

<b>DESIGN EXECUTIVE SUMMARY</b>				
<b>County:</b>	Logan	<b>Item #:</b>	3-80100.00	
<b>Route Number(s):</b>	US 79	<b>State Program #:</b>	1221701D	
<b>BMP/EMP:</b>	2.91/2.93	<b>Federal Project #:</b>	STP 079 1007	
<b>Type of Work:</b>	Bridge Replacement	<b>State Project #:</b>	FD52 110 0079 007-000	
<b>Highway Plan Project Description: REPLACE AND WIDEN BRIDGE ON US-79 AT MP 2.921 IN LOGAN COUNTY.</b>				

**EXISTING CONDITIONS**

<b>ADT (current):</b>	<b>3553</b>	<b>Truck Class:</b>	AAA	<b>19.40%</b>
<b>Existing Functional Classification:</b>	<input type="checkbox"/> Urban <input checked="" type="checkbox"/> Rural Arterial	<b>Terrain:</b>	Rolling	<b>Route is on (check all that apply):</b>
				<input checked="" type="checkbox"/> NHS <input type="checkbox"/> NN <input type="checkbox"/> Ext Wt <input type="checkbox"/> None
<b>Posted Speed Limit:</b>	mph	<b>Statutory Speed Limit:</b>	<input type="checkbox"/> 35 mph (urban) <input checked="" type="checkbox"/> 55 mph (rural)	
<b>Existing Bike Accommodations:</b>	None	<b>Ped:</b>	<input type="checkbox"/> Sidewalk <input type="checkbox"/> Other: ___N/A___	

**PROPOSED CONDITIONS**

<b>Design Functional Classification:</b>	<input type="checkbox"/> Urban <input checked="" type="checkbox"/> Rural Arterial	<b>Design ADT ( ): DHV:</b>	<b>Access Control:</b> By Permit
			Min. Spacing: <u>600'</u>

CONTROLLING CRITERIA:	<u>EXISTING CONDITIONS</u> (Estimated based upon existing geometrics.)	AASHTO Guidance (for design speed)	Recommendation	Design Exception (check if needed for Design Speed)
Design Speed	<b>55 MPH</b>	Minimum: 55 MPH Selected: 55 MPH	<b>55 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	10', 2 Lanes	12', 2 Lanes	12', 2 Lanes	<input type="checkbox"/>	<input type="checkbox"/>
Shoulder Width (Minimum Usable)	0.75' Paved	8' Paved	8' Paved, 2' Earth	<input type="checkbox"/>	<input type="checkbox"/>
Horiz. Curve Radius (Minimum)	Horizontal Tangent	960'	Horizontal Tangent	<input type="checkbox"/>	<input type="checkbox"/>
Max. Superelev. Rate (emax= %)	Normal Crown	8%	Normal Crown	<input type="checkbox"/>	<input type="checkbox"/>
Stopping Sight Distance (Minimum)	900'	495'	900'	<input type="checkbox"/>	<input type="checkbox"/>
Max. Grade (%)	0.50%	5.00%	0.50%	<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:**

**Design Variance**

Border Area (urban)	N/A	N/A	N/A	<input type="checkbox"/>
Sidewalk Width, slope	N/A	N/A	N/A	<input type="checkbox"/>
Bike Lane Width, slope	N/A	N/A	N/A	<input type="checkbox"/>
Shared Use Path Width	N/A	N/A	N/A	<input type="checkbox"/>
Other:				<input type="checkbox"/>

## DESIGN EXECUTIVE SUMMARY

**Design Criteria Notes:**

**Environmental Action:**

**Completion Date:** 04/02/21

scheduled     actual

**Existing Pavement Depths: Not specified in original plans**

**Include:**

1. Typical Sections, including bridges (on 8.5X11 inch paper)
2. Map showing project location
3. Preliminary line & grade meeting minutes
  - Purpose and Need Statement
  - Project overview and existing conditions
  - Discussion of Alternatives (including preferred and no build) with respective traffic control schemes, utility and right of way impacts, environmental impact, and performance (traffic analysis, safety analysis, etc.)
  - Consideration of Bicycle and pedestrian facilities discussion (**HD-1501**)
  - Cost comparison table of alternatives vs. Highway plan (include D, R, U, & C)
  - Discussion if preferred alternative cost is >115% than the highway plan
  - Discussion of clearzone
  - Discussion of design exceptions and mitigation strategies
  - Discussion of low cost maintenance improvements
  - Additional Comments and action items
4. Water related impact summary

**Submitted by Project Engineer:**

KYTC     Consultant

**Date:**

**Recommended by Project Manager:**

*David Erickson*

David Erickson

**Date:** 3/3/2021

**Tier Level Approval**

Tier 1                       Tier 2                       Tier 3

**Location Engineer:**

**Date:**

**Roadway Design Branch Manager:**

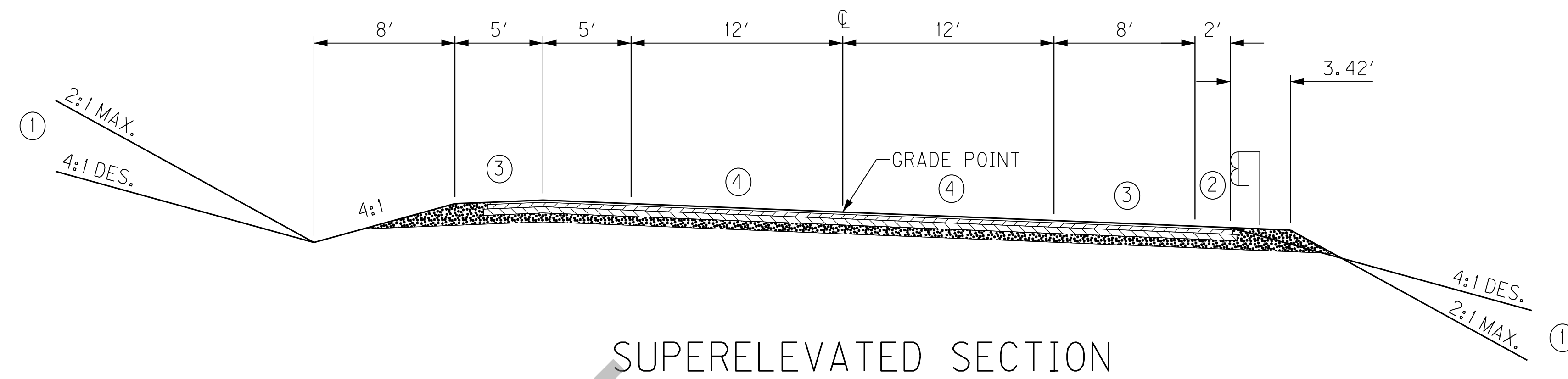
**Date:**

**Geometric Approval**

**Granted by:**

**Date:**

# 3-80100.00 TYPICAL SECTIONS



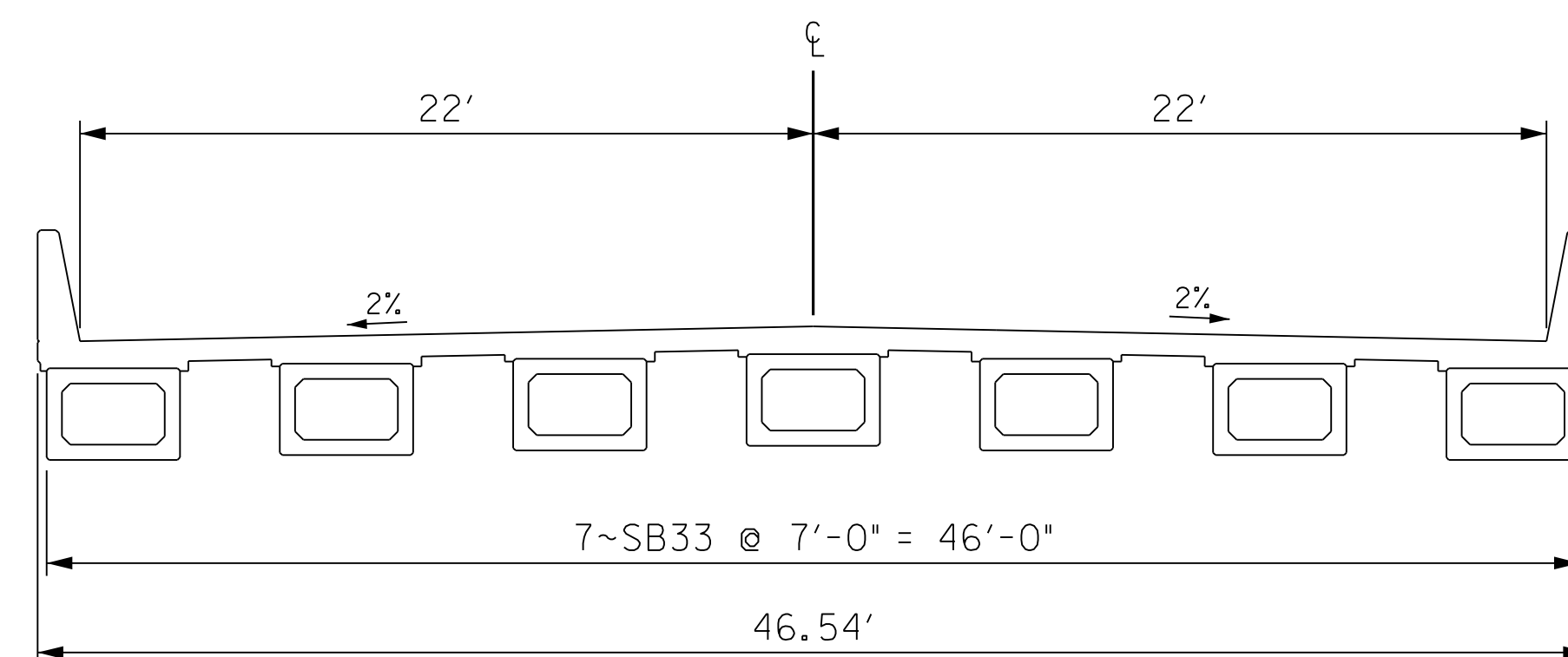
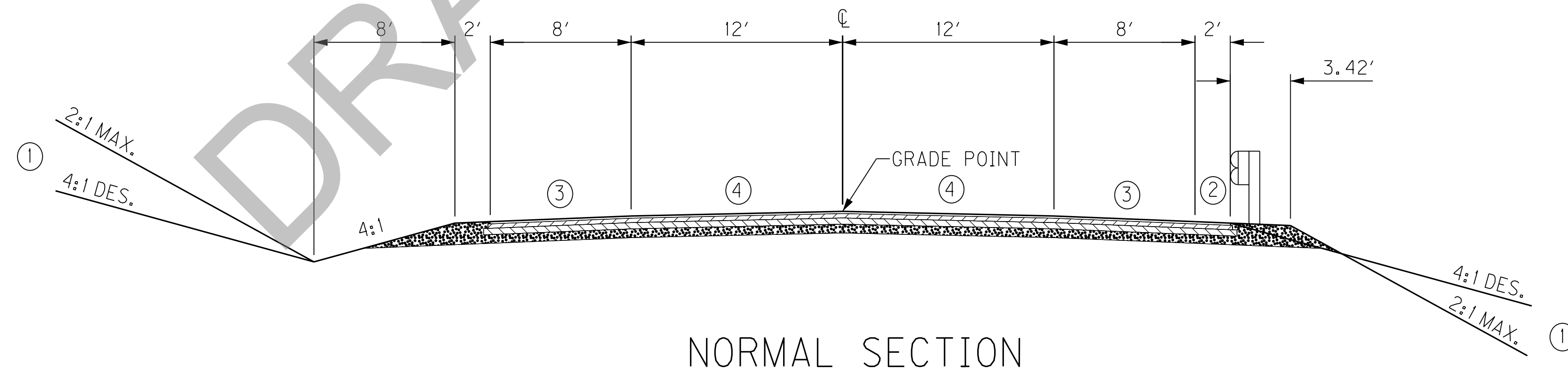
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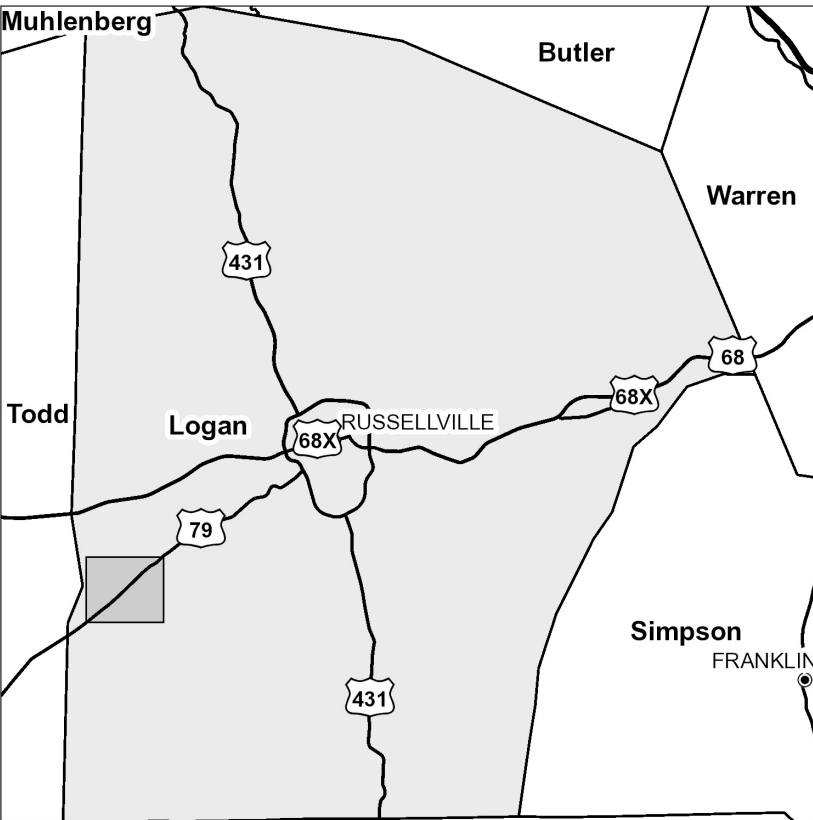
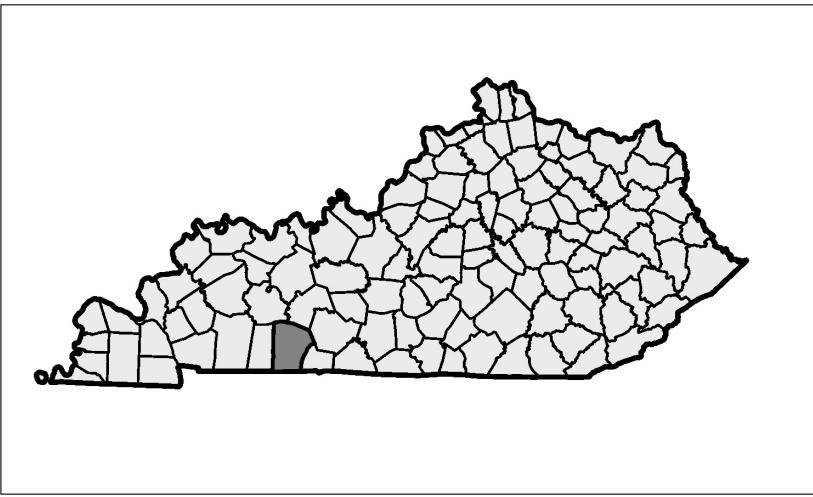
- ① SEE CROSS SECTIONS FOR SLOPES OUTSIDE THE LIMITS OF THE SHOULDER.
- ② 2' SHOULDER SHALL BE PAVED WHERE GUARDRAIL WILL BE INSTALLED.
- ③ PAVED SHOULDERS SHALL BE CONSTRUCTED AT A 4% CROSS SLOPE.

CONSTRUCT FIRST 3'-5" OF SLOPE BEHIND GUARDRAIL WITH A 4% SLOPE EXCEPT WHERE GUARDRAIL END TREATMENTS WILL BE INSTALLED. HERE CONSTRUCT A 10% CROSS SLOPE.

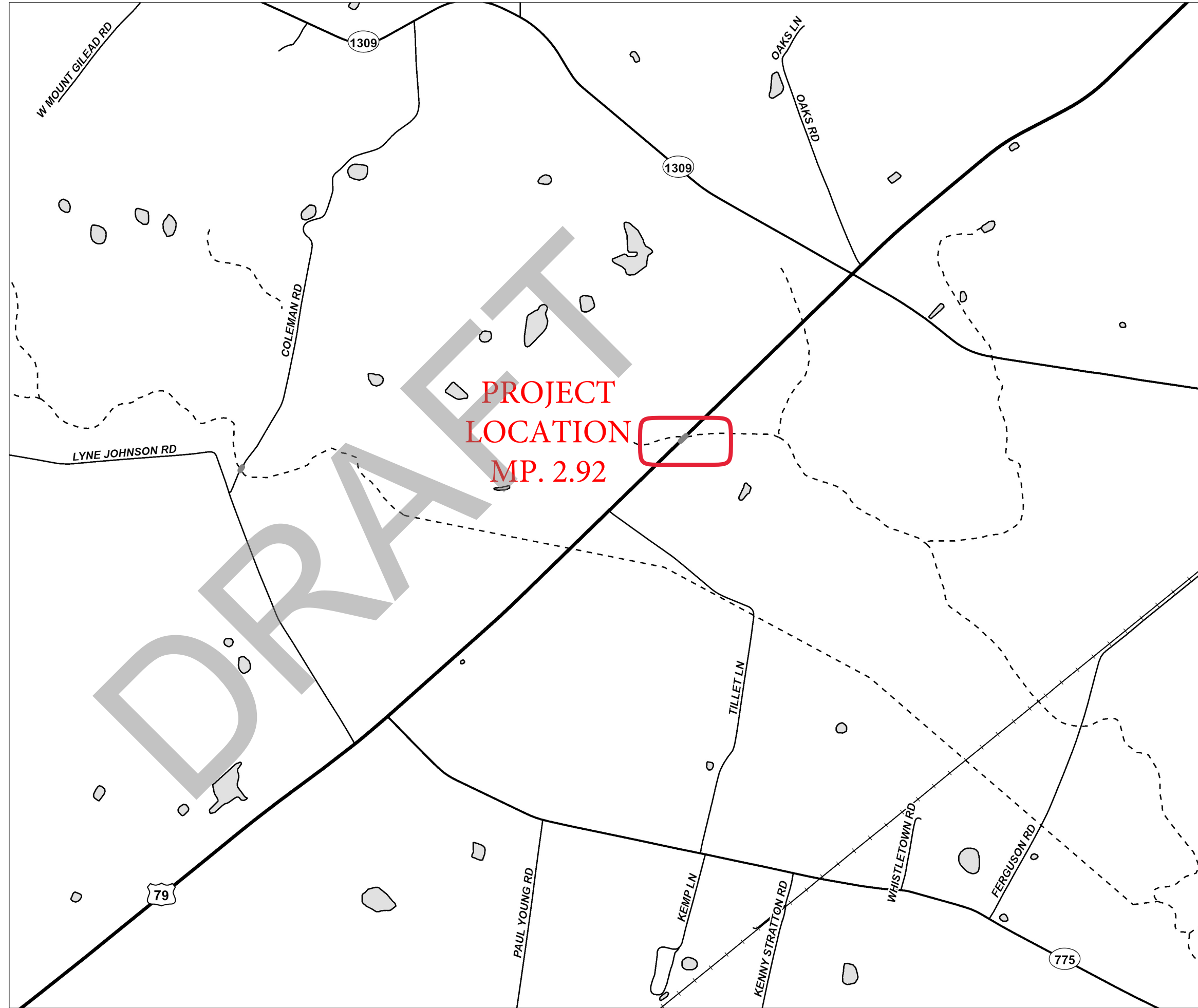
CSB SHOULDERS SHALL BE CONSTRUCTED WITH A 4% CROSS SLOPE.

- ④ 2% TYPICAL PAVEMENT CROSS SLOPE.  
eMAX=4.0%
- ⑤ CONSTRUCT ENTRANCE SHOULDERS WITH AN 8% CROSS SLOPE.





3-80100.00  
LOGAN CO.  
US 79  
MP. 2.92



## Project Overview

This project consists of a bridge replacement on US 79 over Vicks Branch at MP 2.92 in Logan County. US 79 is a rural major arterial for the area that is on the National Highway System with a significant percentage (19%) of truck traffic that connects Russellville, KY and Clarksville, TN. The segment of US 79 that this bridge is located has an approximate traffic count of 3553 ADT (2019). The existing bridge is located in horizontal tangent with rolling topography and has roadway widths of 10' and a total pavement width of 21.5', which results in approximately 9" paved shoulders. The existing three span bridge is 23' wide between the inside of each curb.

## Purpose and Need

US 79 in this area serves as a major arterial between Russellville, KY and Clarksville, TN and is designated as a National Highway System Route. US 79 also provides industrial and commuter traffic access to I-24 in north Tennessee. The segment of US 79 between the KY/TN state line and Russellville, KY has been identified in the highway plan for widening to better accommodate the 19% truck traffic that currently exists on this roadway. This project will consist of a bridge replacement over Vicks Branch in Logan County at mile point 2.92. While this bridge has a structural rating of 63.0 and is not structurally deficient, the 10' lanes on the bridge deck, coupled with heavy truck traffic creates potential risks of collision. The purpose of this project is to ensure the flow of traffic across Vicks Branch while also providing a safe connection for residents and industry between Russellville and Clarksville.

## Discussion of Alternatives

- **No-Build Alternate – Maintain Current Structure**
  - This no-build alternate would leave the current structure in place without removal or reconstruction. This will be maintain the bridge as it exists until it becomes structurally deficient, posing risks as the weight limit to cross may require trucks to detour. This alternate, despite the structure not being structurally deficient, does not address the purpose and need of the project.
  
- **Alternate 1**
  - Geometric Layout (See Exhibit 1)
    - Alternate 1 replaces the bridge and maintains the existing centerline by widening equally on both sides as well as maintaining the tangent. The length of this alternate is controlled by the 15:1 shoulder taper for the guardrail end treatments and has a total length of 920'.
  
  - Utilities
    - Alternate 1 will impact the following utilities: Water, Telephone, Fiber Optic. The required relocations are minor with no foreseen extraordinary circumstances.

- Environmental
  - Environmental document has been consulted out. Approximately 100' of channel change.
- Right of Way
  - Alternate 1 will impact two parcels. The Right of Way Division does not expect any major issues.
- Maintenance of Traffic (See Exhibit 3 & 4)
  - The main point of discussion related to construction was the maintenance of traffic concept. Phase 1 construction will require the installation of a temporary traffic signal so that traffic can be reduced to one way traffic. The southbound lane will be demolished while a portion of the proposed bridge is constructed. Phase 2 will shift traffic to the proposed bridge. The northbound lane will be demolished and the remaining portion of the proposed bridge will be constructed. This alternate would require the use of the temporary traffic signal and one lane of traffic for the duration of construction.
- **Alternate 2**
  - Geometric Layout (See Exhibit 2)
    - Alternate 2 replaces the bridge and widens to the left side. This requires an offset centerline and uses four 3270' radius curves with a 4% superelevation rate. The length for this alternate is controlled by the required length to transition from full super to normal crown and is 1300'.
  - Utilities
    - Alternate 2 will impact the following utilities: Water, Telephone, Fiber Optic. The required relocations are minor with no foreseen extraordinary circumstances.
  - Environmental
    - Alternate 2 has approximately 140' of channel change.
  - Right of Way
    - Alternate 2 will impact three parcels. The Right of Way Division does not expect any major issues.
  - Maintenance of Traffic (See Exhibit 3 & 5)
    - Alternate 2 will have the same Phase 1 MOT layout as Alternate 1. However, Phase 2 will maintain two-way traffic due to the proposed portion being approximately 22' wide. The use of temporary traffic signals would only be required through Phase 1.

## Detours

- Given the narrow lane width that will be able to be provided during Phase 1 construction it was brought up that detours will need to be considered for wide loads and certain farm equipment. The best route for through traffic traveling from Guthrie to Russellville would be to take KY 181 north to Elkton and then travel east on KY 80 to Russellville. This results in an additional 7 miles when compared to traveling US 79 from Guthrie to Russellville.
- For local traffic that might be required to detour, they would have to use KY 1309, US 68-80, & KY 102. This would result in a 16.5 mile detour on State routes. A 4.5 mile detour exists using county roads.

## Bicycle and Pedestrian Facilities

- Currently the facility does not have any bicycle or pedestrian only features such as: bike lanes, sidewalks, or shared use paths. There is not any significant bicycle or pedestrian traffic to require the addition of bicycle and pedestrian facilities.

## Clear Zone Discussion

- The project team recognizes that the AASHTO Roadside Design guide recommends a clear zone width of 20-22ft for slopes that are 6:1 or flatter, and 24-30ft for slopes that are 5:1 or 4:1. The project team also recognizes the impacts of such slopes can have on acquiring property, impacting streams or other habitat, impacting utilities, or other such constraints budgetary or otherwise. In order to be considerate of these factors, the project team chose a typical section with an appropriate clear zone width that also allows minimal footprint. The recommended typical section allows for a minimum of 10' of width for clear zone accommodated by the shoulders for the fully widened sections, and between 2-10' minimum elsewhere. This widening project only concerns the bridge and the approach work required to tie in the widening via tapers and other means. Due to the length of the project, the majority of the clear zone will be limited to the shoulder width, as guardrail will be used as a barrier to protect the bridge ends from collisions as well as vehicles from going off the roadway near the bridge. Since the grade difference between the top of roadway and bottom of the stream are significant, guardrail is required for protection of both the bridge and side slopes and will therefore be the controlling object for clear zone. At locations where there is not any guardrail, the clear zone will vary depending on the constructed and or existing slopes and shoulder width.

### Preferred Alternate

- After the discussion of both alternatives, it was decided by the project team that **Alternate 1** would be carried forward for final design. The fact that Alternate 1 does not introduce unnecessary curvature to an existing horizontal tangent makes it the safer alternative. It is approximately 400' shorter which reduces construction costs, and right of way and utility impacts. The cost savings for Alternate 1 are \$128,000 (R, U, C).

### Cost Analysis

- Project included in the 2020 Highway Plan
  - 3-80100.00 Replace and Widen Bridge on US-79 at MP 2.921 (Bridge over Vicks Branch)

			SYP	PL&G	PL&G
			<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>
SPP	R	2022	\$ 400,000	\$ 60,000	\$ 73,000
SPP	U	2022	\$ 300,000	\$ 85,000	\$ 95,000
SPP	C	2023	<u>\$ 2,250,000</u>	<u>\$ 1,650,000</u>	<u>\$ 1,750,000</u>
		Total	\$ 2,950,000	\$ 1,790,000	\$ 1,918,000

**Note: This project has recently been selected for a BUILD Grant and must be let for construction by September 2022**

### Design Exceptions

- There are no design exceptions on this project.

### Low Cost Maintenance Improvements

- The scope of this project is to replace and widen the bridge. There are no low cost maintenance improvements that would cover the scope of the project.



## WATER RELATED IMPACTS SUMMARY

<b>County</b>	Logan	<b>Route No.</b>	US 79	<b>Item No.</b>	3-80100
<b>Date</b>	3/3/2021	<b>Program #</b>	1221701D		
<b>Federal Project No.</b>	STP 079 1007				
<b>State Project No.</b>	FD52 110 0079 007-000				
<b>Location Engineer</b>	Wendy Southworth				

### 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 checked="" type="checkbox"/>	21141C0250D
Detailed FEMA Study without delineated floodway**	<input type="checkbox"/>	
Approximate FEMA Study	<input type="checkbox"/>	
No FEMA Study	<input 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"/>	
<p>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.</p> <p>Projects that impact special use waters may require an individual KPDES Erosion Control Permit. Contact the Division of Environmental analysis for more information.</p>			

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

## **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.

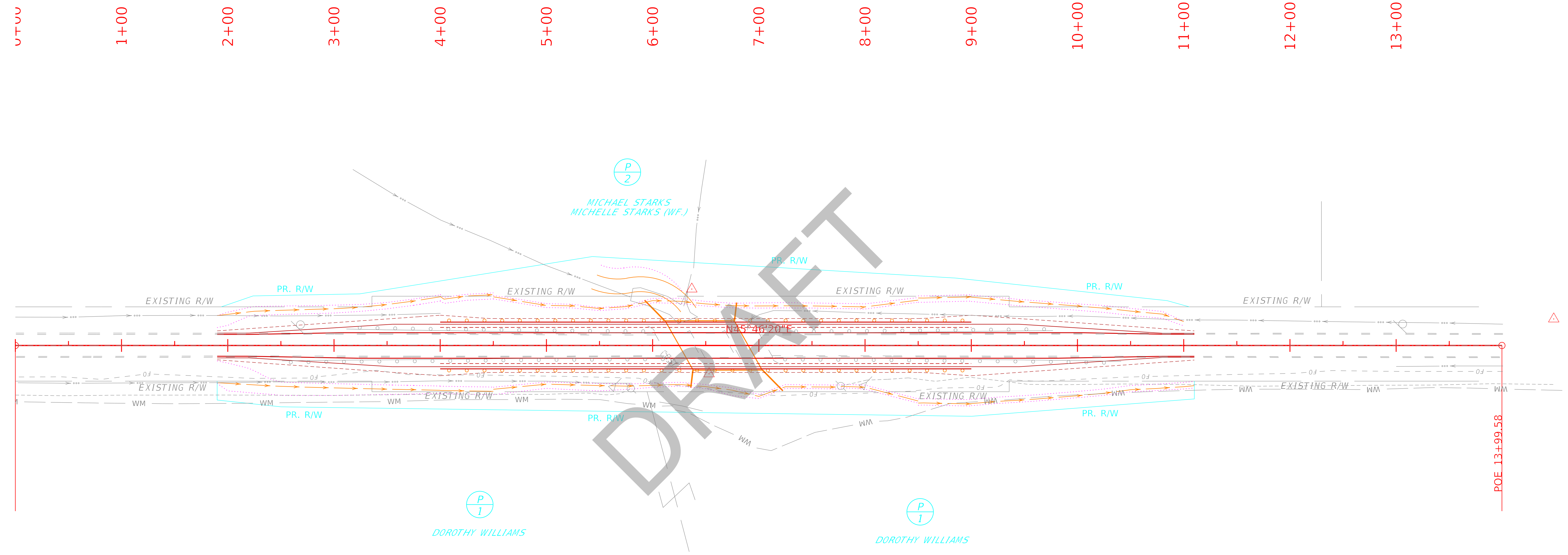
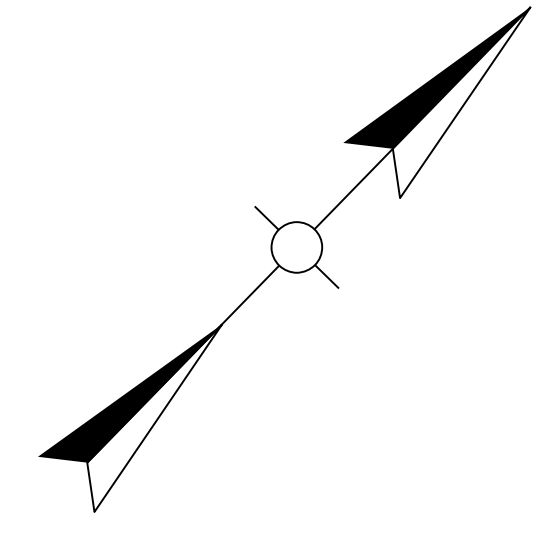
Vicks Branch approaches US 79 at a significant skew. When the bridge and roadway are widened, the fill slopes will intersect the existing ground in the channel. Therefore, it is necessary for a very short stream location upstream of the proposed bridge.

Proper Erosion Control measures will be utilized per KYTC standards and will include BMP items such as silt fence, silt checks, etc. to protect the waters of Vicks Branch.

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COUNTY OF	ITEM NO.	SHEET NO.
LOGAN	3-80100.00	Plan Alt. 1

# 3-80100.00 US 79 BRIDGE REPLACEMENT LOGAN COUNTY, MP 2.92 ALTERNATE 1



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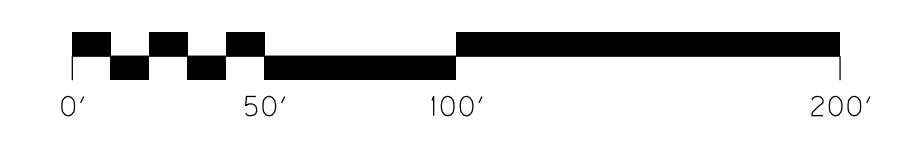


Exhibit 1

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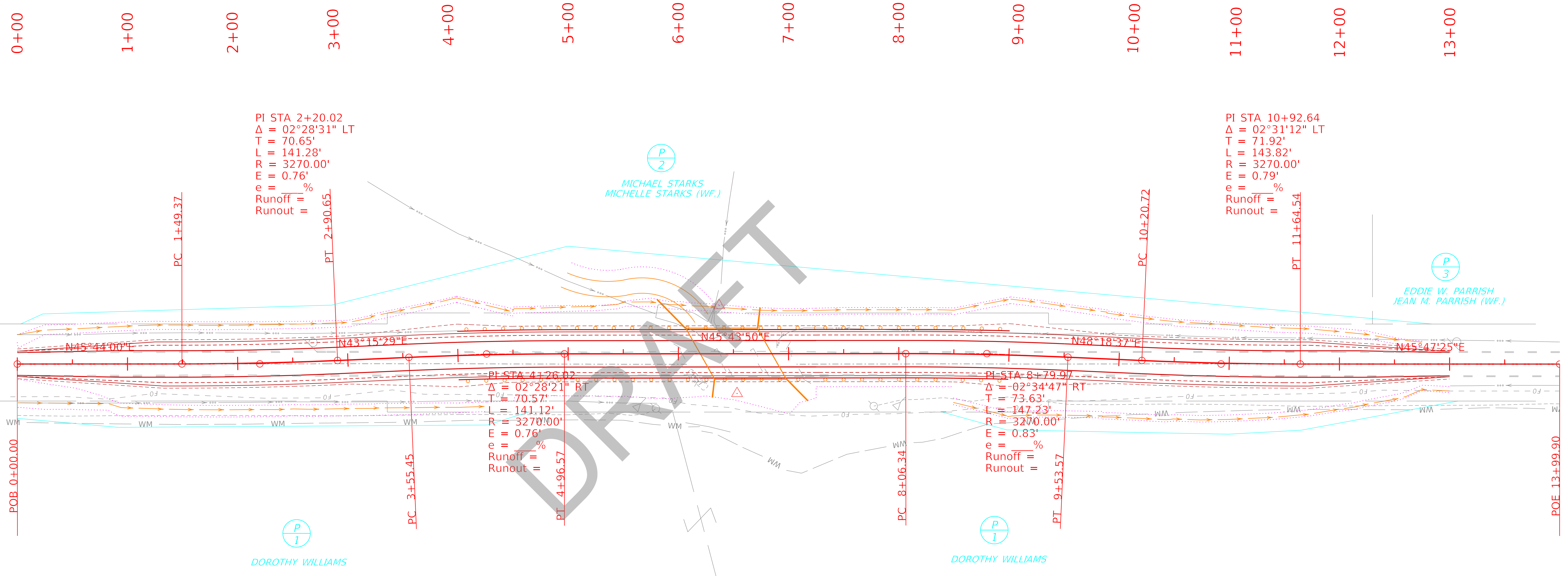
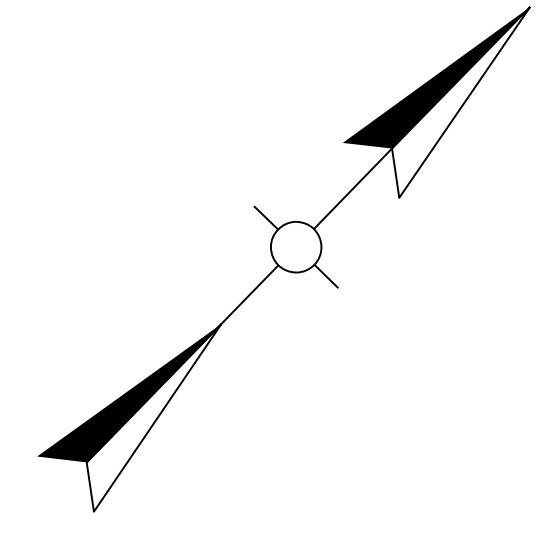
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USER: David.Erickson  
DATE PLOTTED:

OpenRoads Designer v10.13.2.2

COUNTY OF	ITEM NO.	SHEET NO.
LOGAN	3-80100.00	Plan (Alt 2.)

# 3-80100.00 US 79 BRIDGE REPLACEMENT LOGAN COUNTY, MP 2.92 ALTERNATE 2



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OpenRoads Designer v10.13.2.2



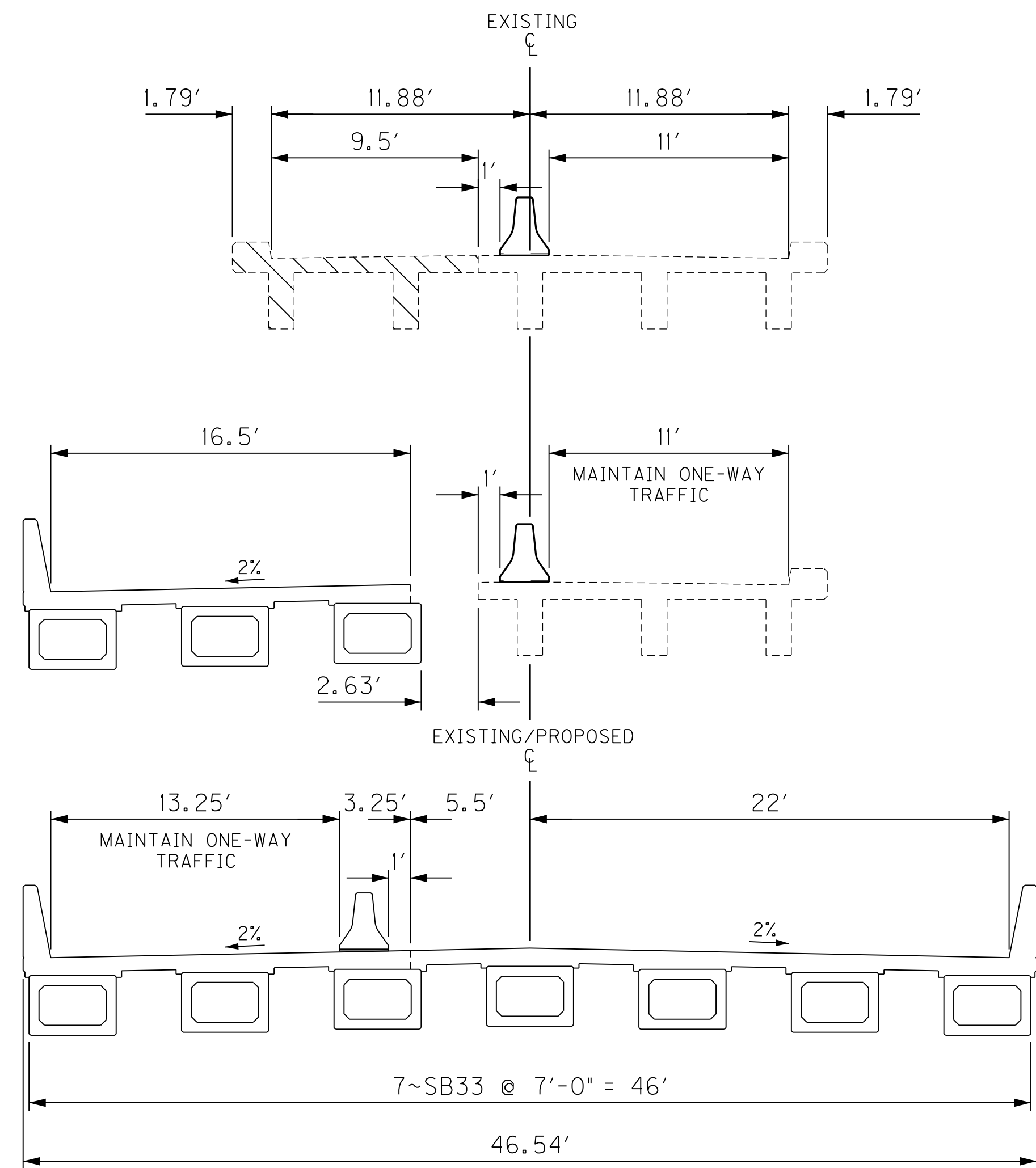
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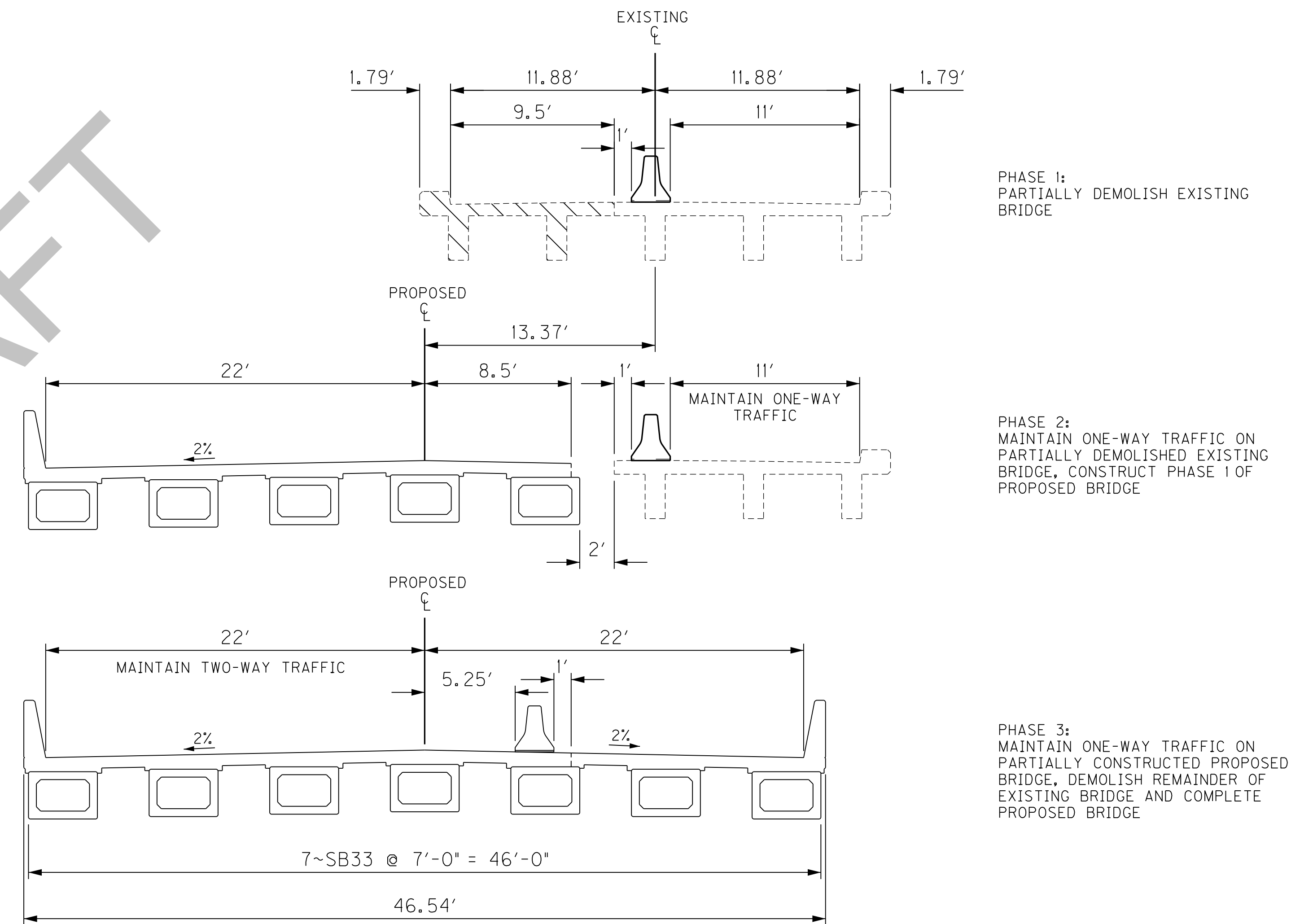
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# 3-80100.00 CONSTRUCTION PHASING

## ALTERNATE 1



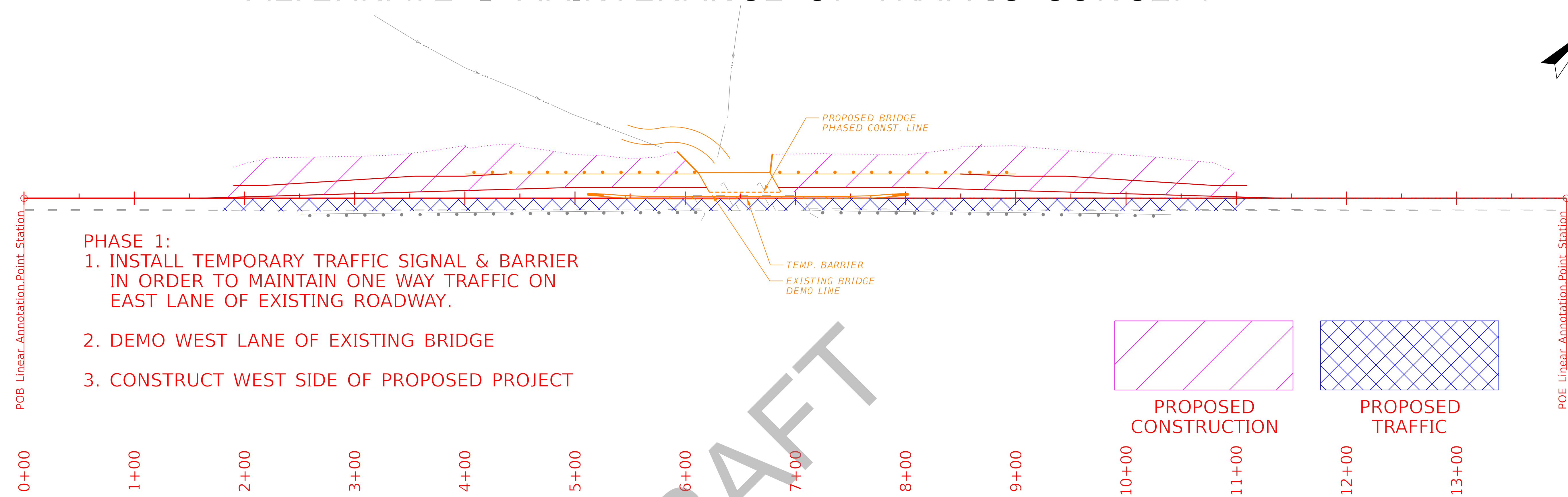
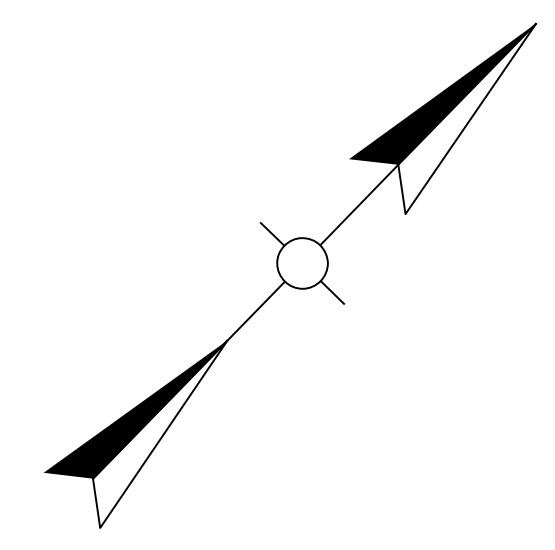
## ALTERNATE 2



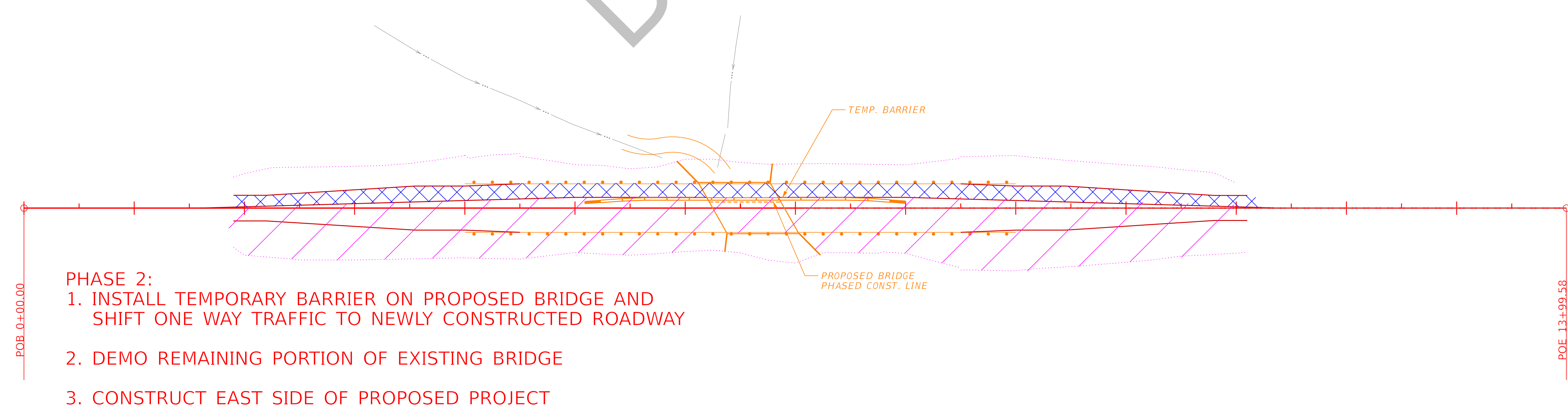
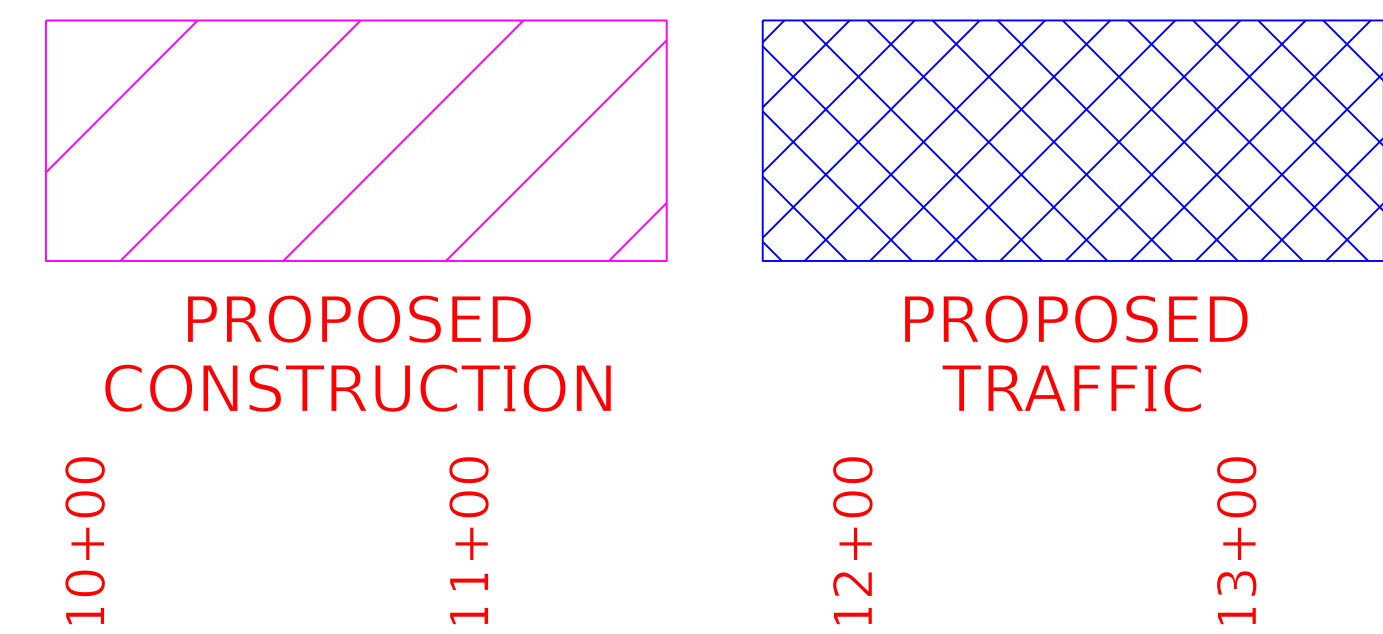
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# 3-80100.00, US 79 BRIDGE REPLACEMENT, LOGAN COUNTY, MP 2.92 ALTERNATE 1 MAINTENANCE OF TRAFFIC CONCEPT

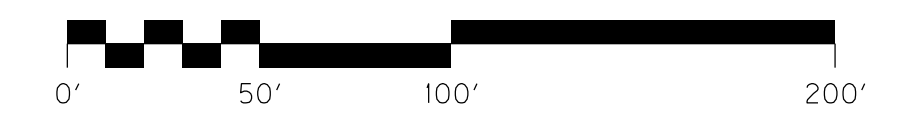


- PHASE 1:**
1. INSTALL TEMPORARY TRAFFIC SIGNAL & BARRIER IN ORDER TO MAINTAIN ONE WAY TRAFFIC ON EAST LANE OF EXISTING ROADWAY.
  2. DEMO WEST LANE OF EXISTING BRIDGE
  3. CONSTRUCT WEST SIDE OF PROPOSED PROJECT

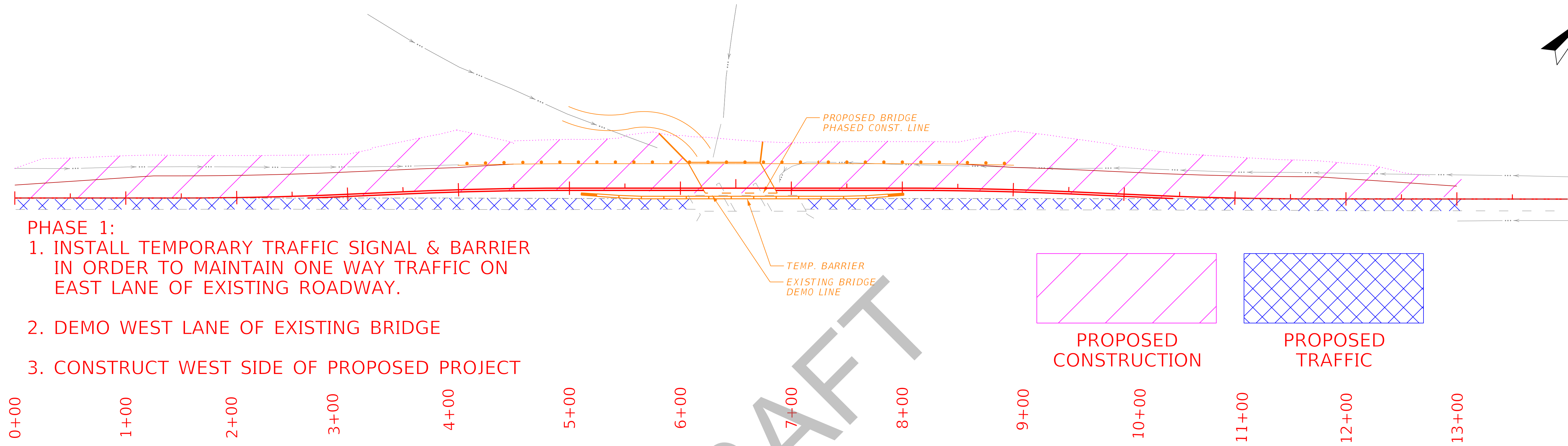
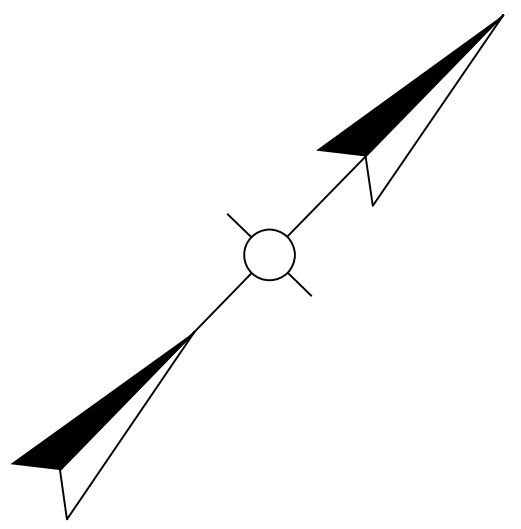


- PHASE 2:**
1. INSTALL TEMPORARY BARRIER ON PROPOSED BRIDGE AND SHIFT ONE WAY TRAFFIC TO NEWLY CONSTRUCTED ROADWAY
  2. DEMO REMAINING PORTION OF EXISTING BRIDGE
  3. CONSTRUCT EAST SIDE OF PROPOSED PROJECT

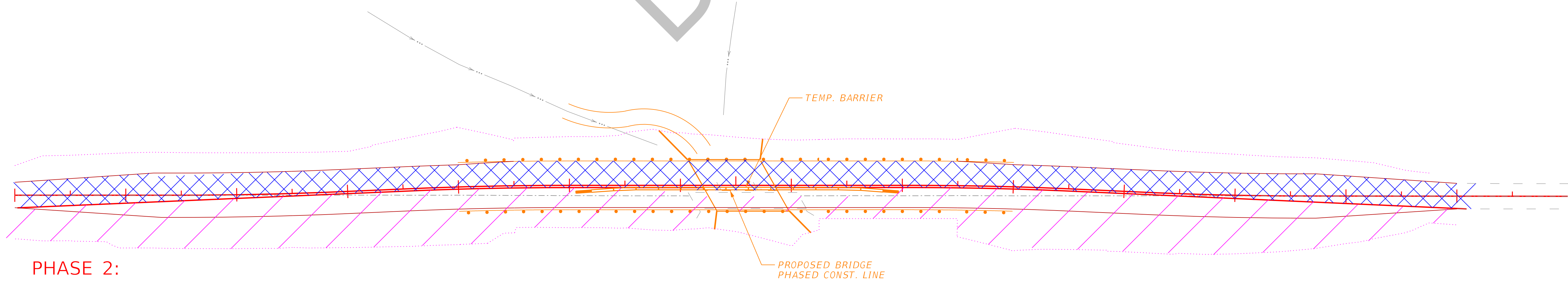
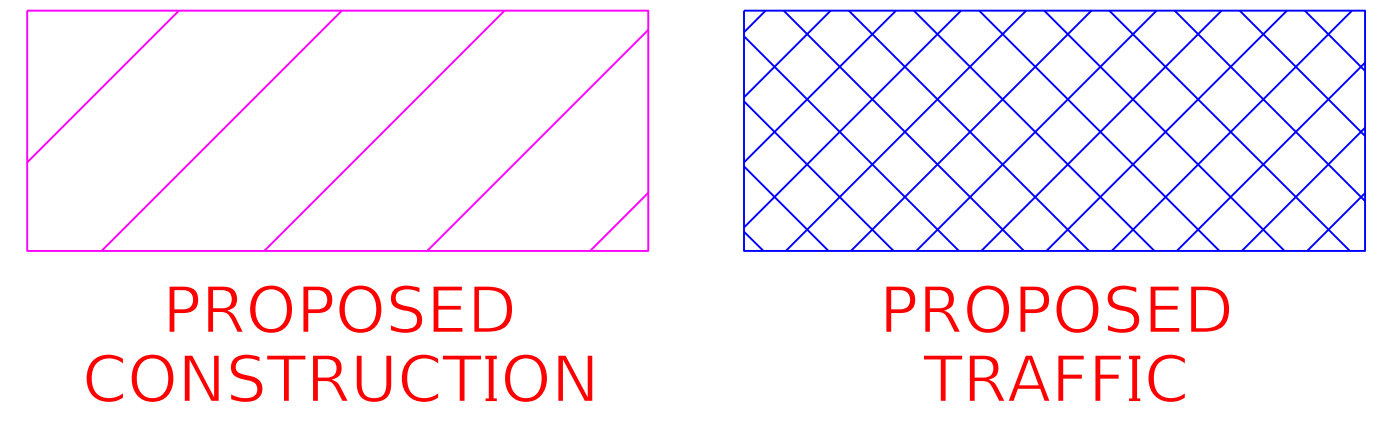
Exhibit 4



# 3-80100.00, US 79 BRIDGE REPLACEMENT, LOGAN COUNTY, MP 2.92 ALTERNATE 2 MAINTENANCE OF TRAFFIC CONCEPT



- PHASE 1:**
1. INSTALL TEMPORARY TRAFFIC SIGNAL & BARRIER IN ORDER TO MAINTAIN ONE WAY TRAFFIC ON EAST LANE OF EXISTING ROADWAY.
  2. DEMO WEST LANE OF EXISTING BRIDGE
  3. CONSTRUCT WEST SIDE OF PROPOSED PROJECT



- PHASE 2:**
1. INSTALL TEMPORARY BARRIER ON PROPOSED BRIDGE AND SHIFT TWO WAY TRAFFIC TO NEWLY CONSTRUCTED ROADWAY
  2. DEMO REMAINING PORTION OF EXISTING BRIDGE
  3. CONSTRUCT EAST SIDE OF PROPOSED PROJECT

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