Vineyard Connector Widening

Civil Engineering Capstone Spring 2025

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Project Objectives

- Address Vineyard's rapid growth by widening the Vineyard Connector Road from two to five lanes.
- Support multimodal transportation with a 12-ft shared-use trail (north side) and 8-ft sidewalk (south side).
- Improve traffic flow, pedestrian connectivity, and safety near the new UTA Frontrunner station.
- Minimize environmental impacts, right-of-way acquisition, and utility conflicts.
- Deliver UDOT-compliant plan sheets covering geometry, drainage, grading, intersections, and utilities.

Design Requirements

- One additional through lane in the eastbound and westbound directions, two-way left turn lane, a trail, and a sidewalk.
- UDOT and other relevant design standards to be used when applicable.
- Environmental impacts study.
- 3 intersection designs- Mill road, Geneva Road, and Main Street.
- Develop a comprehensive cost estimate.

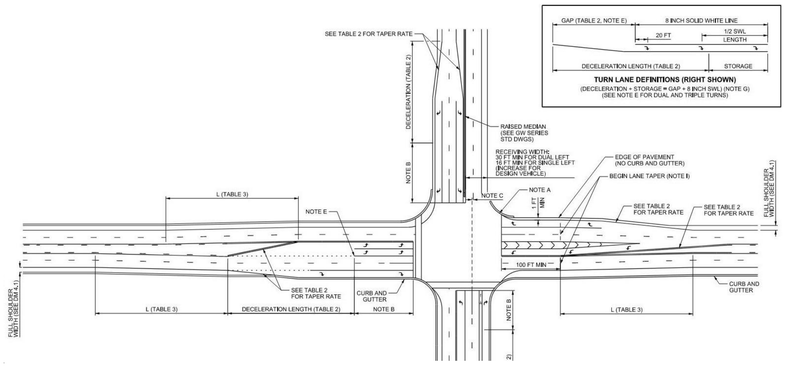


Figure 1. UDOT DM 9.1 - Intersection Geometrics



Figure 2. Project Location

Alternatives

- Widen the road to the north, install the trail on the south side.
- Widen the road to the south, install the trail on the north side.
- Widen the road to the north, install the trail on the north side.

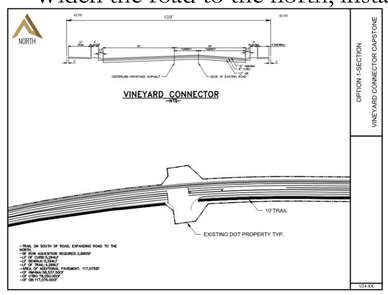


Figure 3. Option 1

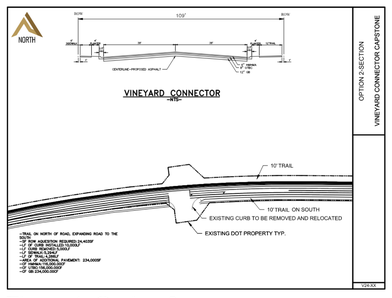


Figure 4. Option 2

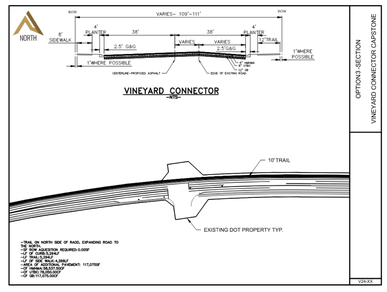


Figure 5. Option 3

Cost Estimate

PIN: PROJECT # PROJECT NAME: Vineyard Widening
Cost Estimate - Concept Level

Prepared By: Brennan Chisholm Date 11/18/24

Proposed Project Scope: 3 lane to 5 lane Atrial Road Widening along the Vineyard Connector Road

Approximate Route Reference Mile Post (BEGIN) =	1.000	(END) =	2.000
Project Length =	1.000	miles	5,280 ft
Current Year =	2024		
Assumed Construction Year =	2027		
Construction Items Inflation Factor =	1.22		3 yrs for inflation
Assumed Yearly Inflation for Engineering Services (PE and CE) (%/yr) =	3.75%		
Assumed Yearly Inflation for Right of Way (%/yr) =	4.5%		
Items not Estimated (% of Construction) =	20.0%		
Preliminary Engineering (% of Construction + Incentives) =	8.0%		
Construction Engineering (% of Construction + Incentives) =	10.0%		

Construction Items		Cost	Remarks
Pulic Information Services		$15,000	
Roadway and Drainage		$3,374,780	
Traffic and Safety		$136,720	
Structures		$4,343,875	
Environmental Mitigation		$0	
	Subtotal	$7,870,375	
	Items not Estimated (20%)	$1,574,075	
	Construction Subtotal	$9,444,450	
P.E. Cost	P.E. Subtotal	$755,556	8%
C.E. Cost	C.E. Subtotal	$944,445	10%
Right of Way Urban/Suburban Residential	Right of Way Subtotal	$0	
Utilities	Utilities Subtotal	$0	
Incentives	Incentives Subtotal	$0	
Miscellaneous	Miscellaneous Subtotal	$0	

Cost Estimate (ePM screen 505)		2024		2027
P.E.		$756,000		$844,000
Right of Way		$0		$0
Utilities		$0		$0
Construction		$9,444,000		$11,568,000
C.E.		$944,000		$1,054,000
Incentives		$0		$0
Aesthetics	0.75%	$71,000		$87,000
Change Order Contingency	9.00%	$856,000		$1,049,000
UDOT Oversight		$0		$0
Miscellaneous		$0		$0
	TOTAL	$12,071,000	TOTAL	$14,602,000
PROPOSED COMMISSION REQUEST	TOTAL	$12,071,000	TOTAL	$14,602,000

Final Design

Selected Design- Alternative 3

- Alternative 3 widens Vineyard Connector Road to the north, incorporating a 12-foot shared-use trail on the same side. This alignment minimizes right-of-way acquisition and utility conflicts while maximizing constructability and cost efficiency.
- The horizontal and vertical alignment ties directly into the existing road crown, preserving existing drainage patterns and eliminating the need for extensive regrading. All cross slopes maintain a 2% grade to curb and gutter, and all clear zones maintain a 4:1 or greater slope to existing ground.
- Key intersections—Main Street, Geneva Road, and Mill Road—were redesigned with appropriate turn pockets, lane lengths, and signal upgrades, all compliant with UDOT's Intersection Design Guide. Tapers were calculated per UDOT DM 3.1 to ensure smooth vehicle transitions.
- Drainage design aligns new catch basins with existing low points and connects to a pre-sized storm drain system, eliminating the need for major upgrades. Utility preservation—no major relocations were required, aside from an overhead signal adjustment at Mill Road. Existing water and sewer infrastructure remained protected throughout the project.
- All design work was completed using Bentley OpenRoads Designer, following UDOT's plan sheet standards and design manuals.
- This solution reflects a balanced approach to engineering efficiency, cost-effectiveness, and long-term community benefit.

See our plan set for detailed construction plans on our final design!

Lessons Learned

- Mastered UDOT-specific OpenRoads Designer workflows.
- Coordinated roadway, grading, drainage, and utility design into cohesive plan sets.
- Applied weighted decision matrix to evaluate design alternatives effectively.
- Strengthened skills in project management, interdisciplinary collaboration, and civil documentation.

Software and Resources

- Design Tools: Bentley OpenRoads Designer, Autodesk Civil 3D
- Collaboration & Visualization: Bluebeam Revu, Google Earth Pro
- Standards & Guidelines: UDOT Roadway Design Manual, AASHTO Green Book
- Other Resources: Microsoft Office 365, Blue Stakes of Utah