Work starts on Blue Mesa Dam

On the Gunnison River in western Colorado, the Tecon Corp. has started work on the first dam of the Curecanti Unit of the Bureau of Reclamation's Colorado River Storage Project. The 342-ft. earthfill dam will contain 3,000,000 cu. yd. Reservoir storage will be 940,800 ac. ft. and the powerplant will have a 60,000-kw. capacity.

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Blue Mesa Dam is to be constructed about 25 mi. downstream from Gunnison and about 1 1/2 mi. downstream from the town of Sapinero. Principal dimensions and characteristics of the dam and powerplant appear in the accompanying table.

Geologically, the damsite is favorable for a high earthfill structure. Foundation and both abutments consist of very hard, moderately jointed granite gneiss, quartz-mica schist, and quartzite. Exploration of the river channel and abutments by drill holes has revealed no dominant foundation defects.

Profile of the damsite along the centerline of the crest of the dam is nearly V-shaped, and after overhanging rock is removed it will slope on either side at 0.6:1. An estimated 190,000 cu. yd. of material will be excavated from the dam's foundation to assure a completely competent and tight contact with bedrock. A grout curtain will extend from the bottom of the cutoff trench into bedrock.

The dam embankment will consist of three zones of selected material, each distinguished by its particular structural and permeable properties and by the method of placement. Details are provided in the caption of the cross-section drawing.

Powerplant

The Blue Mesa Powerplant, to be constructed at the downstream toe of the dam, is to house two 30,000-kv. generators, each driven by a 41,500-hp. turbine. The powerhouse will be a reinforced concrete structure 114 ft. long, 89 ft. wide, and 116 ft. high above foundation.

Construction of the powerhouse will be carried out in two stages. First-stage construction is part of the prime contract for the dam. Second-stage construction, which will be carried out under a separate completion contract, is to begin in the summer of 1965.

Hydraulic features

Gunnison River floodwaters will be passed through a tunnel-type spillway, 1,245 ft. long, extending through the right abutment of the dam. The con-
**Facts on Blue Mesa Dam**

**DAM**
- Type: Earthfill
- Height above riverbed: 843 ft.
- Volume: Earthfill 3,000,000 cu. yd.
  - Concrete (spillway, outlet works, and related structures): 37,460 cu. yd.
- Crest length: 800 ft.
- Crest width: 30 ft.
- Base width: 1,600 ft.
- Crest elevation: 7,528
- Maximum discharge through spillway: 33,700 cfs.
- Freeboard: 8.6 ft.
- Reservoir Capacity: 940,800 ac. ft.
  - Area: 9,180 ac.
- Elevation maximum water surface: 7519.4
- Power Plant Capacity: 60,000 kw.
  - Number of generating units: 2
  - Capacity of each generator: 30,000 kw.
  - Capacity of each turbine: 41,500 hp.

Concrete-lined tunnel will have a maximum capacity of 33,700 cfs. and will be 24 ft. 8 in. in diameter near the upstream portal and 21 ft. at its downstream portal. The initial section of the tunnel will be inclined at an angle of 55 deg. with the horizontal. Minimum thickness of the tunnel lining will be 21 in. at the upstream section and 18 in. at the 21-ft.-diameter section. The spillway intake structure will be controlled by two 25x33.5-ft. radial gates.

During construction, the river will be diverted through a 21-ft. diversion tunnel, to be driven through the right abutment, and the spillway tunnel. The diversion tunnel will be concrete lined and will link with the spillway tunnel about 908 ft. downstream, near the intersection of the inclined section with its horizontal section. Closure of the diversion tunnel will be made by concrete plugs.

The contractor has completed open-cut excavation for the upstream portal of the diversion tunnel and has had three shifts working 7 days a week on open-cut excavation for the downstream portal. A subcontractor has three shifts working 7 days a week on the excavation of the tunnel.

The outlet works will consist of an intake structure, a 16-ft.-diameter, 973-ft.-long tunnel through the dam's right abutment, and a manifold anchor block. Maximum discharge capacity of the outlet works will be 5,100 cfs. The tunnel will also convey water to the main power penstock in the anchor block.

Two steel penstocks will branch off the main penstock. Each will have a diameter of 11 ft. 3 in. A wye branch, having two 7-ft.-diameter steel pipes, will connect to the manifold assembly downstream from the penstocks to conduct the outlet works discharge to a stilling basin. The intake structure of the outlet works will contain a 16x18-ft. fixed-wheel gate for emergency closures.

A metal enclosure at the intake structure is to be provided to pro-
tect the outlet works fixed-wheel gate hoists and controls from low air temperatures (temperatures at the damsite during winter months average about minus 15 deg. F), and will be made removable to facilitate the handling of stoplogs and removal of the gate and hoists by a truck crane. A compressed air system is also to be provided to prevent the formation of ice at both the spillway and outlet works intake structures.

Road construction

U. S. Highway 50 is the principal transportation artery of the area in which the Curecanti Unit is located. The highway's route includes the western Colorado cities of Gunnison, Montrose, Delta, and Grand Junction. From Gunnison, the highway parallels the Gunnison River through the major portion of the Curecanti Unit area. It leaves the river canyon at the town of Sapinero and crosses mesas south of the river. The highway is joined at Sapinero and at Delta by Colorado State Highway 92.

The Blue Mesa damsite is presently accessible over a secondary road. This road has been constructed along an abandoned railroad bed in the river canyon and joins Highway 50 at the towns of Cimarron and Sapinero. Montrose, the railroad nearest major features of the Unit, is served by a branch line of the Denver and Rio Grande Western Railroad extending from the main line at Grand Junction.

Contract for construction of the dam also calls for construction of earthwork, structures, and surfacing for 6.5 mi. of three access roads in the vicinity of Sapinero. Included in this roadwork are 3.85 mi. of temporary relocation of State Highway 92 and a timber bridge, an additional 1.4 mi. of permanently relocated State Highway 92 running to the dam, and 1.33 mi. of a service road to the powerhouse.

In April 1961 the Colorado State Highway Department began work on the relocation of 6.5 mi. of U. S. Highway 50 around the damsite. The highway relocation, financed primarily by the Bureau of Reclamation, is under contract to the H-E Lowdermilk Co., Englewood, Colo. The state highway department prepared the plans and designs and is supervising the work. The relocation includes construction of two structural steel bridges, each about 270 ft. high—the highest such bridges in Colorado.

Curecanti Unit development

To accomplish the objectives of the Curecanti Unit, the Bureau considered a number of plans for development. These embraced a series of two, three, and four dams, reservoirs, and powerplants along the section of the Gunnison River below Gunnison and above the Black Canyon of the Gunnison National Monument.

The two reservoirs and interconnected powerplants will provide the greater part of the capacity for the Curecanti Unit. Water released through the Blue Mesa Powerplant, together with minor downstream inflows, will receive short-item regulation at the smaller Morrow Point Reservoir. Releases through the Morrow Point Dam and Powerplant will be relatively uniform during the irrigation season to maintain flows needed for downstream water rights. A flow of 200 cfs or more will be maintained at all times in the river through the Black Canyon of the Gunnison National Monument to preserve scenic and recreation attractions.

The two reservoirs and interconnected powerplants will permit considerable flexibility in daily and monthly power production operations. The power output of the Blue Mesa Powerplant will fluctuate with variations in load requirements; the Morrow Point Powerplant will be operated largely for base loads during the irrigation season to permit release of near-uniform flows for downstream water uses. During the remainder of the year, the Morrow Point plant will be operated on a variable production basis for integrated operation with other plants in the system in meeting load requirements.

Floyd E. Dominy, whose offices are in Washington, D. C., is Commissioner of the Bureau of Reclamation. The Colorado River Storage Project is in the Bureau's Region 4; F. M. Clinton, at Salt Lake City, Utah, is Regional Director. J. D. Seery is Project Construction Engineer for the Curecanti Unit; his office is at Gunnison, Colorado. All designs for the Unit are under the direction of O. L. Rice, Chief Designing Engineer of the Bureau.