



Sinclair Wash Stream Restoration Feasibility Study

CENE 476



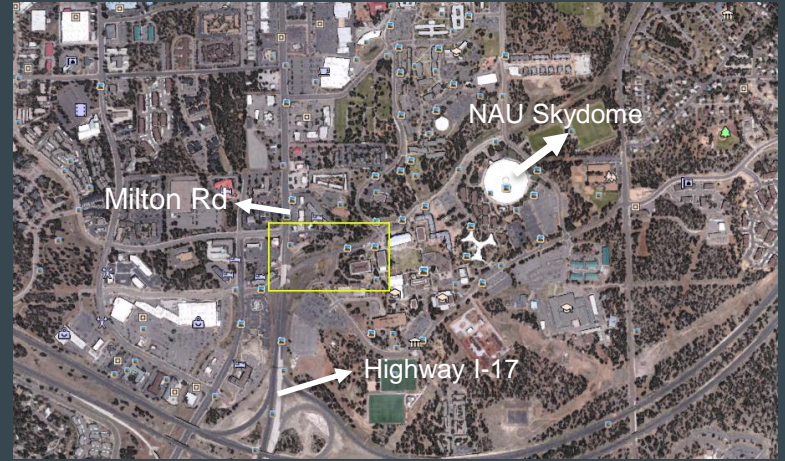
Friday

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Project Overview

- Sinclair Wash Location
- Located in Flagstaff, Northern Arizona
- Runs through the City of Flagstaff and rural parts of the city
- Reach Location



Sinclair Wash Reach map [1]



Detailed Reach Location [2]

Project Overview

- Sinclair Wash Condition
- Sinclair Wash used as a recreational trail
- Convey Stormwater
- Erosion
- Flooding
- Infrastructure Disfunction



Flooding in Sinclair Wash
Arizona Daily Sun [3]

Project Stakeholders



- City of Flagstaff
- Arizona Department of Transportation
- Northern Arizona University
- Coconino County
- City of Flagstaff Community
- Arizona Game and Fish Department



Scope of Service

Task 1.0 Field Assessment

1.1 Site Visit

1.2 Sinclair Wash Documentation

1.3 Infrastructure overall assessment



Culverts in Sinclair Wash [4]

Scope of Service (cont)

Task 2.0 Data Collection

2.1 Surveying

2.2 Acquire Sinclair Wash Maps

2.3 Vegetation in Sinclair Wash

2.4 WildLife in Sinclair Wash



Section of Sinclair Wash [5]

Scope of Service (cont)

Task 3.0 Data Analysis

3.1 Geomorphic Assessment

3.2 Hydraulic Assessment

3.2.1 HEC-RAS Model

3.2.2 Bentley FlowMaster Model



HEC-RAS Software [6]



Bentley Flowmaster Software [7]

Scope of Service (cont)

Task 4.0 Design Alternative

4.1 Low Water Crossing

4.1.1 Analyze Curent Crossings

4.1.2 Propose New Design



Low Water Crossing at Sinclair Wash [8]



Low Water Crossing at Sinclair Wash [9]

Scope of Service (cont)

Task 5.0 Project Management

5.1 Project Meetings

5.2 Project Submittals

- 50 % Report
- Website
- Final Report
- Presentation



Project Exclusions

- Hydrological Analysis
- Geotechnical Analysis
- Project Construction



Project Impact

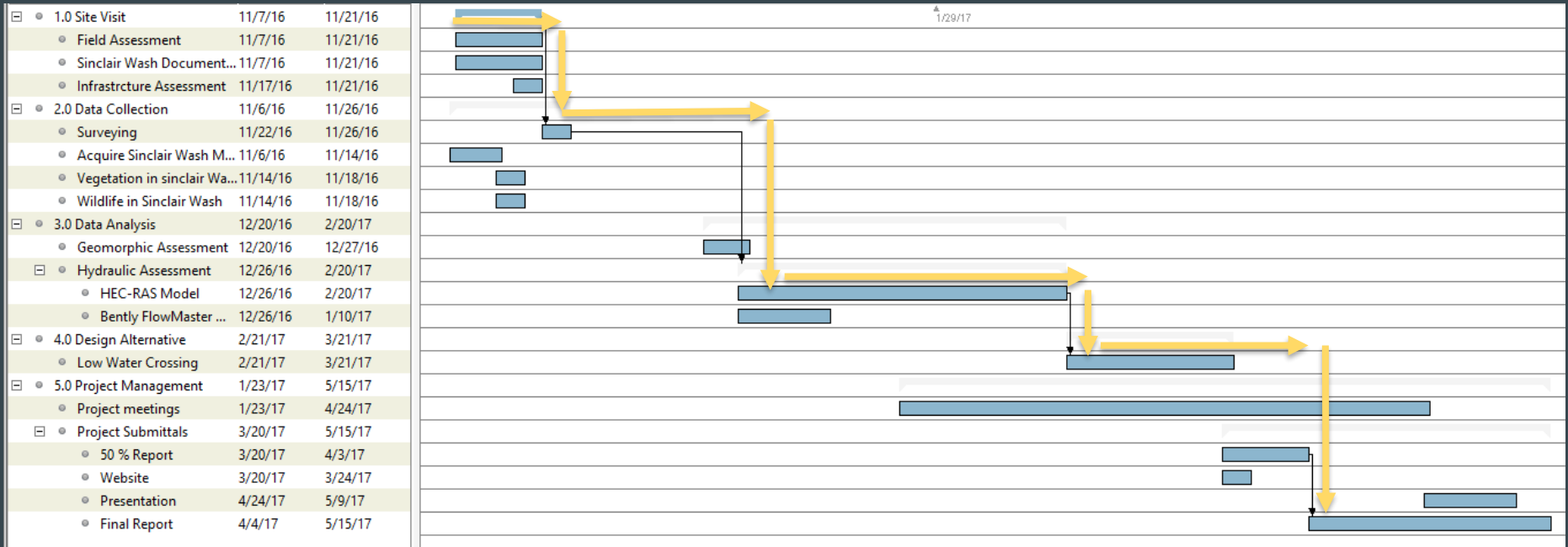
- Environmental impact
- Economical Impact
- Social Impact



Recreational activity at Sinclair wash [10]

Project Schedule

- Schedule shows Project Major Tasks
- Project Critical Path



Project Staffing

Task	Project Manager Hours	Project Engineer Hours	Lab Technician Hours	Engineer in Training	Intern Hours
1.0 Filed Assessment	3	5	15	20	35
2.0 Data Collection	1	20	85	90	55
3.0 Data Analysis	2	30	35	95	75
4.0 Design Alternative	2	25	20	10	35
5.0 Project Management	72	50	35	5	35
Total	80	130	190	220	235

- Total Project Hours 855 Hours

Cost of Engineering Service

Personnel	Classification	Hours	Rate (\$/hr.)	Cost
	Project Manger	80	145	11,600
	Project Engineer	130	85	11,050
	Lab Technician	190	65	14,300
	Engineer in Training	220	70	13,300
	Intern	235	17	3,995
Surveying Equipment		20	130	2,600
Total				56,845

Questions?

References

[1] Google Earth Software.

[2] Google Earth Software

[3]J. Reporter, "Flagstaff sees scattered flooding from downpours", *Arizona Daily Sun*, 2016. [Online]. Available: http://azdailysun.com/news/flagstaff-sees-scattered-flooding-from-downpours/article_0cc7c469-66ab-576d-b641-82ad05600fc8.html. [Accessed: 30- Nov- 2016].

[4],[5] photo credit Abdullah Alsalman

[6]"HEC-RAS", *Hec.usace.army.mil*, 2016. [Online]. Available: <http://www.hec.usace.army.mil/software/hec-ras/>. [Accessed: 30- Nov- 2016].

[7]"Hydraulic Calculator - Open Channel, Pipe, Weir - FlowMaster", *Bentley.com*, 2016. [Online]. Available: <https://www.bentley.com/en/products/product-line/hydraulics-and-hydrology-software/flowmaster>. [Accessed: 30- Nov- 2016].

[8] photo credit Abdullah Alsalman

[9] photo credit Abdullah Alsalman

[10] "City Of Flagstaff Official Website - Sinclair Wash Trail". *Flagstaff.az.gov*. N.p., 2016. Web. 6 Dec. 2016.