Santiago X Creek Dam, Also p. 576.
1934, p. 201 - Alcova Dam. Also 1937, p. 341.
1936, p. 66 - Steel-faced Dam.
1936, p. 73 - Cajalco Dam.
1936, p. 122 - San Gabriel No. 1 Dam.

# SOIL MECHANICS

## (AS APPLIED TO DAMS)

TRANSACTIONS AM. SOC. OF CIVIL ENGINEERS

V. 98, 1933, p. 218 - Soil mechanics research, by Gilboy.
V. 100, 1935, p. 1235 - Underseepage at dams, by Lane.
V. 100, 1935, p. 1352 - Underseepage at dams, by Harza.

ENGINEERING NEWS-RECORD

V. 95, 1925, p. 742 - Soil mechanics, by Terzaghi. Cont'd. pp. 796, 832, 875, 912, 987, 1026, 1064. Also -e-p. 740, 1056 and -l-p. 888, 969, 1006; V. 96, p. 336.
V. 100, 1928, p. 629. Terzaghi on soil mechanics, with many references. Also p. 708.
V. 105, 1930, p. 954. - Earth dams. 965 Three articles. Sampling, graduation curves, etc. Also p. 951; V. 106, p. 287.
V. 106, 1931, 960 - Composition of earth dams. Continued on p. 1044; V. 107, p. 168, 917. Also V. 106, p. 535 and V. 107, p. 871, 986.
V. 107, 1931, p. 90 - Corpus Christi Dam, by Terzaghi. Also pp. 340, 860.
V. 109, 1932, p. 158 - Soil mechanics. Three articles (one by Terzaghi) Also p. 295, 507, 729.
V. 111, 1933, p. 245 - Proctor series. Also p. 286, 348, 373, 268, 600.
V. 111, 1933, p. 500 - Soil bearing tests for Columbus, Ohio.
V. 112, 1934, p. 136 - Retaining wall tests, by Terzaghi. Also p. 259, 316, 403, 503, 150, 632, 644, 514, 747; V. 113, p. 535, 555.
V. 112, 1934, p. 345 - Soil bearing tests at Columbus, Ohio. Also p. 438.
V. 114, 1935 p. 875 - Soils, Hydrometer analysis.
V. 115, 1935, p. 45 - Soil mechanics Education. Also p. 408, 648.
V. 115, 1935, p. 883 - Pressure of loose soils.
V. 116, 1936, p. 453 - Soil mechanics on the Muskingum, by Knappen and Philippe. Cont'd. p. 532, 595, 666 -e- p. 470. Corr. p. 711, -l- p. 926.
V. 118, 1937, p. 588. Soil mechanics, by Burnister. Squeeze tests. Shipping of samples.

CIVIL ENGINEERING

1931, p. 1015, Status of soil research. Also p. 1210.
1934, p. 255, Coulomb's theory. *Also p. 652.
1934, p. 510, Electric analogy, by Lane, Also v. 5, p. 102.
1934, p. 581. Time-settlement curves.
1937, p. 341. Soil stability principles, by Housel.

WESTERN CONSTRUCTION NEWS

1936, p. 87. Field testing machine for bearing capacity of soils. Also p. 110.
1936, p. 150. Clay soil problems. Time-load-settlement curves, 4 pp.*.

RECLAMATION ERA

1937, p. 12, Grand Coulee Dam. Freezing an arch of soil on hillside to prevent sliding.

# CHUTE SPILLWAYS

## ENGINEERING NEWS

V. 67, 1912, p. 20 – Velocities in chutes, by A. P. Davis.
V. 67, 1912, p. 107 – White Rock Creek Dam, Dallas, Texas.
V. 69, 1913, p. 989 – Kachess Dam, Wash. Conduit in open cut, 1 – 12' x 12'.
V. 71, 1914, p. 1444 – Flume across earth dam, serving as spillway causes failure. Also another spillway failure.
V. 73, 1915, p. 1121 – Tiffin Dam failure.
V. 74, 1915, p. 455 – Stepped and boulder-studded chute near Los Angeles, interesting design.

## ENGINEERING RECORD

V. 57, p. 630, Belle Fourche, Also v. 61, p. 466, and v. 66, p. 368.
V. 67, p. 33 – Oakley
V. 67, p. 172 – Quemahoning.

## ENGINEERING NEWS-RECORD

V. 90, 1923, p. 1080, 1118 – Diversion Dam and Lake Kemp Dam, near Wichita Falls, Texas. Also V. 91, 1923, p. 1004 and V. 97, 1926, p. 748.
V. 100, 1928, p. 388 – McKay.
V. 100, 1928, p. 864 – Pleasant Valley, Utah, curved chute.
V. 101, 1928, p. 398 – Colidge (a*)
V. 108, 1932, p. 561. Hunters Creek Dam, in an arm of Sacandaga reservoir. Chute spillway, pavement settled 12", then 2 days later caved in and emptied the reservoir in 1 hour.
V. 115, 1935, p. 214 – El Vado, Chute lined with 1/4" steel plate.
V. 115, 1935, p. 786 – Continental Dam, Colorado new chute spillway.
V. 116, 1936, p. 5 –"Recent studies on flow conditions in steel chutes", by E. W. Lane.
V. 117, 1936, p. 599 – Catamount Creek Dam, Colo. Steel faced dam. Concrete lined wasteway.
V. 121, 1938, p. 174 – Chute spillway for Salt River dams. Ariz. Also (e) on p. 166 and (f) on p. 74, Mormon Flat Dam, spillway on a curve, superelevated.
V. 125, 1940, p. 843 – Anchor bar tests in Chicago.
V. 126, 1941, p. 408, Mud Mountain Dam. Ski-jump type chute spillway.
V. 128, 1942, p. 400 – Under-drains, tests at Vicksburg, Ref. to bulletin. Also p. 909 for further information.
V. 130, 1943, p. 898 – Burnt Mills Dam, chute stepped curved spillway (f). Also V. 135, 1945. Spills first time (f).
V. 138 1947, p. 439 – Waco Dam, troubles and repairs. Also p. 898.

## CIVIL ENGINEERING

1936, p. 311 – Pine Canyon (later Morris Dam).
1939, Aug. p. 490 – Zuni Dam spillway failure.
1940, Mar. p. 153 – Chute spillway hydraulic model tests, by Douma.
1942, Mar. p. 158 – Flow in bend of rectangular flume.
1943, Sept. p. 413 – Chatuge and Nottely dams (good).

## WESTERN CONSTRUCTION NEWS

1926, Dec. 25, p. 33. Coolidge (a*).
1934, p. 382 – Moon Lake (a*).
1935, Apr., p. 96 – Hydraulic model tests of chute spillways, by E. W. Lane.

WESTERN CONSTRUCTION NEWS (Cont'd).

1936, p. 285 - Boca (a*).
1939, p. 327 - Calaveras Dam, Hyle. Model tests for new spillway.

RECLAMATION ERA

1936, p. 14 - Hyrum (a*).
1937, p. 152 - Rye Patch (a*).
1937, p. 181 - Pine View (a*).
1938, p. 60 - Unity (a*).
1938, p. 64 - Taylor Park (a*).
1938, p. 112 - Alamogordo Dam.
1938, p. 164 - Moon Lake (a*).
1938, p. 167 - Alcova Dam (a*).
1939, p. 10 - Bull Lake Dam (a*).
1939, p. 158 - Bartlett Dam (a*).
1939. p. 210 - Deer Creek (a*).

TRANSACTIONS, AMERICAN SOCIETY OF CIVIL ENGINEERS

V. 59, 1907, p. 246 - San Andres.
V. 62, 1909, p. 48 - Melville.
V. 109, 1944, p. 1107 - "The Hydraulic Jump in Sloping Channels", by C. E. Kindsvater.
V. 108, 1943, p. 1393 - "Entrainment of air in Flowing Water," a Symposium by L. Standish Hall and A. A. Kalinske.
V. 108, 1943, p. 1423 - Kittitas chute.

DAMS AND CONTROL WORKS, by Bureau of Reclamation, 1938

P. 49 - Arrowrock
P. 85 - Bartlett
P. 101 - Guernsey
P. 107 - Echo
P. 119 - McKay
P. 123 - Taylor Park
P. 129 - Cle Elum
P. 144 - Alcova
P. 211 - Hydraulic model tests

Proceedings of the Second Hydraulic Conference, State University of Iowa. 1932, p. 248, "Gas-wave analogies in open-channel flow," by A. T. Ippen.

# DAMS ON PERVIOUS FOUNDATIONS

TRANS. A.S.C.E.

V. 99, 1934, p. 792 - High dams on pervious glacial drift, by Burd.
V. 100, 1935, p. 1235 - Underseepage by E. W. Lane & p. 1352 by L. F. Kurza.
V. 102, 1937, p. 679 - Quabbin Dam and Dike, hyd-fill. Caissons to max. 130' depth

ENGINEERING NEWS-RECORD

V. 79, 1917, p. 217 - Island Lake Dam, Minn. Earth embt. on pervious foundation.
V. 81, 1918, p. 186 - Coon Rapids Dam break. On pervious foundation.
V. 81, 1918, p. 481 - Junction Dam.
V. 82, 1919, p. 818 - Weir on pervious foundation, 5' high. Automatic flashboards.
V. 84, 1920, p. 1014 - Island Park Dam, Dayton, O. Low concrete weir on pervious foundation. Aprons, Measuring uplift.
V. 85, 1920, p. 355 - Granite Reef Dam, 15' high on pervious foundation.
V. 90, 1923, p. 926 - Hamilton Dam, Ohio, 7' high on pervious foundation.
V. 92, 1924, p. 259 - Jim Falls Dam, Wis., pervious foundation. Also p. 267, 921.
V. 93, 1924, p. 429 - Kilbourn Dam, Wis. Concrete spillway on sand. Model tests.
V. 93, 1924, p. 1002 - Laguna Weir on pervious foundation. Also (e) on p.979.
V. 94, 1925, p. 180 - Embankments on BeaverRiver, N. Y., all on sand. One is 120' high hyd.-fill.
V. 94, 1925, p. 762 - Pinhook Dam on pervious foundation, 20' high embt. on sand and gravel, drained. Reinforced concrete, hollow spillway. For failure of embt. see v. 98, 1927, p. 1000.
V. 94, 1925, p. 931 - An earth dam for Horton, Kans. 34' high on soft foundation. Concrete spillway. Failure see V. 95, p. 58.
V. 95, 1925, p. 252 - Wanaque dams, N. J., 3 earth and 2 concrete dams. Embt. on sand and gravel with concrete core to rock, 100' deep.
V. 95, 1925, p. 361 - HorseSprings Dam, Wash., 65' high earth dam on sand and gravel, very pervious. Heavy leakage.
V. 96, 1926, p. 155 - Terminal Dam of Soft Maple dev., A sand dam 140' high on glacial drift. Leakage.
V. 96, 1926, p. 252 - Elk Creek Dam., Okla., 2160' long on sand and clay, earth embt. 30' high. Concrete core. Concrete facing. Wave breaker. Channel spillway with V-shaped crest in plan.
V. 98, 1927, p. 108 - Bridgeport, Nev., earth dam, 64' high on pervious foundation. Observations on seepage and fill settlement.
V. 100, 1928, p. 772 - Slumps in Garza Dam, Tex., Hydraulic-fill on sand, clay, and gravel, 80' high. Ref. to V. 94, 1925, p. 630.
V. 103, 1929, p. 685 - Guadalupe River, Tex., 3 hydro plants. Automatic roof weir gates 85' x 12.37'. Dams on soft foundations with aprons and baffles.
V. 105, 1930, p. 520 - Corpus Christi Dam, Tex. Total 4,080' long of which 1250' is a concrete spillway. Embankment max. 61' high with riprap on upstream slope and 40' steel sheet piling. Foundation consists of 10' silt above a 30' stratum of sand and gravel, then hard clay to unknown depth. Spillway designed for 400,000 cfs with crest 22' below top of embankment. Spillway of gravity section supported on 25' wooden piles 2.5' to 3' cc, 35' long and with steel sheet piling underneath upstream cutoff (4'x4'). Apron extending downstream. Complete drawings. Failure p 974, c-952, n-861

V. 116, 1936, p. 882 - Quabbin Dike, 135' high on glacial till.*

V. 117, 1936, p. 328 - Alcova Dam, 230' high.

WESTERN CONSTR. NEWS

1936, p. 266 - Grant Lake Dam, Calif. 100' high on glacial drift. Impervious blanket*.
1936, p. 224 - Caballo Dam, N. M., 86' high on sand, gravel and boulders*.
1937, p. 129 - Wallecito Dam, Colo. 126' high on glacial moraine. Rock at the abutments, Keywalls.

HYDRAULIC-FILL DAMS

TRANS. A.S.C.E.

V. 58, 1907, p. 196 - Schuyler on hydr.-fill dams.
V. 60, 1906, p. 100 - Discussion
V. 74, 1911, p. 88 - Conconully Dam, with discussion of hydr.-fill vs. "mechanical method".
V. 83, 1920, p. 1713 - Hydr.-fill dams, by Hazen.
V. 85, 1922, p. 1181 - Core studies, by Paul.
V. 85, 1922, p. 1309 - Miami dams, Ohio.
V. 92, 1928, p. 1413 - Studies.
V. 99, 1934, p. 206 - Hydr.-fill dams, by Hatch.

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V. 78, 1917, p. 440 - Standley Lake earth dam 140' high. Troubles from slides.
V. 79, 1917, 1197 - Bridgewater dams, semi-hydraulic-fill.
V. 80, 1918, p. 172 - Hydraulic fill dam. Ref. to ER X/12/12 p. 396, EN 10/10/12 p. 669.
V. 83, 1919, p. 371, Miami dams. Also p. 640, 708, 1040,(Ref. to EN 7/15/09, p. 72, Necaxa slip); V. 84, p. 295, 1142; V. 85, p. 486, 547, 600, 196, 962,1138,; V. 86, p. 248,603,764;V 87, pp 730,947,744,820,811; V. 88, p.96.
V. 84, 1920, p. 1088, - The 3 Bridgewater semi-hydraulic-fill dams. Also V. 85, p. 306.
V. 86, 1921, p. 597 - Terrace reservoir dam, hydraulic fill. Much information on hydraulicing and flumes. Material in dam is sand and gravel.
V. 88, 1922, p. 320 - Safety of hydraulic-fill dams. Also (e) on p. 811.
V. 89, 1922, p. 1073 - Priest Dam, 145' high, hydr-fill. Flexible concrete core. Photos in V. 92, p. 17, 379.
V. 90, 1923, p. 1080 - Wichita Falls, Tex: Hydr.-fill 100' high. Also p. 1118, V. 91, p. 1004, V. 97, p. 748.
V. 94, 1925, p. 630 - Garza Dam, Tex., hydr.-fill, on clay and sand, 80' high on pervious foundation.
V. 97, 1926, p. 544 - Tieton dam, earth 224' high. Concrete core 90' deep. Corewall deflected downstream.
V. 98, 1927, p. 145 - Huffman Dam, Ohio. Shrinkage of hydraulic fill.
V. 98, 1927, p. 678 - Sherman development on Deerfield River, Mass. Semi-hydraulic-fill dam 100' high. Analysis of core materials.

V. 102, 1929, p. 669 - Saluda Dam. Also V. 103, p. 629, V. 104, p. 374 (break in dams).

V. 103, 1929, p. 769 - Somerset and Davis bridge dams in Vt. by J. Alb. Holmes. Long period settlements observed. Mechanical analysis of embankment materials. Also (1) in v. 105, p. 504.

V. 104, 1930, p. 869 - Failure of Alexander Dam, Hawaiian Islands. Hydraulic-fill dam, designed to be 125' high failed at 95'*. Also (e) on p. 833.

V. 105, 1930, p. 934 - Earth Dams, A series of 3 articles, 12 pp. by Eiffert, Waddell and Lane. Core materials in Germantown dam, core exploration, sampling, equipment. Bee Tree, earth and rock-fill dam, 850,000 c.y., semi-hydraulic fill, max. 177' high, testing equipment, collecting samples, grid system. Materials in earth dams (Lane). Diagram showing composition of a great number of existing earth dams. Many drawings*. Also (e) on p. 951. Correction in V. 106, 1931, p. 287, of Lane's article. Data on Wichita Dam in V. 105, p. 965.

V. 114, 1935, p. 150 - El Capitan Dam. Core sampling device. Screen tests for core materials*.

V. 114, 1935, p. 482 - Miami dams. Shrinkage and earth pressure.

V. 115, 1935, p. 279 - Fort Peck Dam. Also V. 119, 1937, p. 612.

WESTERN CONSTR. NEWS

1929, p. 96 - Dwinnell Dam.

1930, p. 507 - Buell Dam, 100' high.

1934, p. 375 - Fort Peck dam.

MILITARY ENGINEER

1936, p. 424 - Fort Peck

CIVIL ENGINEERING

1936, p. 462 - Fort Peck. Also p. 659.

## ROCKFILL DAMS

TRANS. A.S.C.E.

V. 75, 1912, p. 27 - Morena Dam.

ENGINEERING NEWS-RECORD

V. 81, 1918, p. 229 - Cucharas Dam. Leaky facing.

V. 94, 1925, p. 548 - Dix Dam, Ky. Also p. 1058 and (e) on p. 1043.

V. 100, 1928, p. 140 - Bucks Creek dams.

V. 102, 1929, p. 904 - Bowman Dam, repair of break.

V. 103, 1929, p. 616 - Salt Springs Dam, Also p. 732 and V. 105, 1930, p. 332 and V. 108, 1932, p. 350. ENR Jan. 16, 1930, p. 92.

V. 108, 1932, p. 761 - Steel-faced rockfill dams.

V. 109, 1932, p. 482 - Spec's for rockfill.

PROC. A.S.C.E.

Oct. 1937, p. 1451 - Many rockfill dams (Good paper). A.S.C.E. trans. V. 104, 1939, p. 1 (discussion).

WESTERN CONSTRUCTION NEWS

1930, p. 248 - Salt Springs Dam.*
1930, p. 396 - Dam in Mexico 180' high.*

CIVIL ENGINEERING

1933, p. 471, 581 - Rockfill dams.
1934, p. 524 - Rockfill dam in Mexico.

FAILURE AND TROUBLES

ENGINEERING NEWS-RECORD

V. 78, 1917, p. 440 - Standley Lake earth dam 140' high, Troubles from slides.
V. 78, 1917, p. 596 - Observed settlement of 2 earth dams.
V. 79, 1917, p. 52 - Failure of an earth dam.
V. 80, 1918, p. 679 - Calaveras Dam failure. Also p. 631, 704, 692; V. 81, p. 1158; V. 82, p. 427, Ref. to Recl. Rec. Nov. '18, Eng. and Con.1/9/19.
V. 81, 1918, p. 186 - Coon Rapids Dam break. On pervious foundation.
V. 81, 1918, p. 229 - Cucharas rockfill dam, Colo. leaky facing.
V. 84, 1920, p. 145 - Failure of Zuni spillway. Silting problems in reservoir.
V. 85, 1920, p. 26 - Belle Fourche Dam. Troubles with concrete block facing.
V. 85, 1920, 689 - Minatare Dam. Break in concrete slab facing.
V. 86, 1921, 1030 - Apishapa Dam, Colo. Rolled-fill, 110'. Drained emb't. steel sheet piling "Soft" foundations. Failure see V. 91, p. 357.
V. 86, 1921, p. 1049 - Failure of Schaefer hydr.-fill dam, 90' high.
V. 89, 1922, p. 121 - Failure of earth dam in Mass. Sand foundation.
V. 91, 1923, p. 357 - Failure of Apishapa earth dam, Colo., 115' high. Also (e) on p. 373, also p. 418, and (l) on p. 447, 568, 817, 900, 1029.
V. 93, 1924, p. 477 - Haiwee Dam, Calif. damaged by waves.
V. 94, 1925, p. 735 - Failure of French Landing Dam, Mich., 40' high on pervious foundation. Drains in emb't. Also (l) on p. 1070; V.95,p.483.
V. 96, 1926, p. 642 - Mystic Lake hydro dev. Crevices in emb't.,leakage stopped by grouting.
V. 98, 1927, p. 334 - Philbrook Dam, Calif. rolled-fill, 90' high (l). Further details, see V. 102, p. 338. Foundation a terminal moraine. Core trench 20' deep. Using sheepsfoot rollers.
V. 100, 1928, p. 466 - Failure of St. Francis Dam, Calif. Grav-arch, 205' high. Also (e) on p. 463,499,649,723,725,879,800; V. 101, p .265 Articles on p.p.456, 466,517,596,727,895. Reports on 553,639,675,895, and (l) on p. 638,789,904,982,983; V. 101,p.144 & (n) on p. 491,492, 527,561,605,756,784,1020; V. 101, p. 293,711
V. 100, 1928, p. 472 - Dam failures of the past. (Also (e) on p. 835).
V. 100, 1928, p. 750 - Table Rock Cove Dam washout, 104' high rolled-fill. Also (e) on p. 765, photos on p. 791; (n) on p. 826; V. 101, p. 109, 147. Reconstruction see V. 103, 1929, p. 934 (*) and (e) on p. 914.
V. 100, 1928 p. 772 - Slumps in Garza Dam, Tex. Hydraulic-fill on sand, clay and gravel, 80' high. Ref. to V. 94, 1925, p. 630.
V. 100, 1928, p. 865 - Pleasant Valley Dam, Utah. Earth and rockfill, 63' high. Troubles from leakage. Also (n) on p. 827, 872. Repairs, see V. 101, p. 915.
V. 101, 1928, p. 485 - Failure of Lafayette Dam, Calif. Rolled-fill to be 140' high failed at 120'. Also (e) on p. 457, Also V. 102, p. 190 and (e) on p. 167, 207.

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V. 101, 1928, p. 502 - Magic Dam, Idaho, hydraulic-fill 135' high. Gate tower tilts from ice pressure.

V. 102, 1929, p. 275 - Lake Pleasant Dam, Ariz. multiple-arch. Cracks developed in the buttresses. Comparison with other high multiple-arch dams. Also (e) on p. 257 and (1) on p. 463.

V. 103, 1929, p. 725 - Mitchell water supply dam for Mitchell, S.D. Earth dam 40' high. Sheet piling to rock. Wooden corewall. Spillway carried as lining over top of embankment. Erosion from wave action. Settlement of fill.*

V. 104, 1930, p. 374 - Saluda Dam break*. Also (e) on p. 347.

V. 104, 1930, p. 869 - Failure of Alexander Dam, Hawaiian Islands. Hydraulic-fill dam, designed to be 125' high, failed at 95'*. Also (e) on p. 835.

V. 105, 1930, p. 520 - Corpus Christi Dam, Tex. Total 4,080' long of which 1250' is a concrete spillway. Embankment max. 61' high with riprap on upstream slope and 40' steel sheet piling. Foundation consists of 10' silt above a 30' stratum of sand and gravel, then hard clay to unknown depth. Spillway designed for 400,000 cfs with crest 22' below top of embankment. Spillway of gravity section supported on 25' wooden piles 2.5' to 3' cc., 35' long and with steel sheet piling underneath upstream cutoff (4'x4'). Apron extending 85' downstream from 3' to 1' thick with 18' to 30' long steel sheet piling at downstream end. Some washout occurred during a flood when dam nearly completed. Complete drawings.* For failure (detail description) see p. 974. Also (e) on p. 952 and (n) on p. 861.

## GATES

ENGINEERING NEWS-RECORD

V. 80, 1918, p. 1225 - Grand River Dam, Colo. Roller gates.

V. 99, 1927, p. 908 - Bellow Falls Dam, Vt., 2 roller gates 115' x 18'. Flashboards with 22' long stanchions.

V. 102, 1929, p. 894 - Waterville Dam, N.C., A constant-angle arch 200' high, 8 sluices 8' x 20' for temporary diversion during construction. Slots 8' wide for shrinkage. Fourteen tainter gates 24' x 10'. Spillway with 180' clear drop.

V. 103, 1929, p. 685 - Guadalupe River, Tex., 3 hydro. plants. Automatic roof weir gates 85' x 12.37'. Dams on soft foundations with apron and baffles.*

V. 104, 1930, p. 432 - Ohio River canalization. History. The 1910 project. Locks and gates. Navigable pass. Wickets and bear traps. Foundations. Economics, 10 pp. Also (e) on p. 431.

V. 105, 1930, p. 263 - Dix Dam, Ky. Tilting reinforced concrete flashboards, 12' high (n)*.

V. 105, 1930, p. 758 - Flint River, Ga. Low spillway with small tainter gates.*

V. 105, 1930, p. 1009 - Diversion dam on Malheur River, Ore., has 7 weir gates 20' x 12' hinged to concrete slab by 3" pins at lower corners. Details of gate.*

V. 106, 1931, p. 754 - Gates operationand handling at Calderwood Dam. Details of gates, seats, rollers, dogging device. Also (1) on p. 1024.

V. 106, 1931, p. 998 - Radial gates 18' x 17' at Echo Dam.

V. 107, 1931, p. 600 - Unusual design of emergency gate at Calderwood Dam. A hemispherical gate for each of 3 - 16' penstocks. Also (1) on p. 898, description of similar gate for Dix River Dam, Kentucky.

V. 108, 1932, p. 356 - Slide gates 2' x 7' operated on 2.5" shafts 50' long.
V. 115, 1935, p. 636 - Vertical gates 40' x 40' at Pickwick Landing Dam.
V. 115, 1935, p. 718 - Roller gate design for Mississippi River Dams. Stress analysis (n).
V. 118, 1937, p. 665 - Roller, lift, tainter, and roofweir gates.
V. 119, 1937, p 611 - Tainter gates and stanchion flashboards at dam in Ft. Electric heaters and compressed air prevents freezing of gates. Steam from oil burner boiler will remove ice in emergency.
V. 122, 1939, p. 716 - Roller gate design.
V. 126, 1941, p. 3 - Grand Coulee Dam drum gates, erection of.
V. 126, 1941, p. 392 - Claytor Dam. Broome type spillway crest gates 50' x 28.5'. Electric heaters and bubbler system.
V. 126, 1941, p. 490 - Fort Peck Dam. Tunnel Control gates. Cylinder type gates (n).
V. 126, 1941, p. 971 - Automatic gate control on canal headworks in California. Operation of 4' x 10' radial gates. Automatic flood control.
V. 127, 1941, p. 7 - Howell-Burger valves at Mud Mountain Dam.
V. 127, 1941, p. 447 - Installation of drum gates (f). Also V. 128, 1942, p. 875, sand-blasting of drum gates.

## CONSTRUCTION, CORRERDAMS AND DIVERSION

ENGINEERING NEWS-RECORD

V. 92, 1924, p. 291 - Cofferdam.
V. 96, 1926, p. 913 - Puddingstone earth dam in So. Calif. overtopped during constructing, (n). See also (n) on p. 665.
V. 99, 1927, p. 92 - Steel sheet pile cofferdam, 40' deep.
V. 106, 1931, p. 716 - Cofferdams for Rock Island Dam and hydro. plant on Columbia River, Wash.
V. 107, 1931, p. 610 - Grouting of cofferdams. Also (1) on p, 783.
V. 107, 1931, p. 665 - Wellpoints.
V. 107, 1931, p. 678 - Cofferdam.
V. 109, 1932, p. 129 - Holes bored by rotary drill for timber piles in clay where a stratum of hard clay was extremely difficult to pierce by driving and jetting. Equipment similar to modern oil drilling rig was used.
V. 109, 1932, p. 275 - Machine for placing riprap.
V. 111, 1933, p. 215 - Sinking caissons 9' x 45' for cutoff wall to maximum of 140' to bedrock at Quabbin Dam.
V. 111, 1933, p. 776 - Sinking caissons to 176' below water level. Also (e) on p. 764, also (1) in V. 112, 1934, p. 482, continued in V. 112, 1934, p. 282, and V. 113, p1934, p. 515.
V. 113, 1934, p. 163 - Wellpoints
V. 113, 1934, p. 301 - Construction plant for Norris Dam.
V. 113, 1934, p. 726 - Norris Dam, concrete plant. Also p. 747.
V. 104, 1930, p. 66 - Deadman Island Dam, Ohio River, Cellular cofferdam.

V. 114, 1935, p. 250 - Alcova Dam. Diversion and outlet tunnel.
V. 114, 1935, p. 339 - Discussion on types of cofferdams for Mississippi River locks and dams.
V. 114, 1935, p. 515 - Wellpoints in excavation.
V. 114, 1935, p. 698 - High-speed concreting at Norris Dam. Details of formwork.
V. 115, 1935, p. 191 - Foundation grouting at Norris Dam.
V. 115, 1935, p. 315 - Cofferdam construction at Bonneville Dam.
V. 115, 1935, p. 699 - Grouting at Norris Dam. Inspection by periscope. Also (e) on p. 724.
V. 116, 1936, p. 549 - Cellular steel sheet piling cofferdam, 55 ft. high at Pickwick Landing Dam. Also description of concreting plant. Concrete delivery and placing.
V. 119, 1937, p. 46 - River diversion at Ft. Peck Dam, 11,000 cu. yds. of rock and gravel dumped into the river. Also (e) on p. 50 and (l) on p. 129. Also p. 153, description of closure and slide which nearly wrecked the plan.
V. 123, 1939, p. 10 - Hansen Dam. Earth-moving equipment. Truck-loading conveyors. Article on 3 pp. describes rolled-fill operations.
V. 123, 1939, p. 460 - Construction of Ross Dam, Wash. Concrete aggregate. River diversion by means of 32 ft. diameter tunnel.
V. 123, 1939, p. 612 - construction of Shasta Dam using cableways.
V. 124, 1940, p. 758 - Cofferdams and Diversion at Green Mountain Dam.
V. 126, 1941, p. 886 - Cofferdams. Special design of gates dripped in cofferdam openings permitting tide water to run through.
V. 127, 1941, p. 222 - Chemical solidification. Leaky joints in masonry made watertight. Solidification of loose soil. Sealing cracks in tunnel. Also (l) on p. 551.
V. 128, 1942, p. 194 - Cofferdams at Kentucky Dam. Driving steel sheet piling 80' to 100' long for cellular cofferdam. Sketch showing pile driving operations, procedure and equipment. Drainage system, unwatering and pumping. Flooding and drainage facilities.
V. 128, 1942, p. 412 - Grouting at Shasta Dam, using plugs in the drill holes to limit grouting zone. Sketch of plug and clamp attachment.
V. 129, 1942, p. 854 - Construction of Norfork Dam, concrete gravity. Article describes aggregate production, concreting and formwork.
V. 130, 1943, p. 562 - Formwork design at Douglas Dam. Cantilever type wooden forms in panels 28' long designed for 5' lifts.
V. 131, 1943, p. 397 - River diversion at Shasta Dam. Temporary gate of 52.5' span closed 1 monolith.
V. 131, 1943, p. 134 - Construction of Douglas Dam, straight gravity dam with a spillway containing 111 tainter gates 30' x 32'. Cofferdams and diversion. Construction plant. Artificial cooling of the concrete.
V. 131, 1943, p. 558 - Cellular steel sheet filing cofferdam 60' high.
V. 132, 1944, p. 187 - Construction of Norfork Dam, concrete gravity. Article describes concrete aggregate production, mixing and cableways. Also correction on pp. 537 and 727.
V. 132, 1944, p. 479 - Dewatering problems. Pumping in sand for tunnel. Wellpoints, continued on p. 556.
V. 132, 1944, p. 850 - Concrete placing at Fontana Dam containing a total of 2.8 mill. cu. yds. of mass concrete. Dam is a straight gravity structure to be 480' high. During one month, 240,000 cu. yds. of concrete were placed from a single plant consisting of 54-yd. mixers. Belt conveyors hammerhead cranes, whirler cranes, all concrete aggregate including sand is manufactured from rock quarried at the site.

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