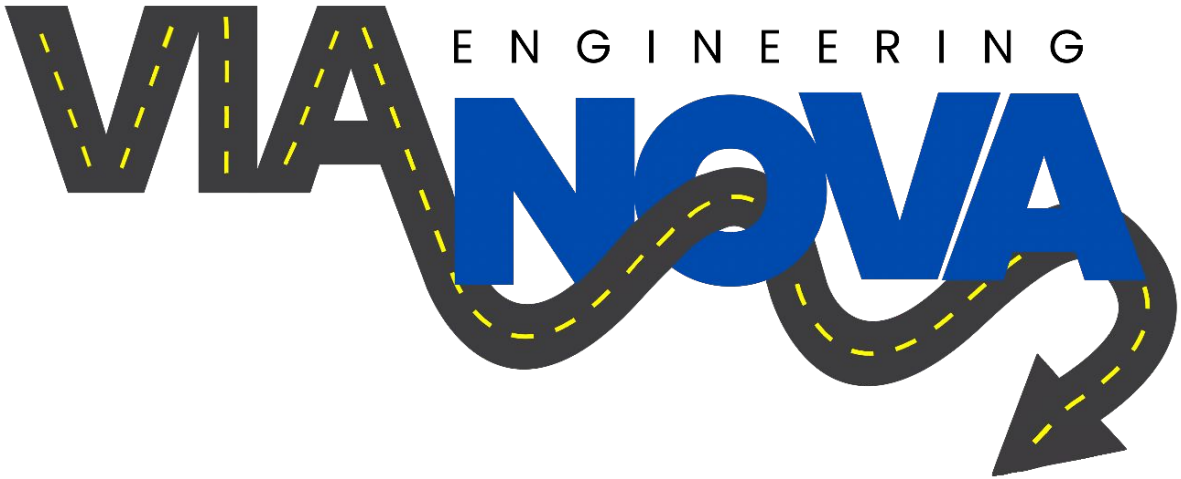


Coconino County Roadway Alignment Final Presentation

Spencer Huttenmeyer, Orlando Santoyo, Lauren Towner, Janelle Sanchez

CENE 476, December 5th, 2025

Project Background

- Purpose
  - Coconino County Public Works has identified a need to provide alternative access from Bellemont to prioritize resident safety, travel efficiency, and future development.
- Background
  - Coconino County Public Works has decided on a proposed alignment.
- Client
  - Nate Reisner (PE, PTOE, Coconino County Public Works County Engineer)

Figure 1: Area for Future Development

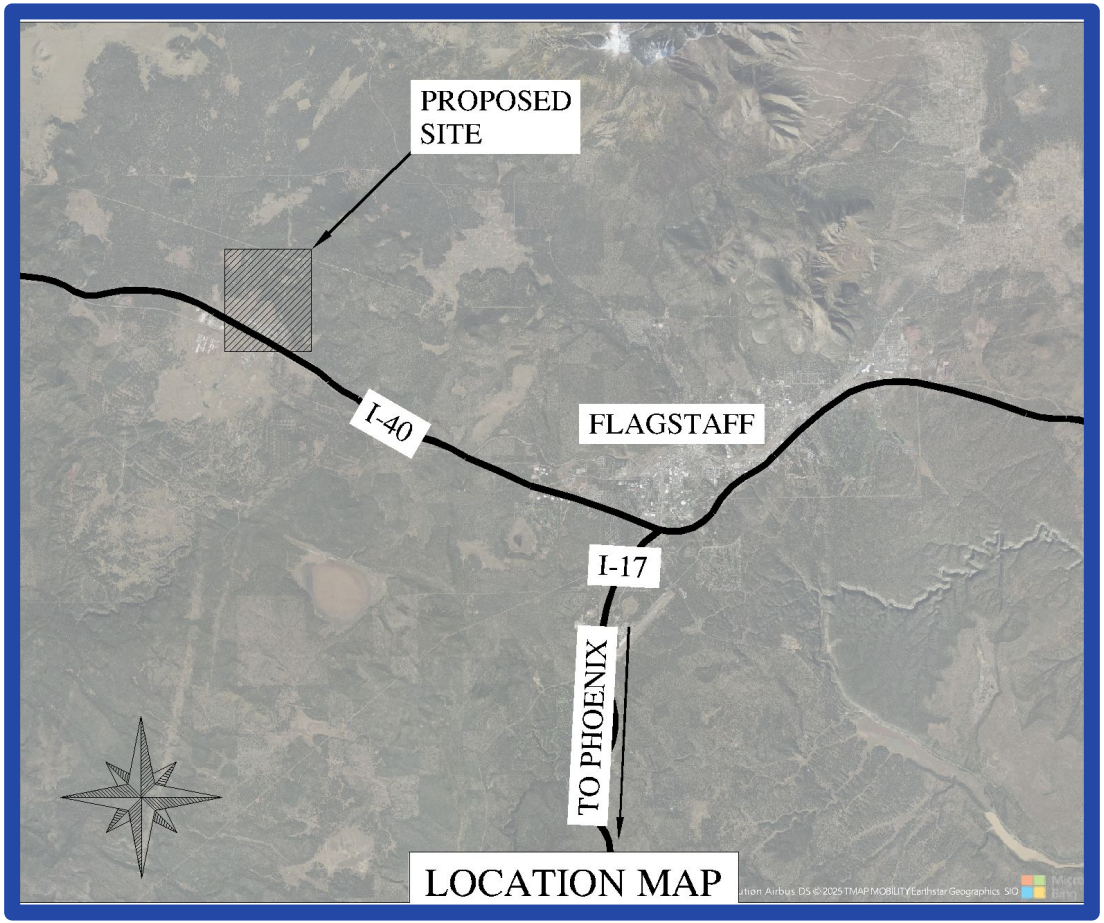


Figure 2: Location Map

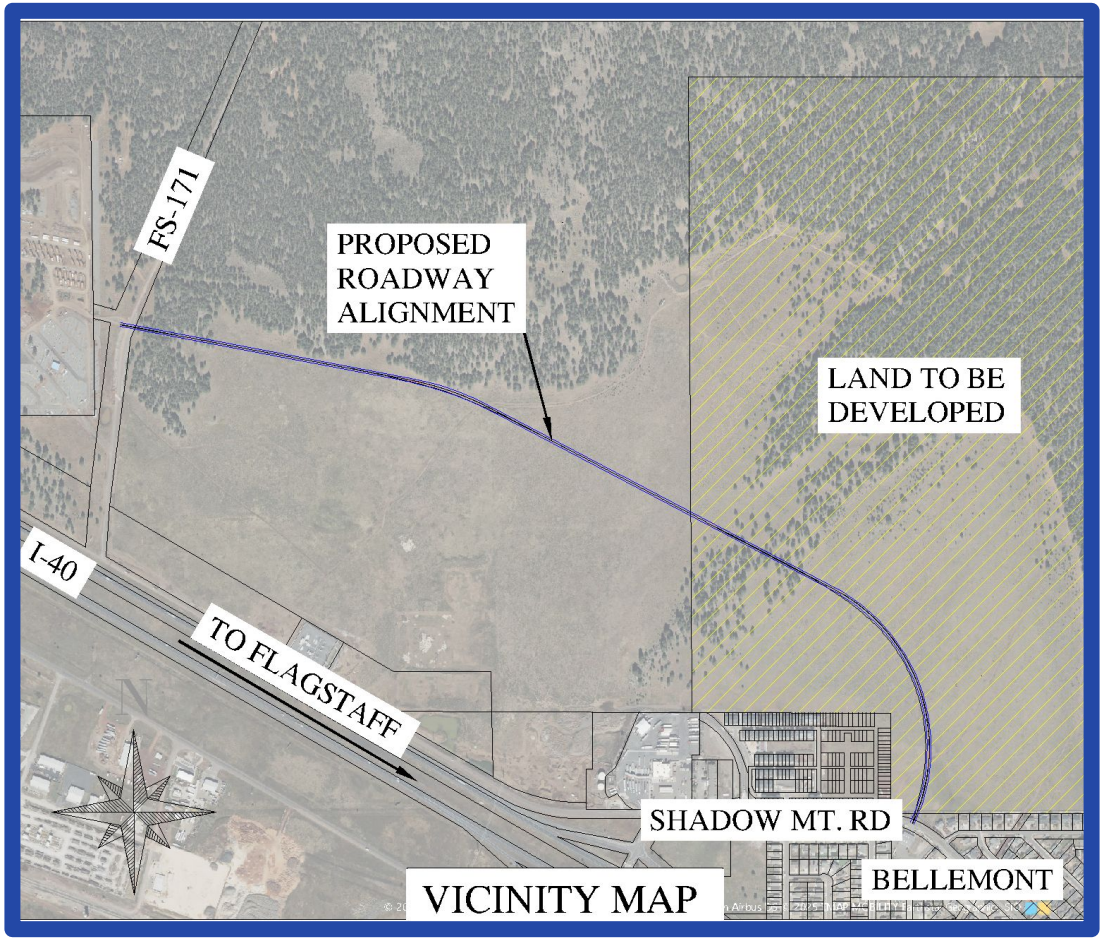


Figure 3: Vicinity Map

1. Acquire Existing Site Information

1.1 Lidar Data

1.2 FEMA Flood Zone

1.3 Geotechnical Reports of Similar/Relevant Projects

1.4 Geotechnical Analysis

1.5 Traffic Count Database System (TCDS) Data

2. Site Investigation

2.1 Site Investigation Planning

2.2 Conduct Site Investigation

Figure 4: Site Investigation Example

3. Hydrologic Analysis

3.1 Watershed Delineation

3.2 Rainfall Intensity

3.3 Peak Flows

3.4 HEC-HMS Model

4. Hydraulic Analysis

4.1 Floodplain Elevation

4.2 Potential Hydraulic Structures

4.3 Hydraulic Structure Model (CulvertMaster & FlowMaster)

5. Traffic Analysis

5.1 Future Traffic

5.2 Connections to Existing Roadways

5.3 Turn Lanes

5.4 Roadway Signage

Figure 5: Forest Service Road 171

6. Roadway Design

6.1 Design Vehicle & Design Speed

6.2 Horizontal Alignment

6.3 Vertical Alignment

6.4 Structural Section

6.5 Typical Cross Section

6.6 Roadway Drainage

6.7 Pavement Markings/Striping Layout

6.8 Select Horizontal & Vertical Alignment

7. Site Design

7.1 Cut & Fill

7.2 Site Grading

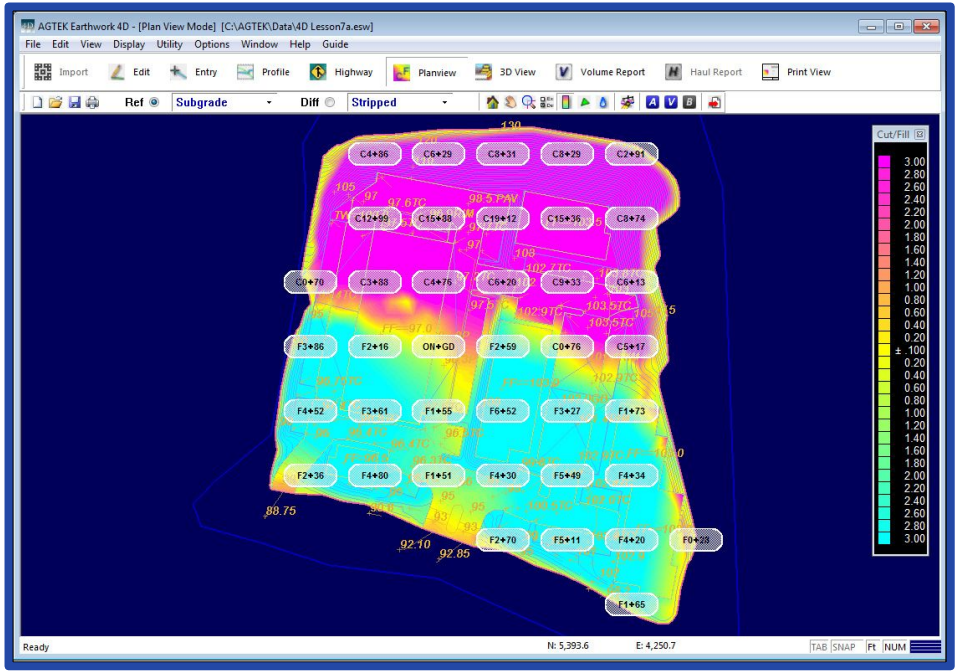


Figure 6: AGTEK Cut/Fill Plan View Example

8. Plan Set

8.1 Plan Set Template

8.2 Cover Page

8.3 Estimated Quantities

8.4 Notes Sheet

8.5 Proposed Typical Cross

8.6 Existing Site Conditions

8.6.1. Topographic Data

8.6.2. Existing Landmarks from Aerial Imagery

8.7 Proposed Improvements

8.8 Plan Details

9. Impact Analysis

- Economic, Environmental & Social impacts during the lifetime duration of 20 years

Figure 7: Project Impacts

10. Deliverables

10.1 30%

- Tasks 1-3

10.2 60%

- Tasks 4-6

10.3 90%

- Task 7

10.4 Final

- Tasks 8 & 9

11. Project Management

11.1 Meetings

11.2 Schedule Management

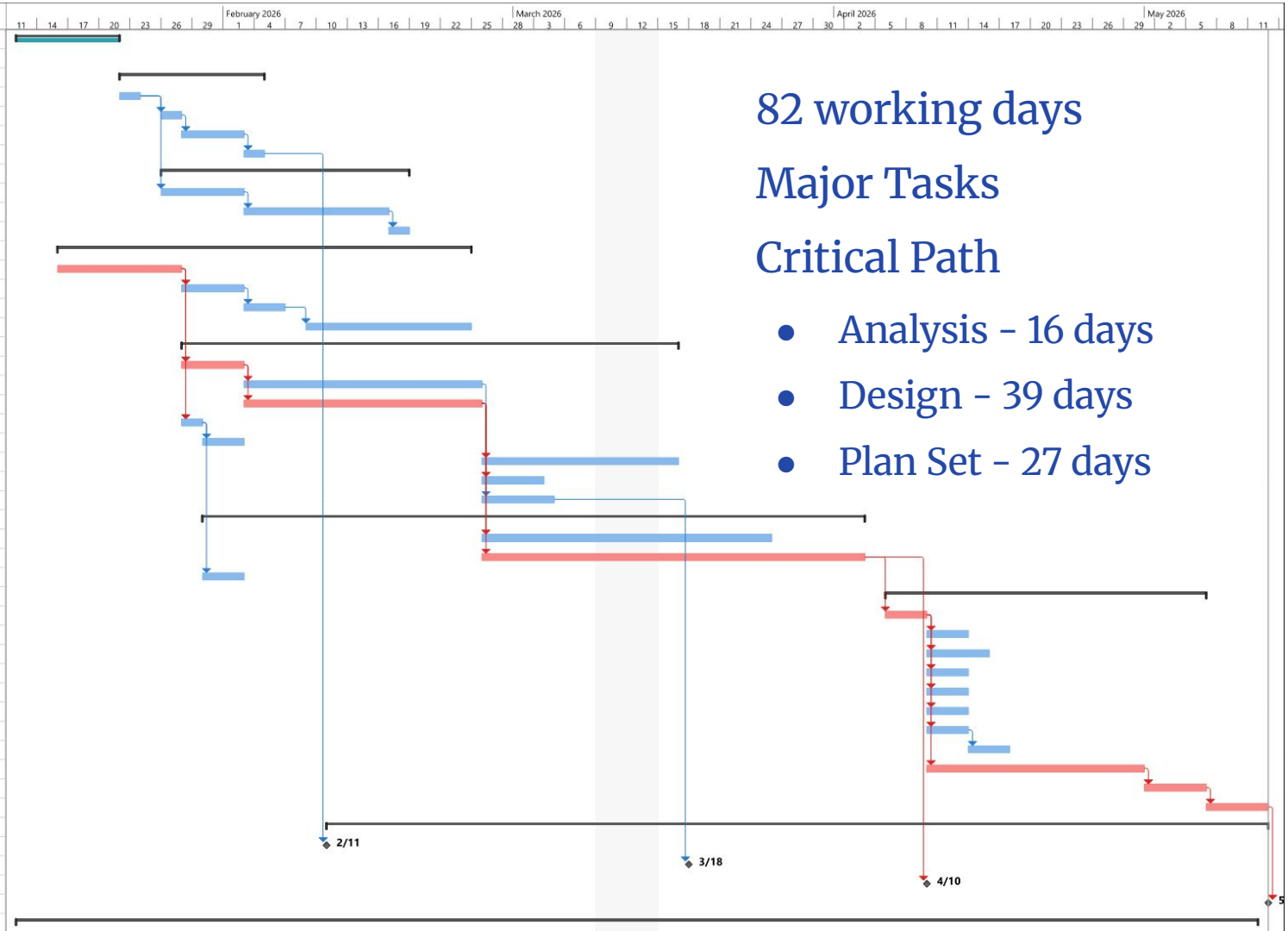
11.3 Resource Management

Exclusions

- Utility Design
- Traffic Impact
- Surveying

Figure 8: Exclusions

ID	Task Name
1	**Task 1 - Acquire Existing Site Information**
7	**Task 2 - Site Investigation**
10	**Task 3 - Hydrological Analysis**
11	Task 3.1 - Delinate Watershed
12	Task 3.2 - Determine Rainfall Intensity
13	Task 3.3 - Determine Peak Flow
14	Task 3.4 - Model Within HEC-HMS
15	**Task 4 - Hydraulic Analysis**
16	Task 4.1 - Determine Floodplain Elevation
17	Task 4.2 - Analyze Potential Hydraulic Structures
18	Task 4.3 - Model Hydraulic Structure
19	**Task 5 - Traffic Analysis**
20	Task 5.1 - Determine Future Traffic
21	Task 5.2 - Determine Connections into Existing Roadway
22	Task 5.3 - Determine Need for Turn Lanes
23	Task 5.4 - Determine Signage on Roadway
24	**Task 6 - Roadway Design**
25	Task 6.1 - Determine Design Vehicle and Design Speed
26	Task 6.2 - Determine Horizontal Alignment
27	Task 6.3 - Determine Vertical Alignment
28	Task 6.4 - Structural Section
29	Task 6.5 - Typical Cross-Section
30	Task 6.6 - Determine Roadway Drainage
31	Task 6.7 - Pavement Markings/Striping Layout
32	Task 6.8 - Select Horizontal and Vertical Alignment
33	**Task 7 - Site Design**
34	Task 7.1 - Determine Cut/Fill
35	Task 7.2 - Determine Site Grading
36	Task 7.3 - Utility Corridor Design
37	**Task 8 - Create a Plan Set**
38	Task 8.1 - Plan Set Border/Template
39	Task 8.2 - Cover Page
40	Task 8.3 - Estimated Quantities/EOPC
41	Task 8.4 - Note Sheet
42	Task 8.5 - Proposed Cross-Section/Typical Cross-Section
43	Task 8.6 - Exisiting Site Conditions and Removals
44	Task 8.6.1 - Topographic Data
45	Task 8.6.2 - Existing Landmarks from Aerial Imagery
46	Task 8.7 - Proposed Improvements (Plan and Profile)
47	Task 8.8 - Plan Details
48	**Task 9 - Impact Analysis**
49	**Task 11 - Deliverables**
50	Task 11.1 - 30% Deliverables
51	Task 11.2 - 60% Deliverables
52	Task 11.3 - 90% Deliverables
53	Task 11.4 - Final Deliverables
54	**Task 10 - Project Management**



82 working days

Major Tasks

Critical Path

- Analysis - 16 days
- Design - 39 days
- Plan Set - 27 days

Staffing

- Senior Engineer (**SENG**)
  - Civil PE with 15 years of experience in civil design
- Project Engineer (**ENG**)
  - Civil PE with 5 years of experience in civil design
- Engineering Technician (**TECH**)
  - Engineer in training with a BS in Civil Engineering
- Engineering Intern (**INT**)
  - Undergraduate student pursuing a BS in Civil Engineering

Staffing Matrix

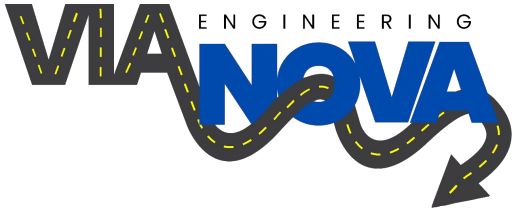
Table 1: Staffing Matrix

Task #	Task Name	*SENG hours*	*ENG hours*	*TECH hours*	*INT hours*	Subtotal
1.0	Acquire Existing Site Information	4	0	12	40	56
2.0	Site Investigation	8	4	8	4	24
3.0	Hydrologic Analysis	3	5	22	8	38
4.0	Hydraulic Analysis	3	14	12	8	37
5.0	Traffic Analysis	3	18	22	14	57
6.0	Roadway Design	14	30	36	38	118
7.0	Site Design	3	20	22	34	79
8.0	Create a Plan Set	7	12	34	46	97
9.0	Impact Analysis	4	4	4	0	12
10.0	Project Management	24	15	9	6	54
11.0	Deliverables	32	24	16	16	88
Total Project Hours		105	146	195	214	**660**

Cost of Services

Table 2: Staffing Cost

Category	Classification	Quantity	Unit	Rate, $/Unit	Cost
1.0 Personnel	SENG	105	Hours	$162	$17,010
	ENG	146	Hours	$127	$18,542
	TECH	195	Hours	$110	$21,450
	INT	214	Hours	$84	$17,976
	Total Personnel				$74,978
2.0 Software	Software	30	Day	$10	$3,000
3.0 Total					**$77,978**



Questions?