

keep the solid material coming at a rate to utilize the full carrying power of the water flowing to the sluices. The quantity of water used in sluicing varied from 3 to 6 cubic feet per second, which was discharged through 3-inch and 4-inch nozzles in the pit. The following table gives a summary of the sluicing records:

**Sluicing Record, Bear Creek Dam.**

DATE	% time sluicing	Hours sluicing	Water used ave. in second feet	Cubic yards Placed	Proportion solids to water	Cubic yds. per hrs. sluicing time
1911.						
Sept., 30 days	70 %	504	3.53	17,085	7.2 %	813
Oct., 31 days	43.5 %	322.8	3.2	10,300	7.3 %	765
Nov., 30 days	51.9 %	373	6.25	14,950	4.8 %	964
Dec., 31 days	66.4 %	493.5	6.25	18,150	4.4 %	888
Jan., 31 days	85.6 %	637	4.7	19,600	4.9 %	740
Feb., 29 days	99.9 %	694.5	4.3	29,650	7.5 %	1110
Mar., 30 days	69.2 %	518.8	3.4	17,300	4.4 %	802
Apr., 15 days	48.5 %	174.4	4.3	7,370	7.3 %	1060
	66.9 %			134,405	6.3 %	893

**Remarks:**

- October—Delay, waiting for free or gravity water.  
 November—Delay, waiting for free or gravity water.  
 Delay due to freezing weather.  
 December—Delay due to flood through temporary spillway.  
 January—Delay removing temporary spillway.  
 Delay due to freezing weather.  
 March—Delay draining fill.  
 April—Delay, slow work finishing crest.

A temporary spillway was maintained through the dam during the winter season, the maximum observed flood discharge through which amounted to 1,300 second feet. The structure was removed about January 1st, 1912, after which, and until the elevation of the permanent spillway was reached, an emergency overflow spillway was maintained over the dam, with plank apron attached to timbers embedded in the fill extending down the slope. The necessity of using this emergency overflow never arose. By manipulating the permanent outlet gates, the water was varied to provide storage in the main pond for floods in the stream, and the peaks were all safely passed without the water level reaching the top of the dam.

**Outlet Structure.**—Two 30-inch riveted steel pipes,  $\frac{1}{4}$  inch thick, each 300 ft. long, are installed in the base of the dam, immediately south of the original stream bed. The trench in which the pipes are laid is excavated in the bed-rock, and backfilled with concrete which forms a casing around the pipes one foot thick on all sides. At the upper end of the pipes a reinforced concrete intake structure with screens is provided. This contains two 24-inch hydraulic gate valves with stems extended to a platform at the top of a structural steel tower 50 feet in height, from which the valves are operated. Venturi tapers were inserted in the pipes on both sides of the valves to minimize flowage losses through the 24-inch valves, made smaller than the pipe merely for sake of economy.

The excavation for the outlet works amounted to 3,730 cubic yards and 343 cubic yards of concrete was used in pipe casing and head works.

The behavior of the dam since completion has been most satisfactory. Measuring weirs set at points below the dam to intercept the water flowing by the dam, show that the aggregate discernable loss on April 4th, 1912, was .191 second feet, which was decreased on April 27th to .100 second feet. Subsequent reports indicate that the loss is steadily diminishing as the body of the fill gradually drains out.

The desirability of raising the height of this dam to obtain additional storage will no doubt appear shortly. The undertaking will be comparatively simple with the apparatus now on the site, a safe foundation installed, and all the perplexing and expensive features of design, methods, and transportation solved. By raising the embankment 20 feet the capacity of the storage basin may be increased to 608,000,000 cubic feet.

**Diversion.**—Two diverting dams, one in the main Jordan River, and one in "Y" Creek, a tributary stream, were installed.

Immediately below the junction of "Y" Creek with Jordan River the canyon narrows, and a ridge of outcropping bed-rock crosses the stream and extends well up the steep slopes on both sides of the canyon, forming a site well adapted for the placing of a concrete or masonry dam. It was originally planned to place the diverting dam at this point, but owing to limited time, the lack of a supply of concrete material nearer than the beach, and further, in view of the possibility of utilizing the site for the construction of a high masonry dam, which would, in addition to diverting the stream into the flume, form a large impounding reservoir in the valleys above, this site was reserved for the erection of the more permanent and higher structure at some later time, and a site for the main initial diversion was selected some 2,000 feet further up the stream.

The diverting dam on "Y" Creek was built a short distance above its junction with Jordan River, and a branch flume installed, which carries the water down the west side of the stream, crosses the main river on a timber truss 60 feet long, and discharges directly into the main flume.

The main Jordan River diverting dam is a log crib filled with rock resting throughout on solid rock. Rock from the excavation for the intake basin was used to fill the cribs. Timber cut adjacent to the site was used in the construction, the logs being notched and drift-bolted together, and thoroughly pinned to the underlying bed-rock. The top, upstream and downstream faces of the dam are sheathed with a double thickness of 2-inch plank laid with broken joints. The general dimensions of the dam are:

Length of crest .....	127 feet
Top width .....	8 feet
Upstream slope .....	1 to 1
Downstream slope .....	1 to 1
Maximum height .....	18 feet

Three timber head gates, with rack and pinion operating gear, are provided to regulate flow of water into the intake basin, which is also formed of log cribs, backfilled with rock, and lined with plank for water-tightness. At the lower end, and immediately above the flume entrance, sand gates are provided, depressed two feet below the flume floor, through which silt and sand collecting in the bottom of the intake basin may be discharged.

The dam has withstood the floods of two seasons, nearly 8 feet depth of water having passed over the crest at the highest stage, and at low-water the observed leakage is practically nothing. The "Y" Creek diverting dam is similar in type to the main dam already described, the crest, however, being only 90 feet in length.

**Main Flume.**—The main flume follows the south side of the Jordan River canyon for a distance of about  $5\frac{1}{2}$  miles. The side of the canyon is precipitous at points, the slope being frequently broken with deep indentations. The formation, as a rule, is stable, and favorable for the flume foundation, consisting generally of hardpan or solid rock, topped with a comparatively thin layer of soil.

(To be continued next week).