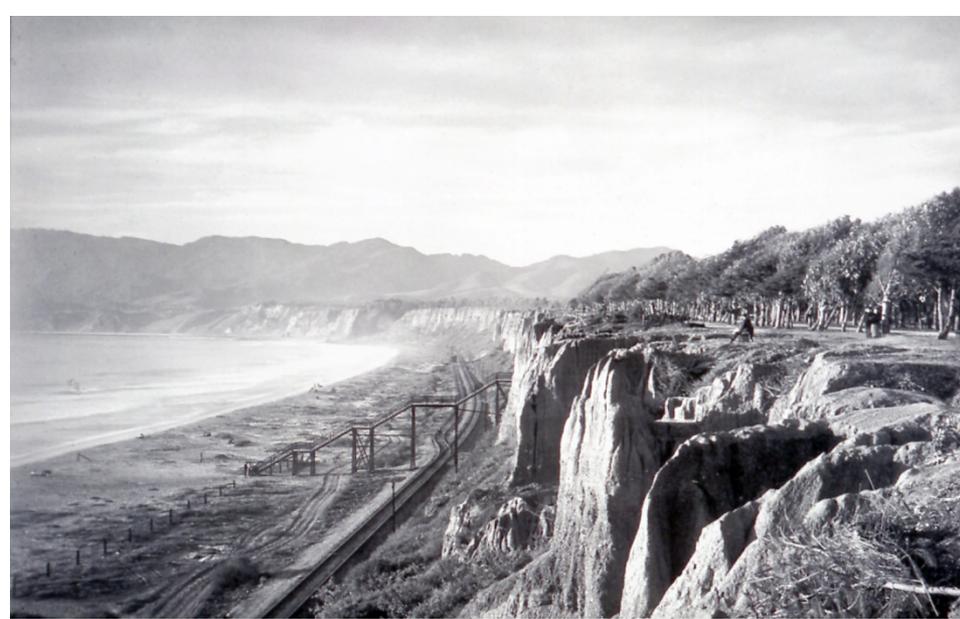
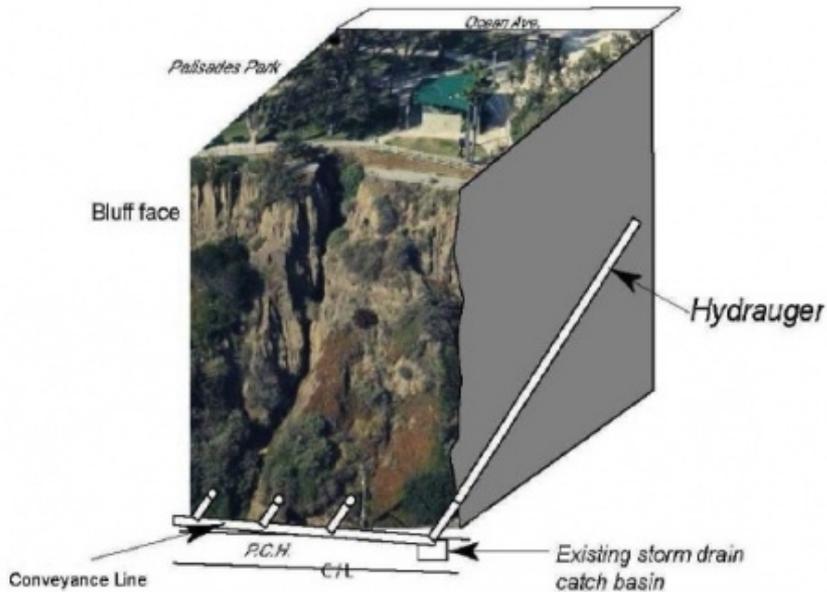


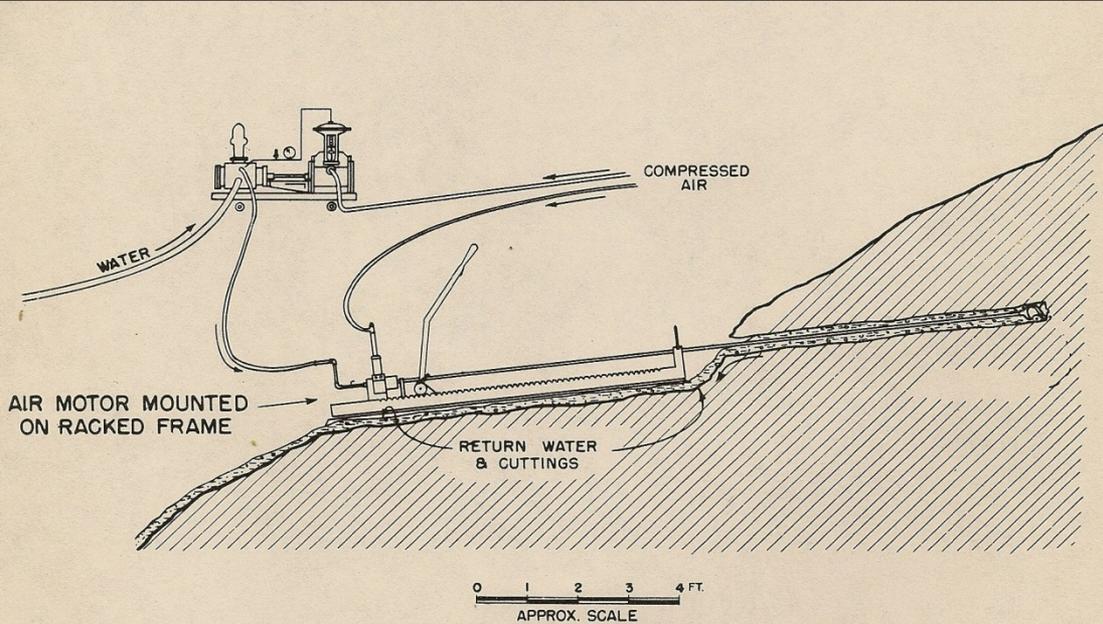
## Part 11

# HYDRAUGERS/ HORIZONTAL DRAINS

# Hydraugers



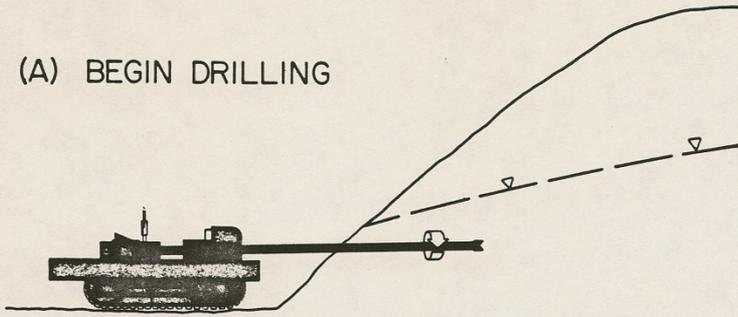
- The Ransome Construction Co. began installing **horizontal drains** in the Oakland Hills in 1940, and others began using them along the Pacific Coast Highway in Santa Monica (shown here) a few years later.



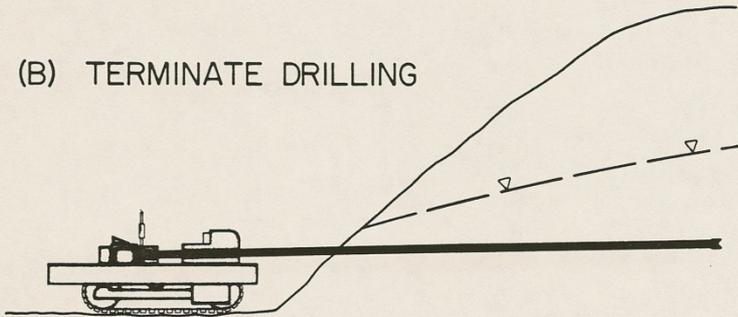
TYPICAL SET-UP FOR DRILLING HORIZONTAL DRAINS

- **Horizontal drains, or “hydraugers,”** were first used to effect landslide repairs undertaken by the E. L. Ransome Construction Co. in Oakland, CA in 1940.
- These are advanced on a slightly upward slope to promote gravity flow out of the cased borehole
- Most state DOTs use hydraugers to enhance long-term slope stability of highway cuts and fills.

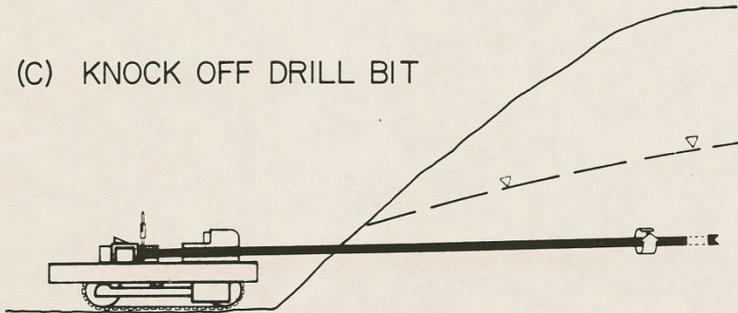
(A) BEGIN DRILLING



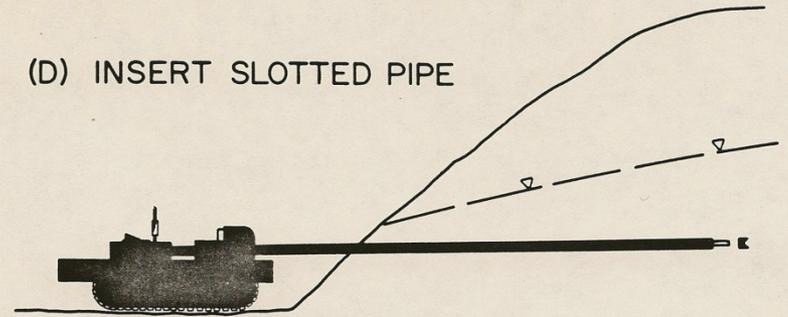
(B) TERMINATE DRILLING



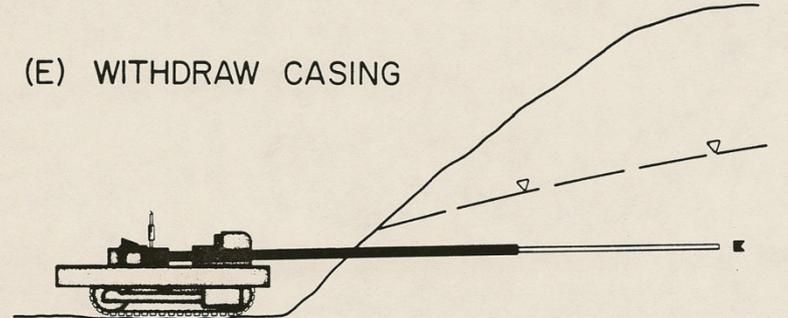
(C) KNOCK OFF DRILL BIT



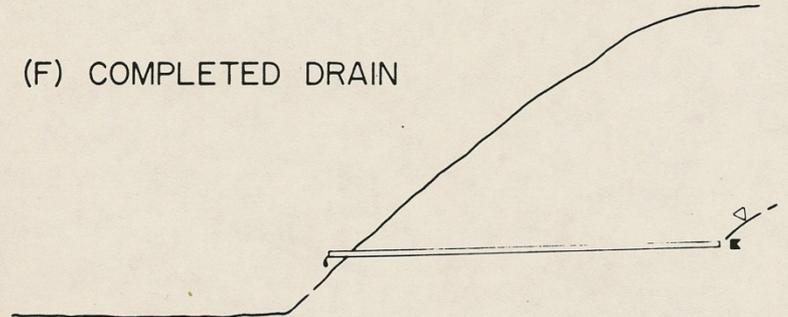
(D) INSERT SLOTTED PIPE



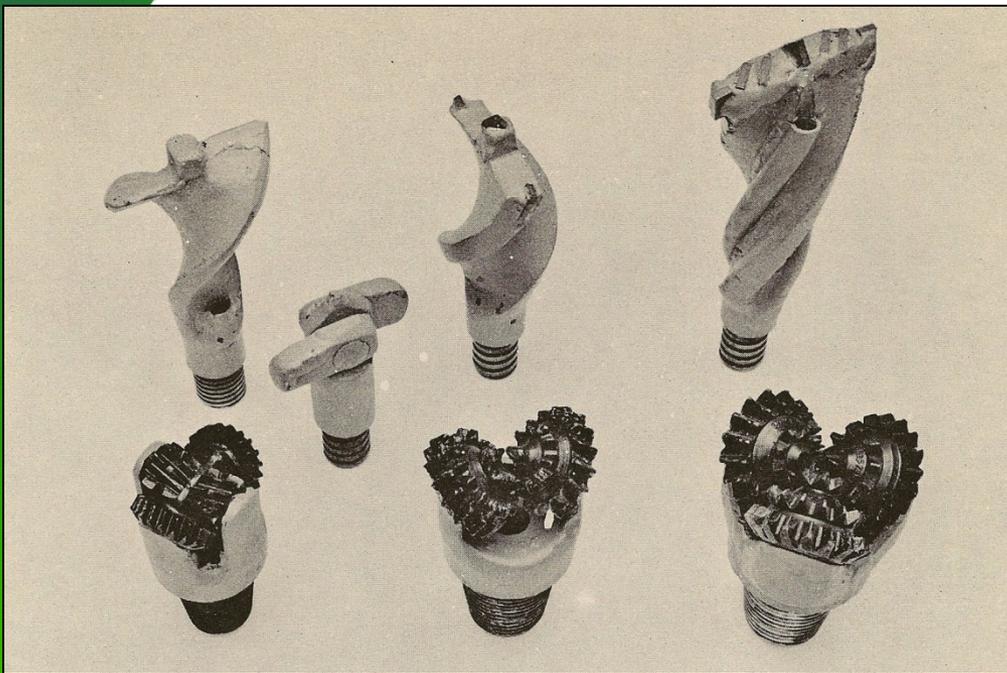
(E) WITHDRAW CASING



(F) COMPLETED DRAIN

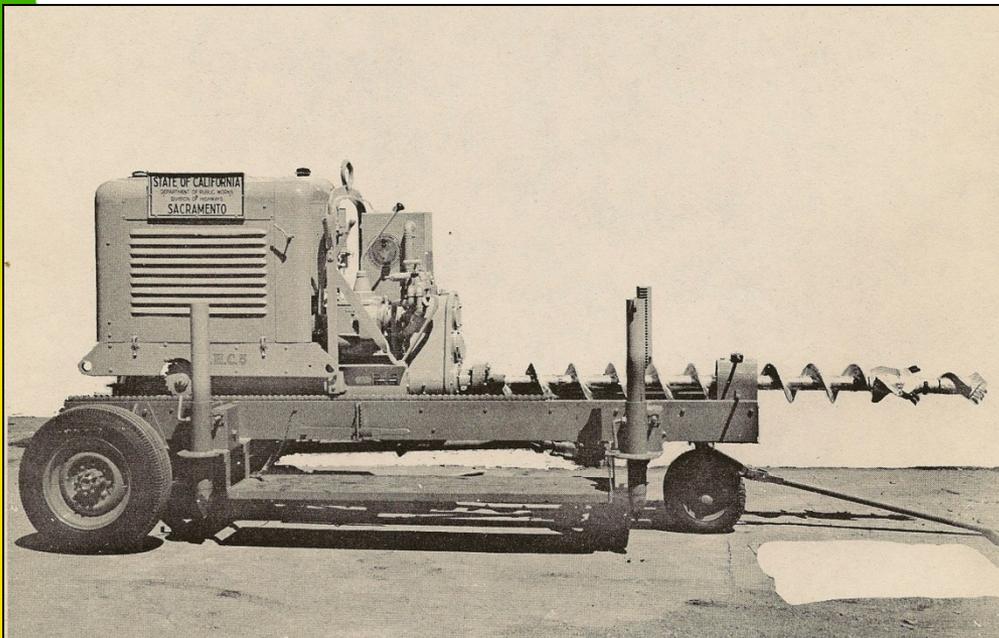


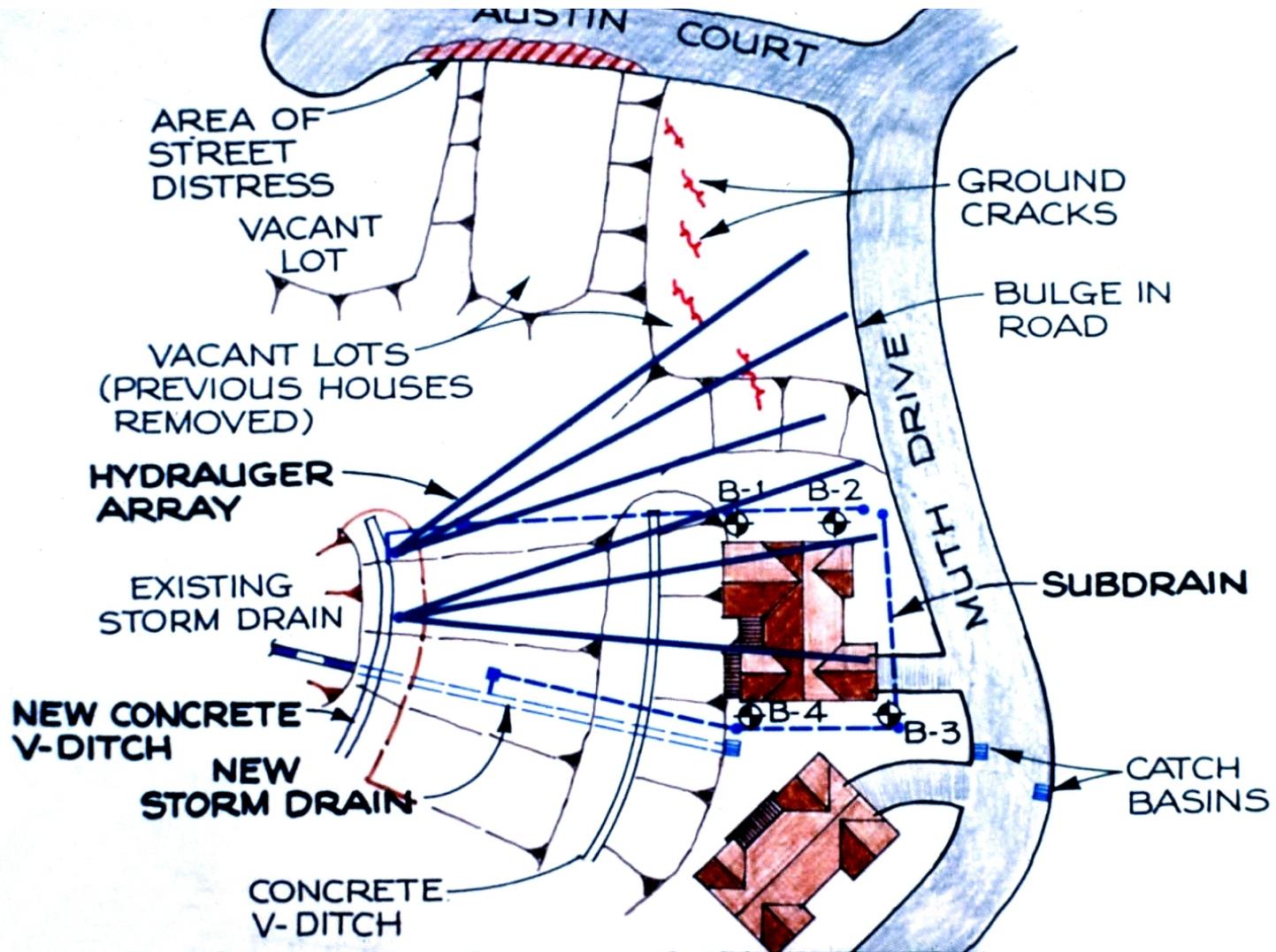
**Typical sequence followed in drilling hydrauger drains into hillsides to drawdown water levels. Note how “knock-off” drill bit is left in the hole after reversing the stem casing. The slotted well casing is inserted inside the casing before it is retracted out of the hole.**



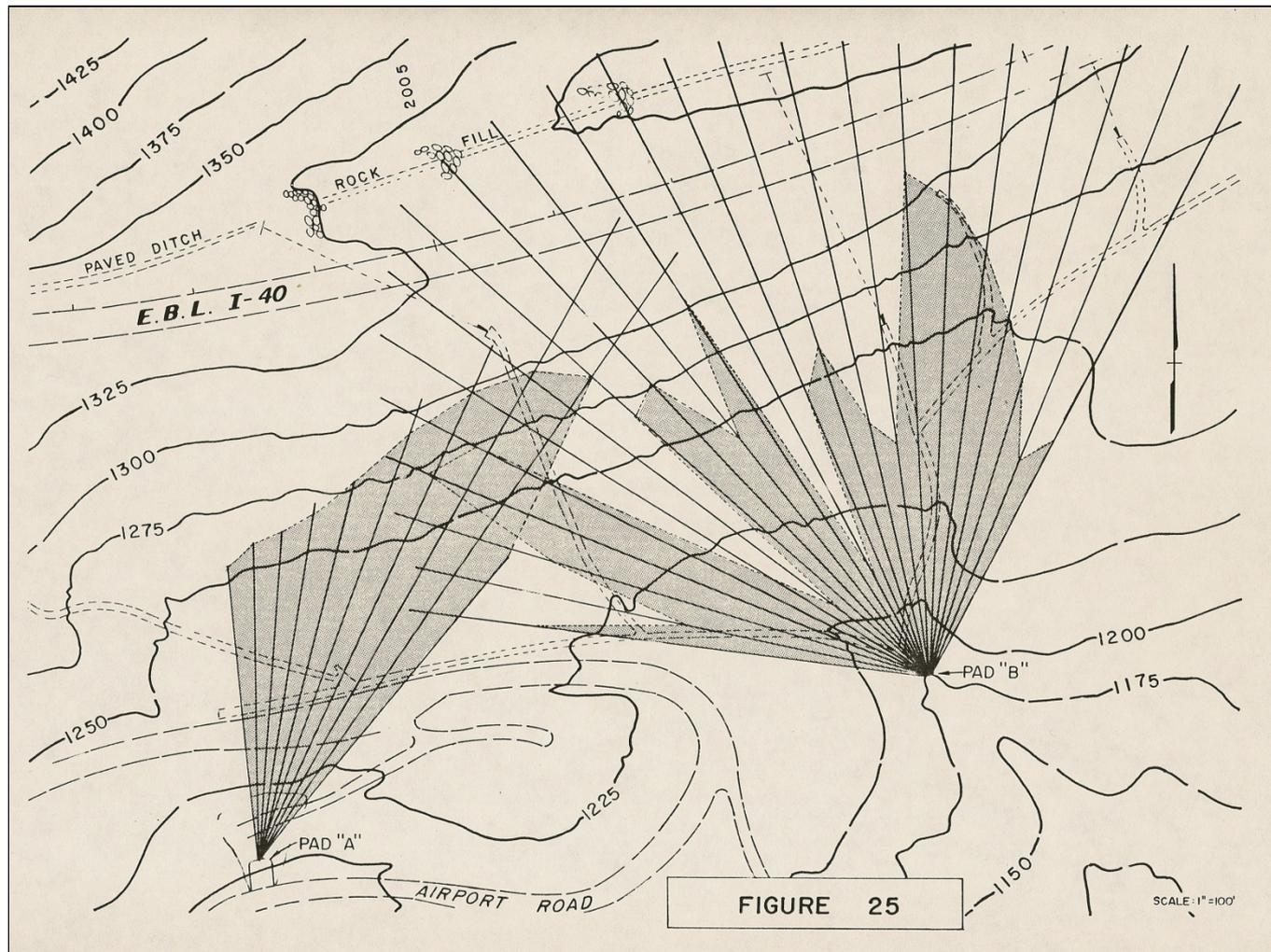
# Typical array of disposable drill bits used for hydroaugers

- The original hydroauger drill rigs, like that shown at lower left, were very basic and intentionally light and portable, operated by small crews of 1 to 3 men
- Jensen Drilling of Portland is a leading manufacturer of such rigs





- Hydraugers can be placed using fan-shaped arrays beneath existing structures and adjoining right-of-way, provided permission is secured from adjacent owners



- **Typical fanned arrays of hydraugers used to stabilize troubled slopes from temporary “drilling pads,” excavated for that purpose. Don’t forget to think about where the discharge will flow towards, naturally.**

# Hydrauger drilling rigs

Drilling rigs for installing hydrauger drains come in a wide variety of types and sizes, often designed and built by the contractors themselves. Their increasing ability to perform directional drilling makes them an invaluable tool for installing subdrainage





- Some **home-built hydraugers** can be broken down into lightweight components, which can be re-assembled in remote locations, like that shown here, which is powered by hydraulics from a compressor located at the crest of the slope.



- Discharge from **hydrauger drains** can easily be measured using a 5 gallon bucket, as shown here. Discharge as great as 1 million gpd have been documented over the years.



- **Hydraugers** need to be maintained if they discharge hard water. Carbonate can be cleansed from the casing slots using a standpipe filled with a 10% HCl solution for 24 hours.

# About the Presenter

- Professor Rogers owned engineering consulting firms in Los Angeles and San Francisco and a general engineering contracting firm prior to entering academia.
- Professor Rogers served as Chair of the Building Codes Committee of the Association of Environmental & Engineering Geologists between 1990-97 and was AEG representative to the International Conference of Building Officials (ICBO) while the 1991, 1994 and 1997 UBC's and 2000 IBC were developed.
- Since 1984 he has taught short courses on grading and excavation codes for ICBO, the University of Wisconsin, University of California, the Association of Bay Area Governments and the City of Los Angeles.



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