



Oak Creek Water Crossing

Devin Kelley

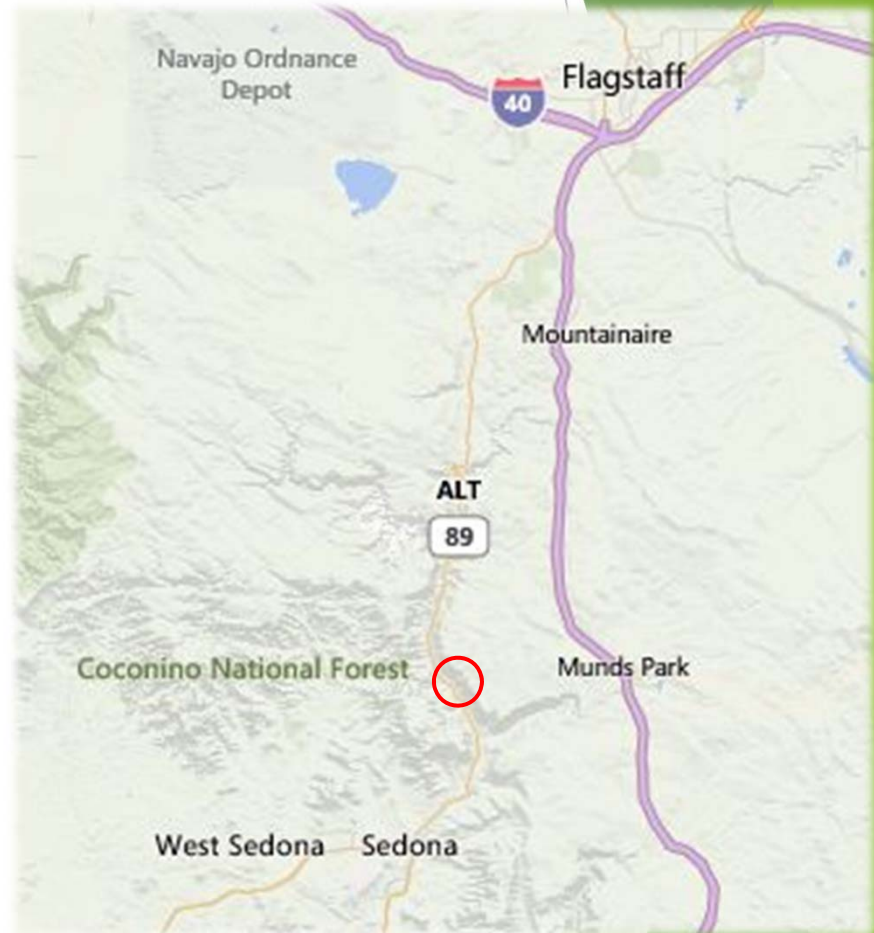
Hilary Sizemore

Fawaz Alotaibi

Bruce Connolly

About the Project

- ▶ Low water crossing through Oak Creek
- ▶ Service the Rancho Mission/Shangri-La Subdivision
- ▶ Floods are problematic in the area
 - ▶ Flood of 1993
- ▶ Only egress and ingress to subdivision



The project site (circled in red) showing its relation to Flagstaff and Sedona

Courtesy of Bing Maps

Needs of the Client

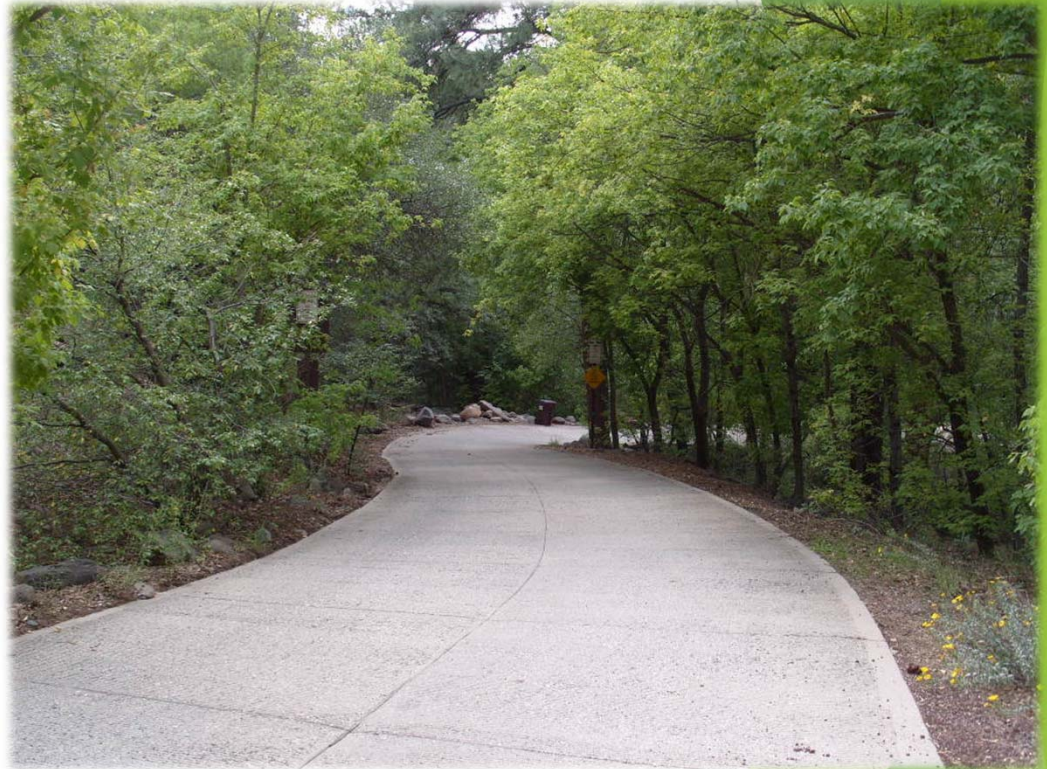
- ▶ Protect the current crossing
 - ▶ Scouring
 - ▶ Stream rerouting
- ▶ Design a new crossing



A view of the downstream apron and bank erosion

Stakeholders

- ▶ Beth Ann Dzierson - Client/Head of HOA
- ▶ Shangri-La residents



The road heading down towards the water crossing

Existing Conditions

- ▶ 40 feet long and 14 ½ feet wide
- ▶ Four 48" concrete culverts
- ▶ Weight limit of 30 tons



The sign shown before⁵ traversing the water crossing

Existing Conditions



The natural beach that formed from deposits can be seen on the left



The crossing as seen from the other side

Foreseen Challenges (Regulations and Required Permits)

- ▶ ADOT
- ▶ ADEQ
- ▶ National Forest Service
- ▶ Game and Fish
- ▶ Army Corps of Engineers
- ▶ Coconino County



Foreseen Challenges (Design)

- ▶ Access to homes
- ▶ Environment
- ▶ Debris buildup
- ▶ Service Life
- ▶ Flooding
 - ▶ Impacts



The narrowness of the crossing can pose a challenge for home access during construction

Foreseen Challenges (Design)



The small culverts could cause buildup of debris to occur during flooding

Scope (Research)

- ▶ Army Corps
- ▶ ADEQ
- ▶ ADOT
- ▶ EPA
- ▶ Forest Service
- ▶ AZ Game and Fish

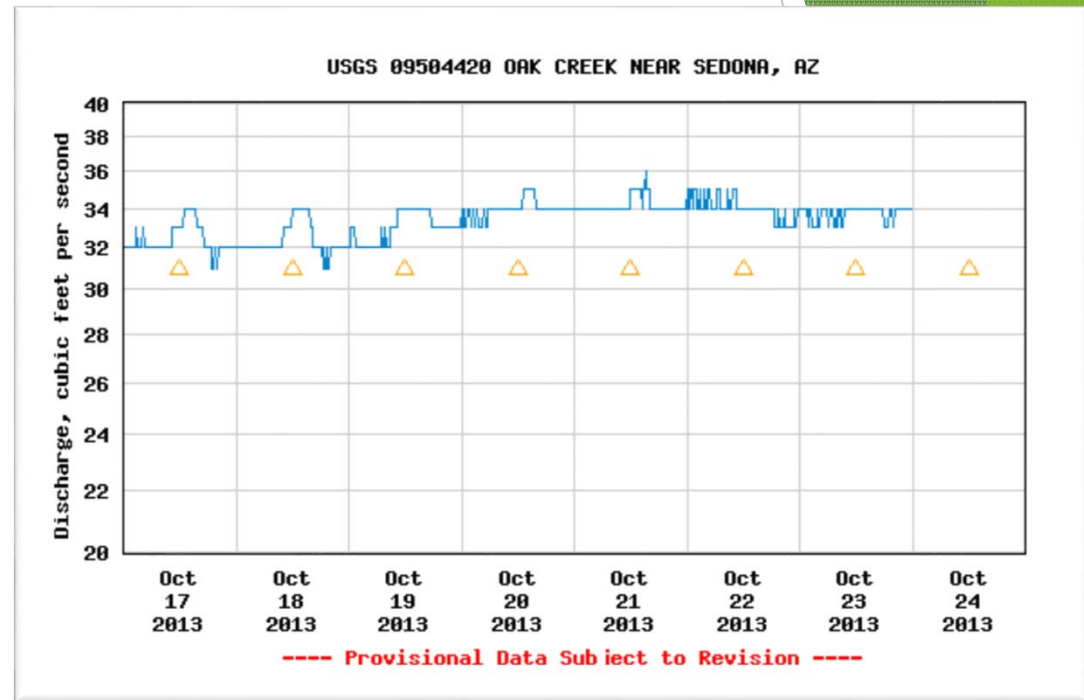
SAFETY



The crossing's surrounding area

Scope (Modeling)

- ▶ HEC-HMS
- ▶ HEC-RAS
- ▶ USGS
- ▶ Land Survey



<http://waterdata.usgs.gov/usa/nwis/uv?09504420>

Scope (Impacts)

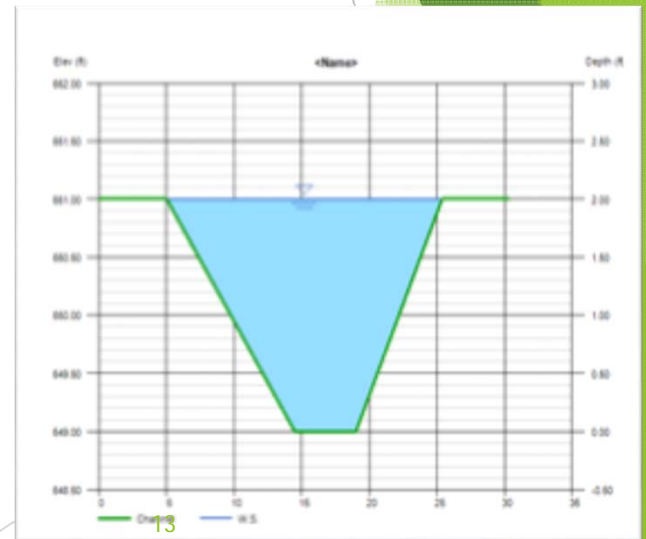
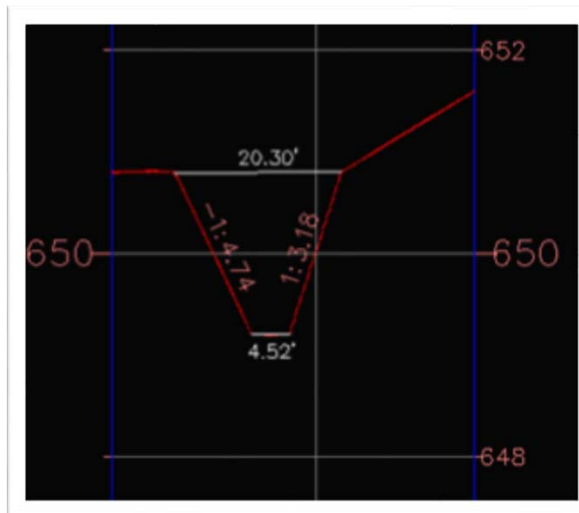
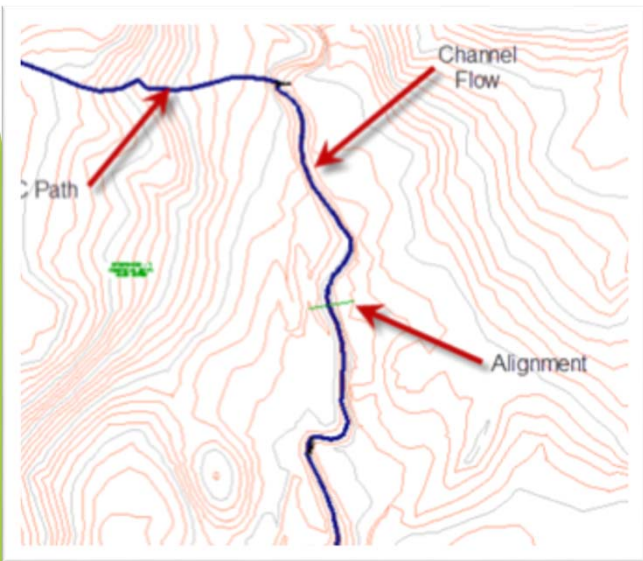
- ▶ Political
 - ▶ Sensitivity
- ▶ Social
 - ▶ Economy



Oak Creek is vital to many aspects of the local community

Scope (Analysis)

- ▶ What is our data and modeling telling us?
- ▶ Use AutoCAD 3D, Culvert Master, HydraFlow, Bentley WaterGEMS
- ▶ What is best for our clients?



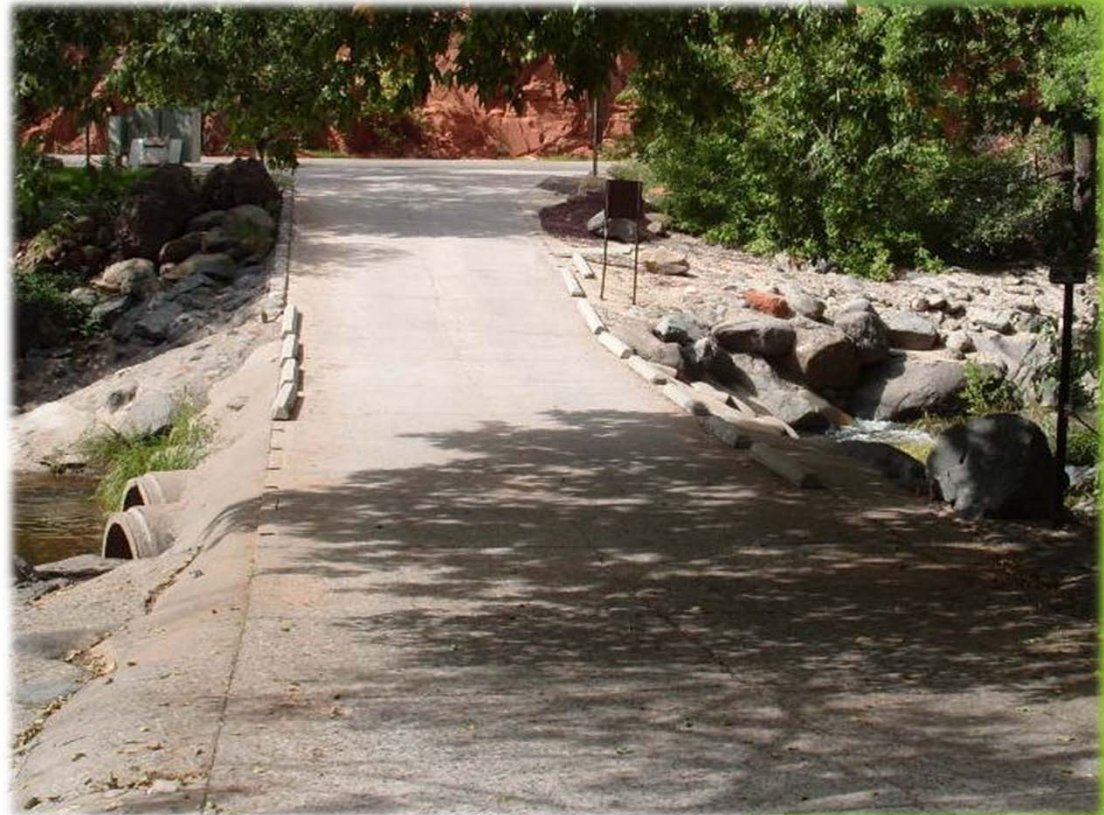
Scope (Design)

- ▶ Review Client's expectations of design
- ▶ Evaluate alternatives
- ▶ Make a calculated decision on design attributes



Scope (Exclusions)

- ▶ Geotechnical Evaluation
- ▶ Traffic Control



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The narrowness of the crossing can be easily seen

Schedule

