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STAT

A REPORT
on
Lesna Dam

Prepared by
Project Treasure Island
for
Directorate of Intelligence, USAF
1954

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REPORT

on

Lesna (Marklissa) Dam in Poland

This report contains information on the Lesna Dam on the Kwisa River which serves for flood control and power production. The report is the result of a study of German open sources published in 1906 - when the dam was built - and during the years 1930 to 1937 as listed in the attached bibliography. The most valuable of these are the sources listed under Nos. 3 and 5.

The information was compiled according to the P.V.D. questionnaire, as follows:

I. Functions

A. The system of which the dam forms a part

In order to improve shipping and flood control on the Oder (Odra) River an extensive system of dams was built on its tributaries. As shown on map Fig. 1, a number of dams were built on the Bobr (Bober) River and on its tributary the Kwisa (Queis) River. The Lesna (Marklissa) Dam and the dam at Zlotniki Lubanskie (Goldentraum) (see separate report) are on the Kwisa River (Fig. 1).

B. The dam within the system

The Lesna Dam is the second downstream dam on the Kwisa River. It creates a storage reservoir and serves the hydroelectric power plant located 100 m below the dam (see Figs. 1 and 2).

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C. Highways and/or railways on the dam or adjacent thereto

There is no highway or railroad running atop the dam.

D. Navigation locks in connection with dam

There is no lock.

II. Location and designation

A. Data which will make possible pin-pointing the installation

The dam is on the Kwisa River near the town of Lesna in Lower Silesia. For detail see Fig. 3.

B. Official, local, and popular names of dams and dependent installations

The dam is now known as Lesna Dam. Before World War II it was known in German as Talsperre Marklissa or Queistalsperre bei Marklissa.

III. Dimensions

A. Dam

1. Maximum and minimum head on dam

Average: 28.00 m.

Maximum: 41.40 m.

Minimum: 20.00 m.

2. Maximum and minimum depth of water below dam

No detailed information available (see Fig. 4).

3. Total height of dam above river bed and above foundations

Height above river bed: 40 m.

Height above foundations: 45 m.

(See Fig. 4).

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4. Elevation of bottom of penstocks at dam

See Figs. 4 and 5.

5. Total thickness at base and at high water level

Thickness at base: 39 m.

Thickness at crown: 6 m.

(See Fig. 4).

6. Slopes of dam faces

(See Fig. 4).

7. Length at crown, across river bed, and along spillway

Length at crown: 130 m.

(See also Figs. 5 and 6)

B. Reservoir

(See Fig. 3).

1. Capacity

Total capacity:	15,000,000 cu m	
Useful capacity:	Summer	7,000,000 cu m.
	Winter	10,000,000 cu m.

2. Area

(See Fig. 3).

3. Length, width and depth (including profiles)

No specific information available; see Fig. 3.

4. Detailed plan in vicinity of dam

The dam is built in a deep rugged valley (see Figs. 2 and 3).

C. Navigation locks in connection with dams (structural details)

There is no navigation lock.

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IV. Hydrological data (rainfall, flow, etc.)

Medium flow: 5 cu m/sec.

Minimum flow: 0.35 cu m/sec.

Maximum flow: 780 cu m/sec.

The catchment area is 310 sq km.

The Kwisa River has its source in the Giant Mountains and has the character of an Alpine river.

V. Foundation conditions and soil characteristics under and near the dam

The foundation is gneiss (see Fig. 7).

VI. Design data

A. Structural type or types

The Lesna Dam is of the arched gravity masonry type (See Figs. 2, 4 and 6).

B. Material used

The dam is built of rubble masonry coated with bitumen.

C. Design criteria

For stresses and forces see Figs. 8 and 9.

D. Details and equipment

Conduits

There are 2 discharge tunnels, originally built to keep the construction site dry. The tunnels are on each side of the dam (as shown on Figs. 5 and 6). Each tunnel is 250 m long, 5.8 m wide. Each tunnel has 3 pipes, 1.10 m in diameter, with double valves.

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Inlet shafts for tunnel

Each of the two shaft spillways are arranged for operation at a different water level. The right shaft is built for a water level at 280.4 m while the left one for a level at 270.4 m. (see Fig. 6).

Penstocks

The penstock consists of two pipes 1.10 m in diameter which run through the dam and feed turbines 1 to 3. Turbines 4 and 5 are fed by a tunnel cut through the right bank of the river. The intake is at 262.50 m elevation (see Fig. 6).

Galleries

The dam is equipped with inspection galleries, as seen on Fig. 5.

VII. Special data on power dams

A. Capacity (kva), present and proposed

Installed capacity	3,575 hp	(1930)
	3,100 kva	(1935)
	2,480 kw	(1935)
Average useful capacity	1,000 hp	(1930).

B. Output (kwh/yr) achieved and proposed

6,000,000 kwh/yr (1930).

C. Powerhouse

1. Location

The powerhouse is located about 100 m below the dam on the right bank of the river (see Figs. 2 and 6).

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2. Structure

See Fig. 2.

3. Installations

5 turbogenerators (Francis turbines), each 715 hp.

4. Number, dimensions, location, and type of penstocks

See Chapter VI.-D.

D. Places of installation served; ties with power grids

The Lesna Dam and Power Plant belong to Poland, since the end of World War II. No information on the present-day power grid was found in available sources. According to a 1937 source, the Lesna Plant belonged to the main power grid of the "Provinzial-Elektrizitaetswerk in Niederschlesien" connecting Lauban and Hirschberg-Schmiedeberg-Landeshut. (The P.E.W. at that time had 14 hydroelectric power plants.) Landeshut was the sub-station connecting this grid with the grid of the "Niederschlesische Elektrizitaets A. G."

E. Location and description of transformer yards and transmission system

No information available.

VIII. Historical data

A. Name and background of the designer

No information available.

B. Dates of construction

The dam and power plant were built during the years 1901 to 1907.

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C. Sources of material

No information available.

D. Records of war damage, failures, removal of equipment, etc.

No information available.

E. Data on conditions of structure at any date

No information available.

F. Proposals for enlargement, alteration, or extension of function

No information available.

IX. Graphical material

A. Photographs, especially those taken during construction

Photographs attached to the report are shown in Figs. 2 and 7.

B. Working drawings, general and detailed

Not available.

C. Record and publication drawings

Diagrams attached to the report are shown in Figs. 1, 3, 4, 5, 6, 8 and 9.

D. Sketches by persons who have seen installation

Not available.

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2. Bachmann, E. H., WASSERKRAFTANLAGEN DES PROVINZIAL-ELEKTRIZITATSWERKES NIEDERSCHLESIEN, HIRSCHBERG IM RIESENGEBIRGE. Deutsche Wasserwirtschaft (Berlin), Vol. 30, No. 6, 1 June 1935, pp. 104-107

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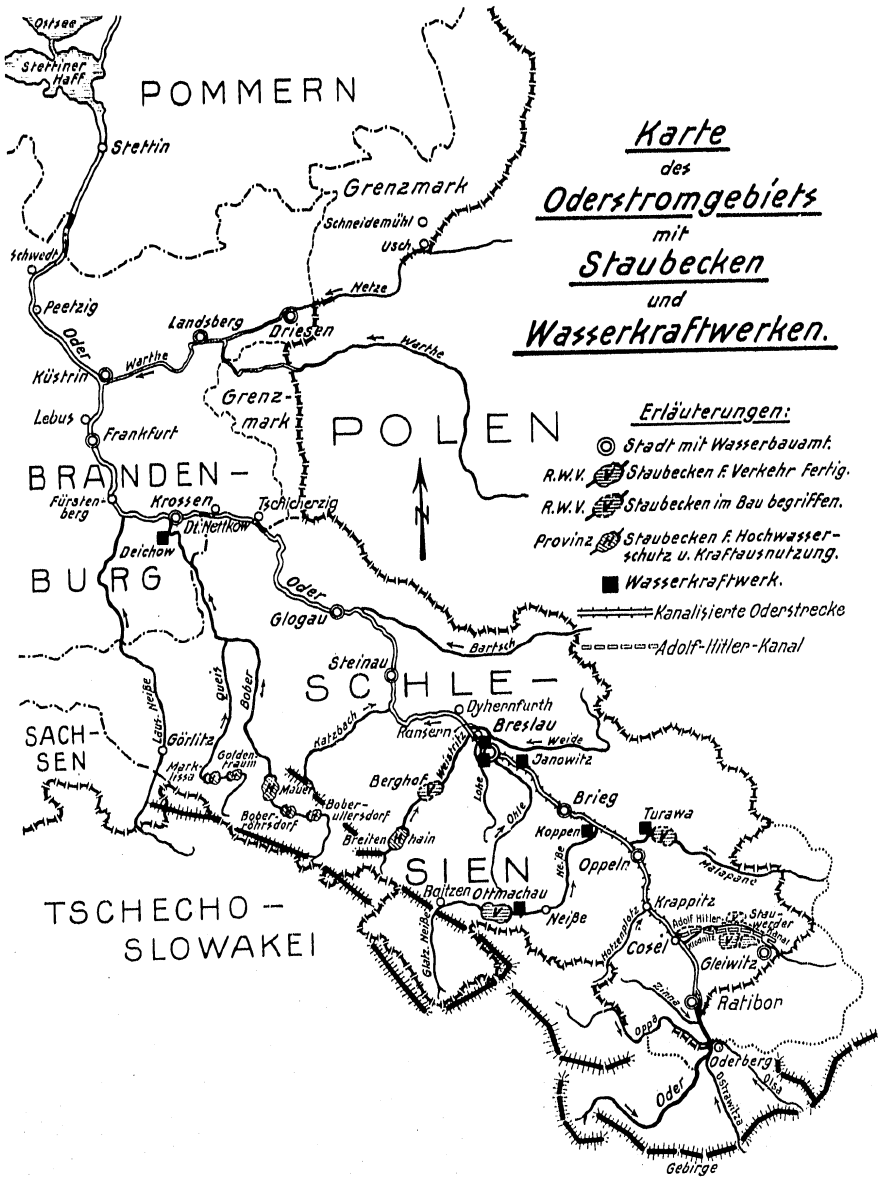

Oder River System. Source:Deutsche Wasserwirtschaft,Stuttgart,1937,p.123

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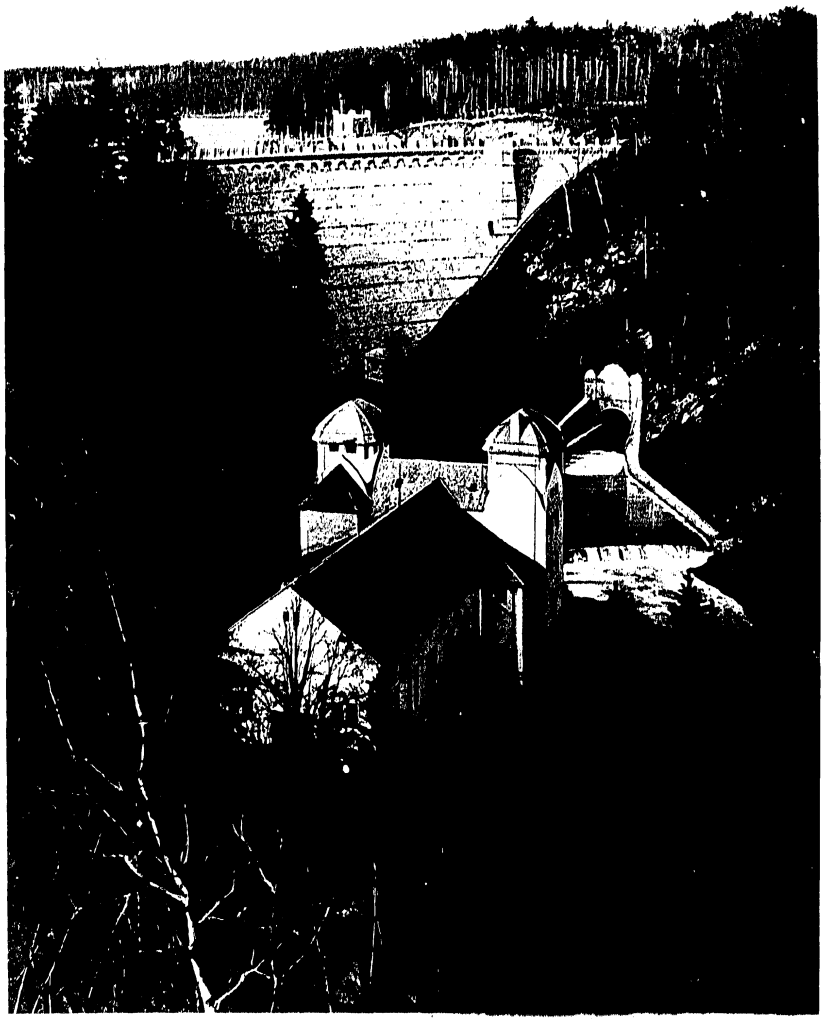

LESNA (MANKLUSSA) DAM, Poland. Dam and Powerhouse. Source: Die Wasserwirtschaft Deutschlands, Berlin, 1930, opposite p. 150

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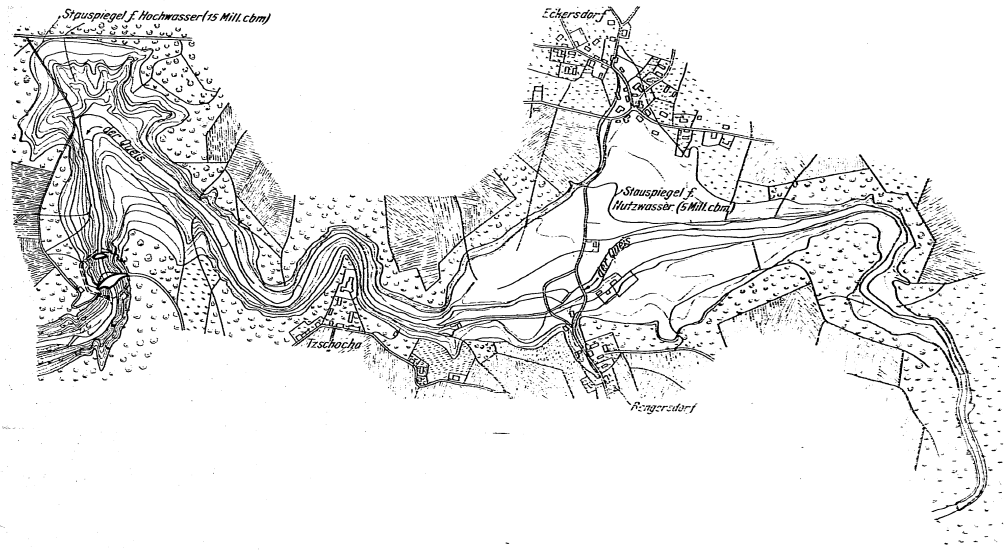

LESNA (Marklissa) Dam, Poland. Layout of Reservoir. Source: Verein Deutscher Ingenieure, Berlin, 1906, p. 943

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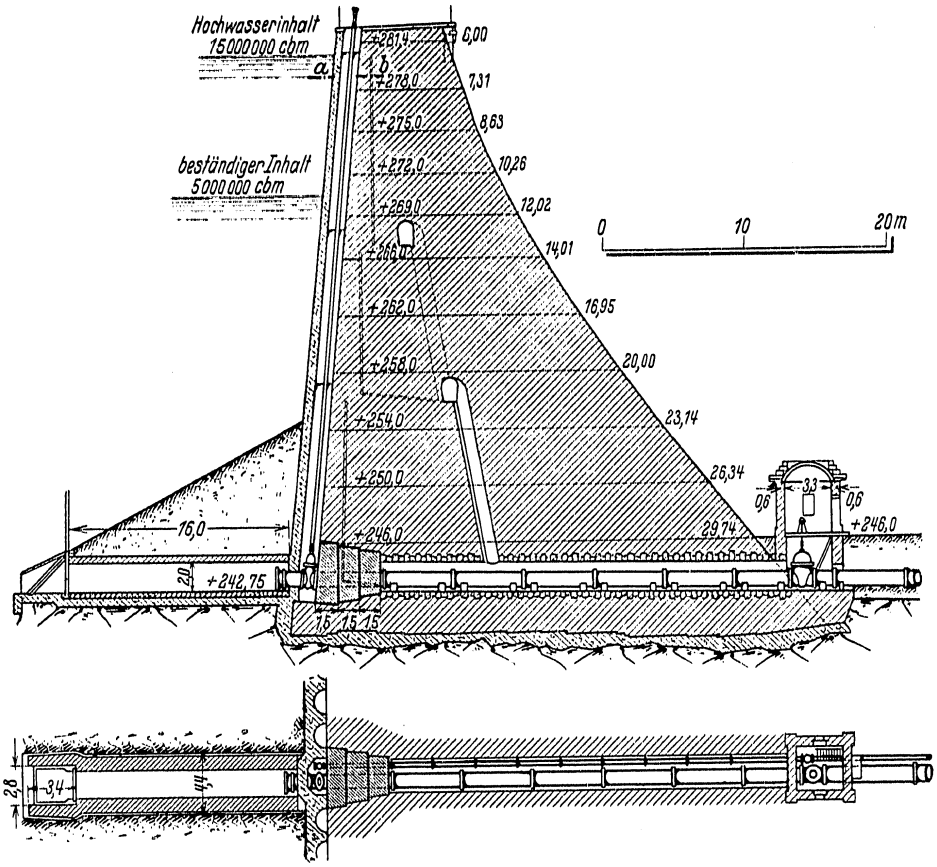

LESNA (MARKLISSA) DAM, Poland. Cross-Section of Dam.
Source: Kelen, N., Gewichtsmauern und Massive Wehre,
Berlin, 1933, p. 52

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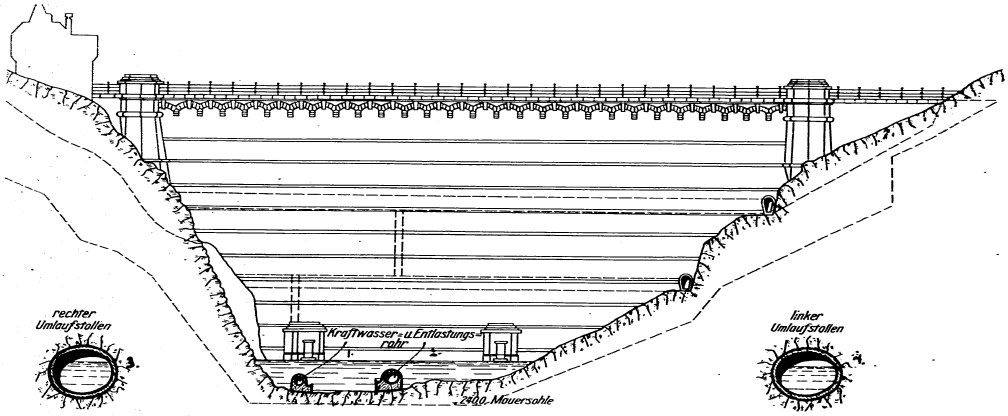

LESNA (MARKLISSA) DAM, Poland. Cross-Section of Dam. 1) and 2) Penstocks 3) Left Discharge Tunnel 4) Right Discharge Tunnel. Source: Verein Deutscher Ingenieure, Berlin, 1906, p. 945

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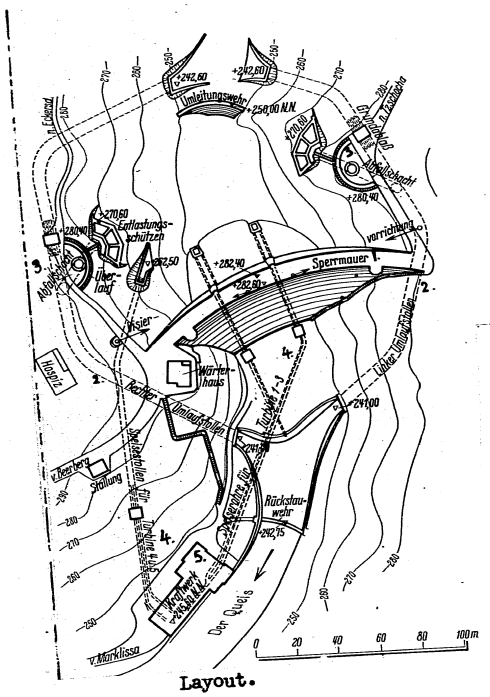
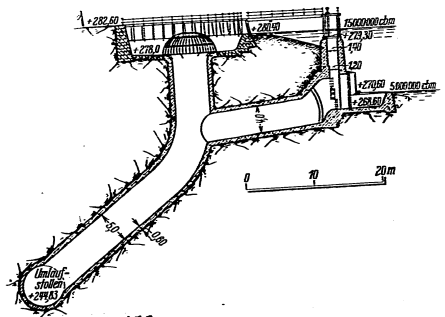


Layout.



Shaft Spillway.

Legend: 1) Dam
2) Discharge Tunnels
3) Shaft Spillways
4) Penstocks
5) Power Plant

LESNA (MARKLISSA) DAM, Poland . Source: Kelen, N., Gewichtsmauern und Massive Wehre, Berlin, 1933, p. 89

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LESNA (MARKLISSA) DAM, Poland. Dam Under Construction.
Source: Verein Deutscher Ingenieure, Berlin, 1906, p.948

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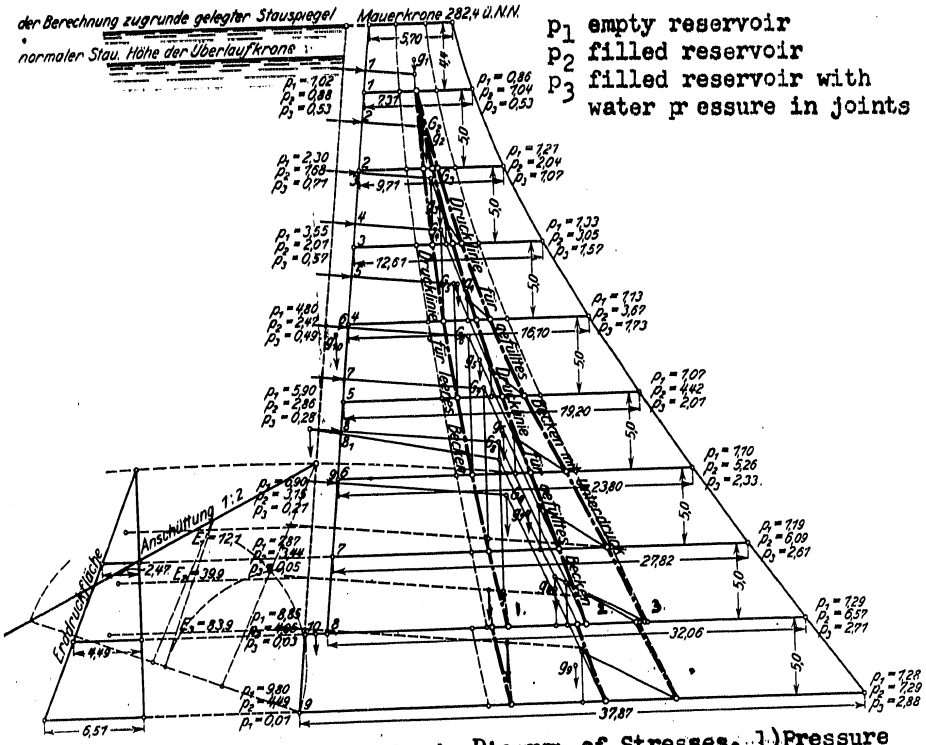

p_1 empty reservoir
p_2 filled reservoir
p_3 filled reservoir with water pressure in joints

LESNA (MARKLISSA) DAM, Poland. Diagram of Stresses. 1)Pressure Line for Empty Reservoir 2)Pressure Line for Filled Reservoir 3)Pressure Line for Filled Reservoir with Uplift. Source: Verein Deutscher Ingenieure, Berlin, 1906, p. 944

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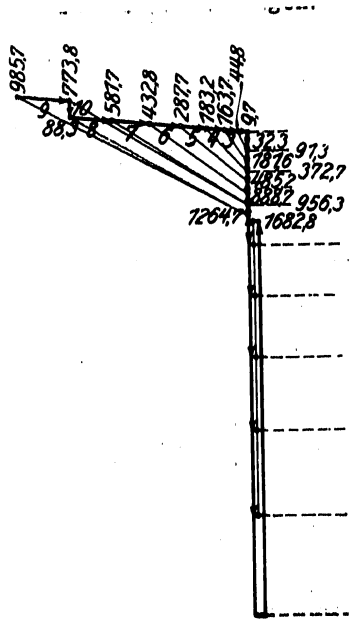
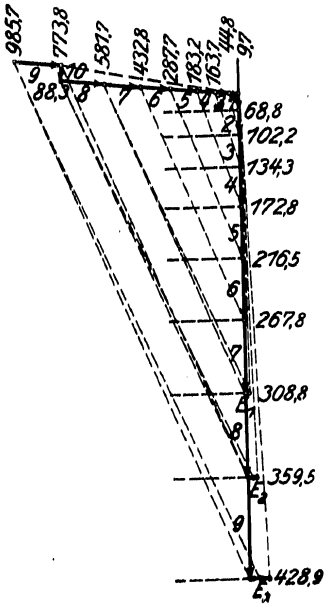
With pressure in joints:



Without pressure in joints:



Force Diagram.

LESNA (MARKLISSA) DAM, Poland. Source: Verein Deutscher Ingenieure, Berlin, 1906, p. 945

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