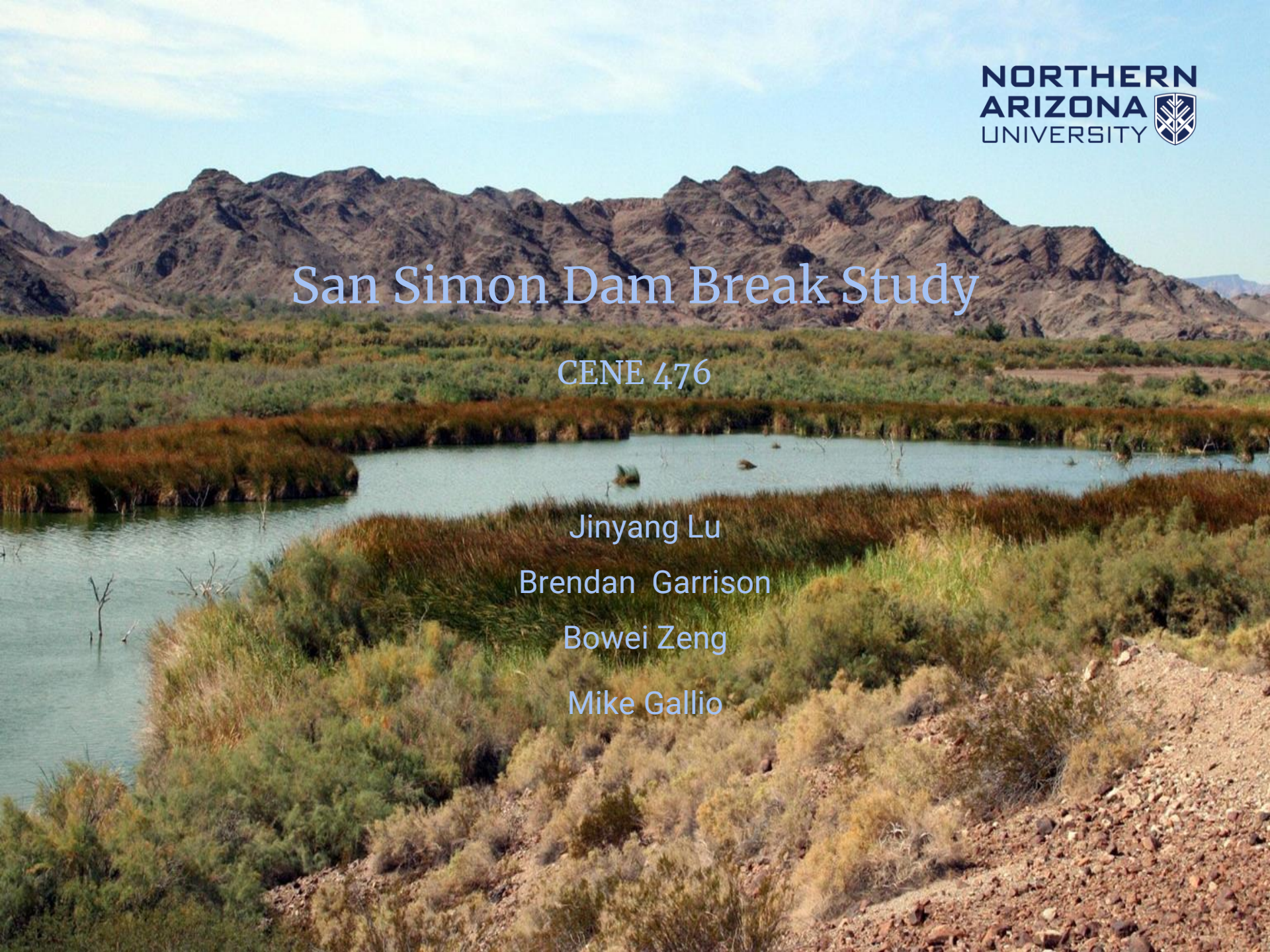

San Simon Dam Break Study

CENE 476

Jinyang Lu

Brendan Garrison

Bowei Zeng

Mike Gallio

Project Understanding

- Stakeholders
  - The Bureau of Land Management
  - The Town of Solomon and Safford
  - Northern Arizona University
  - The student engineers
- Grading Instructor
  - Mark Lamer, PE
- Tech Advisor
  - Dr. Wilbert Odem, PE

Figure 1. Town of Safford on map of Arizona.

Location of Target Dam

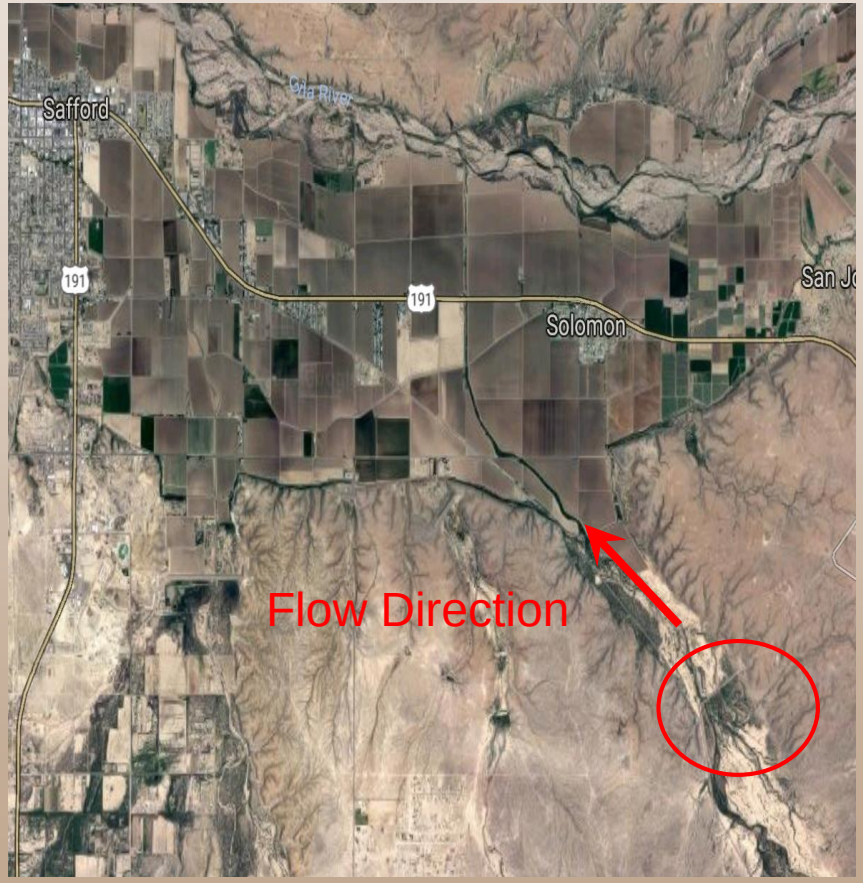

Figure 2. Location map of San Simon Barrier Dam near Safford, AZ, BLM.

Scope of Project

- Field visit and survey of dam structure.
- Gather topographic data and rainfall data.
- Model and run a one-dimensional dam breach analysis in HEC-RAS.
- Conduct an economic analysis.
- Create an affected area map showing the flood zone and severity.

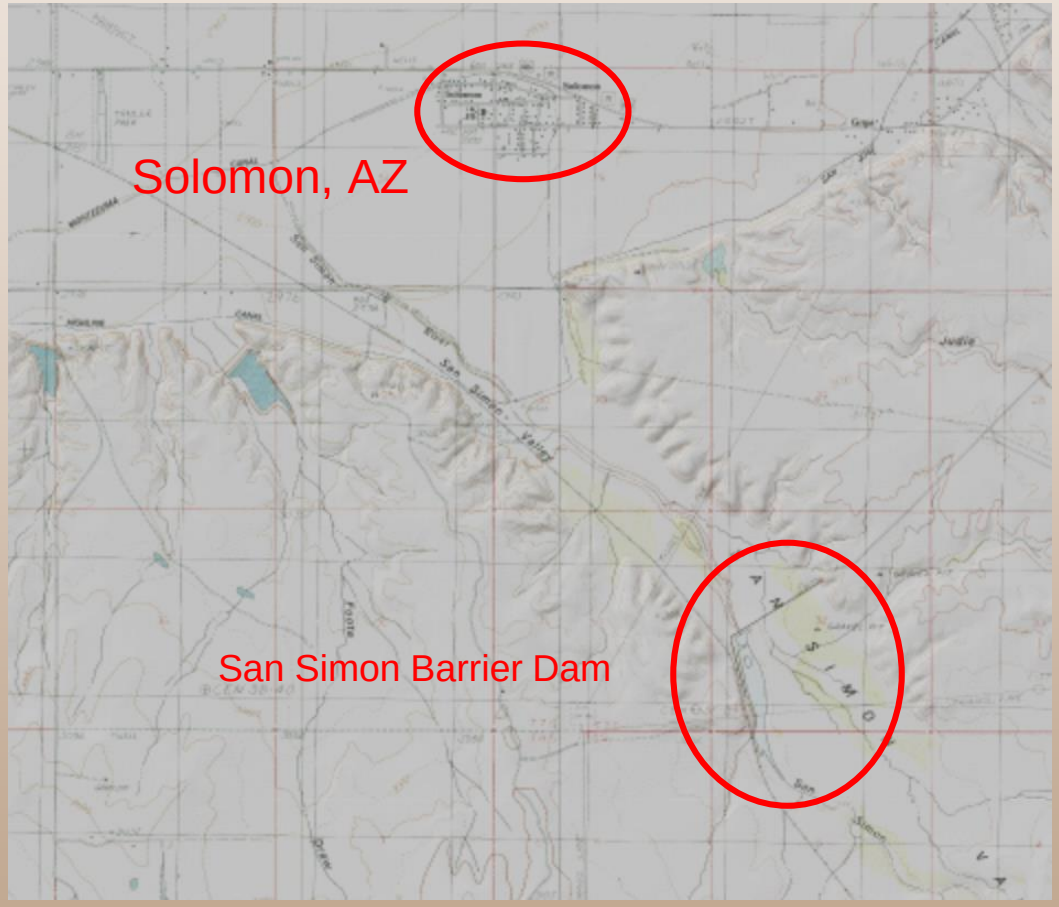

Figure 3: Topographic map of San Simon Barrier Dam to Solomon, AZ.

HEC-RAS Model

- Geometric parameters
- Routing and reservoir effect
- Failure methods
- Peak flow estimation
- Steady flow analysis
- Unsteady flow analysis
- Sediment Transport

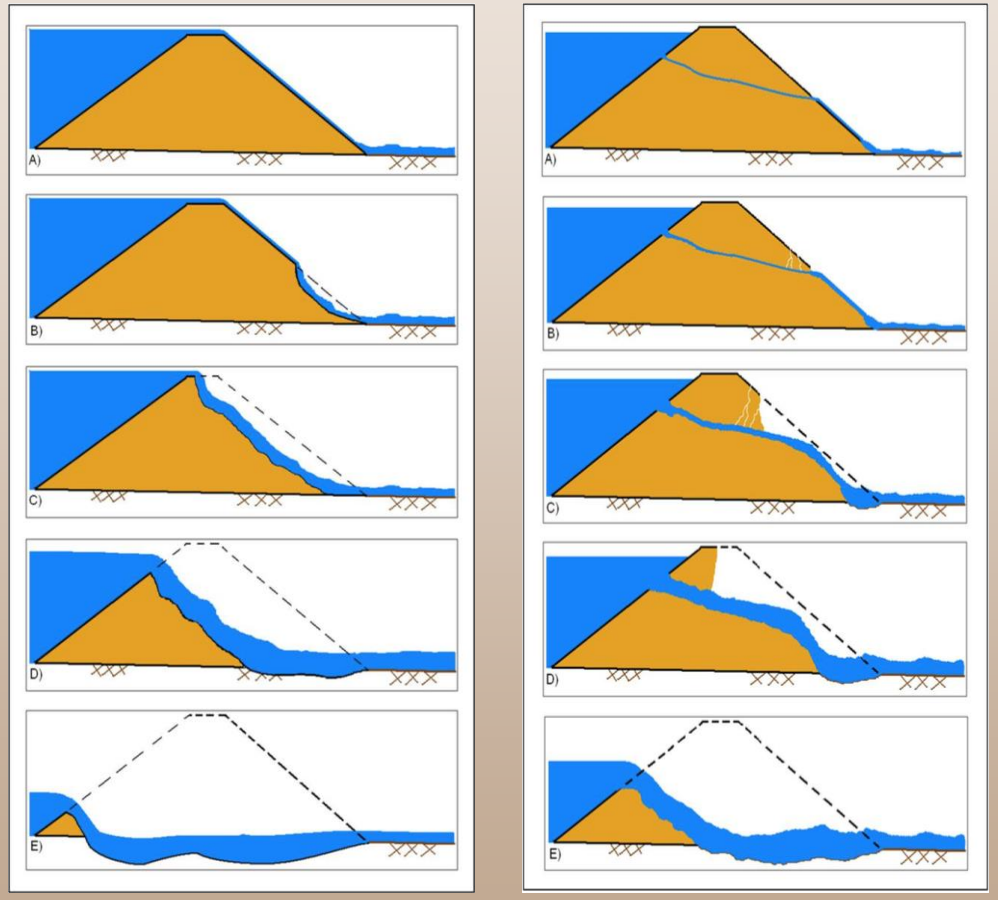

Figure 4. Example breach process for overtopping and piping failure.

Economic Analysis

- Create a flow map of the affected area.
- Gather together a cost estimate for damaged or negatively affected:
  - Roadways
  - Buildings
  - Infrastructure
  - Agriculture
  - Vehicles
  - Equipment
  - Revenue
  - Taxes

Figure 5. Sample flooding to be expected from SSBD break.

Project Schedule

	Task Name	Duration	Start	Finish	Predecessors	Resource Names
1	**Field Investigation**	4 days	Wed 1/17/18	Sun 1/21/18		
2	**Hydrology**	5 days	Mon 1/22/18	Fri 1/26/18	1	
3	**Hydraulic Analysis**	45 days	Mon 1/29/18	Fri 3/30/18	2	
4	Geometric Parameters	3 days	Sat 1/27/18	Tue 1/30/18		
5	Routing and Reservoir Effect	3 days	Wed 1/31/18	Fri 2/2/18		
6	Dam Breach Failure Method	3 days	Sat 2/3/18	Tue 2/6/18		
7	Piping Failure	3 days	Thu 2/8/18	Mon 2/12/18		
8	Overtopping Failure	3 days	Tue 2/13/18	Thu 2/15/18		
9	Peak Flow Estimation	3 days	Fri 2/16/18	Tue 2/20/18		
10	Steady Flow Analysis	6 days	Wed 2/21/18	Wed 2/28/18		
11	Unsteady Flow Analysus	15 days	Thu 3/1/18	Wed 3/21/18		
12	Sedimnt Transport Analysis	3 days	Thu 3/22/18	Mon 3/26/18		
13	Flood Map	3 days	Tue 3/27/18	Thu 3/29/18		
14	**Socio-Economic Impacts**	15 days	Mon 4/2/18	Fri 4/20/18	3	
15	Define Flood Concern Area	4 days	Thu 3/29/18	Tue 4/3/18		
16	Considered Loss Sources	4 days	Wed 4/4/18	Mon 4/9/18		
17	Map of AO	8 days	Mon 4/9/18	Wed 4/18/18		
18	**Project Deliverables**	16 days	Wed 4/18/18	Wed 5/9/18	4	
19	DBA Report	11 days	Wed 4/18/18	Wed 5/2/18		
20	Presentation	5 days	Thu 5/3/18	Wed 5/9/18		
21	**Project Management**	85 days	Mon 2/5/18	Fri 6/1/18	5	
22	Meetings	85 days	Mon 1/15/18	Fri 5/11/18		
23	Website	5 days	Mon 5/7/18	Fri 5/11/18		

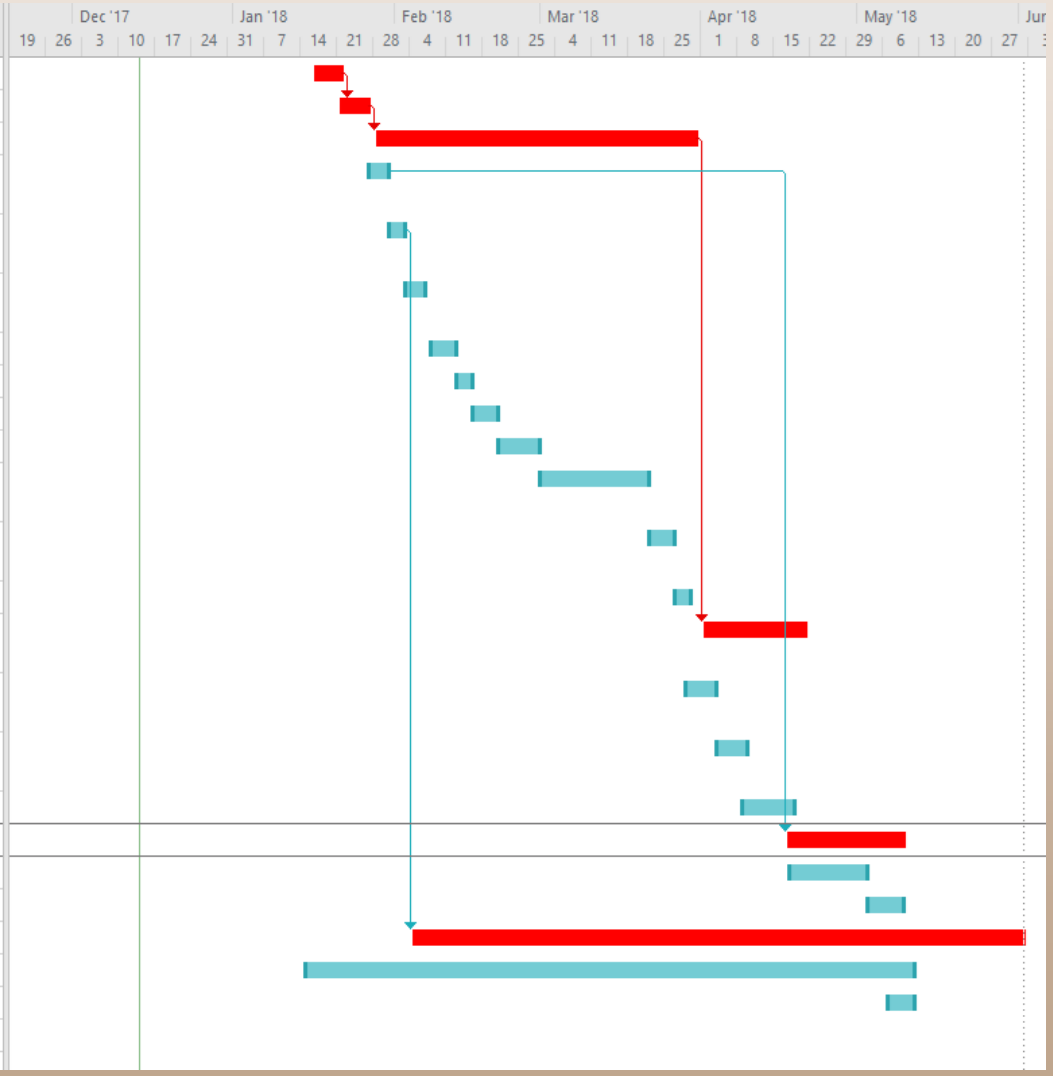

Figure 6. Project schedule on Gantt chart, January 16, 2018 - May 5, 2018.

Personnel Hours

- Senior Engineer (SENG)
- Project Engineer (PE)
- Lab Technician (Lab)
- Engineer in Training (EIT)
- Administrative Assistant (AA)

Table 1. Personnel costs table.

	Cost Per Hour	Estimated #of Hours	Estimated Cost For Project
SENG	$194.00	38	$7,372.00
PE	$67.00	147	$9,849.00
Lab	$48.00	20	$960.00
EIT	$22.00	251	$5,522.00
AA	$56.00	39	$2,184.00
Sum			$25,887.00

Costs of Services

	Staff (hrs.)					Task
Task	SENG	PE	Lab	EIT	AA	Total
Feild Investigation	2	8	1	20	1	32
Hydrology	2	10	3	14	3	32
Hyraulic Analysis	3	12	3	12	3	33
Geometric Parameters	1	6	2	9	1	19
Routing/Resivour Effect	2	10	1	14	2	29
Dam Breach Failure Methods Parameters	4	12	2	35	3	56
Peak Flow Estimation	1	8	2	12	3	26
Steady Flow Analysis	2	10	1	15	1	29
Unsteady Flow Analysis	6	20	3	40	5	74
Sediment Transport Analysis	4	10	1	15	3	33
Flood Map-Severity Index	4	15	1	20	6	46
Socio-Economic Impacts	3	10	0	18	3	34
Define Flood Concern Area	2	6	0	12	2	22
Considered Loss Sources	2	10	0	15	3	30
Map of AO With Districts and Structures	1	9	2	15	2	29
Project Deliverables	4	20	4	40	10	78
Project Mangament Meetings	10	10	10	10	10	50
Website	2	6	1	20	3	32
Totals	38	147	20	251	39	684

Table 2. Personnel hourly breakup table.

Costs of Services

- The total costs of services includes:
  - Vehicle costs
    - Van rental
  - Equipment costs
    - Desert vehicle
    - GPS devices
  - Lodging

Hotel for 5 people x 2 nights

Item	Cost ($/unit)	Units	# Units	Cost ($)
Van Rental	80	Day	3	$240.00
Equipment	60	Day	2	$120.00
Lodging	40	Room/person /day	10	$400.00
Total				**$760.00**

Table 3. Cost table for costs of service.

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Questions?