

# Santaquin Trail Corridor Design

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# Objective

- Design a trail corridor to
  - Improve safety for pedestrians along frontage road.
  - Provide comfortable route for travel.
  - Act as a showpiece for Santaquin, visible from I-15.

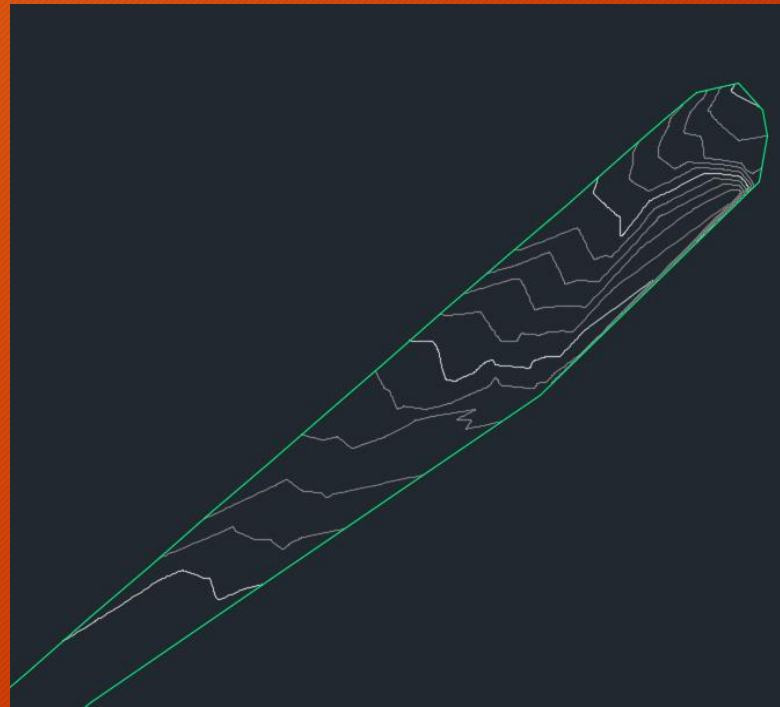


# Project Requirements

- Complete design of 8 ft trail along highland drive
- Full cut and fill design
- Meandering curve per city standards
- Full runoff and drainage analysis
- Design of storm drain facilities
- Property acquisition details
- Full curb and gutter design
- Financial analysis

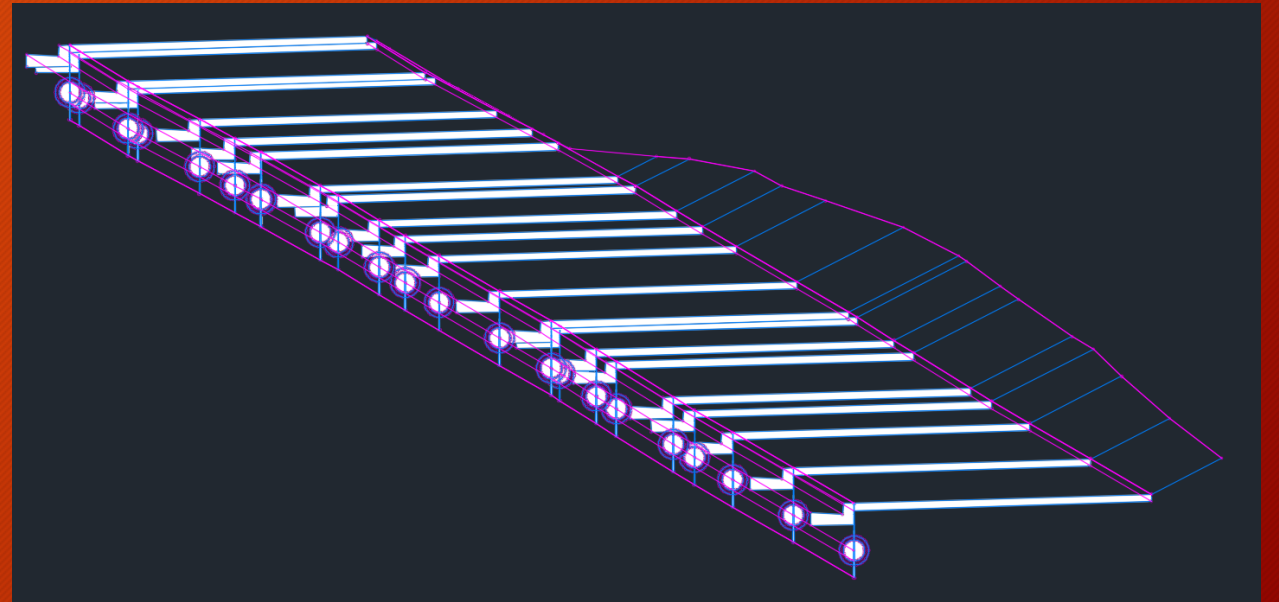
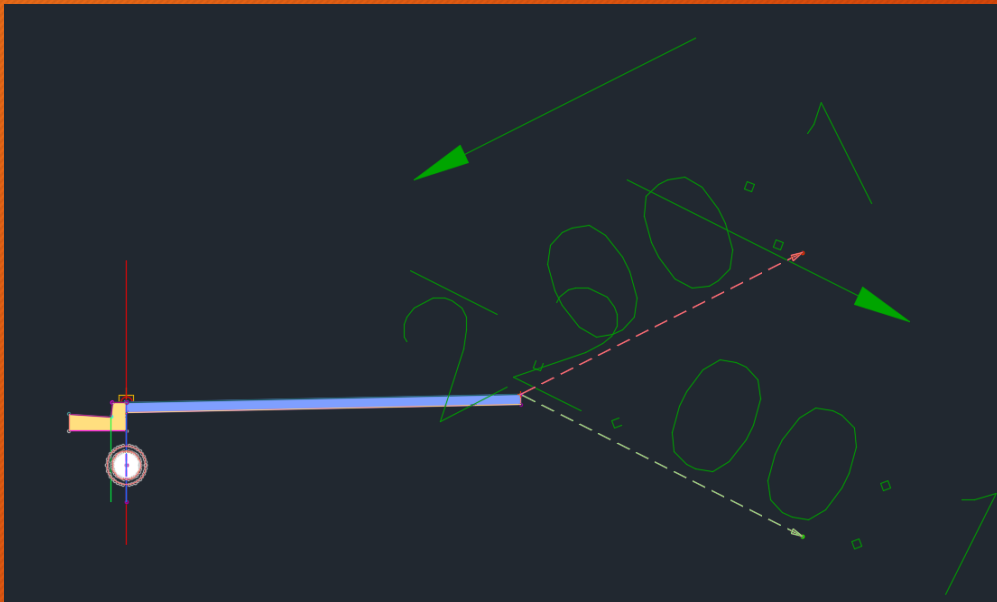
# Creating Existing Conditions

- Using AutoCAD Civil 3D, we created an existing surface using the topographic points provided by Santaquin.



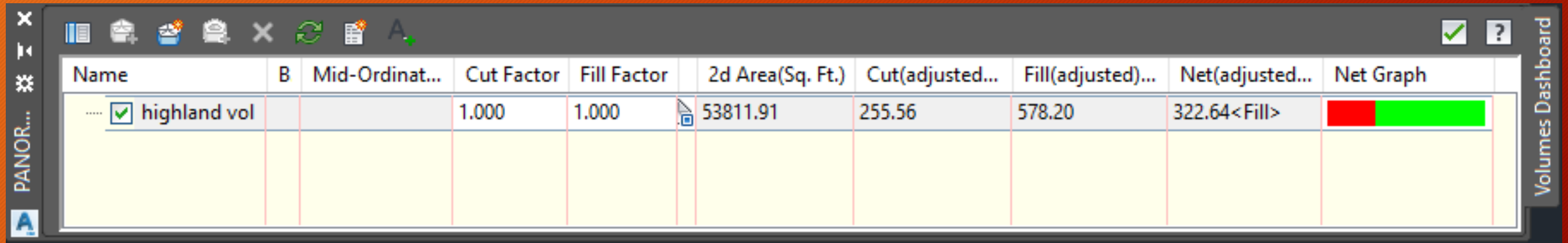
# Creating the Corridor


- Using an assembly and alignment, the proposed corridor was created. The assembly was designed to tie into existing conditions with either a cut or a fill.



# Information Obtained From Corridor

- Using the corridor, total cut and fill values were calculated to be 255.56yd<sup>3</sup> of cut, and 578.20yd<sup>3</sup> of fill. This totals 322.64yd<sup>3</sup> of fill material for the project.

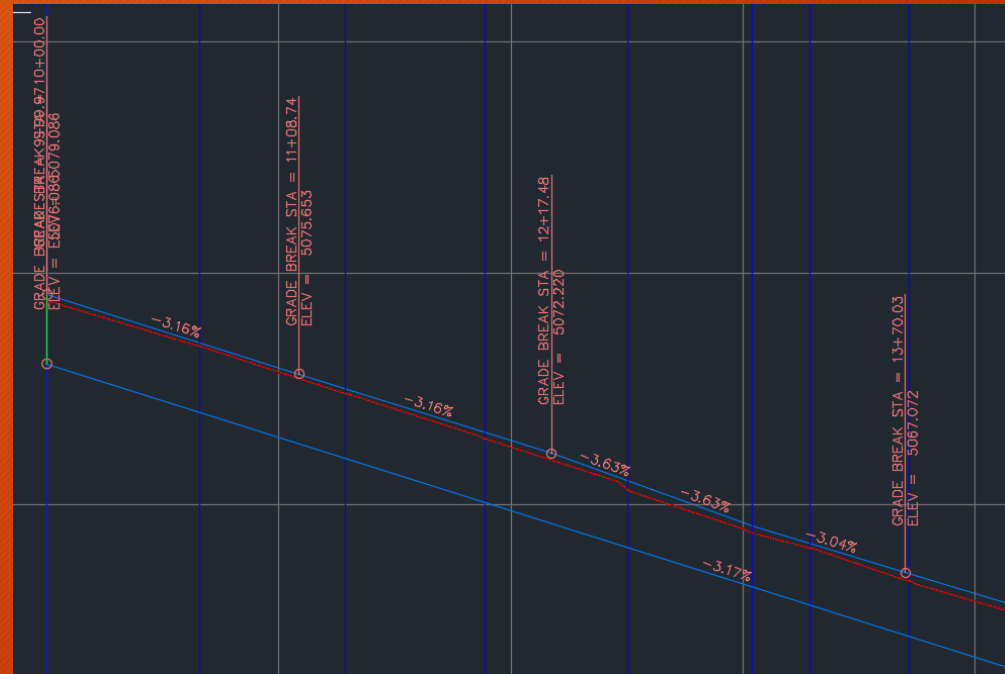


Name	B	Mid-Ordinat...	Cut Factor	Fill Factor	2d Area(Sq. Ft.)	Cut(adjusted...	Fill(adjusted...	Net(adjusted...	Net Graph
<input checked="" type="checkbox"/> highland vol			1.000	1.000	53811.91	255.56	578.20	322.64<Fill>	

It is important to note that the way we ran the calculations included all materials into the fill. This means that concrete for the curb and gutter, asphalt for the trail, and fill soil are all included in the 322.64yd<sup>3</sup>.

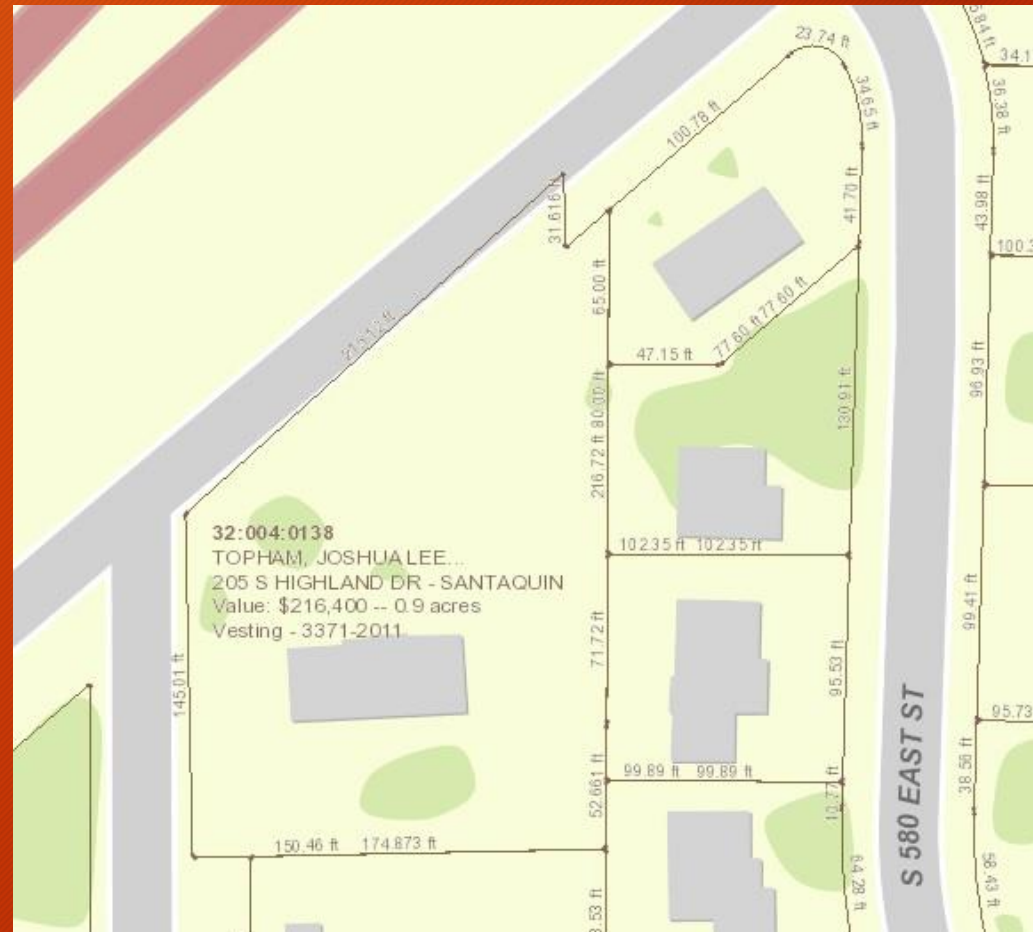
# Information Obtained From Corridor cont.

- Assigning the corridor to a profile, elevations and slopes were assigned to the trail, as well as the storm drain system.



# Property Acquisition

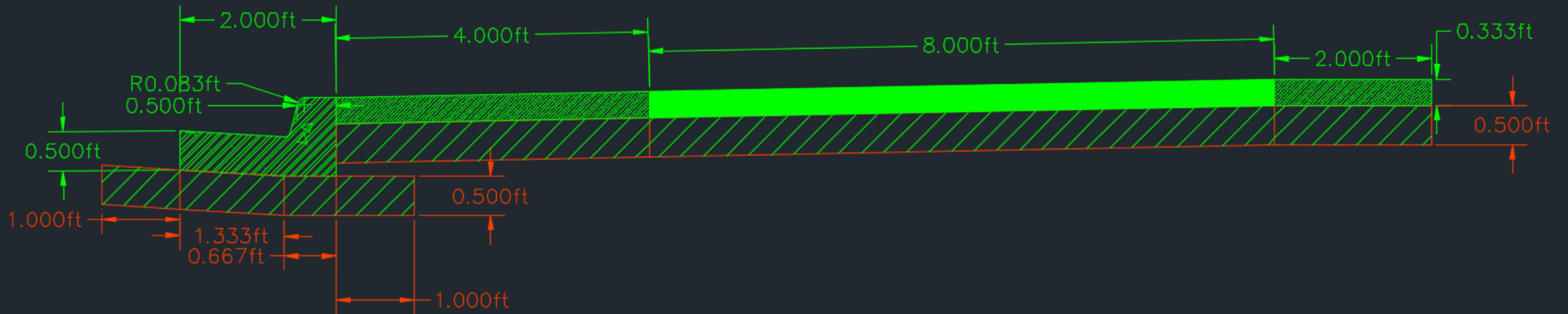
- Only one location was determined to need property acquisition. The total area calculate equals about 3000ft<sup>2</sup>.





# Trail Cross Section

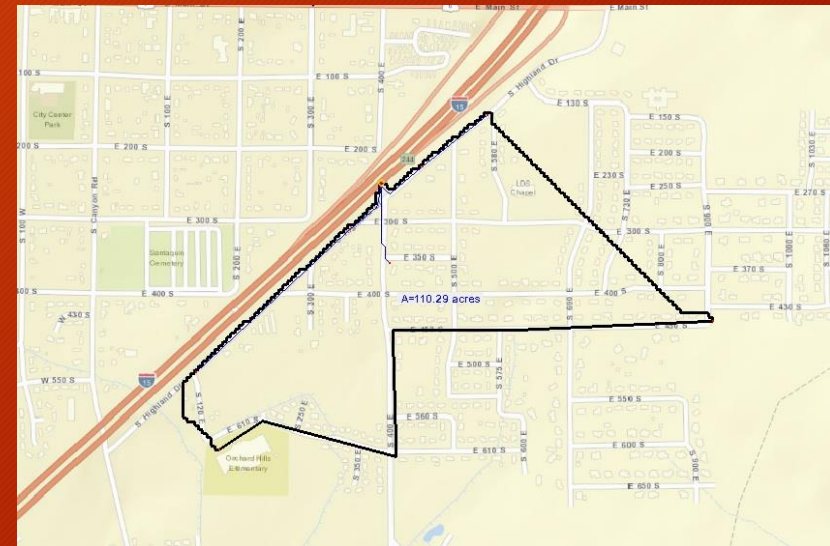
- Following Santaquin City Standards, we created a general cross section for the trail.



# Drainage Analysis

- Using WMS and HMS, intensity and runoff data was obtain for a 1, 2, 5, 10, and 25 year storm.
- The storm drain systems were design according to a 25 year storm.
- The 25 year storm requires storm pipes of 30 inch diameter.

Storms	Precipitation (in)	Max Intesity (in/hr)
1 Year Storm	1.27	0.54
2 Year Storm	1.57	0.67
5 Year Storm	1.88	0.80
10 Year Storm	2.14	0.92
25 Year Storm	2.49	1.07



# Cost Analysis

Cost items	Quantity	Units	Unit Cost	Cost
Net Adjusted Fill	321.7	yd <sup>3</sup>	\$ 25.00	\$ 8,042.50
Cut	255.75	yd <sup>3</sup>	\$ 25.00	\$ 6,393.75
Fill that must be hauled	73.9	yd <sup>3</sup>	\$ 50.00	\$ 3,694.58
sub grade prep	22581.54	ft <sup>2</sup>	\$ 2.00	\$ 45,163.08
Curb and gutter	3696	ft	\$ 15.00	\$ 55,440.00
Pavement	20072.48	ft <sup>2</sup>	\$ 4.50	\$ 90,326.16
ADA ramps	11		\$ 1,000.00	\$ 11,000.00
Bench	1		\$ 1,000.00	\$ 1,000.00
Trash Can	2		\$ 200.00	\$ 400.00
Property	0.072	acre	\$ 65,328.87	\$ 4,688.20
Landscape gravel 1	58	yd <sup>3</sup>	\$ 165.00	\$ 9,583.22
Landscape gravel 2	58	yd <sup>3</sup>	\$ 74.00	\$ 4,297.93
Drain Pipe	3696	ft	\$ 60.00	\$ 221,760.00
Street Lights	8		\$ 8,000.00	\$ 64,000.00
Bike Station	1		\$ 3,000.00	\$ 3,000.00
<b>Total Cost</b>				<b>\$ 528,789.41</b>

In order to approximate the cost of constructing the new trail, we made a simple spreadsheet with all involved items. We did our best to find relevant unit costs for each item on the list, but its not perfect.



# Additional Work

- Determining watershed areas and calculating pipe system design.
- More accurate cost analysis.
- Determining location of existing storm drain and connecting into it.

# Overcoming Challenges

- Using AutoCAD (Practice/Videos)
- Transferring Data to AutoCAD (Topo points)
- Creating the Corridor (Professional help)
- Drainage Analysis (Course knowledge/Professor help)