

# Memorandum

*Making Conservation  
a California Way of Life*

To: COREY MATSON, Project Engineer  
North Region Design, E1

Date: January 11, 2024  
File: 01-MEN-01-PM 43.3/44.2  
01-40110  
01 0000 0154  
Albion River Bridge Replacement

From: JEREMY MILLER-SCHULZE  
North Region Hydraulics  
District 1- Eureka

Subject: **PRELIMINARY DRAINAGE REPORT**

The California Department of Transportation (Caltrans), in cooperation with the Federal Highway Administration, is proposing the Albion River Bridge Project (Project). The Project includes replacement of the Albion River Bridge (No. 10-0136), which is located in Mendocino County on State Route (SR) 1 approximately 15 miles south of Fort Bragg. The total length of the Project is approximately one mile, between postmile (PM) 43.3 and PM 44.2. Within the limits of the Project, SR 1 is an undivided conventional highway with two 11- to 12-foot-wide travel lanes and 0- to 4-foot-wide shoulders. The existing Albion River Bridge (bridge) was constructed in 1944 during World War II and is 969 feet long with a total width of 28.5 feet. The bridge was listed on the National Register of Historic Places and the California Register of Historic Resources in 2017. The bridge sits approximately 155 feet above the Albion River, spanning a relatively narrow canyon with steep slopes reaching approximately 140 to 150 feet above the valley floor. The Albion River outlets to the Pacific Ocean approximately 170 feet downstream of the bridge and is tidally influenced. Beneath the bridge is the privately held Albion River Campground and Marina (Albion Campground) and Albion Flat Beach (Albion Beach).

The Project is needed to address functional, safety and structural deficiencies of the bridge. The bridge is in a poor and deteriorating condition, has a low load rating, and is not an appropriate design for the harsh environment in which it is located. The purpose of this Project is to provide a bridge across the Albion River that meets modern seismic safety standards, provides safe and reliable multimodal access, and minimizes ongoing maintenance costs.

Build Alternatives have been developed to meet the purpose and need of the Project, with consideration given to use of the similar or same alignment as the existing bridge, avoidance, or minimization of impacts to the human and natural environment, and construction and maintenance cost. The alternatives currently under consideration include three Build Alternatives with various design options, and a No-Build (No-Action) Alternative. A preferred alternative will be identified following agency, public, and stakeholder input during the environmental review process.

## **Build Alternatives**

The Build Alternatives consist of options that would improve safety features (e.g., vehicle barriers and sight distance), provide a separated pedestrian walkway on the west side of the new structure, and widen shoulder widths for multimodal use. Under the Build Alternatives, a new bridge would be constructed on an

alignment either to the west of the existing bridge (West Alignment), to the east of the existing bridge (East Alignment), or generally within but slightly west of the existing bridge (On-Alignment) as follows:

- Alternative 1: West Alignment
  - Design Option 1A: Four Span Segmental Box Girder Bridge
  - Design Option 1B: Spandrel Arch with Box Girder Approaches
- Alternative 2: East Alignment
  - Design Option 2A: Three Span Segmental Box Girder Bridge
  - Design Option 2B: Spandrel Arch with Box Girder Approaches
- Alternative 3: On-Alignment (Half-Width)
  - Design Option 3A: Four Span Box Girder Bridge

A replacement bridge would have two 12-foot-wide travel lanes and 6-foot-wide shoulders, steel barrier rails, and a separated 6-foot-wide pedestrian walkway on the west side with a barrier railing. Construction elements would include tree and vegetation removal, cut and fill, temporary and permanent shoring (e.g., cofferdams and retaining walls), use of temporary trestles, construction of a new bridge, demolition of the existing bridge, construction of roadway approaches connecting SR-1 to the new structure, re-establishment of roadside drainage and cross-culverts, utility relocation, and improvements to SR 1 and local connector roads and intersections within the Project area. The new bridge pier foundations would be constructed using Cast-In-Drill-Hole (CIDH) piles, Cast-In-Steel Shell (CISS) piles, or steel micropiles. During construction, soil nail walls and/or anchored soldier pile walls would be used to shore excavations at the south and north embankments and cofferdams would be used to shore excavations at piers in or near the water.

#### *Alternative 1: West Alignment*

The West Alignment Alternative would include either a segmentally constructed box girder bridge with three piers (Design Option 1A) or an open-spandrel arch bridge with box girder approaches and five piers (Design Option 1B). The bridge tie-in at the north abutment would require an extended retaining wall given the coastal bluff topography. The bridge superstructure would involve concrete spans from abutment to abutment, for a total bridge length of approximately 1,020 feet for Design Option 1A and approximately 1,069 feet for Design Option 1B. Demolition of the existing bridge and removal of a portion of the existing roadway approaches would occur once the new bridge is constructed and traffic is diverted. A west alignment bridge would take approximately three years to construct.

#### *Alternative 2: East Alignment*

The East Alignment Alternative would include either a segmentally constructed box girder bridge with two piers (Design Option 2A) or a spandrel arch bridge with box girder approaches and six piers (Design Option 2B). The bridge superstructure would involve concrete spans from abutment to abutment, for a total bridge length of approximately 1,020 feet for Design Option 2A and approximately 1,143 feet for Design Option 2B. Demolition of the existing bridge and removal of a portion of the existing roadway approaches would occur once the new bridge is constructed and traffic is diverted. An east alignment bridge would take approximately three years to construct.

#### *Alternative 3: On-Alignment (Half-Width)*

The On-Alignment Alternative would include a box girder bridge with three piers (Design Option 3A). The bridge tie-in at the north abutment would require an extended retaining wall given the coastal bluff topography. The bridge superstructure would involve concrete spans from abutment to abutment, for a total

bridge length of approximately 943 feet. Given that the replacement bridge construction and demolition of the existing bridge would need to occur in stages (i.e., stage 1: construct the west half of the new bridge and roadway approach, stage 2: demolish the old bridge, and stage 3: construct the east half of the new bridge and roadway approach), an on-alignment bridge would take approximately five years to construct.

### **No Build Alternative**

The No-Build (No-Action) Alternative would not retrofit or replace the existing bridge. The existing bridge would remain in its current configuration and in a condition of being fracture critical, seismically deficient, and functionally obsolete. Given the condition of the existing bridge, extensive recurring maintenance projects would be necessary to maintain current level of service. It is expected that eventual replacement of the bridge would be necessary; however, eventual replacement is not included or evaluated as part of the No Build Alternative.

### **Other Construction Elements**

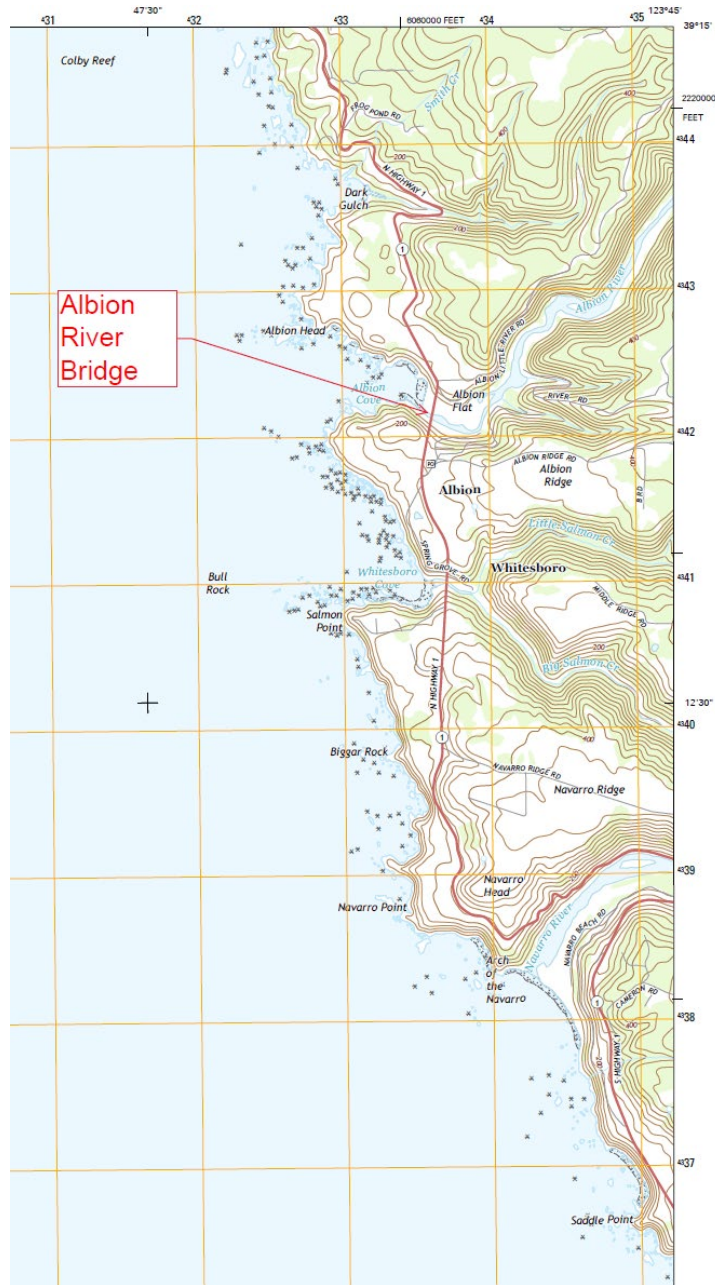
All Build Alternatives would require several construction access roads and staging areas. Access roads and staging areas would require tree and vegetation removal, grading, and temporary surfacing (e.g., base rock or asphalt). For the safety of the residents and to allow safe and direct access to the work zone, the Albion Campground manager's residence that is currently located on the north side of the Albion River may be relocated.

All Build Alternatives would require right-of-way acquisitions and utility easements from private parcels. All Build Alternatives would also require temporary construction easements (TCEs) within private parcels.

It is anticipated that general public access to the Albion Beach from the Albion Campground would be restricted during construction for the safety of construction workers and the public, and access to the Albion Campground would be limited to the campground office, parking lot, restrooms, picnic area, and the dock and marina.

### **Watershed Characteristics**

The proposed project is located on the United States Geological Survey (USGS) Albion Quadrangle, see Figure 1 below. The roadway to the north and south of the bridge lies on top of the coastal bluffs, on mild slopes. Land use within the project limits and in the offsite watersheds is rural with some grassy expanses and thicker stands of trees. The roadway crosses several small channels throughout the project limits.



**Figure 1: USGS Albion Quadrangle.**

### **Climate**

The project area is located between two monitoring stations: Fort Bragg N (04-3161) and Pt Area (04-7009). The monitoring station data indicates the following:

1. The mean annual precipitation is 40.24 and 41.28 inches, respectively.
2. The average monthly minimum January temperature is 39.9 and 40.2 degrees, and the average monthly maximum September temperature is 65.6 and 66.7 degrees, respectively.
3. Rainfall occurs mainly in the winter months.

**Hydrology**

National Oceanic and Atmospheric Administration (NOAA) Atlas 14 intensity, duration, frequency estimates, and the 2-year 24-hour rainfall depth are provided in Table 1 below for Albion, CA Latitude: 39.2278°, Longitude: -123.7687°.

**Table 1: Hydrology Summary**

Time of Concentration (Roadway)	5 minutes	10 minutes
Intensity (Inches/Hour)	5 year – 2.68	5 year – 1.92
	10 year – 3.14	10 year – 2.26
	25 year – 3.79	25 year – 2.71
	100 year – 4.79	100 year – 3.43
2-year 24-hour rainfall depth (inches)	3.76	

**Floodplain Evaluation**

Several of the alternatives being considered will require development in the FEMA Flood Hazard Area (FHA). Construction of bridge pier foundations will require work in the FHA. The proposed work in the FHA is not considered significant because the proposed alternatives would result in less obstruction within the watercourse compared to the existing bridge pilings. Hydraulic modeling of the 1% annual chance flood shows no change in the water surface elevation between the proposed alternatives and the existing condition. A Floodplain Evaluation Report Summary has been created to document the FHA and encroachment of proposed activities and is included in Attachment A.

**Recommendations**

**Roadway Drainage**

Ensure flow paths to existing drainage inlets, ditches or any other drainage facility are perpetuated in areas of proposed work. Adjust existing drainage inlet frames and covers to grade if necessary. Replace existing dike, overside drains and down drain facilities as necessary to maintain existing drainage patterns and meet design standards. Follow Highway Design Manual (HDM) Chapter 830 for guidance on Transportation Facility Drainage. Any improvement to drainage inlets or installation of new inlets should be placed per Index 837.3(2). Per Index 837.2(2). In areas of bicycle traffic, inlet grate types should be selected from those on Standard Plan D77B.

**Proposed Drainage Work – Comments/Recommendations**

The project proposes the following highway drainage work associated with the Build Alternatives:

- PM 43.36 Remove existing culvert. Increase size to 24-inch and place culvert seven feet longer on same alignment.
- PM 43.73 Remove existing culvert, place new culvert or facility at a location to

- convey flow from the SB to NB side of roadway
- PM 44.03 X-Culvert: Remove existing culvert. Increase size to 30-inch and place headwall on same alignment.
- PM 44.03 Longitudinal System: Replace inlets with Type GO inlets. Replace outlet culvert and place FES at outlet.
- PM 44.15 Remove culvert and increase size to 18-inch.
- New Longitudinal Drainage System at 44.03 on SB shoulder:
  - Remove systems PM 44.06 and PM 44.11
  - Place 30-inch pipe to outlet to gulch near x-culvert outlet.
  - Place GO inlet near PM 44.03.
  - System will extend to pick up flow from culvert at PM 44.06 with three 24-inch pipes and two additional GO inlets, and one G1 inlet approximately 40 feet from system at PM 44.06.

Details of the culverts to be improved (mentioned above) are included in a culvert inventory table Attachment B. Hydraulic analysis of drainage systems and roadways within the project limits will be performed during the design process.

To minimize potential impacts on receiving waters within the project area during construction, permanent and temporary Best Management Practices (BMP) would be implemented in accordance with applicable stormwater regulations and standards. The permanent stormwater treatment strategy would consist of capturing and routing stormwater from impervious surfaces within the project limits and treating it using Treatment BMPs such as biofiltration strips, biofiltration swales, infiltration basins, or other approved devices. Runoff from the bridge deck at the abutments will be discharged to vegetated or rock lined ditches. All Build Alternatives have drainage features incorporated into alternative designs to carry drainage from the bridge deck through the abutments and off the structure. Deck drains and scuppers would be used to convey sidewalk drainage to drop-through drains.

The recommendations presented herein do not represent the entirety of the discussion of or recommendations for the drainage work in this project. Investigation and analysis at the next phase will further define the extent of the drainage work accomplished by this project.

If you have questions or concerns, please contact our office at (707) 815-1093.

Attachments:

- A. Floodplain Evaluation Report Summary
- B. Culvert Inventory Table

cc: 1. Corey Matson, Project Engineer

## **Attachment A: Floodplain Evaluation Report Summary**

# FLOODPLAIN EVALUATION REPORT SUMMARY

Dist: 1, Co: Mendocino, Rte: 001

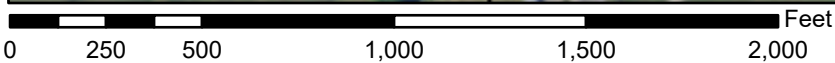
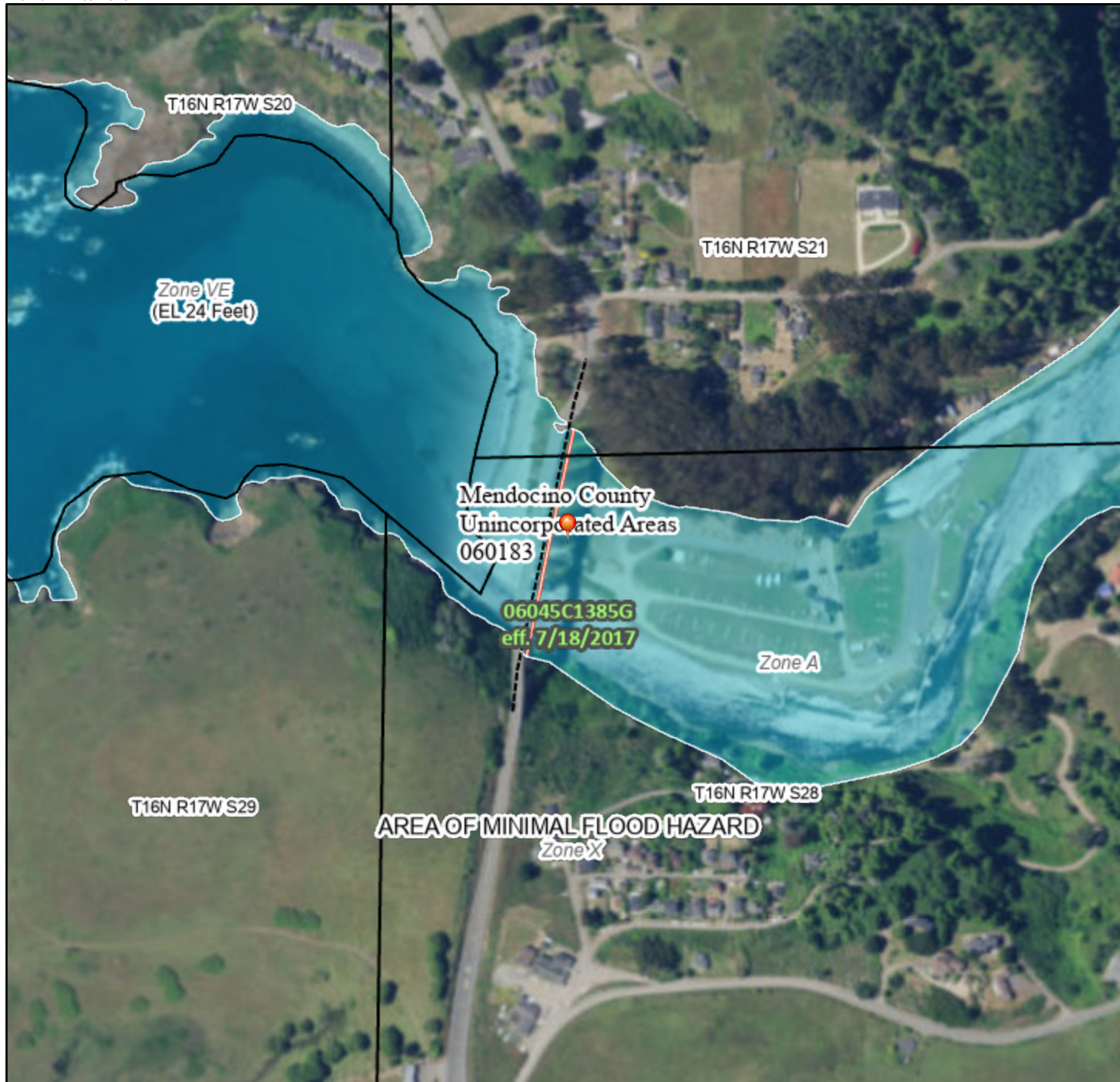
EA: 01-40110, EFIS: 0100000154, Albion River Bridge

<p><b>Project Limits:</b> In Mendocino County near Albion from 3.0 miles north of the Route 128 junction to 0.2 miles north of Albion River (PM 43.3 to PM 44.2).</p>		<p><b>Floodplain Description:</b> Several of the alternatives being considered will require development in the FEMA Flood Hazard Area (FHA). Construction of bridge pier foundations will require work in the FHA. However, hydraulic modeling of the the 1% annual chance flood show no change in water surface elevation between the proposed alternatives and the existing condition.</p>							
		<b>MEN-001-PM 43.8</b>							
Questions to be Checked by "X" in Column "No" or "Yes"		<b>No</b>	<b>Yes</b>						
1 -	Is the proposed action a longitudinal encroachment of the base floodplain?	X							
2 -	Are the risks associated with the implementation of the proposed action significant?	X							
3 -	Will the proposed action support probable incompatible floodplain development?	X							
4 -	Are there any significant impacts on natural and beneficial floodplain values?	X							
5 -	Routine construction procedures are required to minimize impacts on the floodplain. Are there any special mitigation measures necessary to minimize impacts or restore and preserve natural and beneficial floodplain values? If yes, explain.	X							
6 -	Does the proposed action constitute a significant floodplain encroachment as defined in 23 CFR, Section 650.105(q)?	X							
7 -	Are Floodplain Hydraulic Studies that document the above answers on file? If not explain.		X						
<p><b>PREPARED BY: JEREMY MILLER-SCHULZE - D1 NRPD HYDRAULICS</b></p> <p>Signature - Dist. Hydraulic Engineer</p> <p>Signature - Dist. Environmental Branch Chief</p> <p>Signature - Project Engineer</p>									

# National Flood Hazard Layer FIRMMette



123°46'27"W 39°13'49"N



1:6,000

123°45'49"W 39°13'21"N

Basemap Imagery Source: USGS National Map 2023

## Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) <i>Zone A, V, A99</i>
		With BFE or Depth <i>Zone AE, AO, AH, VE, AR</i>
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile <i>Zone X</i>
		Future Conditions 1% Annual Chance Flood Hazard <i>Zone X</i>
		Area with Reduced Flood Risk due to Levee. See Notes. <i>Zone X</i>
		Area with Flood Risk due to Levee <i>Zone D</i>
OTHER AREAS		NO SCREEN Area of Minimal Flood Hazard <i>Zone X</i>
		Effective LOMRs
		Area of Undetermined Flood Hazard <i>Zone D</i>
GENERAL STRUCTURES		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		20.2 Cross Sections with 1% Annual Chance
		17.5 Water Surface Elevation
		Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary
MAP PANELS		Digital Data Available
		No Digital Data Available
		Unmapped



The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on **1/10/2024 at 12:55 PM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

## **Attachment B: Culvert Inventory Table**

PM on SR 1	Inlet		Outlet		Diameter	Length	Material	Condition	Comments
43.36	No End Treat	Rt	Headwall	Lt	18 in	90 ft	RCP	Fair	Replace with 24" culvert
43.37 Rt	Overside	Rt		Rt	8 in	17.5 ft	CSP		Unmarked Overside Drain - to be removed in 40141
43.50	Flared End Sec	Rt	No End Treat	Lt	18 in	115 ft	RCP	Fair	No work
43.52 Lt	Drop Inlet	Lt	?	Lt	18 in	120 ft	PPC		No work. Not sure if this is a CT culvert?
43.53	Flared End Sec	Rt	Headwall	Lt	18 in	90 ft	RCP	Fair	No work
43.53 Rt	No End Treat	Rt	No End Treat	Rt	18 in	78 ft	RCP	Fair	No work. Cross culvert under Albion Ridge Rd
43.53 Rt	No End Treat	Rt	No End Treat	Rt	18 in	30 ft	RCP	Fair	No work. South (right) side of Albion Ridge Rd
43.73	Drop Inlet	Lt	No End Treat	Rt	18 in	43 ft	RCP	Good	Remove
44.00 Rt		Rt		Rt		33 ft			Remove, slotted drain under driveway
44.03	No End Treat	Rt	No End Treat	Lt	24 in	70	RCP/CSP	Fair	Replace with 30" culvert, headwall at east inlet
44.03 Lt	Overside Drain	Lt		Lt	8 in	20 ft	CSP		Remove
44.03 Lt	Unknown	Lt	No End Treat	Lt	12 in	Unknown	Plastic	Unknown	No work. Likely not a CT culvert, may be connected to non-CT DI at PM 44.04 Lt
44.03 Rt 01/02	Pipe Inlet	Rt	No End Treat	Rt	18 in	20 ft	CSP	Poor	Replace
44.03 Rt 02/03	Pipe Inlet	Rt	Pipe Inlet	Rt	18 in	197 ft	RCP	Good	Replace inlets with Type GO, culvert to remain
44.06 Lt 01/02	No End Treat	Lt	See comments	Lt	24 in	10 ft	CSP	Good	Replace - culvert has concrete plug with transition to 12" culvert after about 10 ft
44.06 Lt 02/03	Drop Inlet	Lt	No End Treat	Lt	6 in	50 ft	PPC		Not CT. Drains to CT from Albion River Inn upper parking area
44.06 Lt 02/04	Drop Inlet	Lt	No End Treat	Lt	6 in	50 ft	PPC		Not CT. Drains to CT from Albion River Inn lower turn-around parking
44.11 Lt	No End Treat	Lt	No End Treat	Lt	12 in	160 ft	CSP/PPC	Poor	Replace. Culvert transitions from metal to plastic, location unknown.
44.15 Rt	No End Treat	Rt	No End Treat	Rt	12 in	18 ft	CMP	Unknown	Likely replace
44.15 Lt	No End Treat	Lt	No End Treat	Lt	12 in	23 ft	RCP	Poor	Replace