

# PORTUGUES DAM: CHALLENGES AND SUCCESS IN FOUNDATION DOCUMENTATION AND TREATMENT

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**BUILDING STRONG**<sup>®</sup>  
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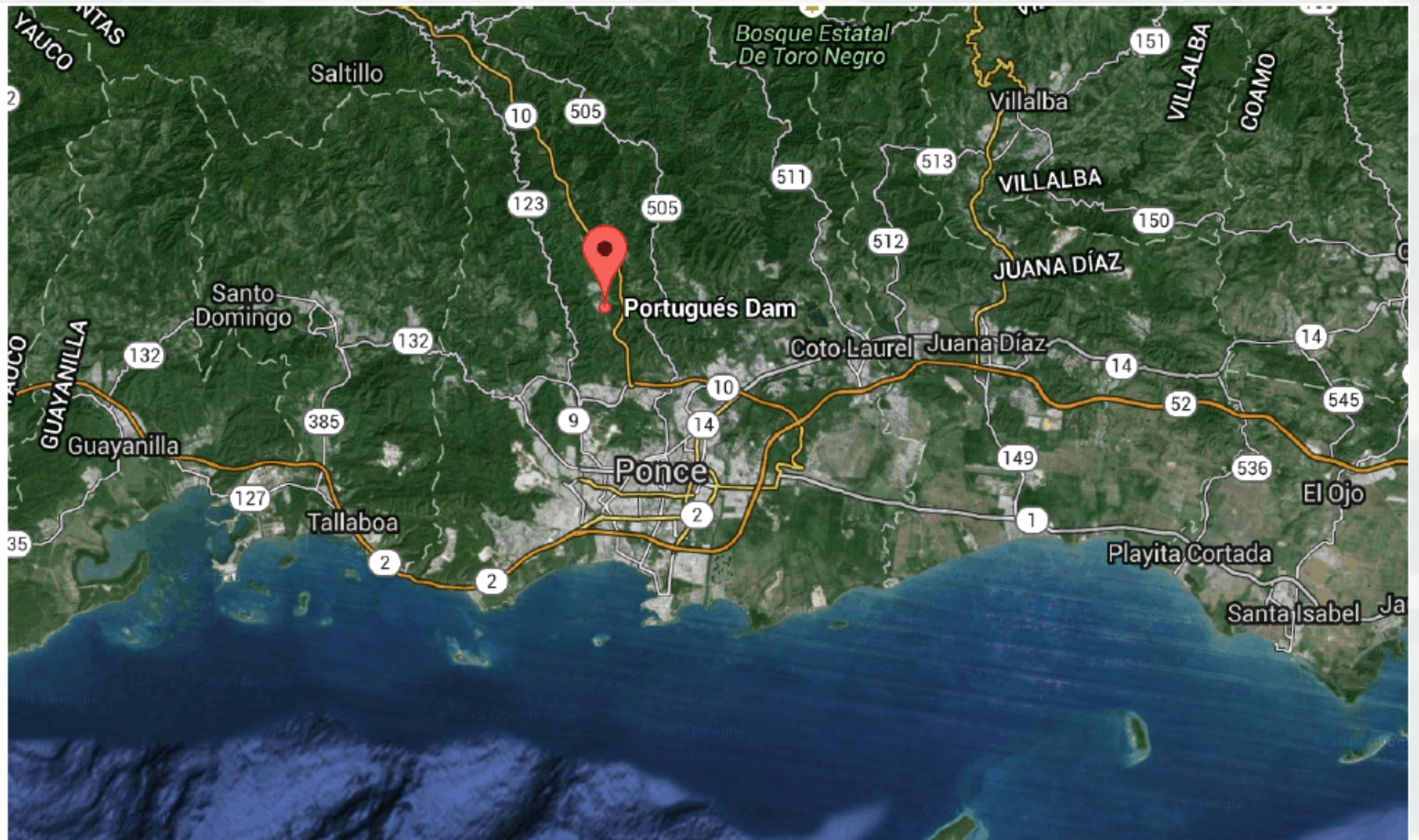
# Portugues Dam



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# **Geologic Features of Importance to be Captured by Mapping**

- Meta-sediment Foundation Rock
- Radiating Shears and Dikes
- High Angle Fracture System
- Weathering



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# Photogrammetric Mapping

- Overlapping series of photos
  - ▶ camera and lens calibration – consumer grade
  - ▶ Perspective for 3D
- Use software to process into 3D image
- Georeferenced with survey control – not always necessary
- Sufficient camera resolution allows feature measurements





# Field Preparation



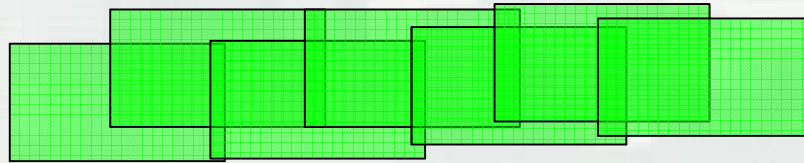
- Place control points
- Layout camera stations
- Identify and mark foundation – color coded



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# Mapping Process

- ~7 photos per strip, one hour on this foundation

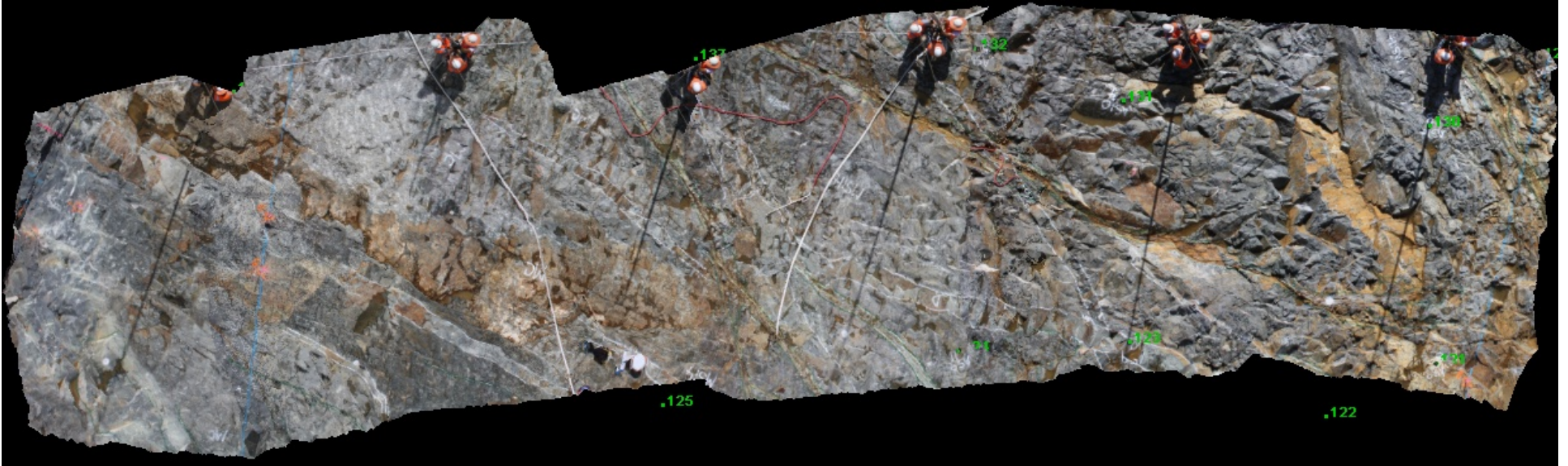


- Immediately print photos for mapping
- Field descriptions directly on the photos
- QC software measurements dip/dip direction





# Strip of Photos

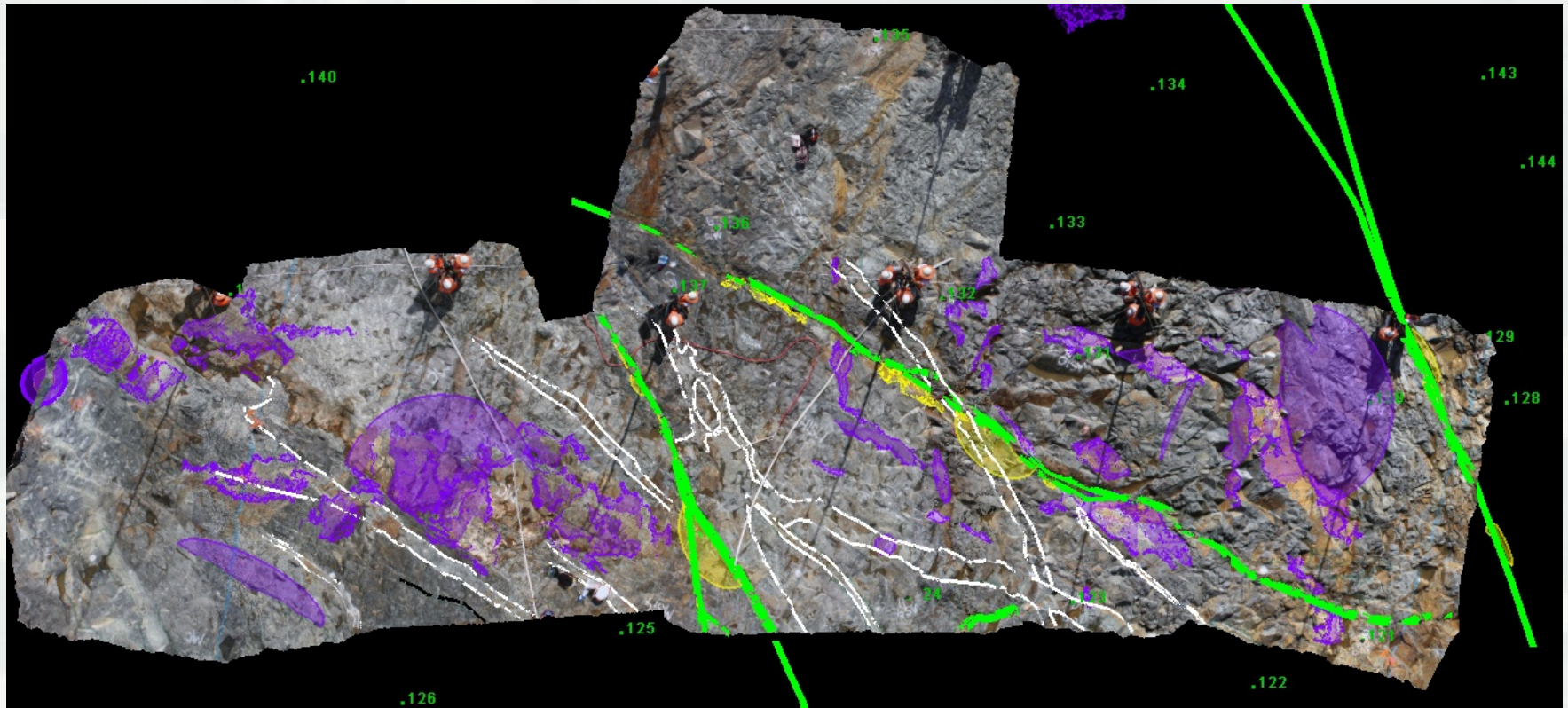


- Field mapping base
- Features described from field labeling



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# Photo Analysis



- Fracture length/continuity/orientation
- Digitize features
- Contours/Sections/Volumes
- Document treatment areas

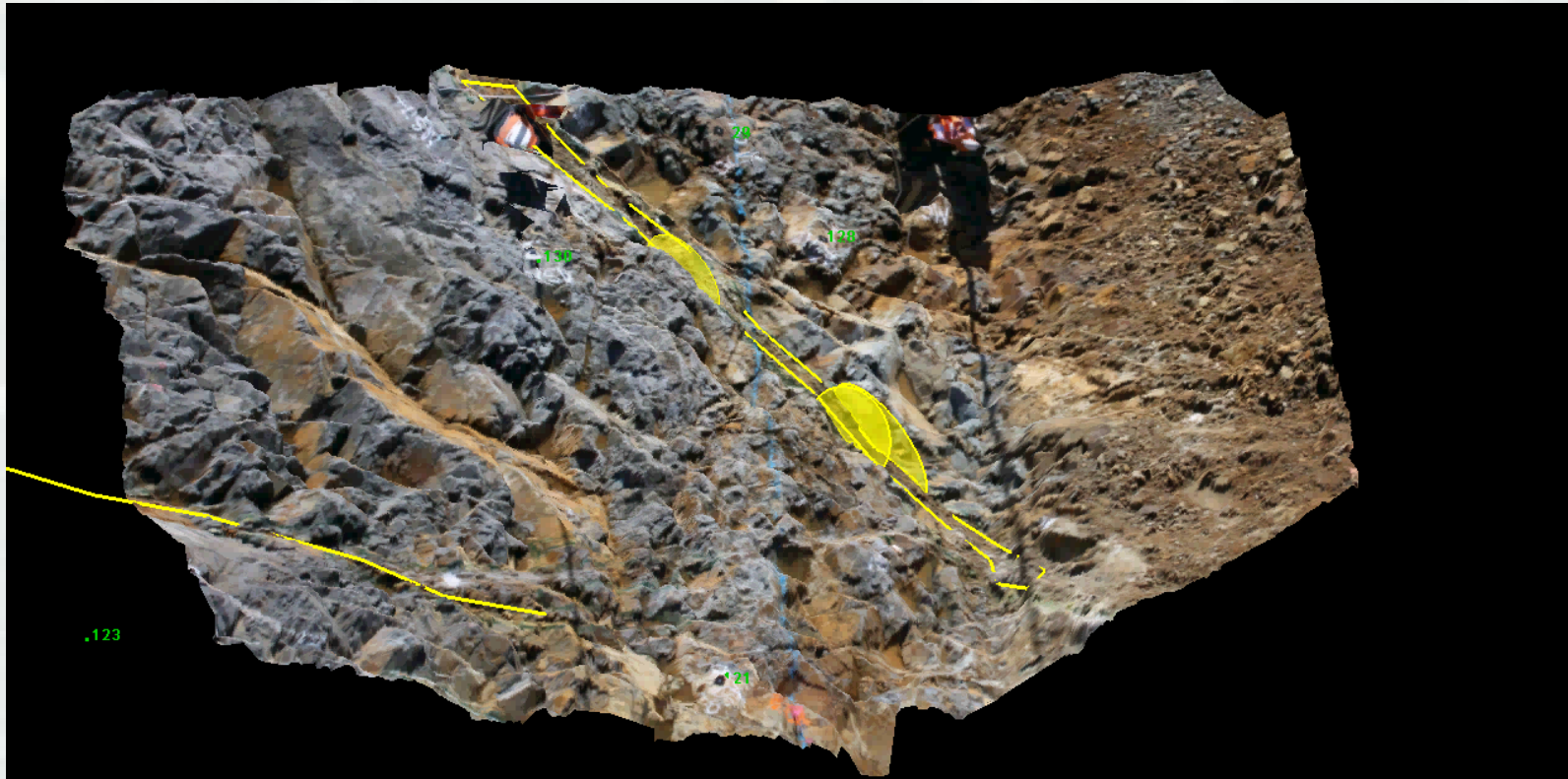


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# 3D Processing and Analysis

- Software processing photos
- Analysis varies with purpose

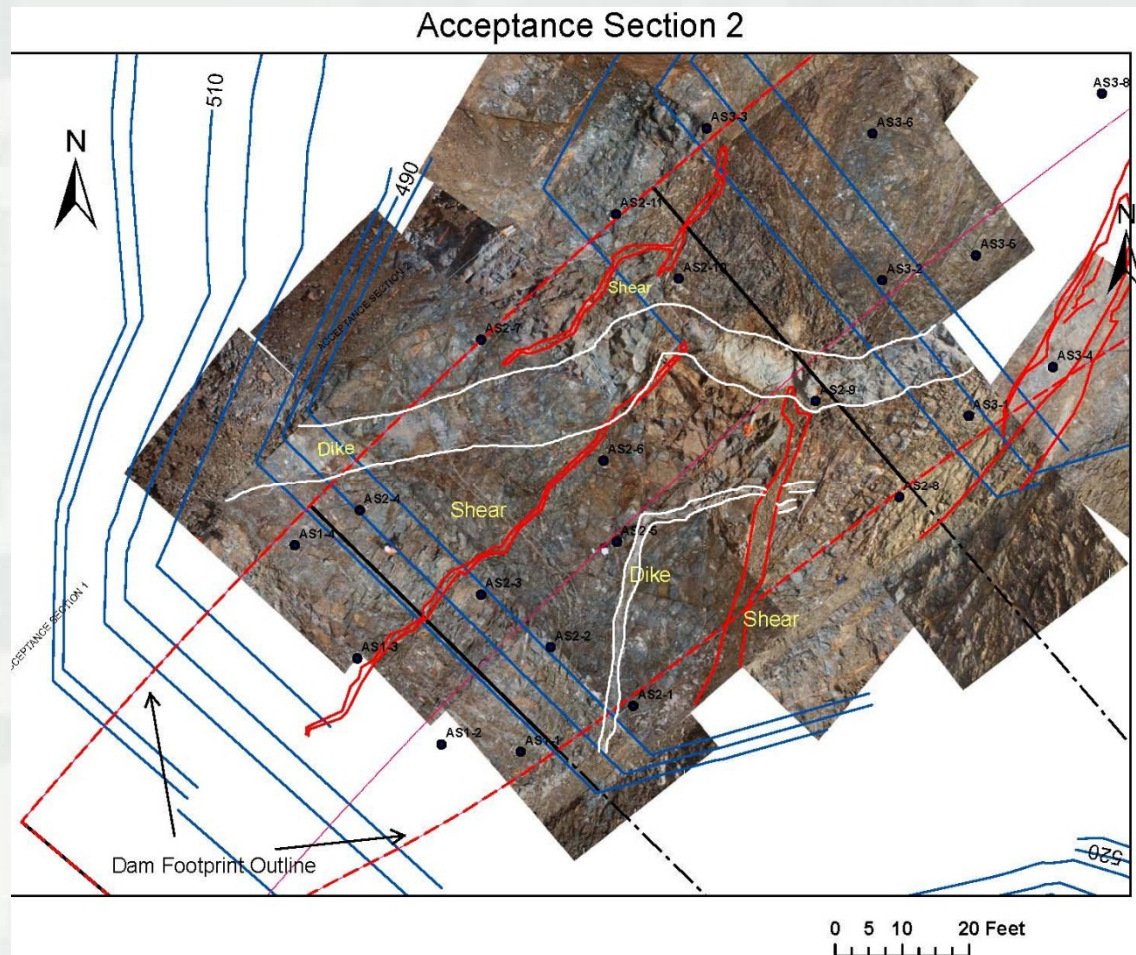


Processed  
photo pair



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# Data Presentation

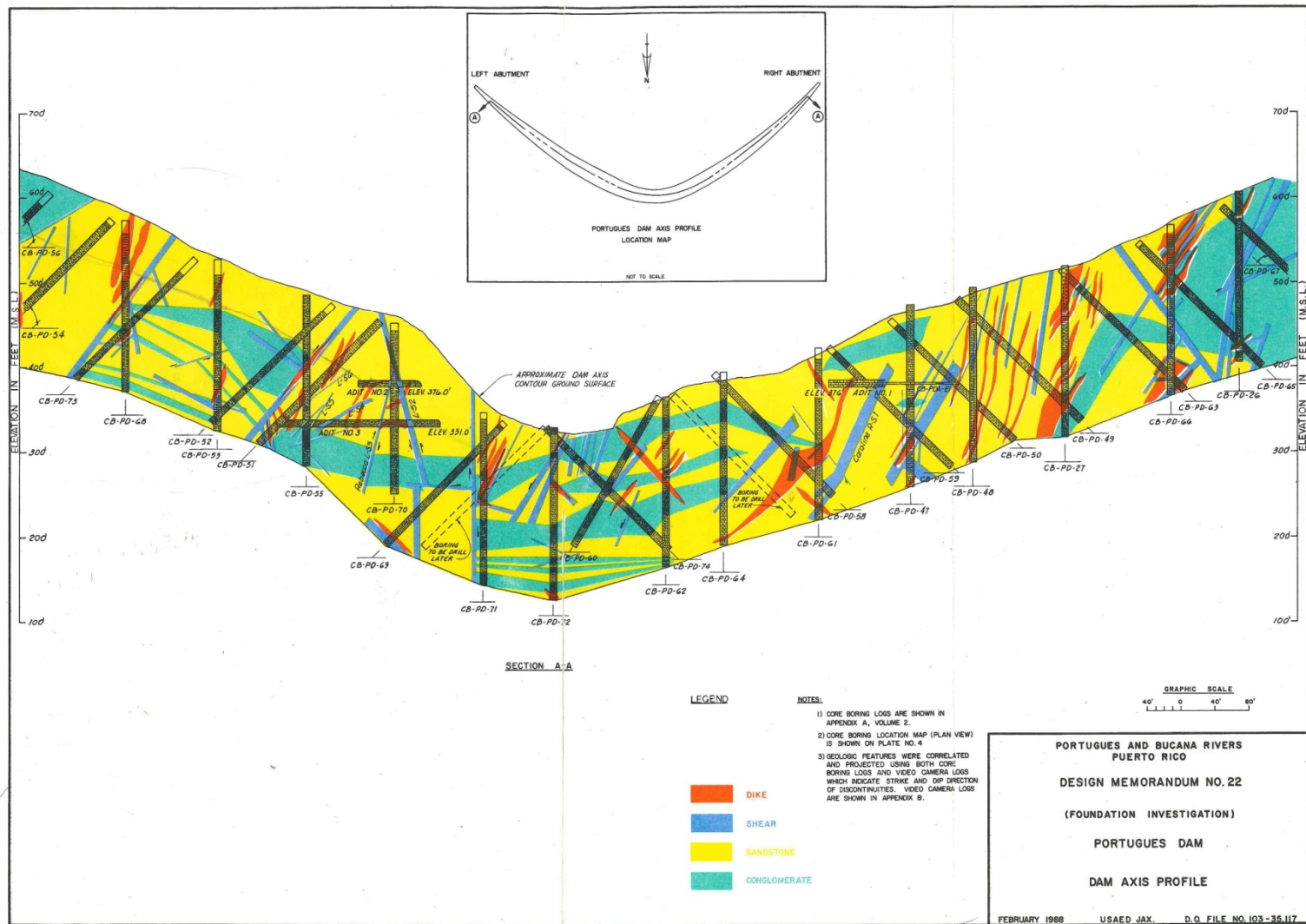


- GIS with numerous presentation possibilities.
- Cross sections projecting shears to boreholes using orientation data.



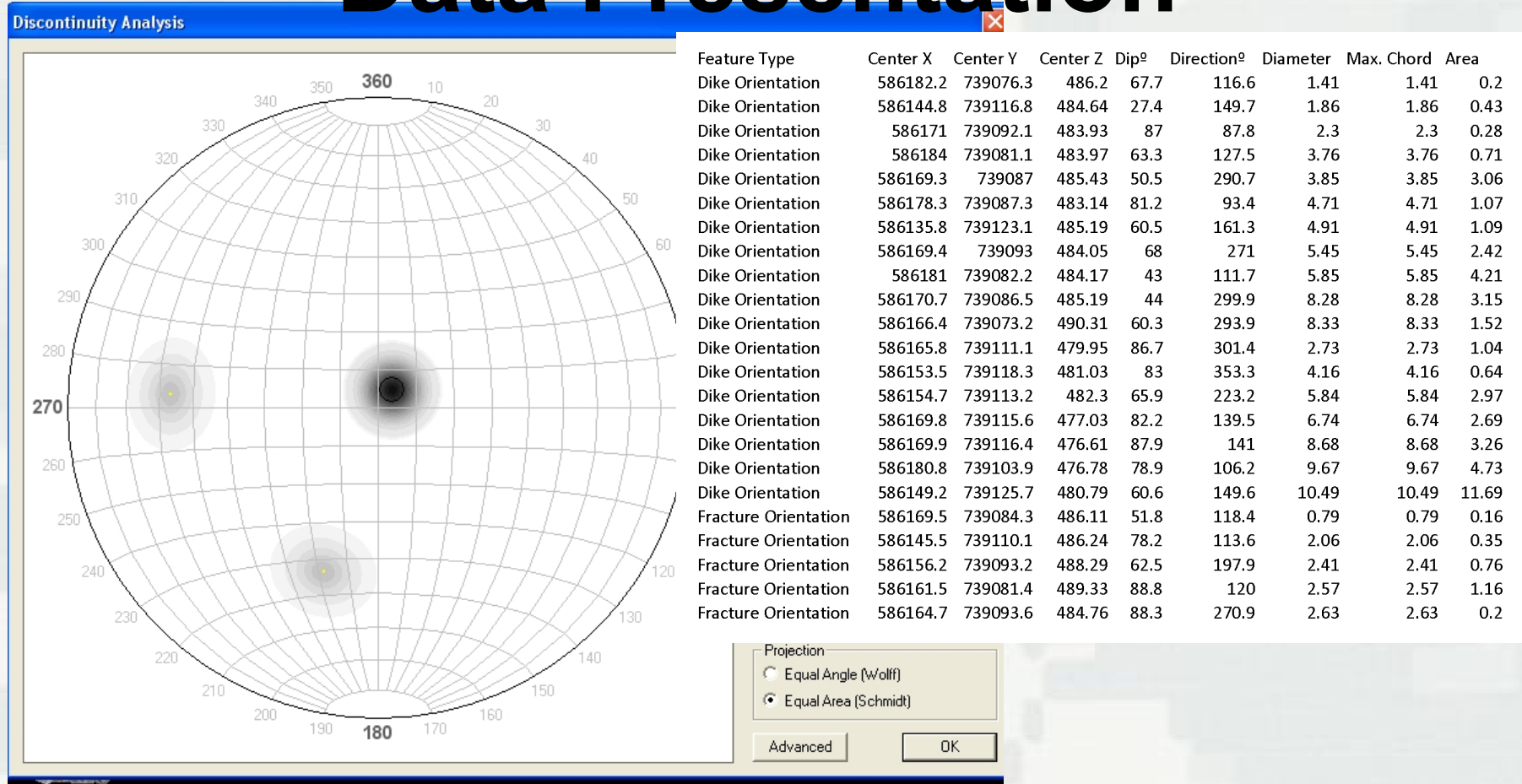
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# Data Presentation



- Stereonet of measured orientations



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# Foundation Preparation Challenges

- Steep Slopes
- Equipment and Personnel Access
- Safety
- Removal of Weathered Materials



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# River Valley Foundation



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# Left Abutment Excavation



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# Excavated Shear Zone



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# Right Abutment Fall Protection



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# Left Abutment Fall Protection



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# Thank You



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