

Number of muckers per shift: 4 or 5.

Number of mucking shifts per day: Usually 2.

Type of haulage: Electric after the first 400 to 500 feet.

Wages: Drillers and helpers \$3, muckers \$2.50, blacksmiths \$4, helpers \$2.50, motormen \$2.75, dumpmen \$2.50.

Tunnel 12, Length 4,900 Feet.

(Through hard granite at an average speed of 185 feet per month.)

	Cost per foot of tunnel.
Excavation	\$22.10
Engineering32
Permanent equipment	2.35
Timbering (90 feet)08
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	\$24.75

Tunnel 13 for 1,525 Feet.

(Through hard granite at an average speed of 130 feet per month.)

	Cost per foot of tunnel.
Excavation	\$20.60
Engineering10
Permanent equipment	2.25
Adit proportion37
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	\$23.32

Tunnel 14, Length 859 Feet.

	Cost per foot of tunnel.
Excavation	\$22.70
Engineering13
Permanent equipment	2.25
Adit proportion72
Timbering (22 feet)16
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	\$25.96

Tunnel 15, Length 895 Feet.

	Cost per foot of tunnel.
Excavation	\$23.28
Engineering11
Permanent equipment	2.25
Adit proportion	2.42
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	\$28.06

Tunnel 16, Length 2,723 Feet.

(Through hard granite at an average speed of 145 feet per month.)

	Cost per foot of tunnel.
Excavation	\$20.07
Engineering17
Permanent equipment	2.25
Adit proportion55
Timbering (18 feet)04
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	\$23.08

Tunnel 17, Length 3,024 Feet.

	Cost per foot of tunnel.
Excavation	\$20.47
Engineering21
Permanent equipment	2.25
Timbering (142 feet)22
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	\$23.15

Tunnel 17½ for 1,345 Feet.

(Through medium-hard to hard granite at an average speed of 225 feet per month.)

	Cost per foot of tunnel.
Excavation	\$19.56
Engineering31
Permanent equipment	2.25
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	\$22.12

Tunnel 17A for 3,275 Feet.

	Cost per foot of tunnel.
Excavation	\$18.70
Engineering17
Permanent equipment	2.25
Timbering (441 feet)	1.18
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	\$22.30

Tunnel 17B for 4,915 Feet.

	Cost per foot of tunnel.
Excavation	\$21.09
Engineering21
Permanent equipment	2.25
Timbering (163 feet)	1.90
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	\$25.45

ELIZABETH DIVISION, ELIZABETH LAKE TUNNEL.

Location: Los Angeles County, Cal.

Purpose: Water supply, power and irrigation.

Cross-section: Rectangular, with arched roof.

Size: 12 by 12 feet.

Length: 26,870 feet.

Type of power: Electric power purchased from aqueduct plant.

Ventilator: Pressure blower.

Size of ventilating pipe: 18 inches.

Drills: Pneumatic hammer, 3 in the south heading and 2 in the north.

Mounting of drills: Horizontal bar.

Number of holes per round: 25 in the south heading, 16 in the north heading.

Average depth of round: 8 to 10 feet.

Number of drillers and helpers per shift: 2 drillers and 2 helpers at the north end, 3 drillers and 3 helpers at the south end.

Number of drill shifts per day: 3.

Explosive: 40 per cent. and 60 per cent. gelatine dynamite.

Number of muckers per shift: 6.

Number of mucking shifts per day: 3.

Type of haulage: Electric.