

San Simon Barrier Dam Status Update 4

CENE 486C

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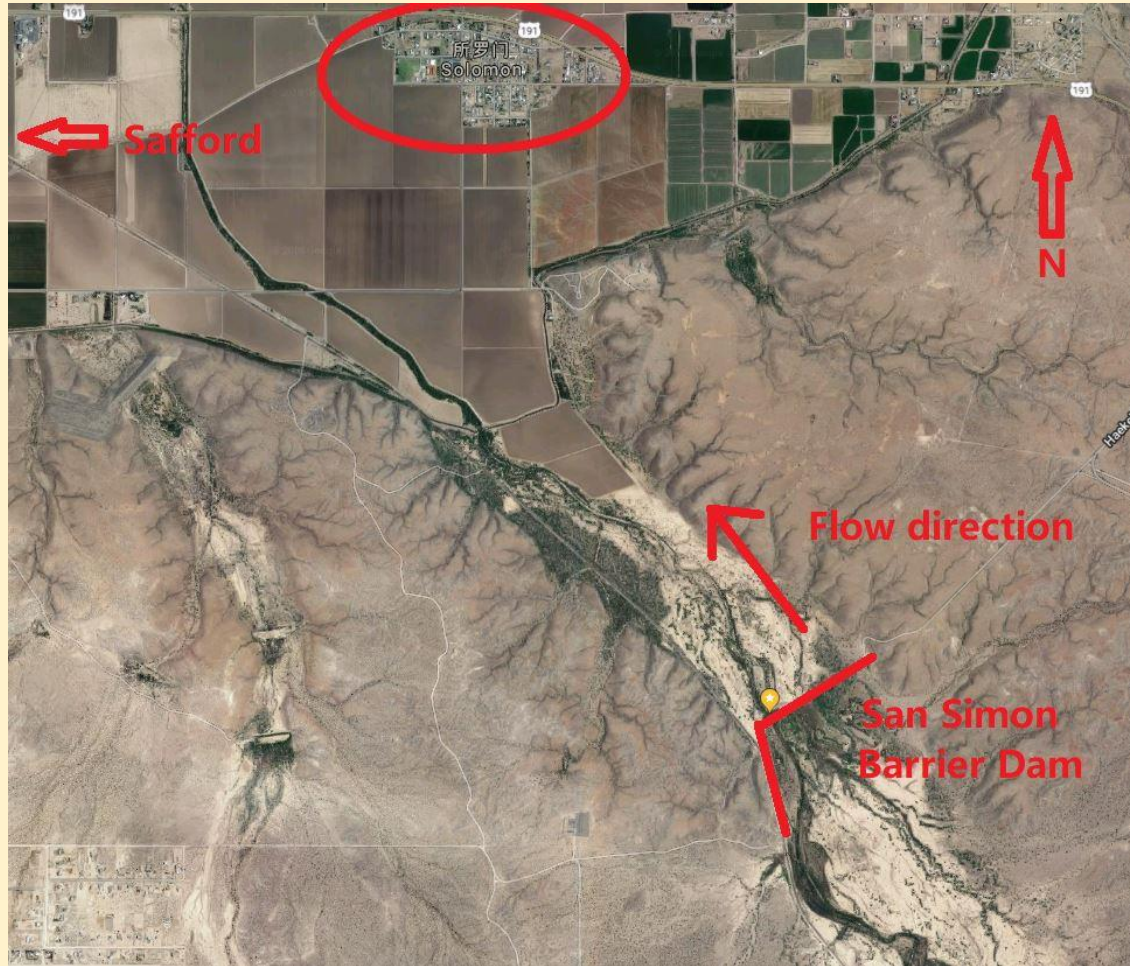
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PROJECT INTRODUCTION



- Location: San Simon Barrier Dam Located in Safford, Arizona
- Client: Bureau of Land Management (BLM)
- Flow analysis
- Determine dam safety rating
- Economic analysis

Figure 1. Map Safford in reference to State of Arizona. [1]

Schedule

Table 1: Schedule of Project

Task #	Task	Original		Actual	
		Start	Finish	Start	Finish
3.4	Unsteady Flow HEC-RAS	3/1/2018	3/19/2018	3/14/2018	3/28/2018
3.5	Sediment Transport Analysis	3/1/2018	3/19/2018	3/15/2018	4/9/2018
3.6	Flood Map- Severity Index	3/1/2018	3/19/2018	3/17/2018	
4.0	Eco-Ecnomic Impact	3/20/2018	4/10/2018	4/4/2018	
4.1	Socio-Ecnomic Impact	4/10/2018	4/25/2018		
4.2	Team Presentation& Report	4/15/2018	4/28/2018		



Dam Video

Work Completed

- Hec-RAS was used to calculate altitude and flow data at different locations.
- Add cross section in ArcGIS map.
- Digital Elevation Model (DEM) data updata has been converted into ArcGIS map.

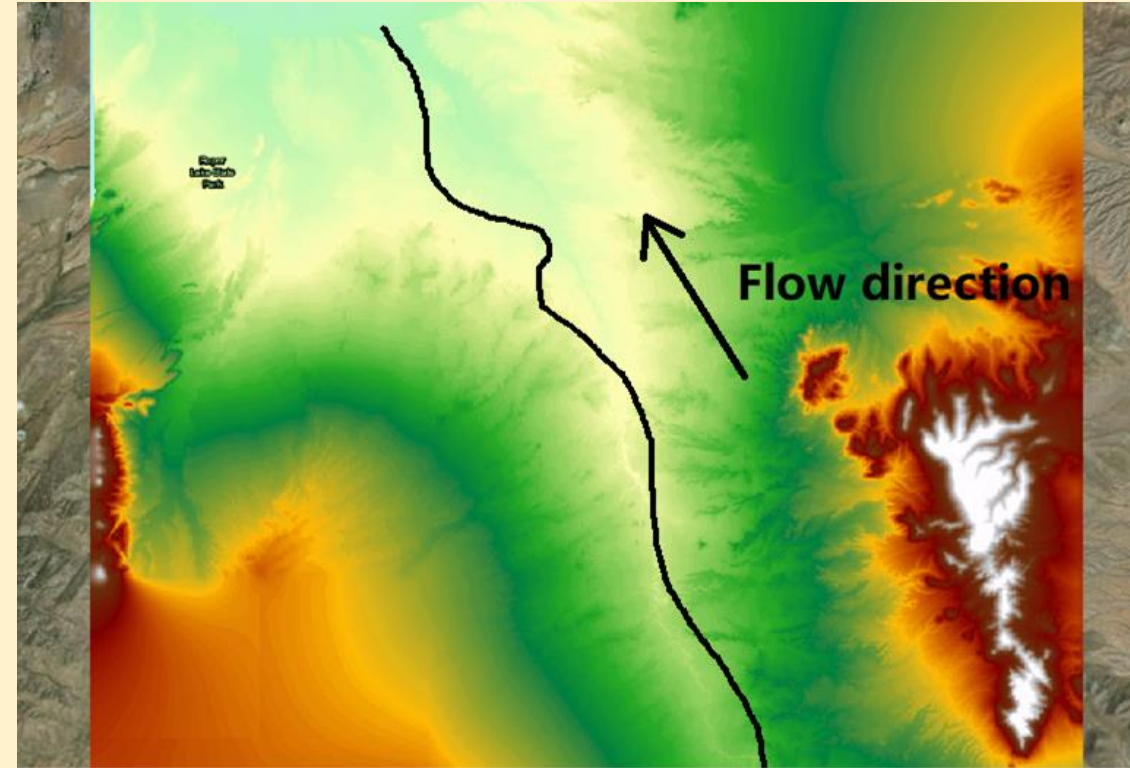


Figure 2. ArcGIS map of San Simon Basin created using HEC-geoRAS extension.[2]

Work Completed

- HEC-RAS Basin (New Version)
- More Cross Section
- More DEM data input



Figure 3. New Version of HEC-geoRAS map[2]

Work Completed

- Contours have been created in HEC-RAS using HEC-geoRAS file.
- Experiencing initial errors due to reach lengths and contour lengths being too short.
- Cross Section of upstream

Cross section#	Distance from end
1	22805.8
28	5779.145
50	2010.196

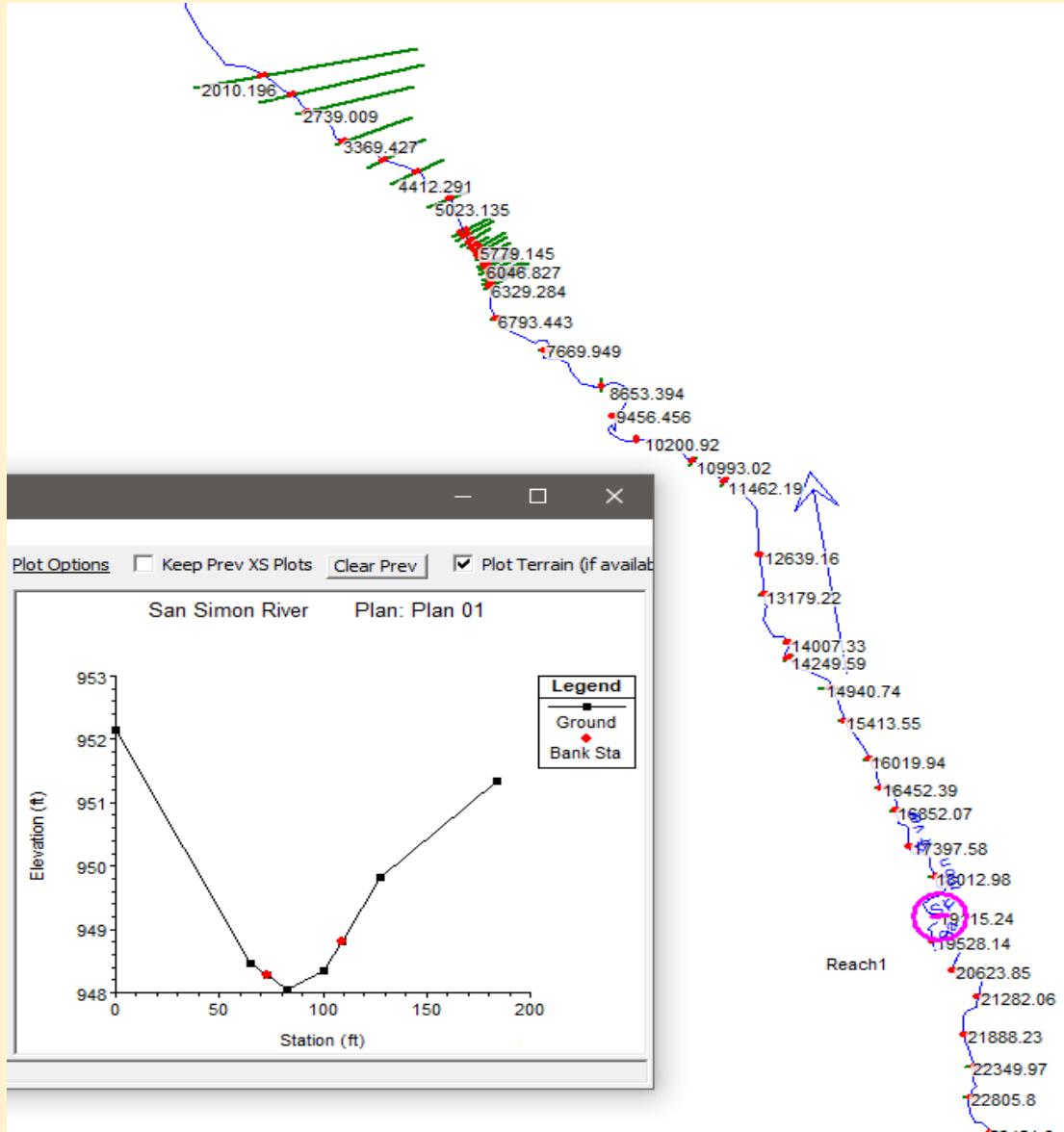
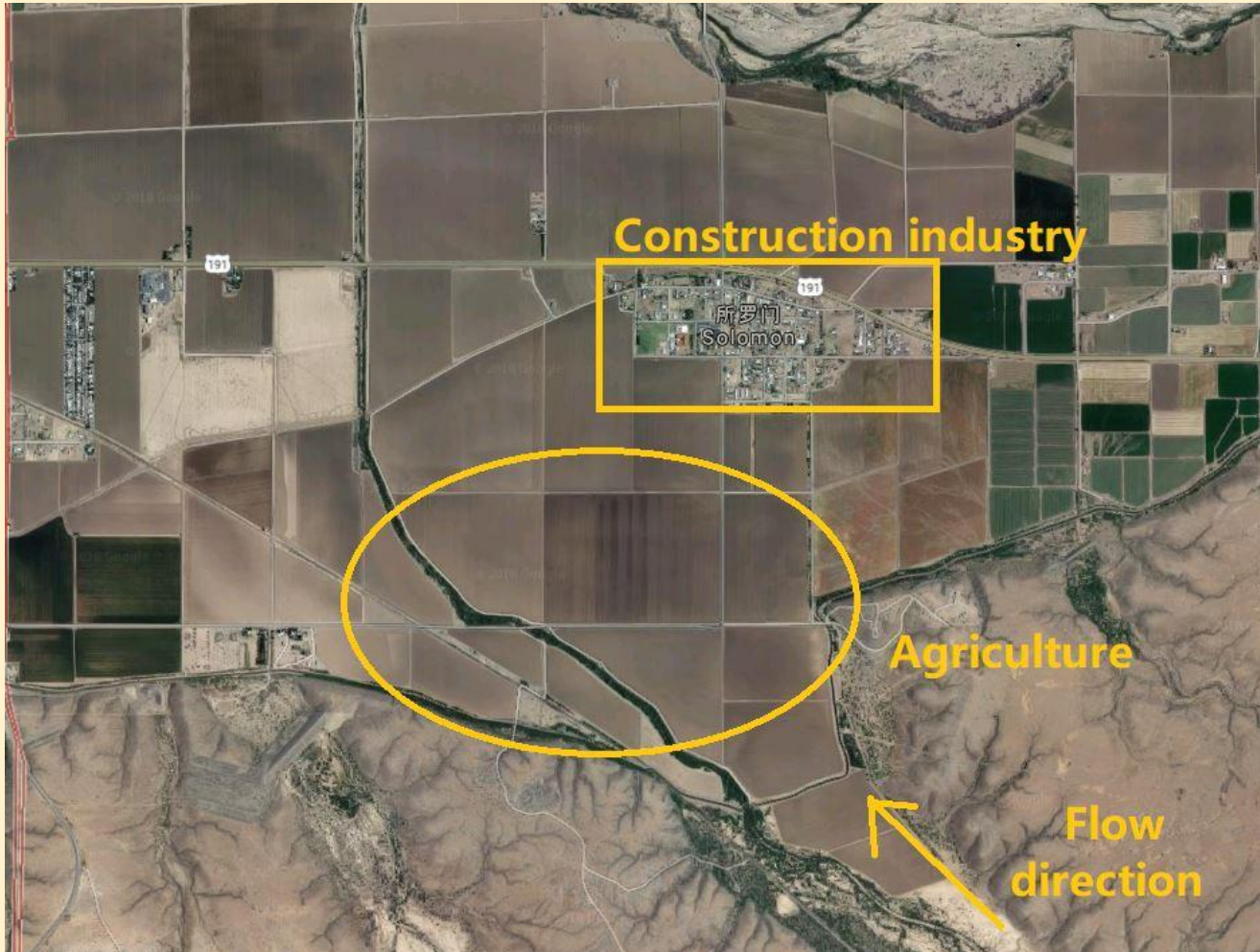


Figure 4. HEC-RAS basin[4].

Future Work



- The analysis of the HEC-geoRAS results in geometric data of the study area (including riverbeds, cross-sections, Channel).
- Obtaining water velocity and depth results from hydraulic calculations.
- Dividing the dam flood inundation area into six regions through analysis.

Figure 5. Affected area near Solomon, AZ [5].

Future Work

Table 2: Criteria of zoning and rates of Property Damage of areas inundated by dam-break flood(RESCDAM)

Area category	Zoning Standard			Property loss rate%	Indirect loss factor(λ / %)
	Submerged depth(m)	Maximum flow rate($m*s^{-1}$)	Flooding duration(h)		
Breakout area	>3.5	>2.0	>12	100	60
Destruction Area	2-3.5	>2.0	>12	90	57
Severe disaster area	1-2	1.0-2.0	>24	Calculated with general flood property loss rate	50
Moderate disaster area	0.5-1	0.5-1.0	>120		45
Light disaster area	0.1-0.5	0.1-0.5	<48		30
Safe area	0-0.1	0-0.1	<0.5	0	10

Dam breach economic loss formula: $S = \alpha W (1 + \lambda)$

- S is the dam economic total loss (\$);
- α is the dam flood loss property loss rate;
- W is the property value (\$) in the submerged area;
- λ is the indirect economic loss conversion factor of dam break;
- αW is the direct economic loss caused by dam collapse.

References

- [1] *Google map*, 2018. [Online]. Available: <https://www.google.com/maps/place/Safford,+AZ/@32.7973682,-109.6232473,5673m/data=!3m1!1e3!4m5!3m4!1s0x86d7f6fc89bf058f:0xeb719602820d6e8b!8m2!3d32.8339546!4d-109.70758?authuser=1>. [Accessed: 01- Apr- 2018].
- [2] Brendan Garrison, San Simon Barrier Dam HEC-RAS model. 2018..
- [3] "USDA:NRCS:Geospatial Data Gateway", [Datagateway.nrcs.usda.gov](https://datagateway.nrcs.usda.gov), 2018. [Online]. Available: <https://datagateway.nrcs.usda.gov/>. [Accessed: 01- Apr- 2018].
- [4] W,Zhijun. M,Xiaotong. "A Method of Estimating Economic Loss Caused by Dam-break", [Ckyyb.crsri.cn](http://ckyyb.crsri.cn), 2018. [Online]. Available: <http://ckyyb.crsri.cn/CN/abstract/abstract2376.shtml>. [Accessed: 01- Apr- 2018].
- [5]C. Wobus, M. Lawson, R. Jones, J. Smith and J. Martinich, "Estimating monetary damages from flooding in the United States under a changing climate", *Journal of Flood Risk Management*, vol. 7, no. 3, pp. 217-229, 2013. [Accessed: 28- Mar- 2018].

Thanks
Any questions?

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