

CENE 476



Preliminary Passing Lane Design for State Route 64

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Purpose:

- Design a passing lane 3 miles in length
- Reduce traffic collisions
- Alleviate traffic congestion

Client:

Arizona Department of Transportation (ADOT).

Representative:

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Project Location (A)

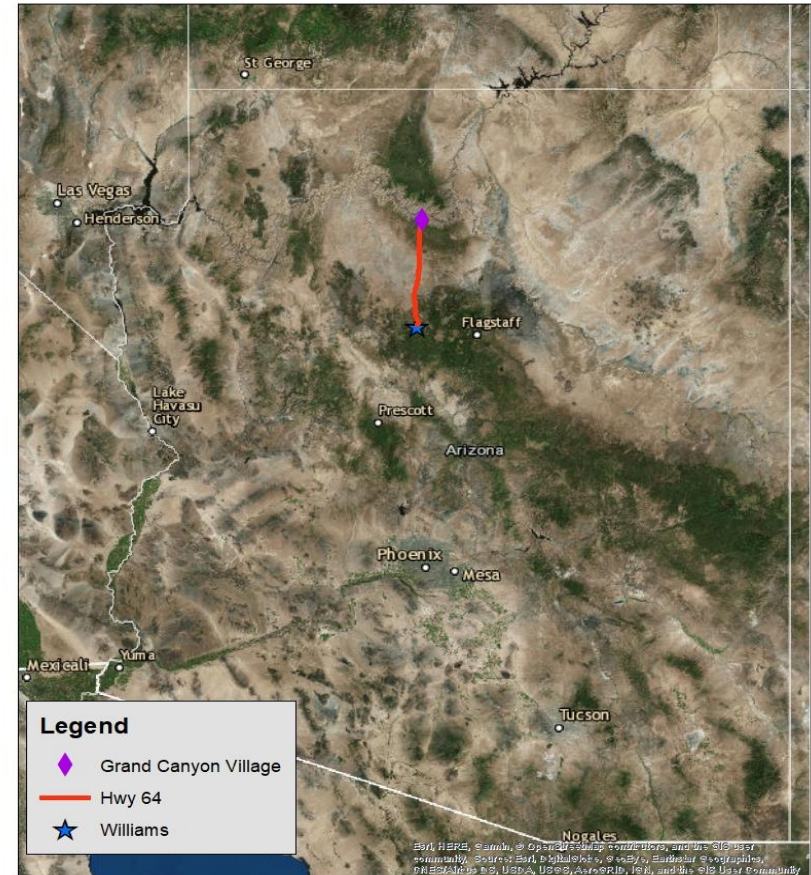
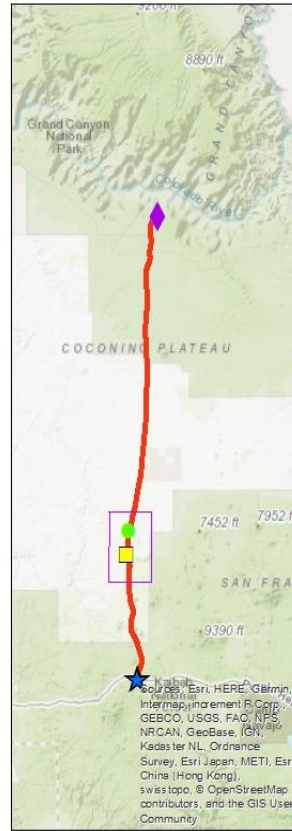


Figure 1: State Map[1]

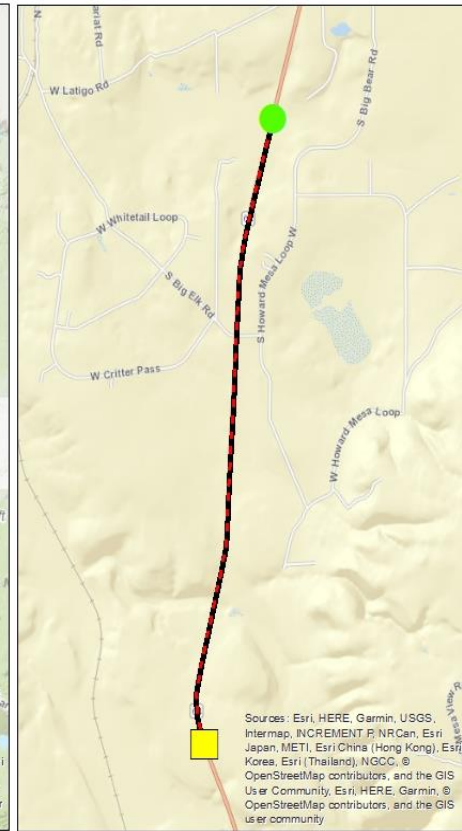
Project Location

- SR 64 is located between Williams and Grand Canyon Village.
- Proposed passing lane is located between mile 201 and mile 204.

Hwy 64 Location (A)



Site Location (B)



Map (A) represents the layout of Hwy 64 between Williams, and the Grand Canyon, and the location of the project site.

Map (B) represents a zoomed layout of the site location, the location is between maker 201 (Miles), and maker 204 (Miles).

Legend

◆ Grand Canyon Village

★ Williams

— Hwy 64

Legend

● Maker 204 (Miles)

■ Maker 201 (Miles)

— Project Area

Figure 2: Site Map[1]

Task 1: Site Assessment

1.1 Road Condition Assessment

1.1.1 Asphalt Condition

1.1.2 Shoulder Condition

1.2 Drainage Condition Assessment

1.2.1 Culvert Condition & Location

1.2.2 Wash Integrity

1.3 Soil Sampling

1.4 Right of Way (ROW) Assessment



Figure 2: Mile Post 201 Northbound Street View [2]

Task 2: Hydrology & Hydraulics Assessment

2.1 Map Culverts

2.2 Hydrology

- Design for 10, 25, and 50 year storms
- Design for stormwater runoff and containment

2.3 Hydraulics

- Determine culvert adequacy using CulvertMaster



Figure 3: Mile Post 204 Northbound Street View [2]

Task 3: Geotechnical Analysis

3.1 Sieve Analysis

3.2 Plasticity Index Analysis

3.3 Compaction Analysis

3.4 Soil Classification Report

- AASHTO Soil Classification System



Figure 4: Sieve Analysis Equipment [3]

Task 4: Highway Design

4.1 Cross Sections

- Typical / Existing
- Every 1000 ft.

4.2 Plan

4.3 Profile

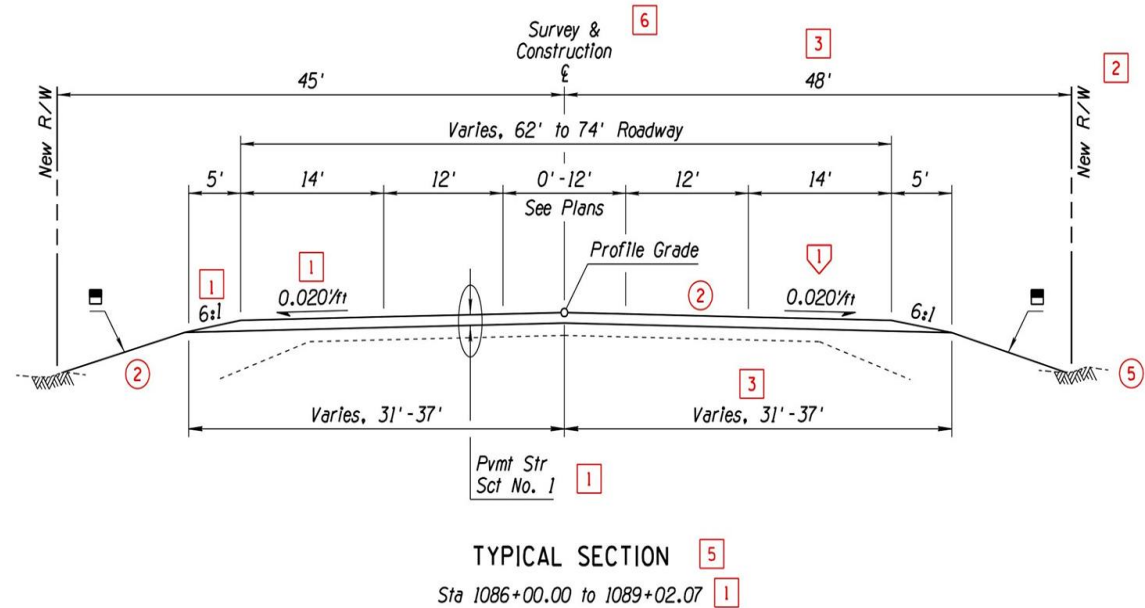


Figure 5: Example of an ADOT Typical Roadway Cross Section[4]

Task 5: Traffic Control Plan

5.1 Phasing

- Construction process

5.2 Quantities

- Barriers, signs, stripping

5.3 Duration



Figure 6: Traffic Control Flagging Sign [5]

Task 6: Design Plan Sets

- 6.1 Face Sheet
- 6.2 Roadway Sections
- 6.3 Existing Conditions
- 6.4 Roadway Construction Plans
- 6.5 Drainage Plans
- 6.6 Storm Water Pollution Prevention Plan (SWPPP)
- 6.7 Traffic Control Plans
- 6.8 Cost Estimate Report To Implement



Figure 7: ADOT Roadway Design Guidelines[4]

Task 7: Project Management

7.1 Project Meetings

7.1.1 Client Meetings

7.1.2 Team Meetings

7.2 Deliverables

- 30% Plan Set

- 60% Plan Set

- 100% Plan Set

- Website

7.3 Documentation

7.3.1 Meetings

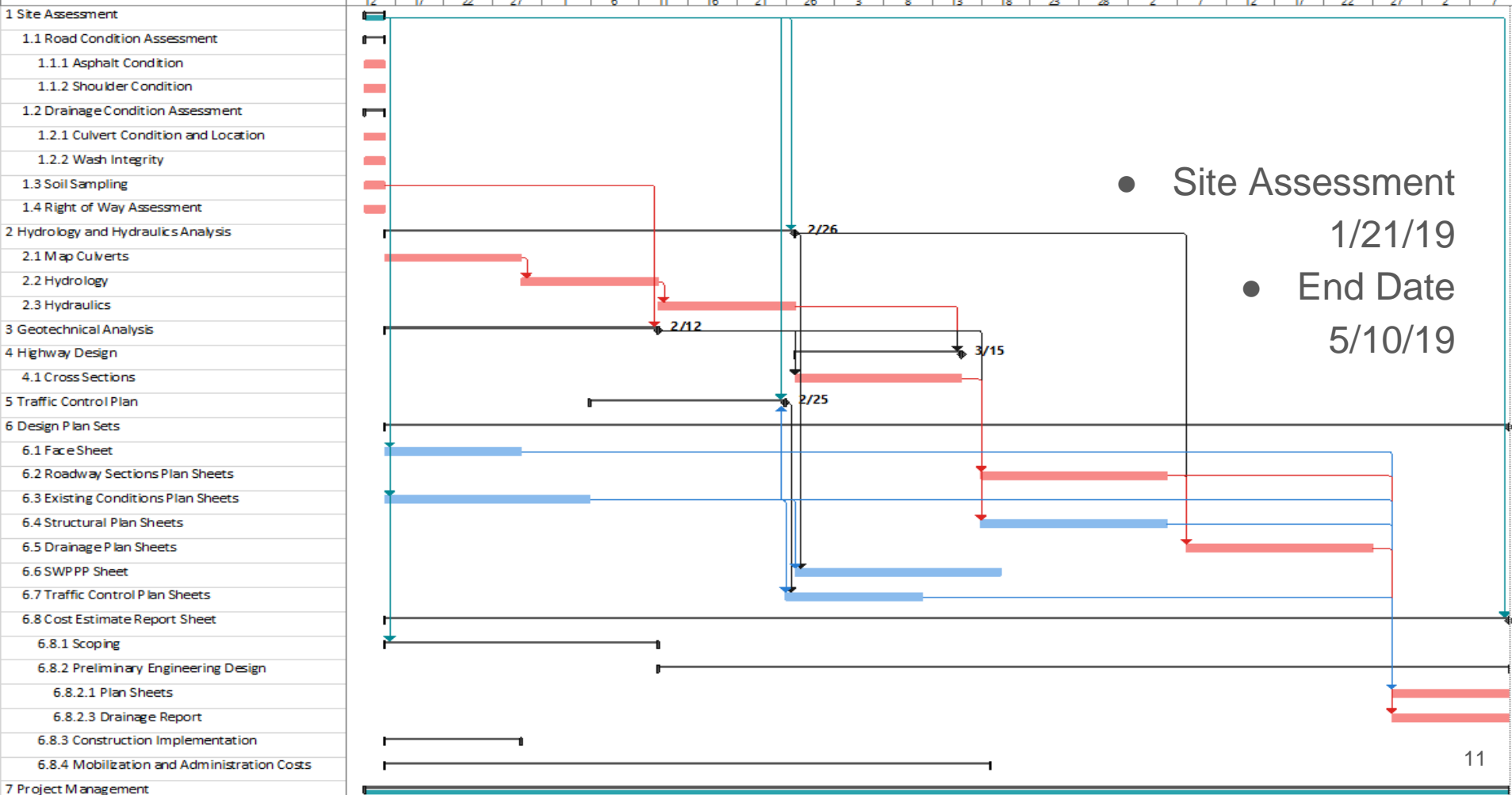
7.3.2 Hours

7.4 Manage Resources

7.4.1 Equipment

7.4.2 Materials

7.4.3 Transportation



- Site Assessment
 - End Date
- 1/21/19
- 5/10/19

Staffing

Table 1: Staffing Plan

Task Name	STAFF (hours)				Task Total
	Project Manager	Senior Engineer	Engineer Step I	Drafter	
1 Site Assessment	30	30	20	32	112
2 Hydrology and Hydraulics Analysis	0	12	18	24	54
3 Geotechnical Analysis	0	35	45	0	80
4.0 Highway Design	26	21	29	50	126
5 Traffic Control Plan	36	0	0	0	36
6 Design Plan Sets	102	106	88	88	384
6.1 Face Sheet	8	4	4	12	28
6.2 Roadway Sections Plan Sheets	0	10	10	10	30
6.3 Existing Conditions Plan Sheets	0	10	10	10	30
6.4 Roadway Construction Plan Sheets	0	10	10	10	30
6.5 Drainage Plan Sheets	0	10	20	20	50
6.6 SWPPP Sheet	0	10	0	10	20
6.7 Traffic Control Plan Sheets	2	12	6	16	36
6.8 Cost Estimate Report Sheet	92	40	28	0	160
7 Project Management	47	45	55	47	194
STAFF TOTAL	194	204	200	241	839

Cost Estimate

Table 2: Billable Services

Billable Services			
Staff	Hours	Cost per Hour	Cost Per Staff
Project Manager	194	\$ 140	\$ 27,160
Senior Engineer	204	\$ 112	\$ 22,848
Engineer Step I	200	\$ 34	\$ 6,800
Drafter	241	\$ 36	\$ 8,676
Totals	839	-----	\$ 65,484

Table 3: Travel Cost

Cost of Travel					
	Van Cost per Day	Number of Days	Cost per Mile	Mileage	Total Cost
Staff	\$ 43	2	\$ 0.22	50	\$ 136

References

[1] ARCGIS Software. (2001). Redlands, CA: Esri.

[2] Google Earth. (2001). Mountain View, CA: Google.

[3] “Gradation Test,” *Pavement Interactive*. [Online]. Available: <https://www.pavementinteractive.org/reference-desk/testing/aggregate-tests/gradation-test/>. [Accessed: 09-Oct-2018].

[4] E. Weil, “Components of a plan set,” *ADOT*, 22-Jan-2014. [Online]. Available: <https://www.azdot.gov/media/blog/posts/2014/01/22/components-of-a-plan-set>. [Accessed: 08-Oct-2018].

[5] “Traffic Control Company | Traffic Control Services | AWP,” *Area Wide Protective*. [Online]. Available: <https://www.awptrafficsafety.com/allstate/>. [Accessed: 08-Oct-2018].