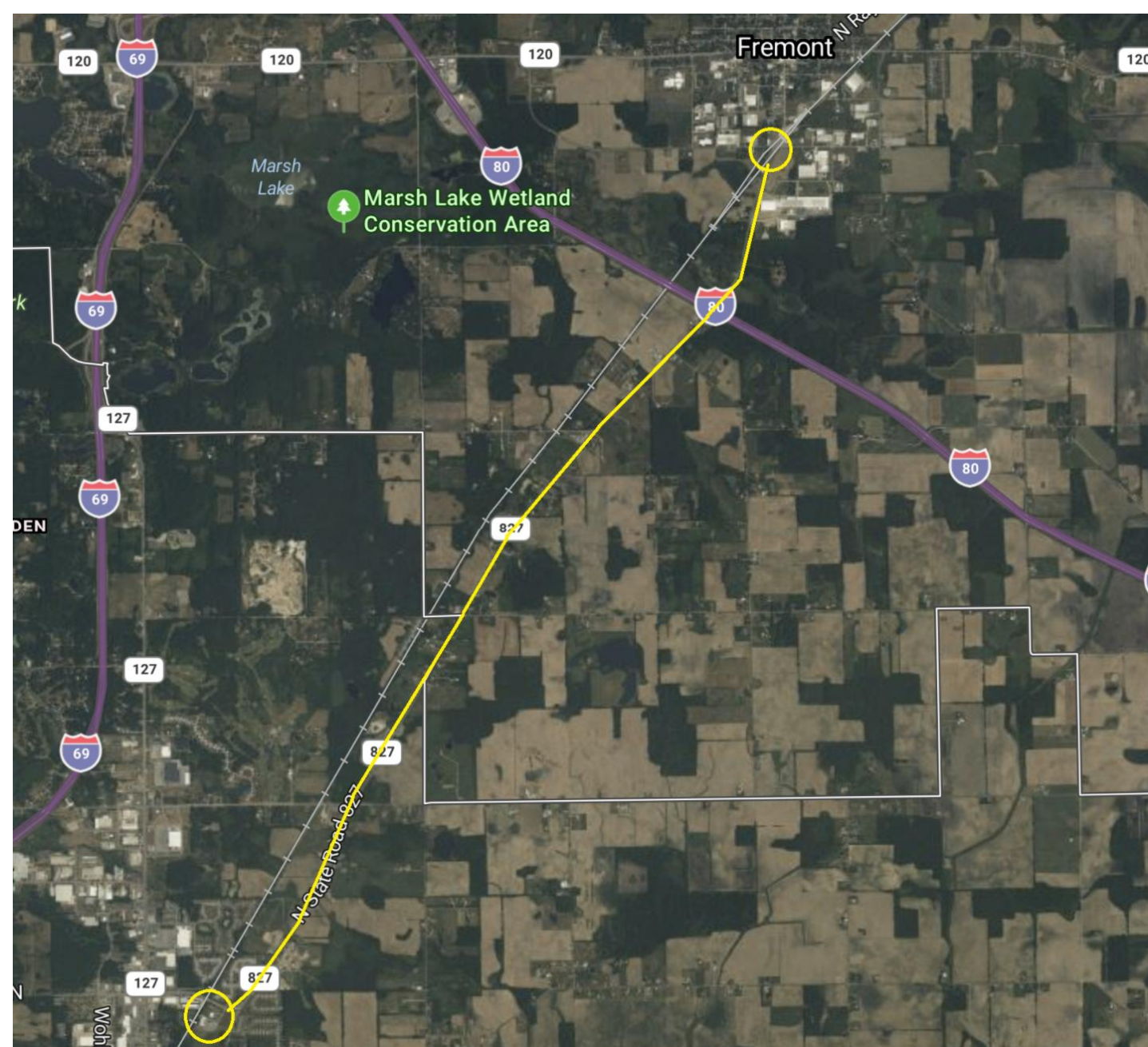


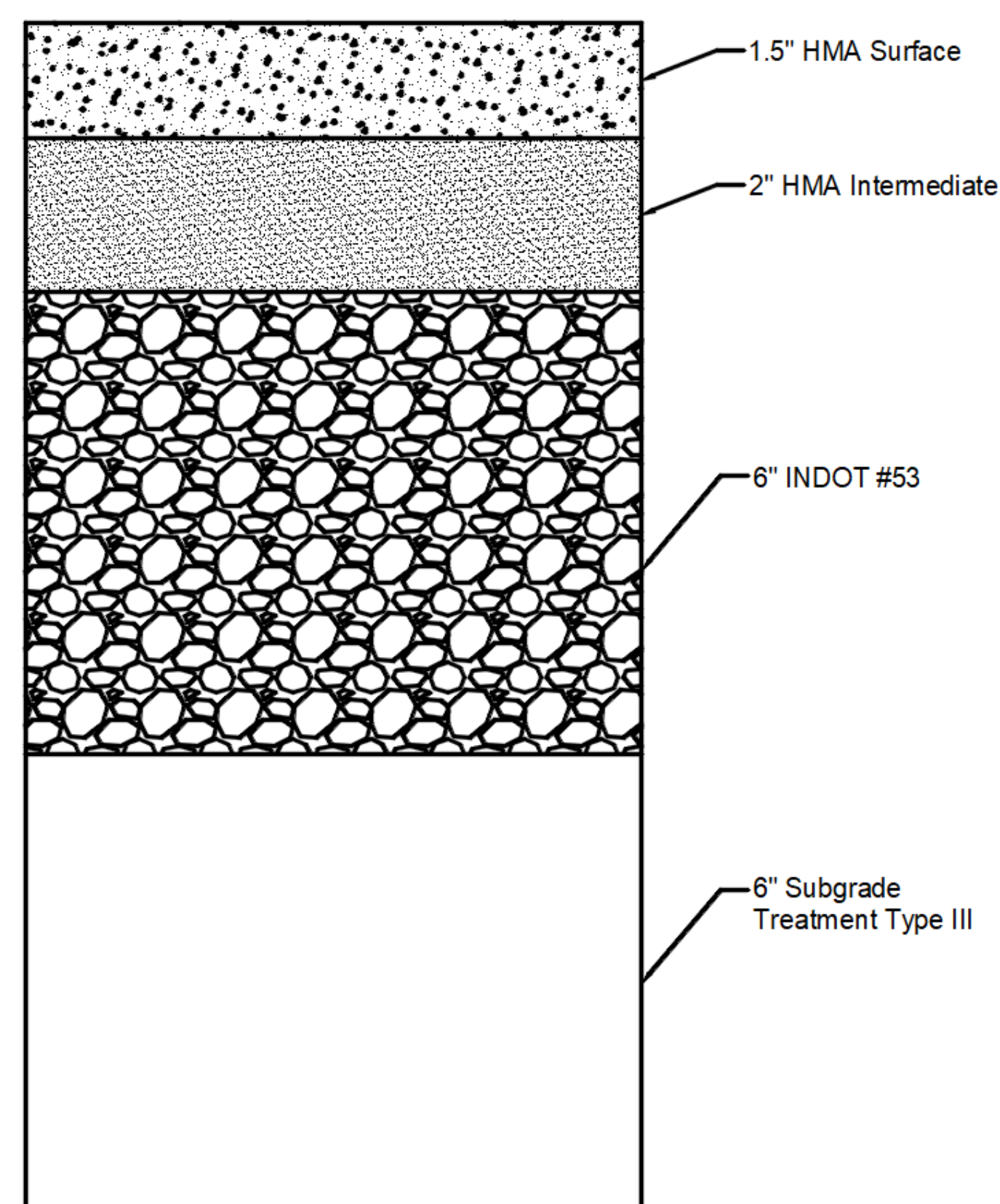
General

BRAG Engineering has designed a 6-mile trail from the YMCA in Angola, Indiana up to Fremont, Indiana near Swager Street. This trail promotes connectivity between the two communities as well as an active and healthy lifestyle to all. This trail will also provide a safe way of transportation for bicyclists and pedestrians.



Pavement Design

BRAG Engineering used the Indiana Design Manual to produce the pavement design. They used the pavement section specifically stated for "Non-Motorized Vehicle Use Facility HMA Pavement Section."



Data Collection & Analysis

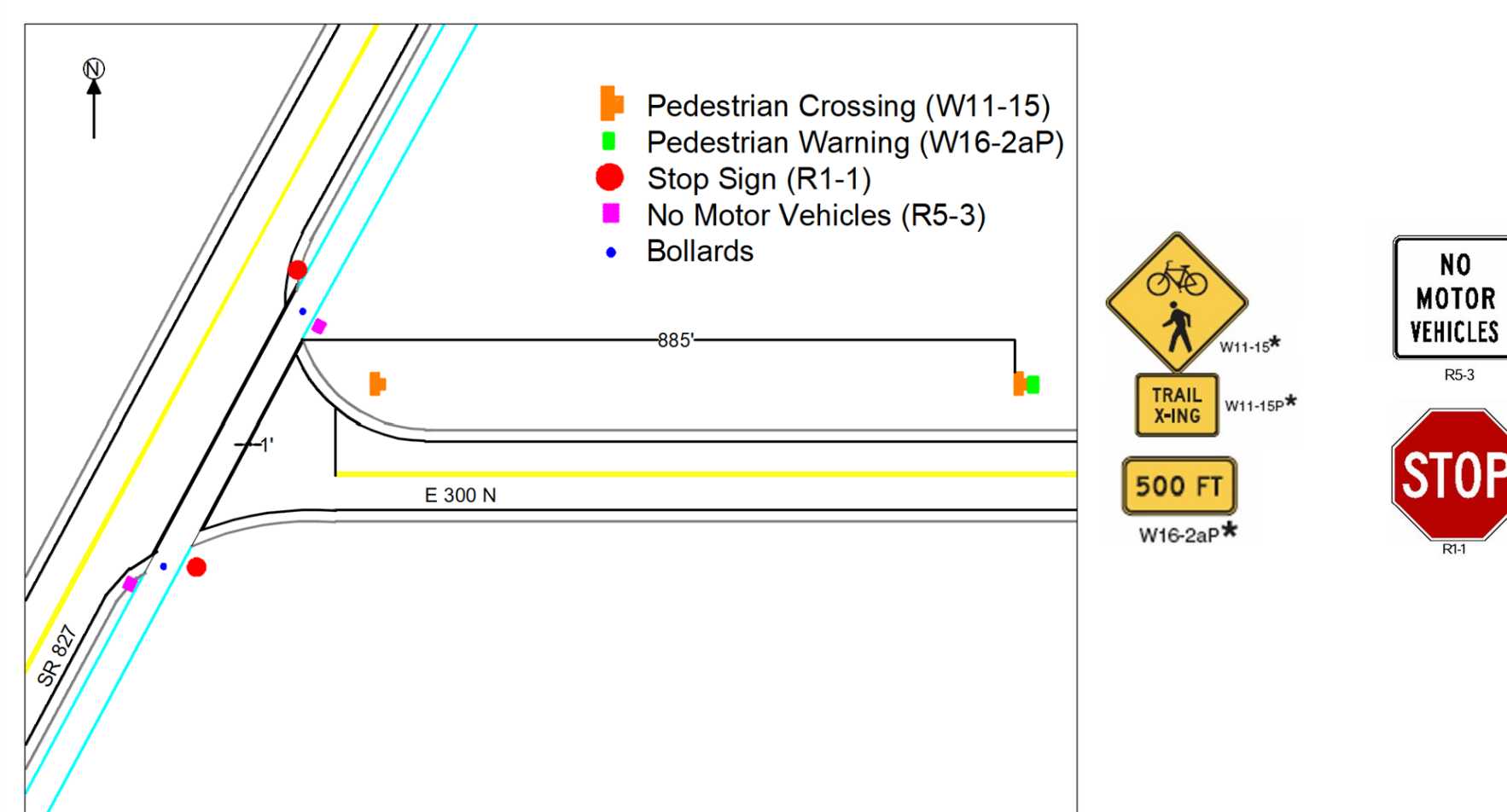
BRAG surveyed cross-sections along 3 miles and took points at edge of pavement, Right of Way (ROW), utilities, centerlines, and stream crossings. BRAG Engineering supplemented their data base with topo from Schneider Corp to create a complete base map. BRAG also conducted a soil investigation to identify where bad soils are present.

Soil Label	Soil Type	Area Used	% of Area
GnB	Glynwood Silt Loam, 2 to 6 percent slopes	214.2	20.5%
Pa	Palms Muck, drained	4.6	0.4%



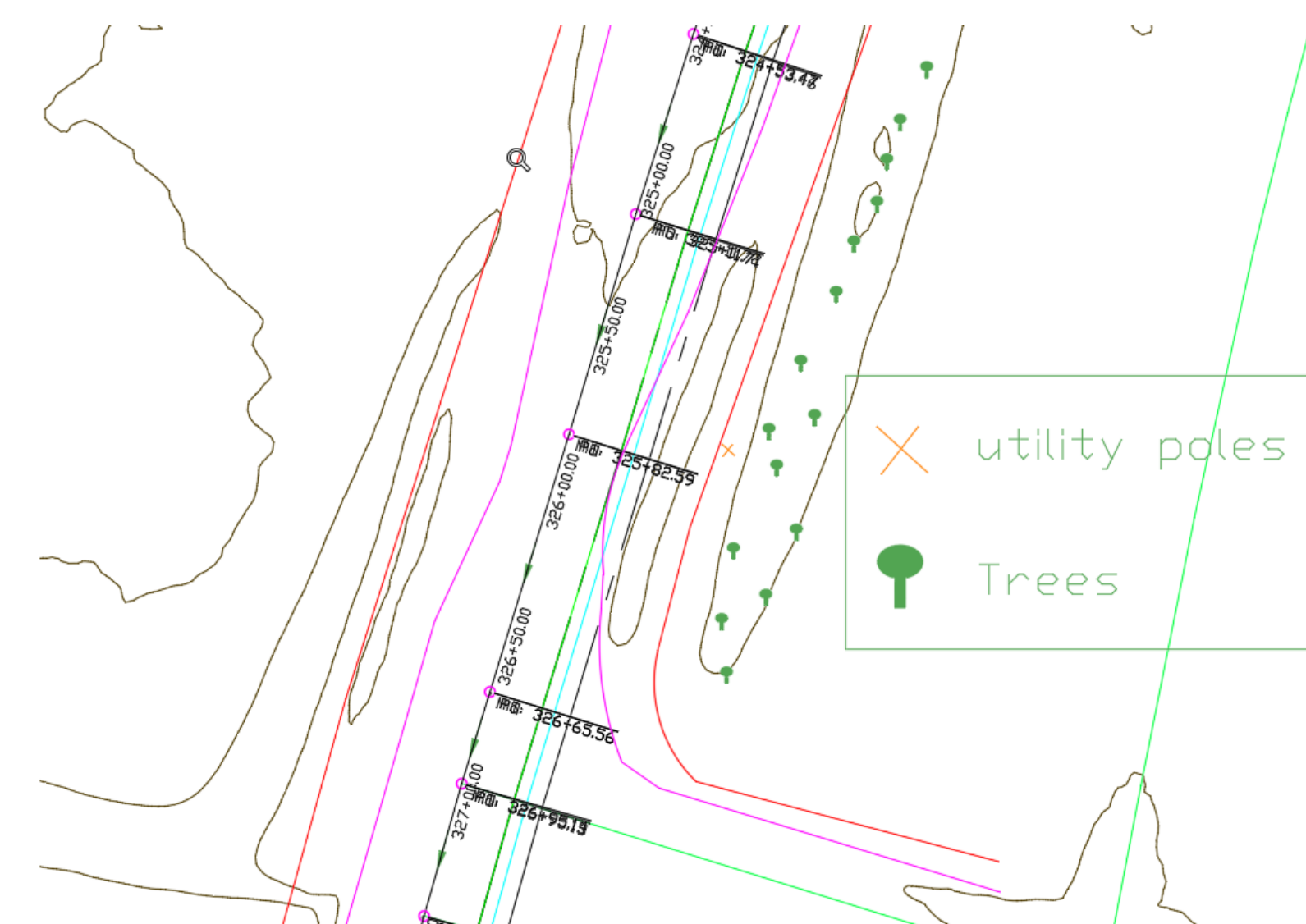
Safety and Signage

Sight Distance was taken into careful consideration by BRAG. Each intersection poses a risk to the safety of the trail users. Therefore, BRAG made sure the Sight Distance between motorists and trail users was clear. Also, appropriate signage was added to the trail and roadways to warn both users.



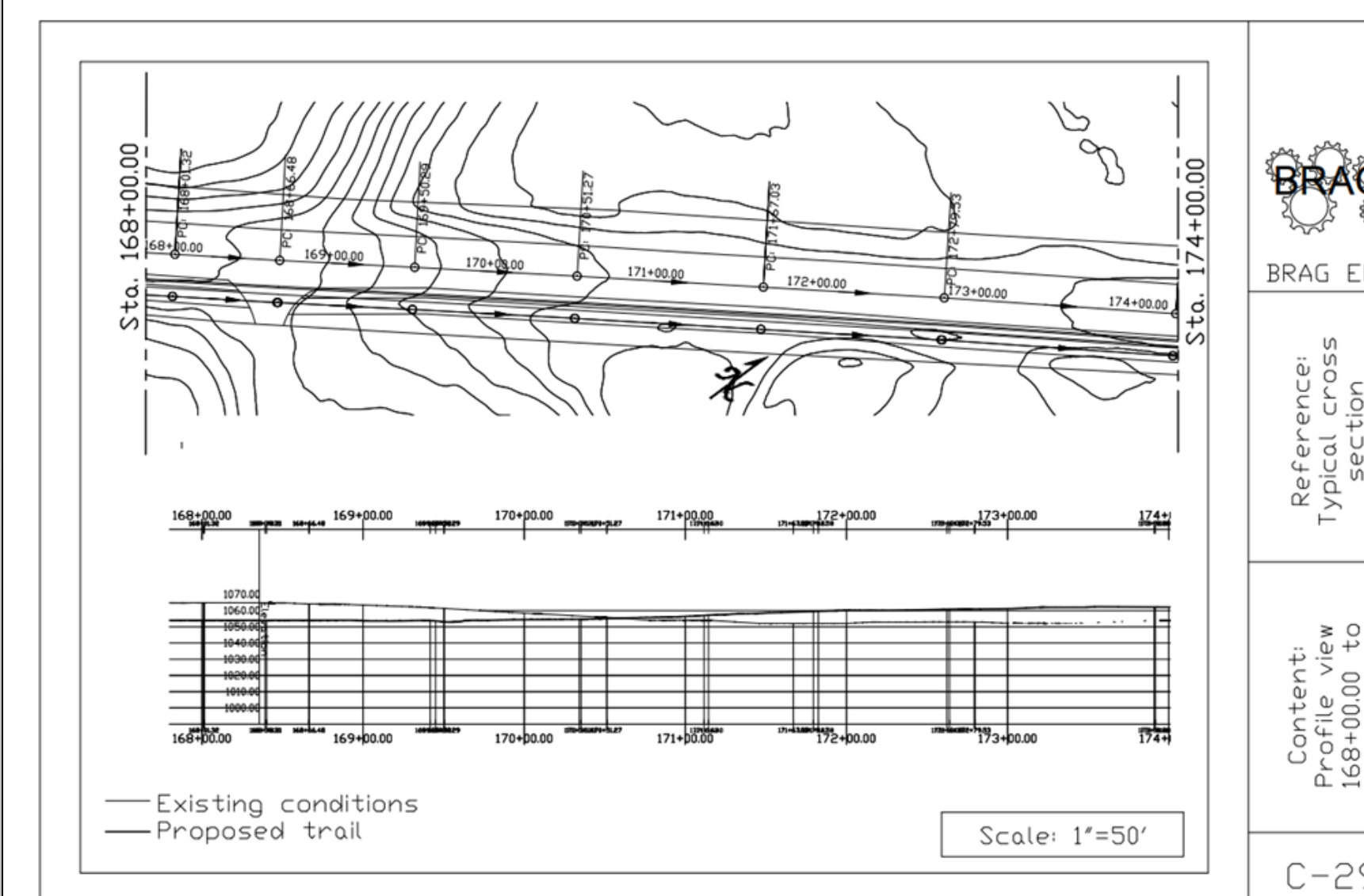
Site Planning

BRAG evaluated whether there were issues with wetlands, Superfund Sites, or underground storage tanks. This trail travels along the east side of State Route 827. The east side was chosen as it runs into less utilities, driveways, and crosses no train tracks. Therefore, BRAG would run into less issues while designing and it would be safer for the trail users. There are some utilities that will need to be relocated along with trees that need to be removed that are in the designed trail's way. There is also a lane shift that happens under the I-90 overpass. Correct signage and barriers were designed to ensure pedestrian and bicyclist safety.



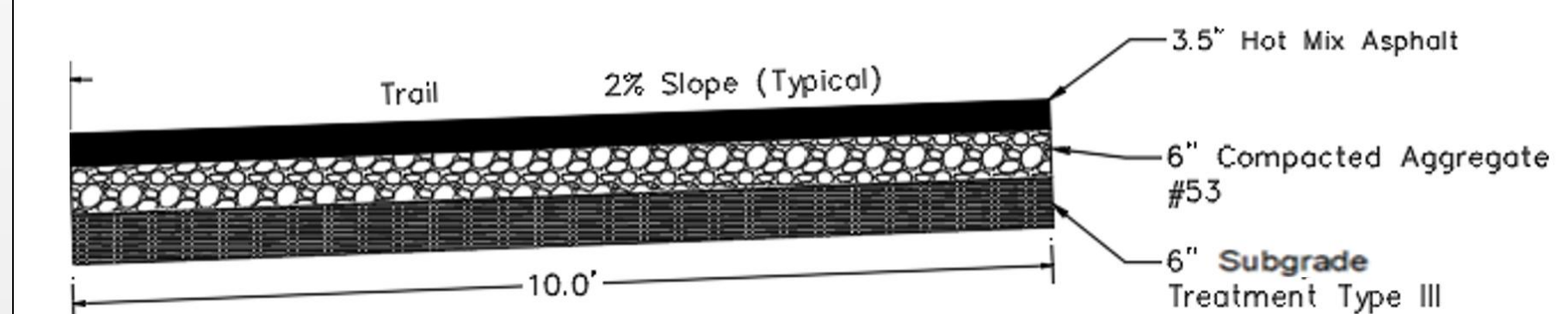
Plans & Profiles

BRAG Engineering created profile views that displayed the centerline of the road, edge of pavement, buffers, trench, and trail. These profiles allow for the existing conditions and proposed trail to be shown.

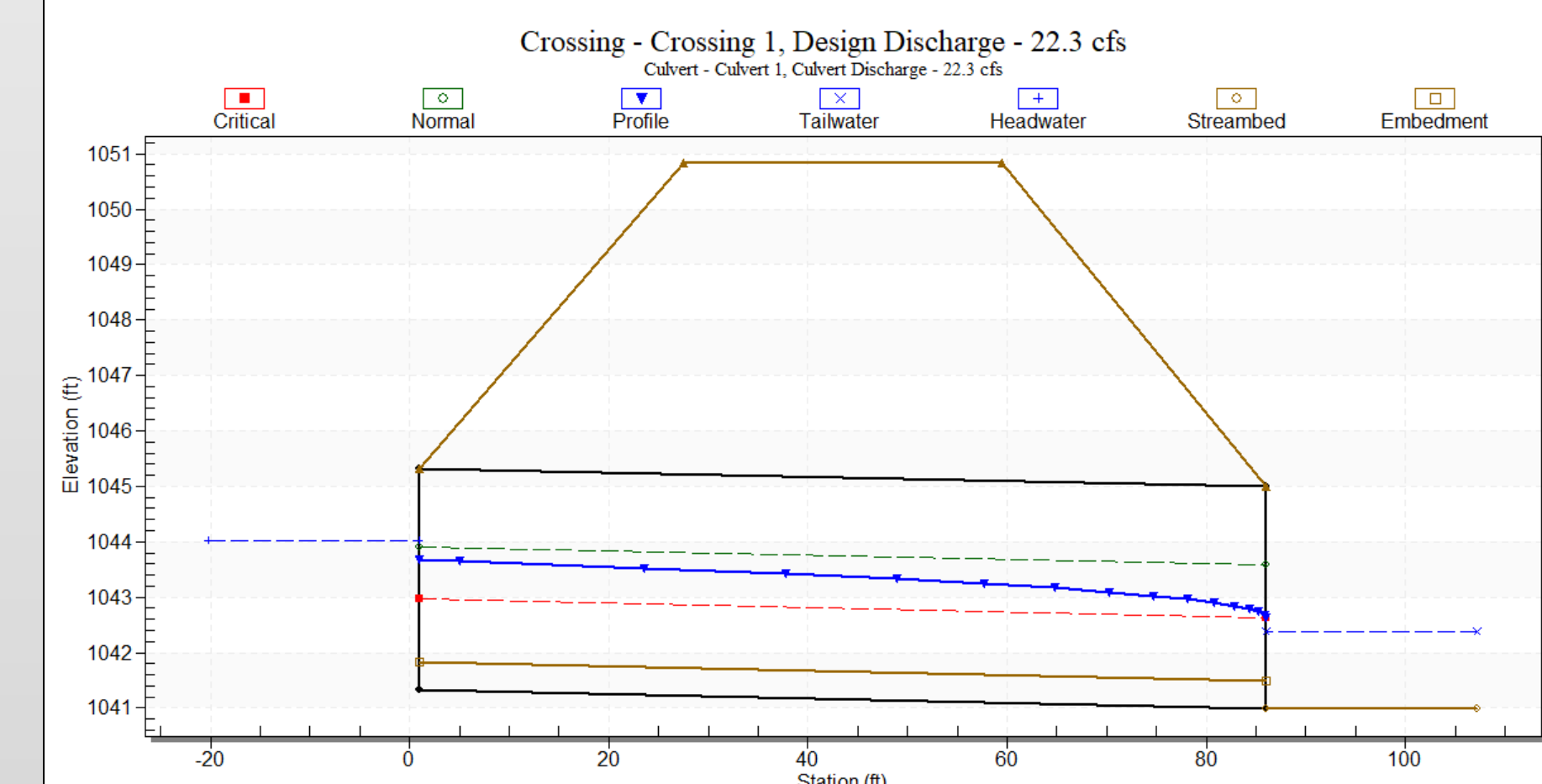


Hydraulics & Hydrology

BRAG Engineering used the Rational Method to calculate the flow rates and used the Michigan LID manual to design the infiltration trench. Areas by sag curves in the road, near wetlands and ponds, and by low-lying farmland were considered for a trench. There are two stream crossings present that were analyzed during the design.



They used StreamStats to delineate the watershed of the two stream crossings and to get the peak flow rates. From there they used HY-8 to analyze the culverts, and it was found both culverts had enough capacity for the flow.



Cost Estimation

For the cost of the 6-mile trail, BRAG Engineering used the INDOT Price Summary to gather prices for all the costs. The total of the 6-mile trail came out to be \$1,502,650

Description	Total Cost
Pavement	\$1,400,000
Crosswalks	\$12,000
Tree Removal	\$9,500
Rip-Rap	\$34,200
Utility Relocation	\$24,500
Contingency	5%
Final Cost	\$1,577,783