

### DESIGN EXECUTIVE SUMMARY

<b>County:</b>	WARREN	<b>Item #:</b>	3-8857.00	
<b>Route Number(s):</b>	31W	<b>State Program #:</b>	9333701D	
<b>BMP/EMP:</b>	10.561/11.688	<b>Federal Project #:</b>	STP 7434 023	
<b>Type of Work:</b>	Major Widening	<b>State Project #:</b>	114 0031 010-012	

**Highway Plan Project Description: IMPROVE US-31W FROM CAMPBELL LANE (US-231) TO UNIVERSITY BOULEVARD (US-231X). (14CCN)(16CCR)(18CCR)**

#### EXISTING CONDITIONS

<b>ADT (current):</b>	<b>24,000</b>	<b>Truck Class:</b>	AAA ▼	<b>Trucks: 6.1%</b>
<b>Existing Functional Classification:</b>	<input checked="" type="checkbox"/> Urban <input type="checkbox"/> Rural Arterial ▼	<b>Terrain:</b>	Rolling ▼	<b>Route is on (check all that apply):</b> <input type="checkbox"/> NHS <input type="checkbox"/> NN <input type="checkbox"/> Ext Wt <input checked="" type="checkbox"/> None
<b>Posted Speed Limit:</b>	45 mph "or" <b>Statutory Speed Limit:</b>		<input type="checkbox"/> 35 mph (urban)	<input type="checkbox"/> 55 mph (rural)
<b>Existing Bike Accommodations:</b>	Bike Lane ▼ *	<b>Ped:</b>	<input checked="" type="checkbox"/> Sidewalk **	<input checked="" type="checkbox"/> Other: _____

#### PROPOSED CONDITIONS

<b>Design Functional Classification:</b>	<input checked="" type="checkbox"/> Urban <input type="checkbox"/> Rural Arterial ▼	<b>Design ADT (2043):</b>	34,000 DHV: 2,900	<b>Access Control:</b> Min. Spacing: _____ By Permit ▼
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CONTROLLING CRITERIA:	EXISTING CONDITIONS (Estimated based upon existing geometrics.)	AASHTO Guidance (for design speed)	Recommendation	Design Exception (check if needed for Design Speed)
Design Speed	<b>45</b>	Minimum: 30 mph Selected: 35 mph	<b>35 mph</b>	<input type="checkbox"/>

Note: For any remaining controlling criteria that are less than AASHTO recommended guidance: If recommended design speed is ≥ 50 mph, exceptions are needed; If recommended design speed is < 50 mph, variances are needed.

				Exception (≥ 50 mph)	Variance (< 50 mph)
Lane Width, No. of Lanes	12', 3	min. 11', 2	11', 4	<input type="checkbox"/>	<input type="checkbox"/>
Shoulder Width (Minimum Usable)	4'	Curb and Gutter	Curb and Gutter	<input type="checkbox"/>	<input type="checkbox"/>
Horiz. Curve Radius (Minimum)	2350'	371'	2350'	<input type="checkbox"/>	<input type="checkbox"/>
Max. Superelev. Rate (emax= 4 %)	2.20%	4%	2.20%	<input type="checkbox"/>	<input type="checkbox"/>
Stopping Sight Distance (Minimum)	656.84	250	656.84	<input type="checkbox"/>	<input type="checkbox"/>
Max. Grade (%)	3.25%	8.00%	3.25%	<input type="checkbox"/>	<input type="checkbox"/>
Normal Cross Slope (%)	2.00%	2.00%	2.00%	<input type="checkbox"/>	<input type="checkbox"/>
Vert. Clearance (ft.)	N/A	N/A	N/A	<input type="checkbox"/>	<input type="checkbox"/>

#### OTHER CRITERIA:

				<u>Design Variance</u>
Border Area (urban)	Varies	8'-12'	10'(Sidewalk), 13'(SUP)	<input type="checkbox"/>
Sidewalk Width, slope	4'-10'	4' min 8' desirable	5'-8'	<input type="checkbox"/>
Bike Lane Width, slope	4', 2%	None	None	<input type="checkbox"/>
Shared Use Path Width	8'	None	8'	<input type="checkbox"/>
Other:				<input type="checkbox"/>

## DESIGN EXECUTIVE SUMMARY

**Design Criteria Notes:** \*Bike Lane - MP 10.993-11.53  
 \*\*Sidewalk MP 10.561-MP 10.799 and MP 11.54-11.688

**Environmental Action:**

CE Level 1

**Completion Date:** \_\_\_\_\_

scheduled  actual

**Existing Pavement Depths:** Three new cores were taken on 4-27-18 that ranged from 9.25" to 12.5". The bike lanes are full depth pavement.

**Include:**

1. Typical sections, including bridges
2. Map showing project location
3. Project overview and existing conditions
4. Purpose and Need statement
5. Discussion of alternatives (including preferred and no build) with respective traffic control schemes, and environmental, utility and right-of-way impacts.
6. Discussion of Design Exceptions /Variances and mitigation strategies
7. Cost comparison table of alternatives vs. Highway Plan
8. Discussion if preferred alternate cost is >115% than highway plan
9. Discussion of clearzone
10. Consideration for bicycle and pedestrian facilities (see HDM Chapter 1500)
11. Water-related impacts summary

**Submitted by Project Engineer:**

KYTC  Consultant **Date:**

**Recommended by Project Manager:**

**Date:**

**Tier Level Approval**

Tier 1

Tier 2

Tier 3

**Location Engineer:**

**Date:**

**Roadway Design Branch Manager:**

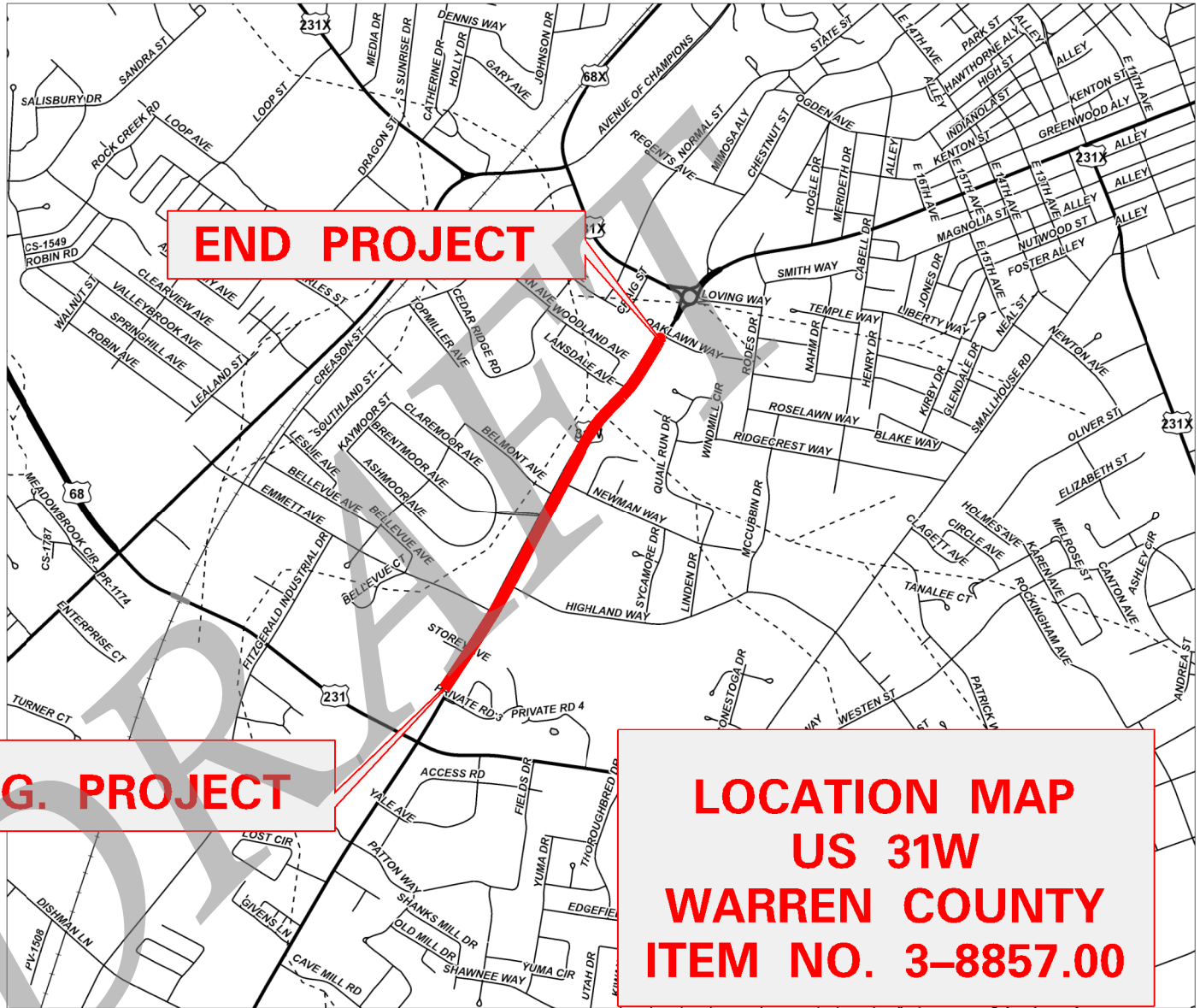
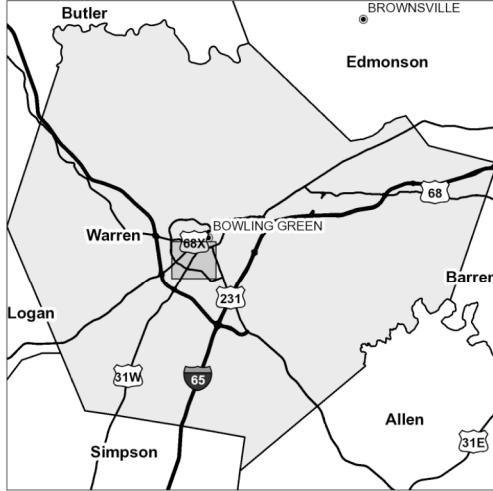
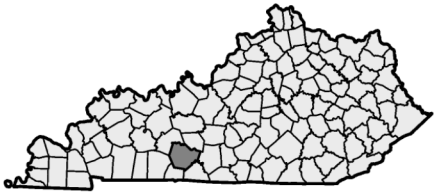
**Date:**

**Geometric Approval**

Director, Div. of Hwy. Design

**Granted by:**

**Date:**

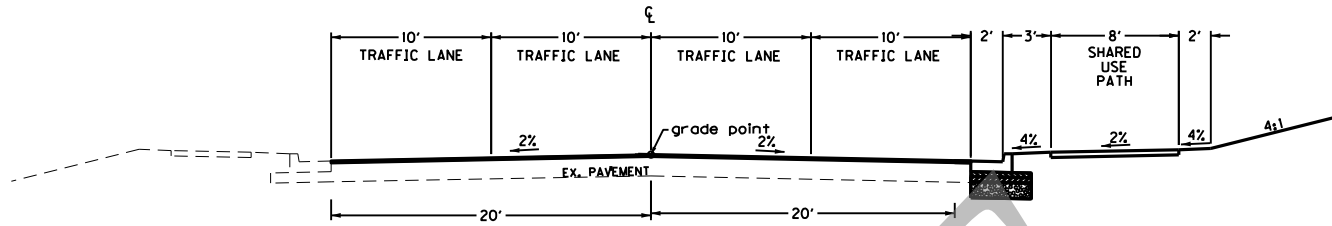


**END PROJECT**

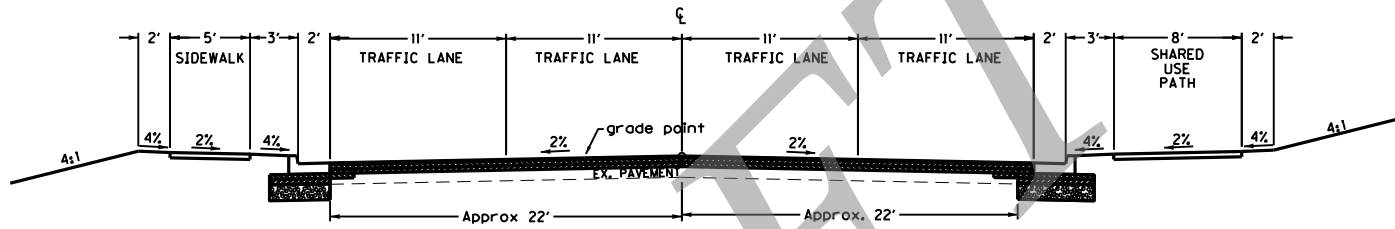
**BEG. PROJECT**

**LOCATION MAP  
US 31W  
WARREN COUNTY  
ITEM NO. 3-8857.00**

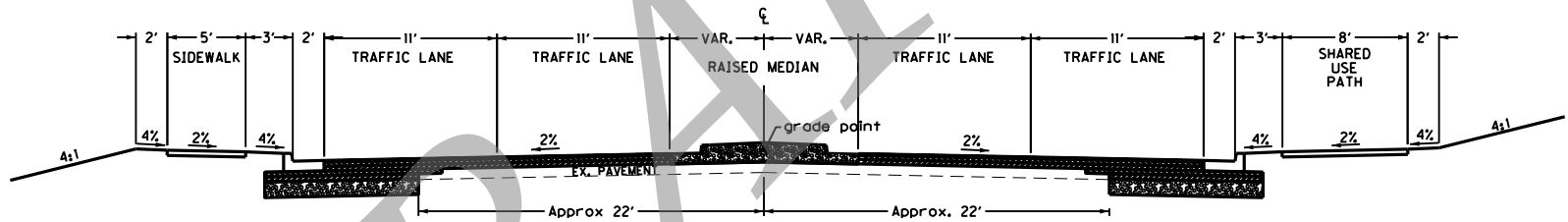
# TYPICAL SECTIONS



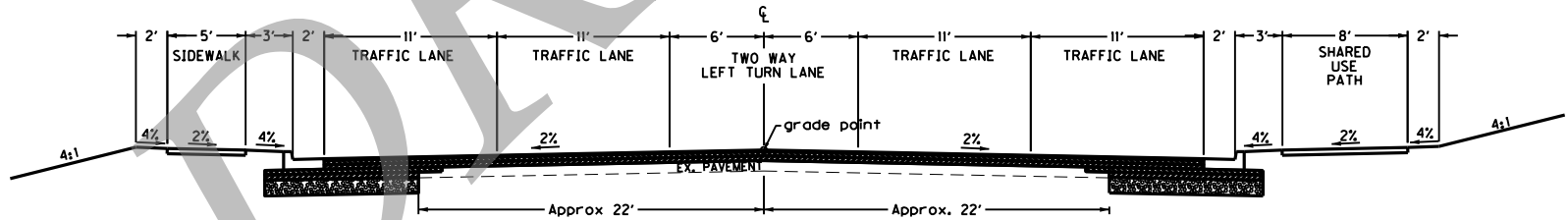
**4 LANE URBAN (NORMAL)**  
**STA. 170 + 46 TO 172 + 65 (TIE INTO EXISTING US 31W)**



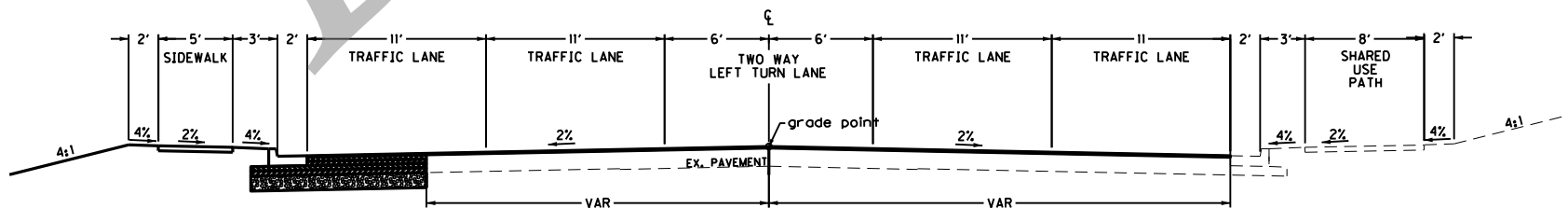
**4 LANE URBAN (NORMAL)**  
**STA. 154 + 40 TO STA. 170 + 46**



**5 LANE URBAN (NORMAL)**  
**STA. 126 + 30 TO STA. 135 + 35**



**5 LANE URBAN (NORMAL)**  
**STA. 125 + 90 TO STA. 126 + 30, STA. 135 + 35 TO 154 + 40**



**5 LANE URBAN (NORMAL)**  
**STA. 119 + 60 TO STA. 125 + 90**

**Item No. 3-8857.00**  
**Improve US 31W from Campbell Lane (US 231)**  
**To University Boulevard (US 231X)**  
**Warren County, Kentucky**

**1. Project Overview and Existing Conditions**

This section of US 31W Nashville Road has typical sections that vary throughout the project area. Near the US 31W/Campbell Lane Intersection, there are two lanes in each direction with a dual left turn lane onto Campbell Lane. Both sides also have sidewalks in this area. From the Potter Children's Home to the Storey Avenue intersection, the typical section tapers down to a three-lane section with a turn lane in the center. The right side of the roadway in this section has an existing shared use path. The three lane typical continues between Storey and Emmett Avenue. From Emmett Avenue to Highland Way, the center lane tapers down to a flush median. From Highland Way to Lansdale Avenue the typical is three 12' lanes with a center turn lane, and two four foot bike lanes one on each side. From Lansdale Avenue, the existing typical transitions to tie in to the roundabout project completed in 2014.

The traffic forecast that was developed for this project shows that existing data in 2018 is 24,000 vpd and is expected to increase to 34,000 vpd by the year 2040. The accident data for this section of roadway shows that there were 388 accidents over the past five years (2013-2017) with 332 of those were rear end collisions. These rear end collisions can be attributed to the heavy congestion and the long queue lengths for this segment of US 31W. In order to address the long queue lengths and further potentially reduce the number of rear end collisions, a wider roadway typical would be required to increase capacity. Increasing capacity for this section of Nashville Road will increase safety and improve the flow of traffic.

**2. Purpose and Need**

US 31W (Nashville Road) is a three to five lane roadway that serves as an urban minor arterial for the residential and commercial areas in the Campbell Lane/University Boulevard area of Bowling Green. The section of the corridor from Campbell Lane to University Boulevard also provides direct access to Western Kentucky University and Downtown Bowling Green along with access to many residential areas along the corridor. With the mix of residential, commercial, and educational development, there is an interest in expanding the existing mobility opportunities for pedestrians and bicyclists. The increasing traffic volumes and the capacity limitations of the existing roadway impede the mobility and safety along the corridor. During peak times, long queues develop from the signals at Emmett and Story Avenues toward the roundabout.

The purpose of this project is to improve the safety and mobility for motorists, pedestrians, and bicyclists along the US 31W (Nashville Road) Corridor from Campbell Lane (US 231X) to University Boulevard.

### 3. Public Involvement

A stakeholder meeting was held on June 25<sup>th</sup>, 2018 with a gathering of neighborhood leaders from adjacent neighborhoods to the project. The project team felt that these leaders would provide thoughtful feedback and communicate the opinion of the residents in their neighborhoods. During the meeting, the stakeholders were shown exhibits and a project presentation. The stakeholders were also shown two typical section alternatives that were designed to encourage lower speeds through the project. One alternative included a raised median and the other was four lanes with no median. At the Preliminary Line and Grade meeting held November 9<sup>th</sup>, 2018 the project team felt that there were not enough responses or support for the raised median, so the four lane option with no median moved forward into final design.

The following table is a summary of the comments from the questionnaire. Each row is one stakeholder and the columns are the issues addressed.

Traffic	Safety	Drainage	Access	Aesthetics	Right of Way
<ul style="list-style-type: none"> <li>Traffic Congestion Relief</li> </ul>	<ul style="list-style-type: none"> <li>Liked traffic calming design elements</li> </ul>		<ul style="list-style-type: none"> <li>Prefers landscaped median</li> </ul>	<ul style="list-style-type: none"> <li>Landscaping</li> </ul>	
<ul style="list-style-type: none"> <li>Thinks lane direction should be reversible.</li> <li>5 Lanes is overkill</li> </ul>	<ul style="list-style-type: none"> <li>U-Turns are dangerous</li> </ul>	<ul style="list-style-type: none"> <li>Sinkhole in front of property</li> </ul>	<ul style="list-style-type: none"> <li>No Median/Does not want restricted access</li> </ul>		
<ul style="list-style-type: none"> <li>Likes roundabout for Emmett Ave</li> <li>Traffic congestion relief</li> </ul>	<ul style="list-style-type: none"> <li>Goal of improved safety</li> </ul>		<ul style="list-style-type: none"> <li>Likes raised median idea</li> </ul>	<ul style="list-style-type: none"> <li>Landscaping</li> </ul>	
<ul style="list-style-type: none"> <li>Likes roundabout for Emmett Ave</li> <li>Traffic congestion relief</li> </ul>	<ul style="list-style-type: none"> <li>Concerned with speeds</li> </ul>		<ul style="list-style-type: none"> <li>Dislikes access restriction but understands benefits of raised median overall</li> </ul>		<ul style="list-style-type: none"> <li>Does not want to lose yard</li> </ul>
<ul style="list-style-type: none"> <li>Traffic congestion relief</li> <li>Campbell Lane signal is a problem</li> </ul>	<ul style="list-style-type: none"> <li>Median will NOT slow drivers (Cemetery Rd.)</li> </ul>	<ul style="list-style-type: none"> <li>Covering sinkhole will worsen flooding</li> </ul>	<ul style="list-style-type: none"> <li>No Median/Does not want restricted access</li> </ul>		
		<ul style="list-style-type: none"> <li>Widening will worsen flooding for church</li> </ul>	<ul style="list-style-type: none"> <li>Very concerned about access to church</li> </ul>		<ul style="list-style-type: none"> <li>Concerned about losing frontage/sign</li> </ul>
<ul style="list-style-type: none"> <li>Traffic congestion relief</li> <li>Better Bike Ped Access</li> </ul>	<ul style="list-style-type: none"> <li>Speed should be addressed</li> </ul>		<ul style="list-style-type: none"> <li>Likes raised median idea</li> </ul>	<ul style="list-style-type: none"> <li>Landscaping</li> </ul>	
<ul style="list-style-type: none"> <li>Traffic congestion relief</li> </ul>		<ul style="list-style-type: none"> <li>Mentioned sinkholes and general water issues</li> </ul>	<ul style="list-style-type: none"> <li>Likes raised median idea</li> </ul>	<ul style="list-style-type: none"> <li>Landscaping</li> </ul>	
<ul style="list-style-type: none"> <li>Traffic congestion relief</li> </ul>	<ul style="list-style-type: none"> <li>Accidents are a concern</li> </ul>				

### 4. Alternatives Considered

#### No Build Alternative

The No Build Alternative would not address the Purpose and Need. The existing road would still have the safety and capacity problems that will worsen under future traffic volumes.

#### Preferred Alternative

The Preferred Alternative begins near the Potter Children’s Home. At this point, there are two lanes of traffic in both directions and the end of a dual left turn lane. At station 125+90, the proposed typical changes to five lane urban with equal widening on both sides. The entire project will have a 5’ sidewalk on the left side and an 8’ shared use path on the right side. Both fill in a gap between existing sidewalk and shared use path facilities. From the Storey Avenue intersection to the Highland Way intersection, a raised median restricts left turning movement

to only the intersections. The parking lots and commercial driveways through this area create multiple conflict points that have contributed to crashes. A raised median through this area will improve safety by reducing conflict points. Continuing past Highland Way to the Newman Way intersection, the proposed typical returns to the five lane equal widening. From Newman the typical transitions from a five lane section to a four lane section with no median. The idea behind this transition is that with limited left turning movements into the residential entrances and the potential for high speeds that the 4 lane typical would encourage drivers to slow down. Traffic on the inside lanes of this section would feel the friction of oncoming traffic while traffic in the outside lanes would see the multitude of driveways and be encouraged to slow down.

Throughout the length of the project, there is sufficient pavement width to maintain two traffic lanes. Traffic can be shifted as needed to construct the widening on either side while maintaining traffic.

Environmentally, this alternate could potentially impact Underground Storage Tanks (UST's) at the gas stations and limit excavation depths for utilities located within this area. Further impacts will be determined once the final design of the preferred alternate is underway and utility impacts are determined.

The right of way for this project will be set 2' behind the sidewalk or shared use path. A large portion of the project will only require temporary easements for slope/entrance construction since the existing right of way width is 100' total.

Since this is a densely developed urban setting, there are significant utility impacts. There will be gas, telephone, electric, water, sanitary, and cable relocations. Final impacts will not be known until final drainage and final utility relocations are completed.

#### **Raised Median Alternative**

The Raised Median Alternative is identical to the Preferred Alternative from the beginning of the project to Newman Way and at the tie in at the end of the project. From Newman Way to Lansdale Avenue this alternative includes a raised median with possible landscaping. The width of the median could vary from 8' to 20' but has the goal of encouraging lower speeds toward the roundabout. The visual cue of the barrier and landscaping has been shown to provide traffic calming benefits. All left turns would be restricted in this area and drivers would make U Turn maneuvers at Newman Way and at Lansdale Avenue.

The right of way impacts for this alternative will be will vary from the preferred alternative in the raised median area between Newman Way and Lansdale Avenue. The 20' median option would require right of way acquisition on the right side in addition to larger slope easements. Bulb outs for U Turn movements will also require additional right of way.

Environmental impacts for this alternate will be the same as the preferred alternate since the Underground Storage Tanks are not within the limits of the landscaped median.

Utility impacts in excess of the preferred alternate will depend on the final location of the existing utilities as determined during final design.

**5. Discussion of Design Exceptions/Variations and Mitigation Strategies**

There are no design exceptions or variations needed for this project.

**6. Cost – As compared to the SYP budgeted amount**

<u>Fund</u>	<u>Phase</u>	<u>Fiscal Year</u>	<u>2018 Highway Plan Estimate</u>	<u>PL&amp;G Estimate</u>
SPP	R	2019	\$ 1,750,000	\$ 1,750,000
SPP	U	2019	\$ 2,000,000	\$ 5,800,000*/\$7,800,000**
SPP	C	2022	<u>\$ 4,250,000</u>	<u>\$ 4,177,585</u>
Total			\$8,000,000	\$1,1727,585*/13,727,585**

\*Cost of Utility Relocation with Percentages Applied

\*\*Total Cost of Utility Relocation

**7. Discussion if Preferred Alternate Cost is >115% than Highway Plan**

The preferred alternative is 144%\*/169%\*\* greater than the Highway Plan estimate. The main factor in the increase in cost as compared to the 2018 Highway Plan is the Utility estimate costs are substantially higher. The Right of Way and Construction estimates are the same or less than the Highway Plan estimate. The estimated utility costs currently have the potential to decrease somewhat once the actual impacts are determined and final design of the preferred alternate is underway. An effort to minimize the impacts where possible will be made. AT&T will possibly be 90% self-funded which could decrease estimated utility costs. Utilities may be located more accurately in Phase II to help lessen impacts once final design details such a drainage impacts are known.

**8. Discussion of Clearzone**

For a design speed of 35 MPH and an ADT of greater than 6000, the Roadside Design Guide suggests a clearzone of 16’-18’ with 4:1 foreslopes. Since this is an urban project, the typical clearzone used is from the edge of pavement to 2’ behind the sidewalk or shared use path. This distance coincides with the proposed right of way line for this project. On the left side, which includes the 5’ sidewalk, the clearzone will be 10’, and on the right side, which includes the 8’ shared use path, the clearzone will be 13’.

**9. Consideration for Bicycle and Pedestrian**

The design team chose to implement an urban typical section that includes a 5’ sidewalk on the left side of the roadway and an 8’ shared use path on the right side. The sidewalk will provide connectivity on the left side between existing sidewalks near the intersection with Campbell Lane and at the end of the project with sidewalks completed with the roundabout. The shared use path on the right side will be a continuation of an existing greenway that ends in front of the Potter Children’s home. The shared use path will continue from that greenway to Oaklawn Way.



10. Avoidance to Water Related Impacts

**WATER RELATED IMPACTS SUMMARY**

<b>County</b>	WARREN	<b>Route No.</b>	US 31W	<b>Item No.</b>	3-8857.00
<b>Date</b>	11-30-2018	<b>Program #</b>	9333701D		
<b>Federal Project No.</b>	STP 7434 023				
<b>State Project No.</b>	114 0031 010-012				
<b>Location Engineer</b>	Wendy Southworth PE				

**Section 1: Impact Checklist**

Complete this section for each alternative considered at the conclusion of Phase 1 design.

FLOODPLAIN IMPACTS		
FEMA Study Type	Yes	Community No.
Detailed FEMA Study with delineated floodway*	<input type="checkbox"/>	
Detailed FEMA Study without delineated floodway**	<input type="checkbox"/>	
Approximate FEMA Study	<input type="checkbox"/>	
No FEMA Study	<input checked="" type="checkbox"/>	
<p>* If proposed design impacts the floodway, then it may require initiation of map revision process (CLOMR/LOMR).</p> <p>** If proposed design impacts water surface elevations, then it may require initiation of map revision process (CLOMR/LOMR).</p> <p>Potential impacts to floodplains and/or floodways shall be assessed early in the project. Refer to the Drainage Manual.</p>		

SIGNIFICANT RESOURCE IMPACTS	YES		NO	
Are open sinkholes impacted? If so, how many sinkholes are impacted?	<input type="checkbox"/>		<input checked="" type="checkbox"/>	
Are wetlands impacted? If so, how many total acres are estimated? _____ acres	<input type="checkbox"/>		<input checked="" type="checkbox"/>	
Are any of the streams in the project area designated "Special Use Waters" (e.g. Wild Rivers, Exceptional Waters, Outstanding State Resource Water, etc.)?	<input type="checkbox"/>		<input checked="" type="checkbox"/>	

Where possible, alignments should be developed that avoid significant resources. When it becomes impossible to avoid a significant resource, the project should be designed to minimize these impacts. Significant resource impacts are discussed in DR 202 of the drainage manual. Wetland impacts and their costs are discussed in DR 500 of the Drainage Manual.

Projects that impact special use waters may require an individual KPDES Erosion Control Permit. Contact the Division of Environmental analysis for more information.

<b>STREAM CHANNEL IMPACTS</b>	<b>YES</b>	<b>NO</b>		
Will stream relocations (channel changes) be needed?  If so, check all that apply:  1. Will at least "1" relocation be over 100' in length? <input type="checkbox"/>  2. Will at least "1" relocation be over 300' in length? <input type="checkbox"/>  3. Will at least "1" relocation be over 500' in length? <input type="checkbox"/>  How many total linear feet are estimated? _____ LF	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Will new culverts or culvert extensions be constructed?  If so, check all that apply:  1. Will at least "1" be over 300' in length? <input type="checkbox"/>  2. Will at least "1" be over 500' in length? <input type="checkbox"/>  How many total linear feet are estimated? _____ LF	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Will temporary stream crossings be needed?	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Will excess material sites that require permitting be needed?	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Will bridges be constructed?	<input type="checkbox"/>	<input checked="" type="checkbox"/>		

On highway projects that involve stream crossings such as bridge and culverts, it is often not feasible to totally avoid stream channel impacts. In these cases, design the project to minimize the impacts. Stream relocations should be avoided if possible. If stream relocations are unavoidable design to project to minimize their impacts. Stream channel impacts are discussed in DR 506, 601-3, 608-2, and 802-3 of the drainage manual.

## **Section 2 : Impact Discussion**

Complete this section for the chosen alternative. Discuss the selected alternate's influence on each of the impacts listed above. Discuss any avoidance, minimization and/or mitigation measures included in the project.

This project has no box culverts or blue line stream impacts. Since this is an urban widening project, the drainage will consist of a storm sewer system that will convey water from the roadway into drainage boxes and outfall off of the project. Existing drainage patterns will be considered to determine outfall locations. Ditching will be required as necessary in areas with significant sheet flow toward the roadway. Existing detention basins exist in front of the Holy Trinity Lutheran School as well as the Unitarian Church. Existing culvert pipes may be extended and/or utilized in the storm sewer design.