

PANAMA CANAL

GAILLARD CUT (CULEBRA CUT)



by

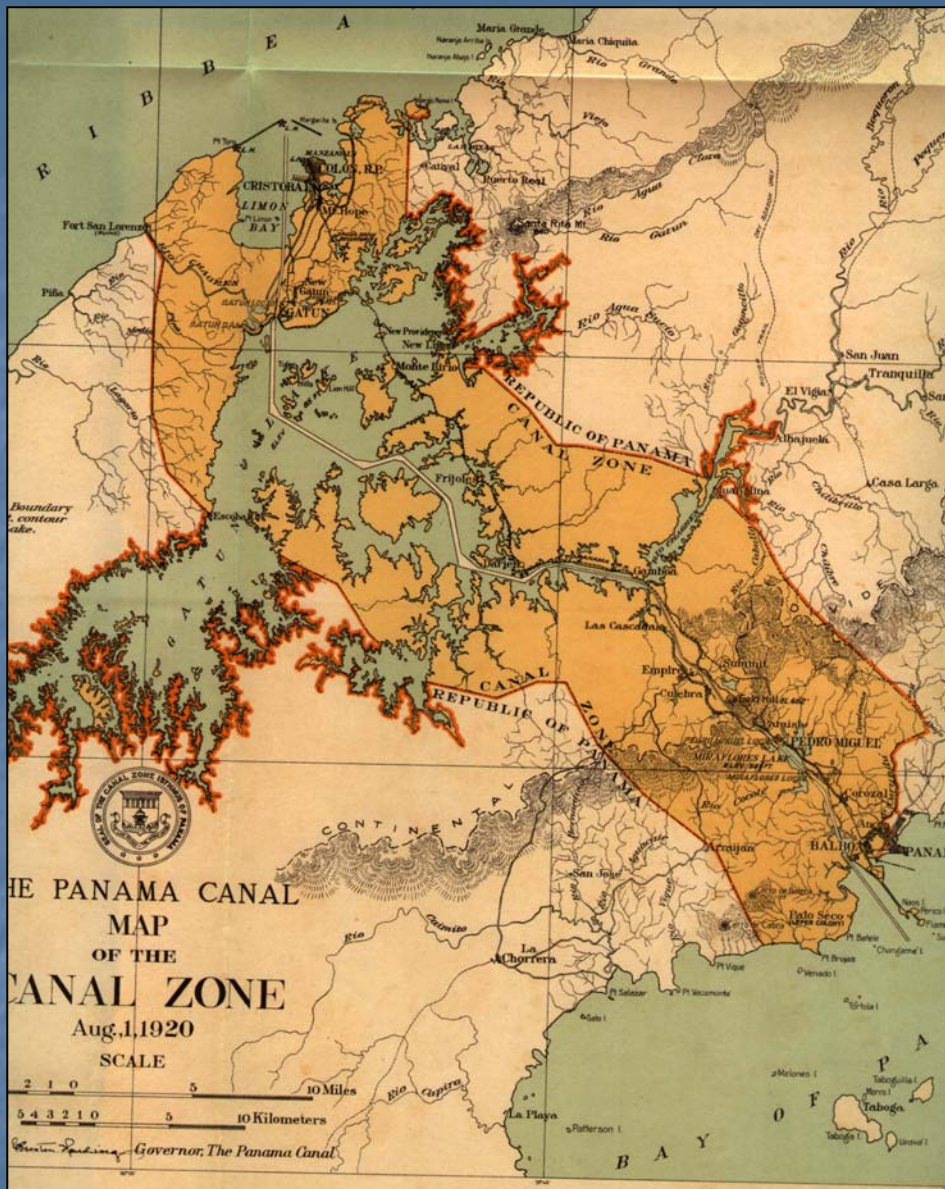
Maung Myat

AGENDA

- BRIEF INTRODUCTION TO PANAMA CANAL
- GAILLARD CUT

PANAMA





The Canal Zone.

...this formation is a relatively hard and compact, and except locally where sheared by faulting, has stood fairly well at steep angles, even where the slopes of the cut are high. From these faulted places masses of loose rock have fallen, but not enough to be classed as important slides.

Las Cascadas agglomerate.—The Las Cascadas agglomerate also consists of volcanic debris partly consolidated, but much less so than the Bas Obispo formation. It contains large and small subangular fragments in a fine-grained matrix of volcanic clay and tuff, and some solidified ash or lava-mud flows, as well as flows and dikes of grayish andesite, and considerable andesitic breccia locally interbedded with the agglomerate.

This formation outcrops along the canal between Empire and Las Cascadas over a distance of 2½ miles. It is of very variable constitution and is much softer and more friable than the Bas Obispo formation. Several hundred feet in thickness of it are exposed, but its base is not known. Some of the beds of this formation are relatively fine grained and impervious, but they have locally a coarse, friable, and in places, containing small pebbles, and dip at angles of 10° to 20° to the east side of the cut. The rocks on the west side are just as weak, but owing to the fact that they dip away from the canal, only 5 slides, having a combined volume of 1,000,000 cubic yards, developed on that side. The slides in this formation, and their yardage, are given in the table, page 64, Appendix C.

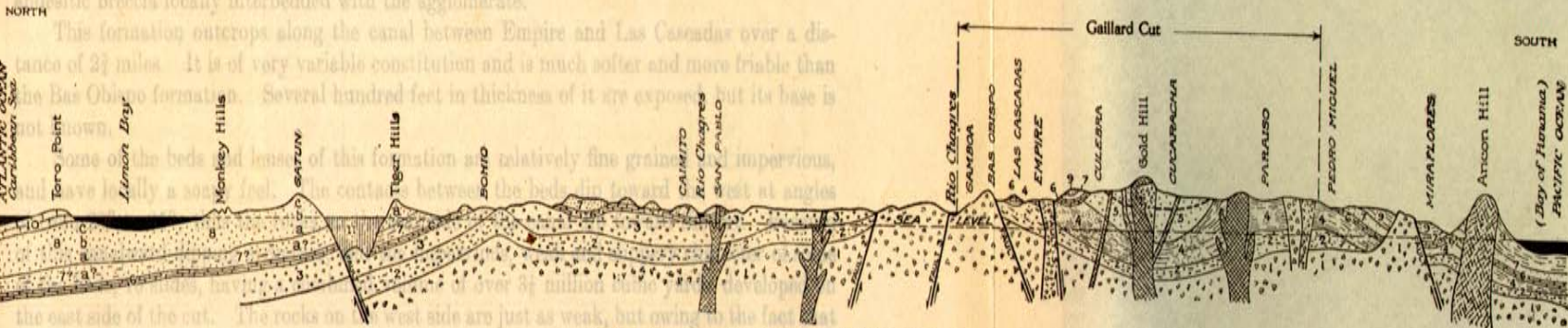


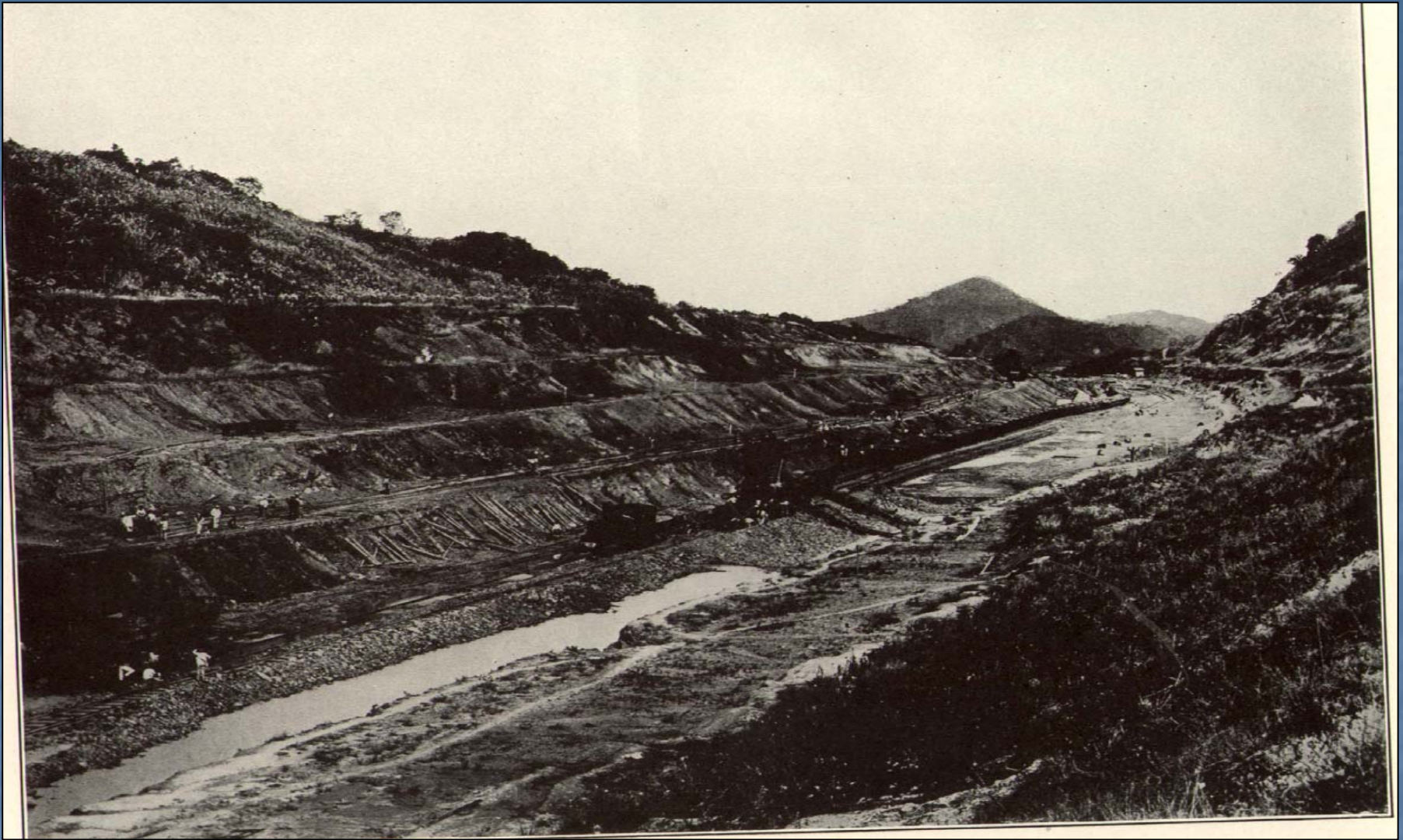
FIG. 2.—Generalized geologic section across the Isthmus of Panama.

80698*—24. (Face p. 46.)

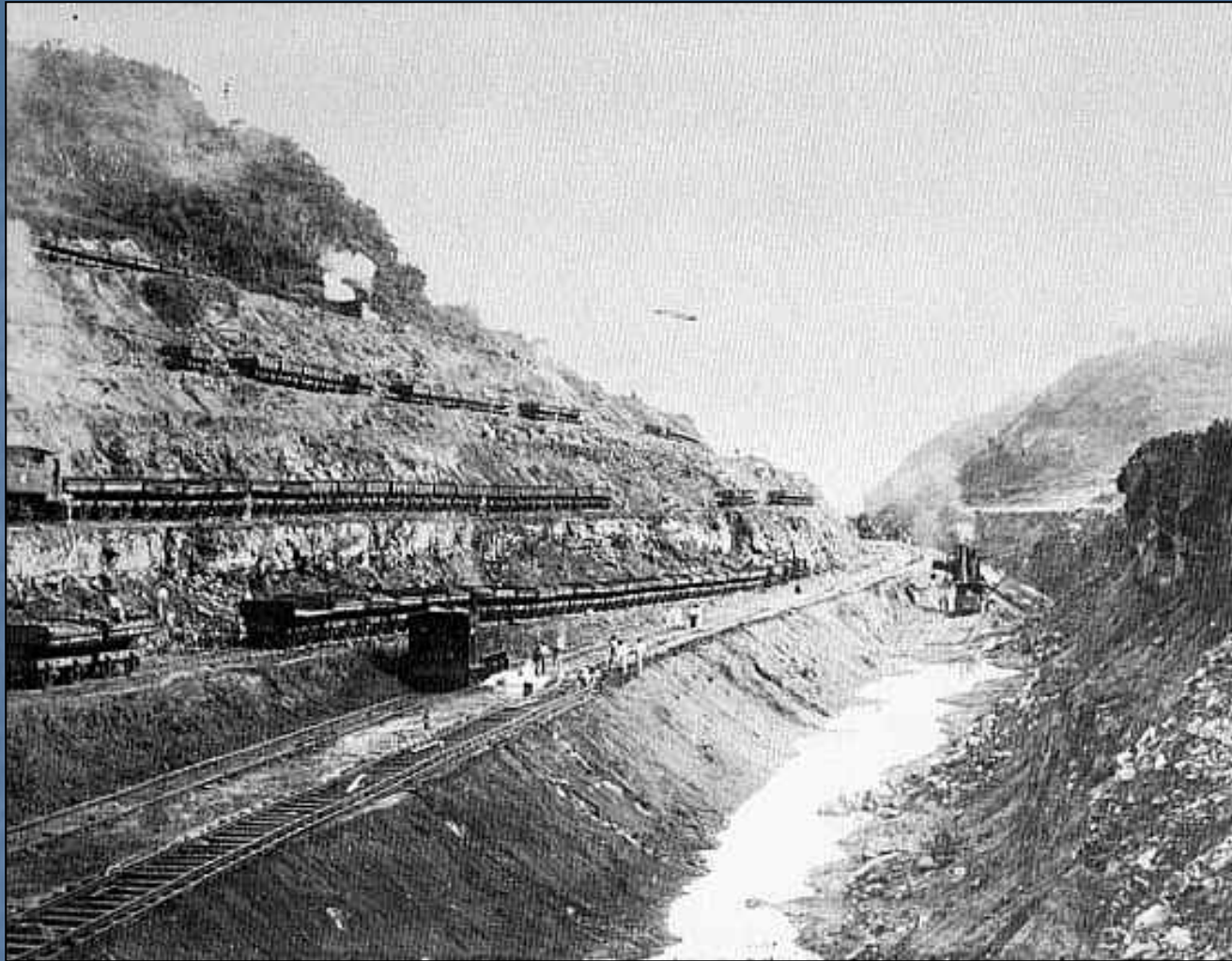
- Geologic profile of the Canal. Atlantic Ocean is to the left.
- Culebra Formation (4) – Dark well laminated beds of soft shales, sandy limestone and calcareous sandstone.
- Cucaracha Formation (5) – Very fine grained clayey rock.

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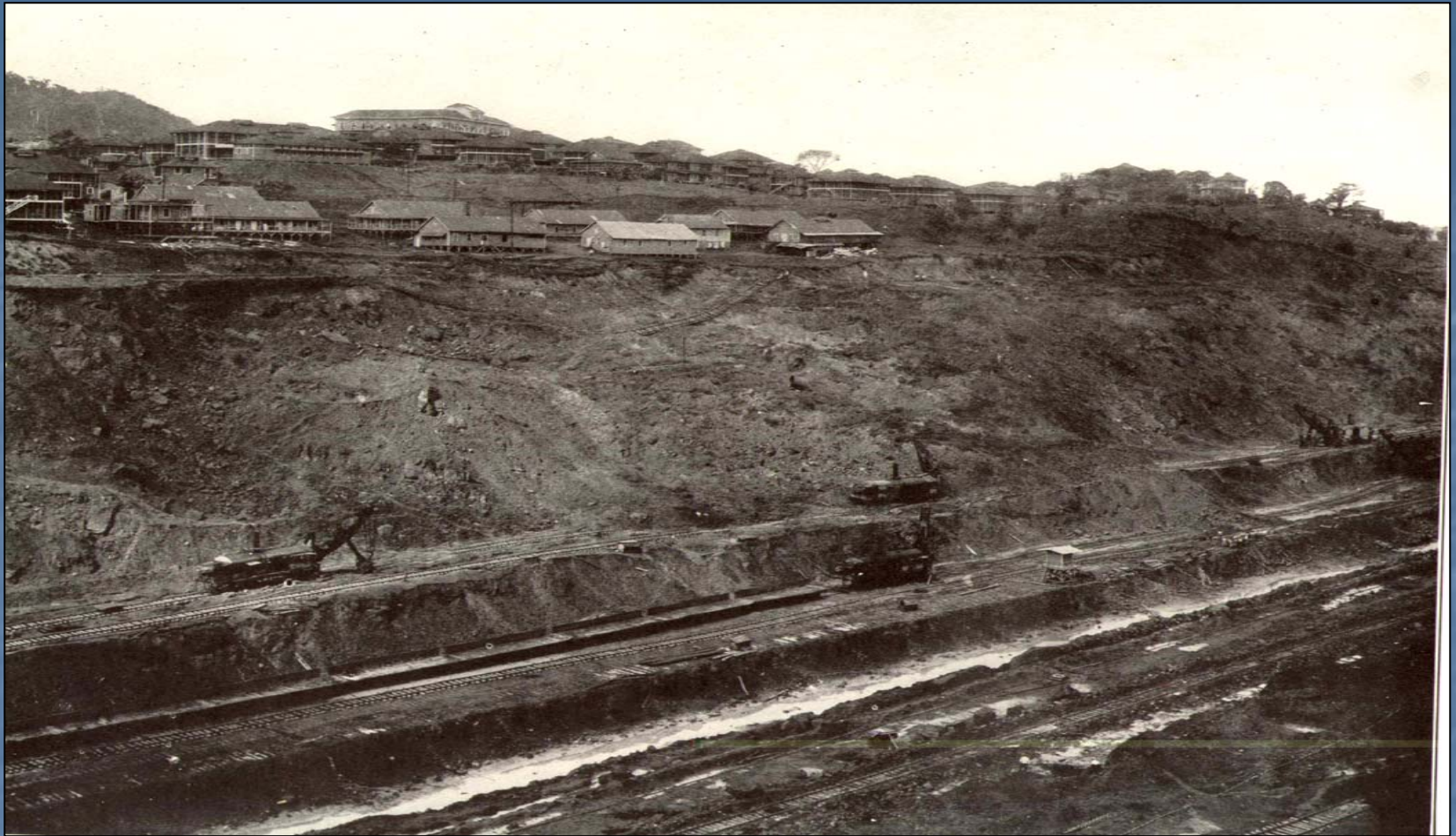
- Culebra Cut was the “special wonder” of the canal. Here, men and machines labored to conquer the 8.75-mile stretch extending through the Continental Divide from Gamboa on the Chagres River at the north to Pedro Miguel on the south. The lowest point in the saddle between Gold Hill on the east and Contractors Hill on the west was at elevation 333.5 feet above sea level.
- Three major slide areas 1) East Culebra, 2) West Culebra and 3) Cucaracha.
- Four different types of slides 1) Gravity, 2) Structural, 3) Deformation and 4) Combination.
- Worst of the slides occurred in 1912 in front of the town of Culebra, West bank of the cut. 75 acres broke away. 10,000,000 cy and 7,000,000 cy from the East bank. Took 1/3 of a year dig out.



View looking south toward the eastern bank of Gaillard Cut, opposite Contractors Hill, showing the terraced bank as it was in 1890. This was the condition the French left it in. Construction did not start back up until 1905.



Culebra cut in 1904 prior to start of American construction activities.
Construction activities within this section started back up in 1905.

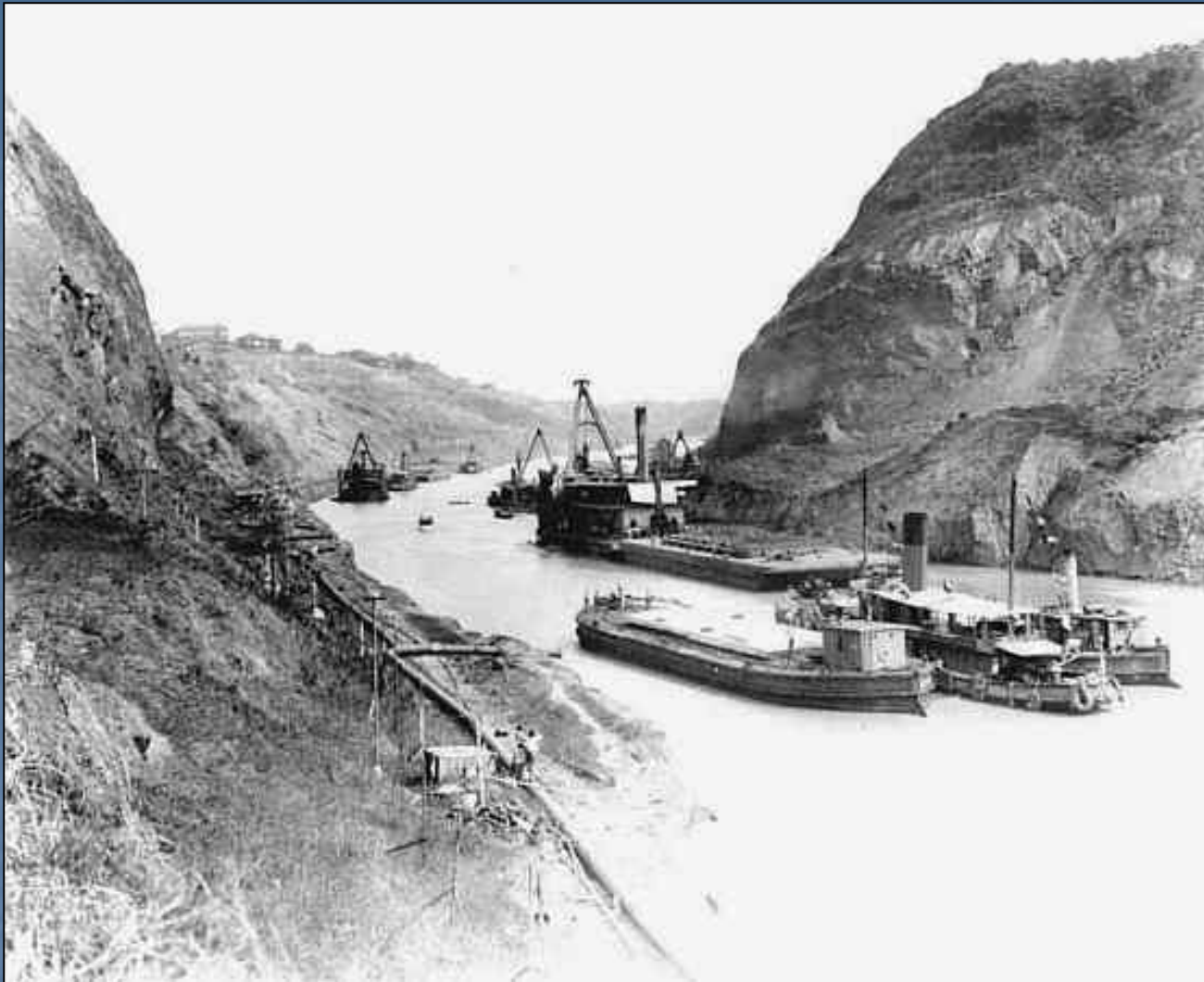


View of a small slide in the west bank of the cut below Culebra Hill, October 16, 1909. A major slide in this area occurred in 1912 when 75 acres slid into the cut, approximately 10,000,000 CY.

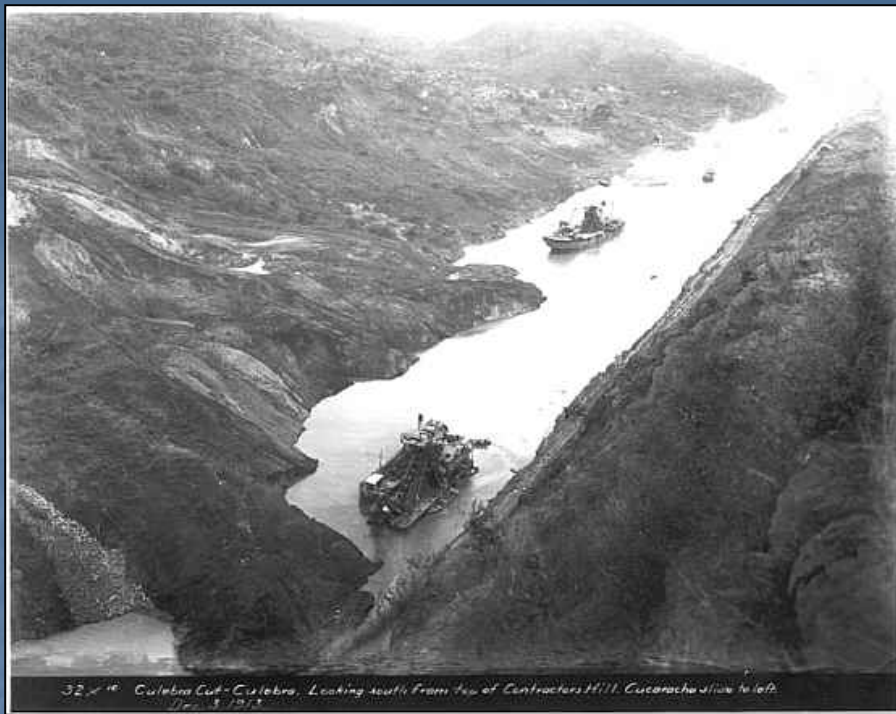
6-17-12



View from Contractors Hill looking north, June, 1912.
This slide is classified as a “structural break” or “deformation” slides. In these, factors such as unstable geological rock formations, slope steepness and height and the effects of blasting combine to form a slide. At the Canal, excavation removed lateral support from the high banks created in the deepest portions of Culebra Cut. Unable to sustain the weight above it, the slopes sheared



In 1913, the canal was filled with water. Due to continued landslides, the canal wasn't opened until August 1914.



32 x 40 Culebra Cut-Culebra. Looking south from top of Contractors Hill. Cucanachistie to left.
Dec. 3, 1913



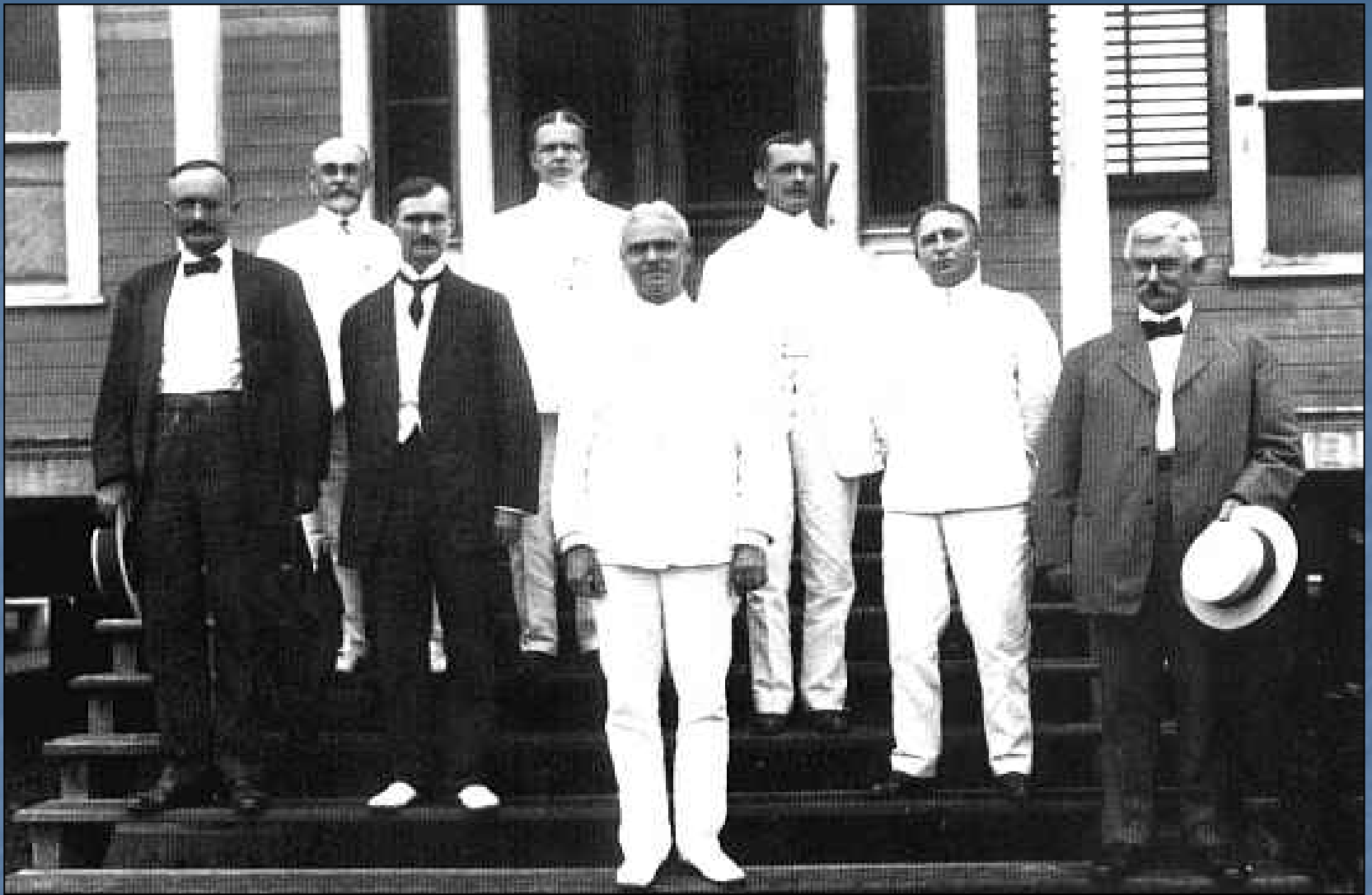
- Dredging operations at Culebra Cut 1913



A fissure formed in connection with the breaking down of the face of Zion Hill, West Culebra slide area, August 8, 1915.



West Culebra Slide. View looking south from the edge of the slide, August 8, 1915.



Staff



Panama Canal – Present
Gaillard Cut section