

# The COLORADO - BIG THOMPSON PROJECT

The Colorado-Big Thompson Project in northeastern Colorado collects, stores, regulates, and diverts surplus water of the Upper Colorado River for supplemental irrigation of 720,000 acres of highly developed land in the South Platte River Basin. Electric energy is generated by the falling water.

Green Mountain Reservoir on the Blue River stores and regulates water for the benefit of Western Slope water users. A system of reservoirs and aqueducts on the Western Slope stores and transports the surplus waters to the Alva B. Adams Tunnel for diversion under the Continental Divide. On the Eastern Slope the diverted water passes through four powerplants and the Foothills storage system on its way to beneficial uses in the fertile plains area.

Irrigation releases are made in accordance with requests from the NORTHERN COLORADO WATER CONSERVANCY DISTRICT. The Colorado State Engineer supervises distribution from the streams to the irrigation company headgates. The individual irrigation companies make deliveries to the land at the farm turnouts.



**BEEET SUGAR PRODUCTION**

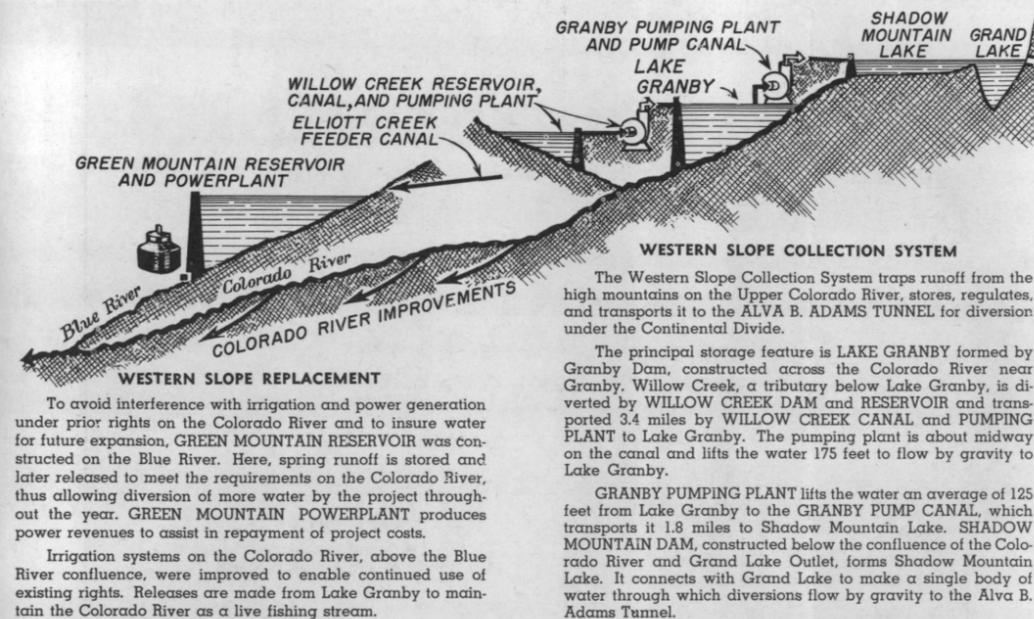
Irrigation in the project area was first developed about 1860 along the stream bottom lands. In 1870 the Union Colony, sponsored by Horace Greeley, constructed ditches from the Cache la Poudre River to bench lands in the vicinity of Greeley. The Colony irrigated 12,000 acres so successfully that other projects soon followed, using water from the South Platte, Cache la Poudre, and Big Thompson Rivers and from St. Vrain and Boulder Creeks.

By 1900 practically all the irrigated area had been developed and direct stream flow overappropriated. An era of reservoir construction followed to store spring floods for summer use and by 1910 most of the suitable plains reservoir sites were developed. Residents then gave serious thought to an 1889 dream of tapping the headwaters of the Colorado River for use on the Eastern Slope.

In 1935, \$150,000 of PWA funds were allotted to the Bureau of Reclamation to conduct surveys and to report on the feasibility of such a diversion. The Northern Colorado Water Conservancy District was organized in 1937 to contract for the use of the project water and to repay irrigation costs.

Actual project construction began in 1938 at Green Mountain Dam. Although work was drastically curtailed during the War, water was delivered through the Adams Tunnel to the Big Thompson River June 23, 1947; to the Cache la Poudre River in 1951; and to St. Vrain Creek in 1954.

Electric energy was first generated in May 1943 at Green Mountain Powerplant. All authorized features of the project were completed by 1959.



The Western Slope Collection System traps runoff from the high mountains on the Upper Colorado River, stores, regulates, and transports it to the ALVA B. ADAMS TUNNEL for diversion under the Continental Divide.

The principal storage feature is LAKE GRANBY formed by Granby Dam, constructed across the Colorado River near Granby. Willow Creek, a tributary below Lake Granby, is diverted by WILLOW CREEK DAM and RESERVOIR and transported 3.4 miles by WILLOW CREEK CANAL and PUMPING PLANT to Lake Granby. The pumping plant is about midway on the canal and lifts the water 175 feet to flow by gravity to Lake Granby.

GRANBY PUMPING PLANT lifts the water an average of 125 feet from Lake Granby to the GRANBY PUMP CANAL, which transports it 1.8 miles to Shadow Mountain Lake. SHADOW MOUNTAIN DAM, constructed below the confluence of the Colorado River and Grand Lake Outlet, forms Shadow Mountain Lake. It connects with Grand Lake to make a single body of water through which diversions flow by gravity to the Alva B. Adams Tunnel.

## Water Supply and Distribution

The Western Slope collection area of 438 square miles produces an average of 298,000 acre-feet of water annually, of which 257,700 acre-feet are surplus and available for diversion. This is used to supplement the 900,000 acre-feet produced annually by the Eastern Slope streams for irrigation of the 720,000 acres of project lands. The Northern Colorado Water Conservancy District is responsible for apportionment of the water to more than 120 ditches and 60 reservoirs serving project lands.

## Soils and Environment

Irrigable soils of the project are deep in profile and have a wide texture range, with fine sandy loam predominating. The growing season of 4 to 5 months varies inversely with the altitude (5400 to 3500 feet elevation). Precipitation varies from 20 to 8 inches annually, with a mean of about 15 inches. Temperatures range from -30° to 105°F.

## Produce and Markets

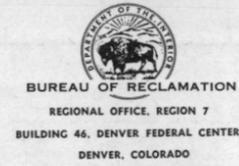
Principal crops are sugar beets, alfalfa, small grains, corn, vegetables, beans, and fruit. Cattle and sheep are fattened from farm-grown feeds and sugar beet by-products. Hog raising and dairy and poultry products are also important. Although Denver is the principal market, products are distributed throughout the nation.

## Benefits

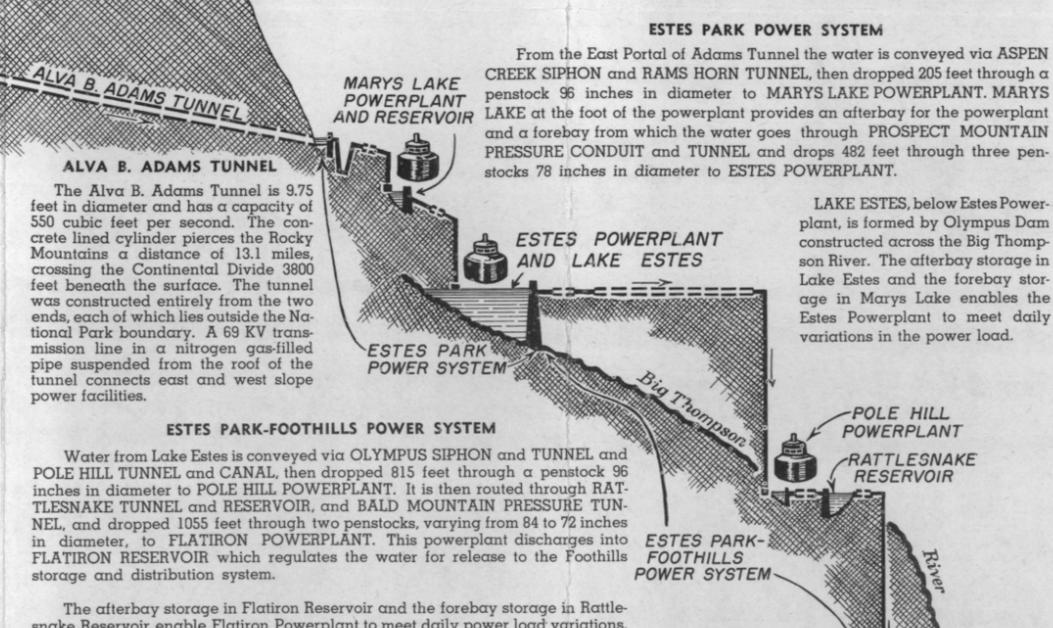
The Colorado-Big Thompson Project stabilizes the agricultural and industrial economy of northeastern Colorado. It is particularly effective each year during late summer months of the irrigation season, and has a tremendous impact throughout the season in drought years.

In the severely dry year of 1954 the project supplied 300,352 acre-feet of supplemental water and was credited with production of \$22,000,000 worth of the \$41,000,000 crop grown during the season. Without project water the area would have suffered a catastrophe of far-reaching proportions. Sales of electric energy produced in 1960 totaled \$3,980,000.

Indirect benefits from the project are evidenced by ever increasing new businesses, new capital improvements, and an increase in valuations serving as a tax base. Other benefits, to the visitor as well as to the local resident, include increased facilities for such recreation as boating, fishing, camping and picnicking.

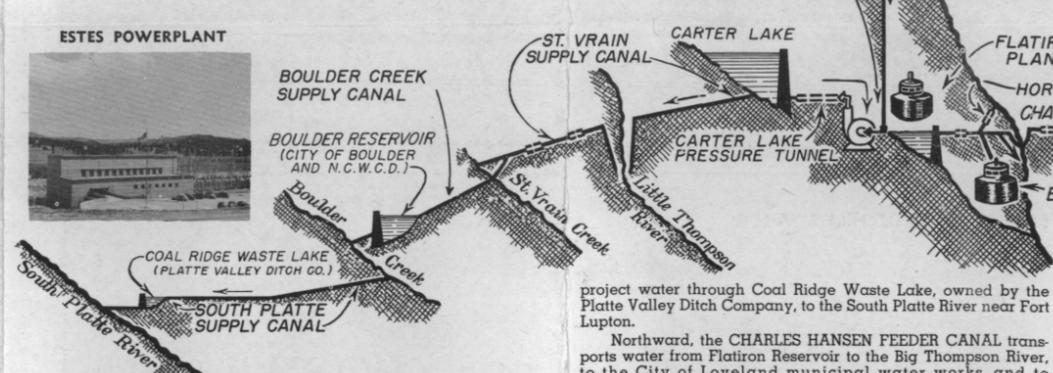


**"THE BARRIER BETWEEN"**  
Project color film  
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From the East Portal of Adams Tunnel the water is conveyed via ASPEN CREEK SIPHON and RAMS HORN TUNNEL, then dropped 205 feet through a penstock 96 inches in diameter to MARYS LAKE POWERPLANT. MARYS LAKE at the foot of the powerplant provides an afterbay for the powerplant and a forebay from which the water goes through PROSPECT MOUNTAIN PRESSURE CONDUIT and TUNNEL and drops 482 feet through three penstocks 78 inches in diameter to ESTES POWERPLANT.

LAKE ESTES, below Estes Powerplant, is formed by Olympus Dam constructed across the Big Thompson River. The afterbay storage in Lake Estes and the forebay storage in Marys Lake enables the Estes Powerplant to meet daily variations in the power load.



The afterbay storage in Flatiron Reservoir and the forebay storage in Rattlesnake Reservoir enable Flatiron Powerplant to meet daily power load variations.

Water from Lake Estes is conveyed via OLYMPUS SIPHON and TUNNEL and POLE HILL TUNNEL and CANAL, then dropped 815 feet through a penstock 96 inches in diameter to POLE HILL POWERPLANT. It is then routed through RATTLESNAKE TUNNEL and RESERVOIR, and BALD MOUNTAIN PRESSURE TUNNEL, and dropped 1055 feet through two penstocks, varying from 84 to 72 inches in diameter, to FLATIRON POWERPLANT. This powerplant discharges into FLATIRON RESERVOIR which regulates the water for release to the Foothills storage and distribution system.

The project water through Coal Ridge Waste Lake, owned by the Platte Valley Ditch Company, to the South Platte River near Fort Lupton.

Northward, the CHARLES HANSEN FEEDER CANAL transports water from Flatiron Reservoir to the Big Thompson River, to the City of Loveland municipal water works, and to HORSETOOTH RESERVOIR. The canal crosses the Big Thompson River in a siphon, elevated above both the river and highway. Water from the Big Thompson River can be diverted into the canal via the HORSETOOTH SUPPLY CONDUIT.

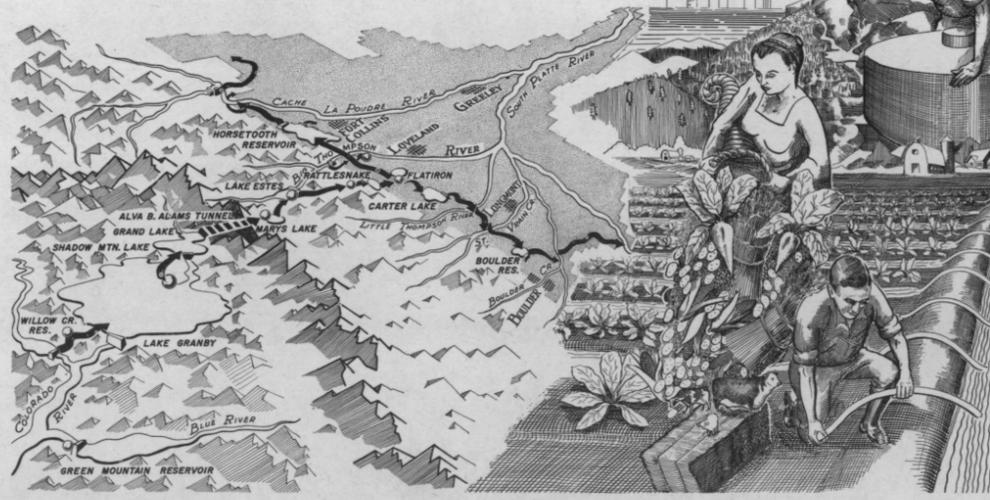
Project water deliveries, and Big Thompson River water to be returned to the river, are dropped through a chute from the Feeder Canal ahead of the siphon crossing or passed through the BIG THOMPSON POWERPLANT to convert the head available to electric energy.

Horsetooth Reservoir lies west of Ft. Collins between the Dakota and Lyons Hogbacks, with HORSETOOTH DAM closing the gap at the north between the hogbacks. SOLDIER, DIXON, and SPRING CANYON DAMS close gaps along the Dakota ridge.

An outlet at Soldier Canyon Dam supplies water to Colorado A&M College and to the small DIXON FEEDER CANAL for the irrigated area cut off from its water supply by the reservoir.

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## BUREAU OF RECLAMATION



## Project Data

### CANALS AND TUNNELS

Feature	Length (Miles)	Capacity (C.F.S.)
Elliott Creek Feeder Canal	1.1	90
Willow Creek Pump Canal	3.4	400
Granby Pump Canal	1.8	1100
Alva B. Adams Tunnel	13.1	550
Estes Park Aqueduct	4.3	550-1300
Estes-Foothills Aqueduct	11.8	550-960
Carter Lake Conduit and Tunnel	1.4	550
St. Vrain Supply Canal	9.8	575-625
Boulder Creek Supply Canal	15.7	175-200
South Platte Supply Canal	32.2	115-230
Charles Hansen Feeder Canal	13.2	550-930
Horsetooth Supply Conduit	1.0	375
Charles Hansen Canal	5.1	1500
Windsor Extension	0.5	250
North Poudre Supply Canal	12.5	250
Dixon Feeder Canal	3.0	8
Total Length*	129.9	

\*95.5 miles of Canal, Conduit and Siphon and 34.4 miles of Tunnel

### RESERVOIRS AND DAMS

Reservoir	Dam	Hydraulic Height of Dam (Feet)	Crest Length (Feet)	Reservoir Capacity (Acres-Feet)
Green Mountain	Green Mtn.	264	1150	154,600
Lake Granby	Granby*	223	861	539,800
Willow Creek	Willow Creek	95	1100	10,600
Shadow Mtn. Lake	Shadow Mtn.	37	3077	18,400
Marys Lake	Marys Lake*	20	820	900
Lake Estes	Olympus	45	1951	3,100
Rattlesnake	Flatiron	100	1100	2,180
Flatiron	Flatiron	55	1725	760
Carter Lake	Carter Lake*	190	1235	112,200
Horsetooth	Horsetooth*	111	1840	151,800
	Soldier Canyon	203	1438	
	Dixon Canyon	215	1265	
	Spring Canyon	198	1120	
Total Reservoir Capacity				994,340

\*Completed reservoir also required dikes.  
\* Includes Grand Lake

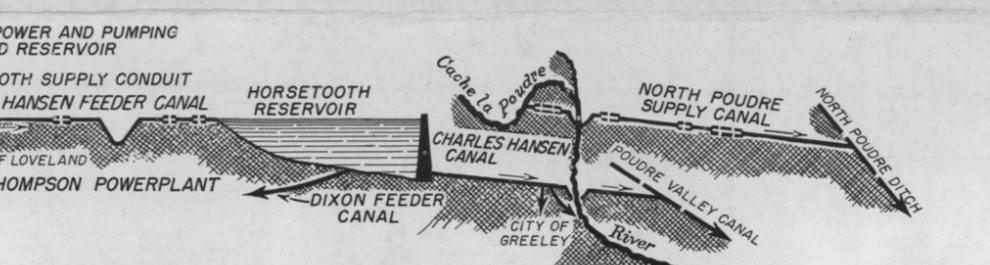
### POWERPLANTS

Name	No. Units	Rated Head (Feet)	Installed Capacity (KW)	Av. Annual Generation (Million KWH)
Green Mountain	2	203	21,600	78
Marys Lake	1	205	8,100	50
Estes	3	482	45,000	117
Pole Hill	1	815	33,250	213
Flatiron	2	1055	63,000	286
Flatiron Reversible Pump	1	250	8,500	
Big Thompson	1	180	4,500	15
Total			183,950	759

### FOOTHILLS STORAGE AND DISTRIBUTION SYSTEM

Southward, the FLATIRON REVERSIBLE PUMP and MOTOR lifts water from Flatiron Reservoir a maximum of 297 feet and delivers it through CARTER LAKE PRESSURE CONDUIT and TUNNEL to CARTER LAKE. When the flow is reversed, the unit acts as a turbine-generator and produces electric energy.

The ST. VRAIN SUPPLY CANAL delivers water from Carter Lake to the Little Thompson River, St. Vrain Creek, and BOULDER CREEK SUPPLY CANAL. The latter delivers water to Boulder Creek and to Boulder Reservoir, located on the canal and owned by the Conservancy District and the City of Boulder. The SOUTH PLATTE SUPPLY CANAL, diverting from Boulder Creek, delivers



The principal outlet from Horsetooth Reservoir is through Horsetooth Dam into the CHARLES HANSEN CANAL. This canal delivers water to a chute discharging into the Cache la Poudre River and to a siphon which crosses the river to supply the Poudre Valley and Reservoir Company Canal. A turnout supplies the municipal water works of the City of Greeley. Water is delivered to the river to replace by exchange that diverted upstream by the NORTH POUDE SUPPLY CANAL. This canal delivers water to the North Poudre Ditch.

### POWER TRANSMISSION SYSTEM

The Project power transmission system consists of 760 miles of 115 and 69 KV lines, 24 miles of 6.9 to 24.9 KV lines and 42 substations and switchyards. Interconnections are made with the Missouri River Basin system at Sterling and Greeley, and with the Public Service Company of Colorado at Dillon, Greeley, and Erie. The Salida-Gunnison line in southwestern Colorado is served by wheeling over lines of the Public Service Company. Project power facilities are operated by the Bureau of Reclamation.

