CENE 476 CAPSTONE DESIGN Crossed Arrow Engineering

Dewey Site Design

Kewei Ren
Danielle Tom
Lanceford Quotskuyva
Daniel Langsmith

FIGURE 1

Background

FIGURE 2

- 5-acre lot
- Lot Number 402-04-275C
- Engineering services for a SFR lot
- 2 ft ditch adjacent to site

Background

Figure 3 Site Area Map

Purpose

Provide engineering services

Create a site design, drainage system design grading plan for client

Client

Taylor Layland, REMAL Consulting

Taylor@remalconsulting.com

Stakeholders

- NAU
- Town of Dewey Humboldt
- Opolski Rachelle R & Robbins William G JT

Location

11800 E Prescott Dells Ranch Rd

Background and Survey

Task 1: Background Research

- Obtain and review existing reports/data and code

Task 2: Site Investigation

- Assessment of existing site conditions and environment
- Required forms/documents:
  - NAU safety checklist
  - Field safety training
  - Tools list

Task 2.1 Field Surveying

- Survey of site, processing of data, and collection of any necessary soil samples

Figure 4

Analysis

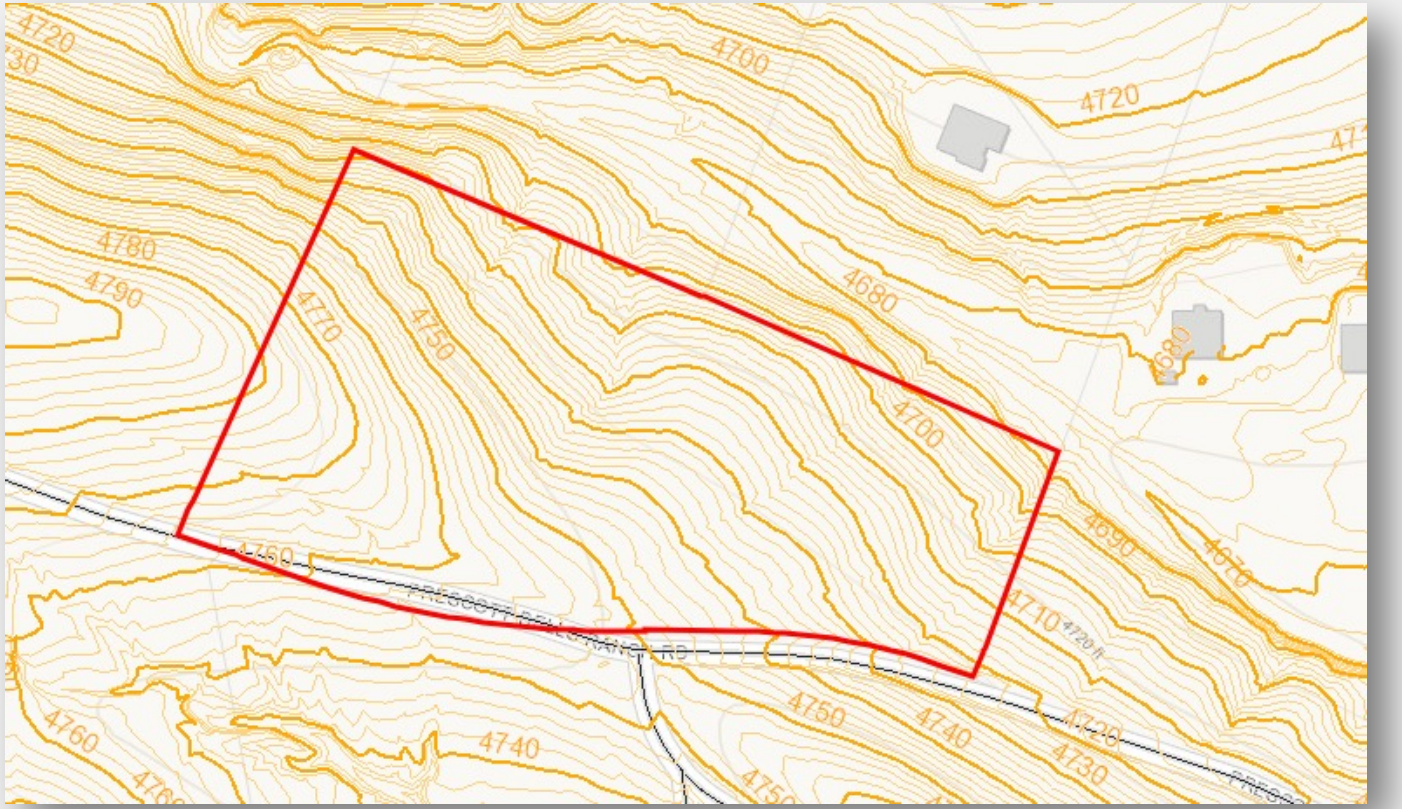


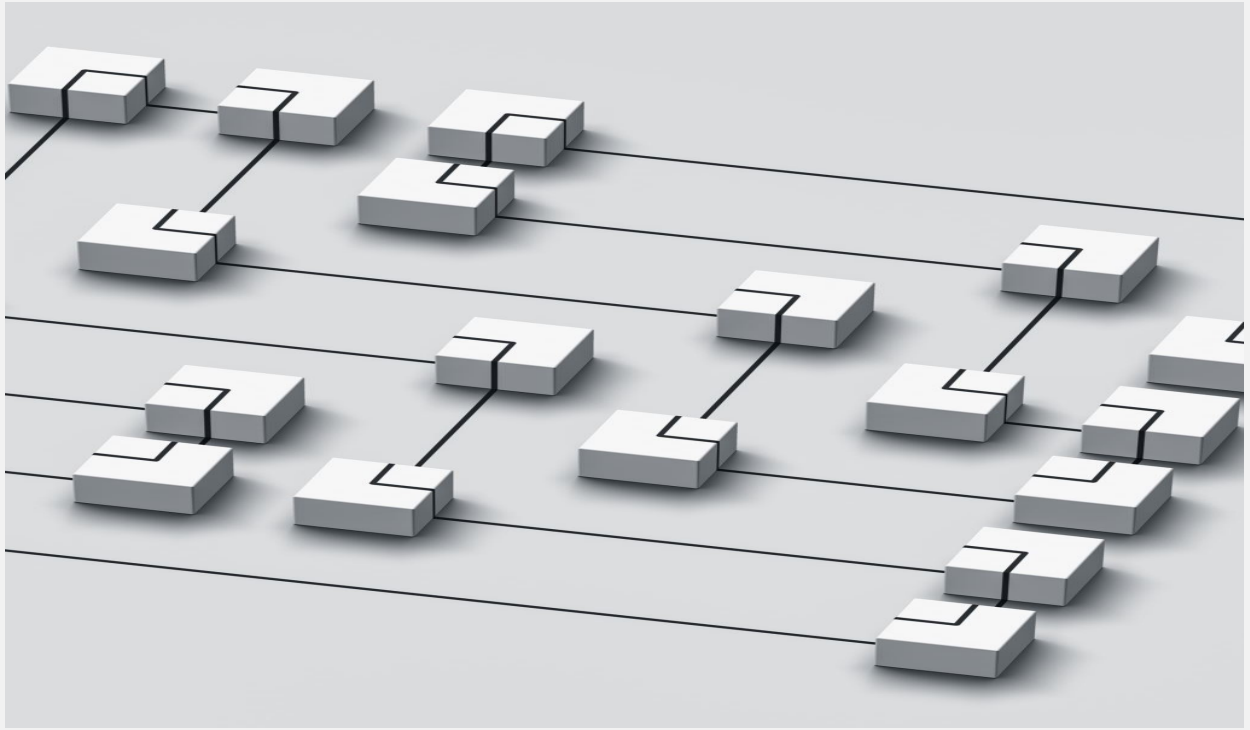
Figure 5

Task 3: Geotechnical Analysis

- Obtain Lab Access
  - CENE Laboratory Plan Binder
  - Using CENE laboratories
- Analyze Samples
  - Site Work Plan
    - ASTM D6913 Sieve analysis
    - ASTM 4318-17 liquid and plastic limit
- Develop Geotechnical Report

Analysis

- **Task 4: Hydraulic Analysis**
  - **Review Existing Drainage Plan**
  - **Determine Existing Channel Capacities Channel *Analysis***
  - **Design Recommend ed Channel Modifications**



Task 4: Hydraulic Analysis

4.1 Review Existing Drainage Plan

4.2 Determine Existing Channel Capacities Channel Analysis

4.3 Design Recommended Channel Modifications

Construction Plan

Task 5: Construction Plans

- Cover Sheet
- Existing Plans
  - ➢ *Predeveloped conditions*
- Proposed Plans
  - ➢ *Plan and Profile*

Task 6: Impact Analysis

- Environmental Impacts
- Societal Impacts
- Economic Impacts

Figure 6

Project Deliverables

01 30% Submittal

02 60% Submittal

03 90% Submittal

Design Report
Presentation
Construction Drawings

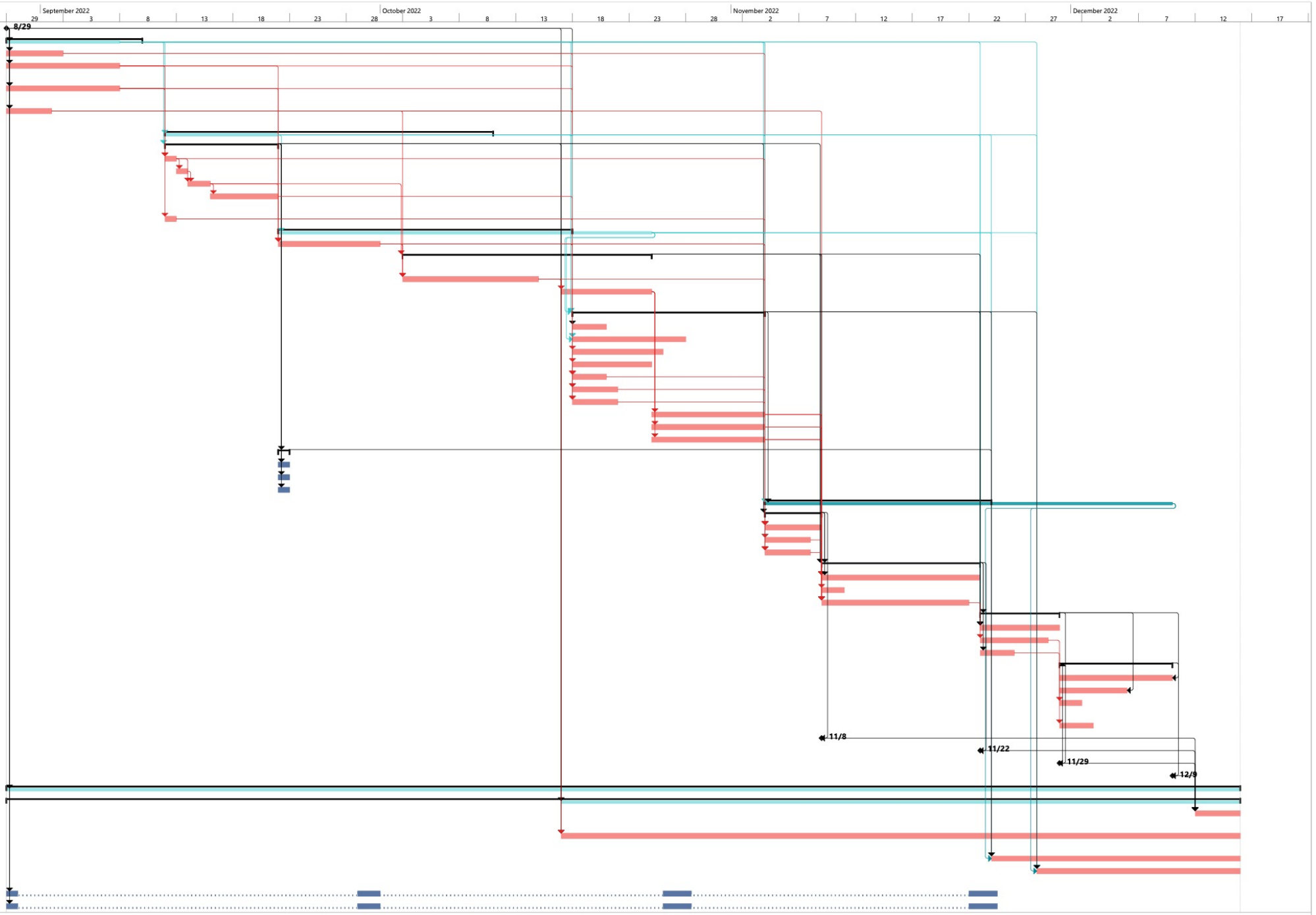
04 Final Submittal

Report
Final Presentation
Construction Drawings
Website

Project Management

- Project Management
- Project Meetings
- Grading Instructor Meetings
- Technical Advisor Meetings
- Client Meetings
- Engineering Design Team Meetings
- Schedule Management
- Resource Management

ID	Task Name	Duration
1	Project Start	0 days
2	**2.1.0 Background Research**	**10 days**
3	2.1.1 Review Existing Codes	5 days
4	2.1.2 Obtain and Review Existing Studies	8 days
5	2.1.3 Obtain and Review Existing Survey Data	8 days
6	2.1.4 Obtain FEMA Floodplain Information	4 days
7	**2.2.0 Site Investigation**	**21 days**
8	**2.2.1 Site Visit**	**8 days**
9	2.1.1 Site Work Plan	1 day
10	2.1.2 Equipment	1 day
11	2.1.3 Land Survey	2 days
12	2.1.4 Process Collected Survey Data	4 days
13	2.2.2 Document Existing Topogra	1 day
14	**2.3.0 Hydrology Analysis**	**18 days**
15	2.3.1 Rational Method Analysis	7 days
16	**2.3.2 Determine Existing Channel Properties**	**16 days**
17	2.3.1.1 Channel Analysis	10 days
18	2.3.2.2 Design Recommended Channel Modifications	6 days
19	**2.4.0 Construction Plans**	**13 days**
20	2.4.1 Cover Sheet	3 days
21	2.4.2 Notes and Specifications	8 days
22	2.4.3 General Details	6 days
23	2.4.4 Elevation Profiles	5 days
24	2.4.5 Existing Channel Plans	3 days
25	2.4.6 Existing Topographic Survey	4 days
26	2.4.7 Existing Floodplain Map	4 days
27	2.4.8 Proposed Channel Plans	8 days
28	2.4.9 Proposed Grading Plans	8 days
29	2.4.10 Proposed Drainage Plans	8 days
30	**2.5.0 Impact Analysis**	**1 day**
31	2.5.1 Environmental Impacts	1 day
32	2.5.2 Societal Impacts	1 day
33	2.5.3 Economic Impacts	1 day
34	**2.6.0 Project Deliverables**	**14 days**
35	**2.6.1 30% Submittal**	**3 days**
36	2.6.1.1 30% Report	3 days
37	2.6.1.2 30% Presentation	2 days
38	2.6.1.3 30% Construction Draw	2 days
39	**2.6.2 60% Submittal**	**10 days**
40	2.6.2.1 60% Report	10 days
41	2.6.2.2 60% Presentation	2 days
42	2.6.2.3 60% Construction Draw	9 days
43	**2.6.3 90% Submittal**	**5 days**
44	2.6.3.1 90% Report	5 days
45	2.6.3.2 90% Construction Draw	4 days
46	2.6.3.3 90% Website	3 days
47	**2.6.4 Final Submittal**	**8 days**
48	2.6.4.1 Final Report	8 days
49	2.6.4.2 Final Presentation	4 days
50	2.6.4.3 100% Construction Drawings	2 days
51	2.6.4.4 Final Website	3 days
52	2.6.5 30% Completion	0 days
53	2.6.6 60% Completion	0 days
54	2.6.7 90% Completion	0 days
55	2.6.8 Full Completion	0 days
56	**2.7.0 Project Management**	**79 days**
57	**2.7.1 Project Meetings**	**79 days**
58	2.7.1.1 Grading Instructor Meetings	4 days
59	2.7.1.2 Technical Advisor Meetings	44 days
60	2.7.1.3 Client Meetings	16 days
61	2.7.1.4 Engineering Design Team Meetings	14 days
62	2.7.2 Schedule Management	8 days
63	2.7.3 Resource Management	8 days



Staffing

- Senior Engineer (SENG)
- Engineer (ENG)
- Drafting Technician (DRFT)
- Survey Technician (STECH)
- Engineer in Training (EIT)

Table 1

Task	SENG	ENG	DRFT	STECH	EIT	TOTAL HOURS	DAYS ALLOTTED
1.0 Background Research	3	9	5	0	3	20	10
2.0 Site Investigation							21
2.1 Site Visit	2	4	11	19	15	51	8
2.2 Document Existing Topography		2	2		6	10	1
3.0 Hydraulic Analysis							23
3.1 Rational Method Analysis		2			4	6	7
3.2 Determine Existing Channel Properties	1	7	4	0	15	27	16
4.0 Construction Plans							15
4.1 Cover Sheet			2		3	5	3
4.2 Notes and Specifications		1			4	5	8
4.3 General Details	1	1	3		4	9	6
4.4 Elevation Profiles			8		8	16	5
4.5 Existing Channel Plans			4		6	10	3
4.6 Existing Topographic Survey		1	8	1	3	13	4
4.7 Existing Floodplain Map	2		4		4	10	4
4.8 Proposed Channel Plans		8	4		6	18	8
4.9 Proposed Grading Plans		4	4		5	13	8
4.10 Proposed Drainage Plans		4	4		5	13	8
5.0 Impact Analysis							1
5.1 Environmental Impacts	1	1			6	8	1
5.2 Societal Impacts	1	1			6	8	1
5.3 Economic Impacts	1	1			6	8	1
6.0 Project Deliverables	21	54	49	0	104	228	14
7.0 Project Management	50	50	10	10	34	154	79
Total Personnel Hours	83	150	122	30	247	632	79

Cost Estimate

Position

Classification	Hours	Rate ($/hr)	Cost
Senior Engineer	83	$120.00	$9,960.00
Engineer	150	$85.00	$12,750.00
Drafting Technician	122	$65.00	$7,930.00
Survey Technician	30	$60.00	$1,800.00
Engineer in Training	247	$45.00	$11,115.00

Supply

Classification	Days	Rate ($/day)	Cost
Survey Equipment	2	$100.00	$200.00
Total Cost			$43,755.00

Reference

- FIGURE 1 https://search.brave.com/images?q=skidsteer+grading+with+lidar&source=web#84
- FIGURE 2 Cited in photo
- FGIURE 3 https://gis.yavapaiaz.gov/v4/
- FIGURE 4 https://search.brave.com/images?q=yavapai%20county%20seal#0
- https://search.brave.com/images?q=town%20of%20dewey%20humboldt%20seal#0
- FIGURE 5 https://gis.yavapaiaz.gov/v4/map.aspx?search=
- FIGURE 6 https://azdailysun.com/business/kinney-construction-services-shapes-the-community-20-years-on/article_174ceed6-1588-50d7-a9d2-be11e0e337d4.html.
- FIGURE 7 https://search.brave.com/images?q=blueprints