The sand was carefully tamped along the foot wall as the concrete was finished. One skip road and the ladder way were built first, hoisting going on meanwhile in the other compartment. The skip was then changed over to the completed road, and the other road was built up. The steel sets were 2 feet 4 inches apart in the lower half of the collar, and 3 feet 0 inches apart in the upper half, centre to centre. The concrete between the sets was reinforced with ¾ inch rods, as shown by Fig 1, which also shows the construction of the steel sets and the position of the concrete.

The materials used for the concrete were: Portland cement, coarse amygdaloid stamp sand and crushed trap rock. They were mixed by hand in the proportion 1:3:5, in the shaft house just back of the shaft and lowered by means of a bucket and trolley, the trolley rope being concreted in on the hanging side as the work progressed. As no difficulty was experienced at No. 2 shaft with the sand running in, or otherwise, it was decided to build the Nos. 3 and 4 collars of reinforced concrete only, leaving out the steel sets. Fig. 3 shows the construction of the No. 3 collar, which was started in June, 1910, and finished in August, 1910. The materials for the concrete were the same and the work was carried on in the same manner as at No. 2, except that there were no steel sets. The collar at No. 4 shaft was similar to the one at No. 3, except that the dividers were made 12x48 inches instead of 12x12 inches. The overburden at No. 4 shaft was 128 feet deep on the pitch of the shaft, (71 deg.), that at Nos. 3 and 2 being 60 and 80 feet, respectively; but in order to secure a suitable foundation, the No. 3 and No. 4 collars were started some distance below the ledge in the solid rock. The length of No. 3 collar was 93 feet, and No. 4 was 158 feet.

Comparative Statement of Cost of Concrete Shaft Collars

	No. 2 Shaft.	No. 3 Shaft.	No. 4 Shaft.
Labor—			
Length to foundation..	80 ft.	93 ft.	158 ft.
Shaftmen	$2,019.10	$1,028.85	$1,994.70
Masons	528.51		
Surface labor	301.80	295.50	192.45
Blacksmith labor	360.41	67.55	40.50
Machinist labor	311.76	41.82	27.85
Carpenter labor	144.97	42.73	54.69
Electrician labor	10.84	8.82	8.96
Teaming labor	120.56	74.46	56.64
	$3,797.95	$1.559.73	$2,375.79
Supplies—			
Structural steel	$2,180.56		$ 136.00
Cement—1252 sks. No. 2	588.83		
Cement—1238 sks. No. 3		$ 470.80	
Cement—2169 sks. No. 4		810.09	
Stamp sand—11 cars No. 2	159.50		
Stamp sand—3¼ cars No. 3		45.70	
Stamp sand—8½ cars No. 4			123.25
Fine rock, 6 cars	90.00		
Sundry supplies	261.75	102.55	75.91
Freight	215.33		
	$3,495.97	$ 619.05	$1,145.25
Total cost of shaft collars	$7,293.92	$2,178.78	$3,521.04

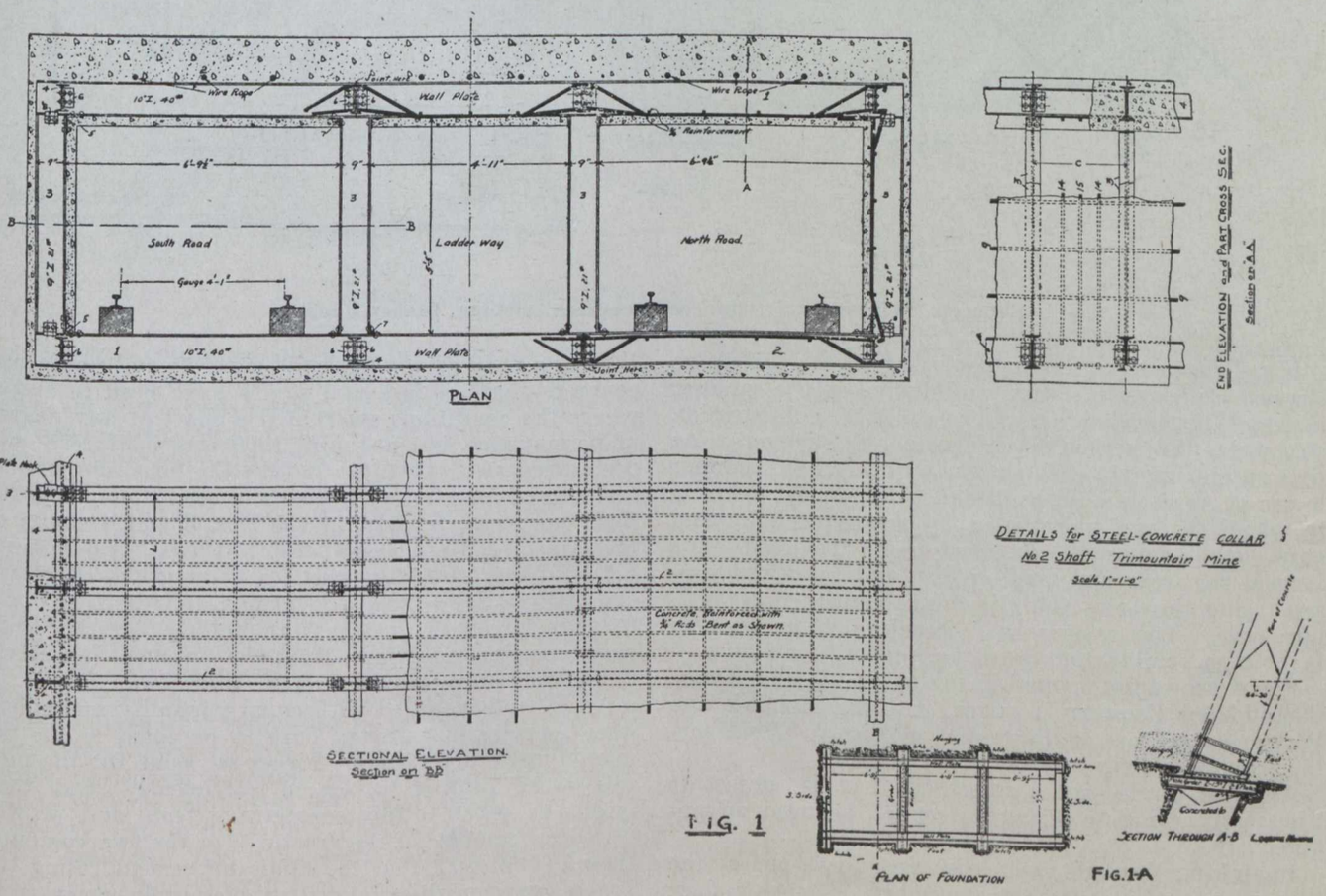

FIG. 1 FIG. 1A

Details for steel-concrete collar, No. 2 shaft, Trimountain mine