RESILIENT BRANFORD

DRAFT

ALTERNATIVES ANALYSIS SUMMARY

CIRCA
Connecticut Institute for Resilience and Climate Adaptation

FUSS & O'NEILL

MAY 2023

RESILIENT BRANFORD SUMMARY

The Amtrak railroad underpass, locally referred to as the Cattle Crossing, is the entry point for flooding from the Branford River into the Meadow Street neighborhood. The Amtrak railroad embankment provides flood protection to the neighborhood, despite likely not being constructed for this purpose. By creating a barrier to the floodwaters at the entrance to the Cattle Crossing, the risk of flooding along Meadow Street, caused by the Branford River, will be reduced.

The FEMA Flood Insurance Rate Map (FIRM) depicts the 100-year floodwater elevation at 12 feet (NAVD88). This is referred to by FEMA as the Base Flood Elevation (BFE) (see dashed line in Figure 1). The Amtrak embankment is currently at elevation 12 (NAVD88), as shown in Figure 2, and the lowest elevation of the road under the Cattle Crossing is 0.52 feet (NAVD88). The mean higher high water of the Branford River is elevation 2.97 feet (NAVD88).

Four alternatives were evaluated to address flooding at the Cattle Crossing.

1. Flood Gate with Floodwall
2. Flood Gate
3. Close the Cattle Crossing
4. Do Nothing

Benefits and considerations of each alternative are discussed in the following sections.

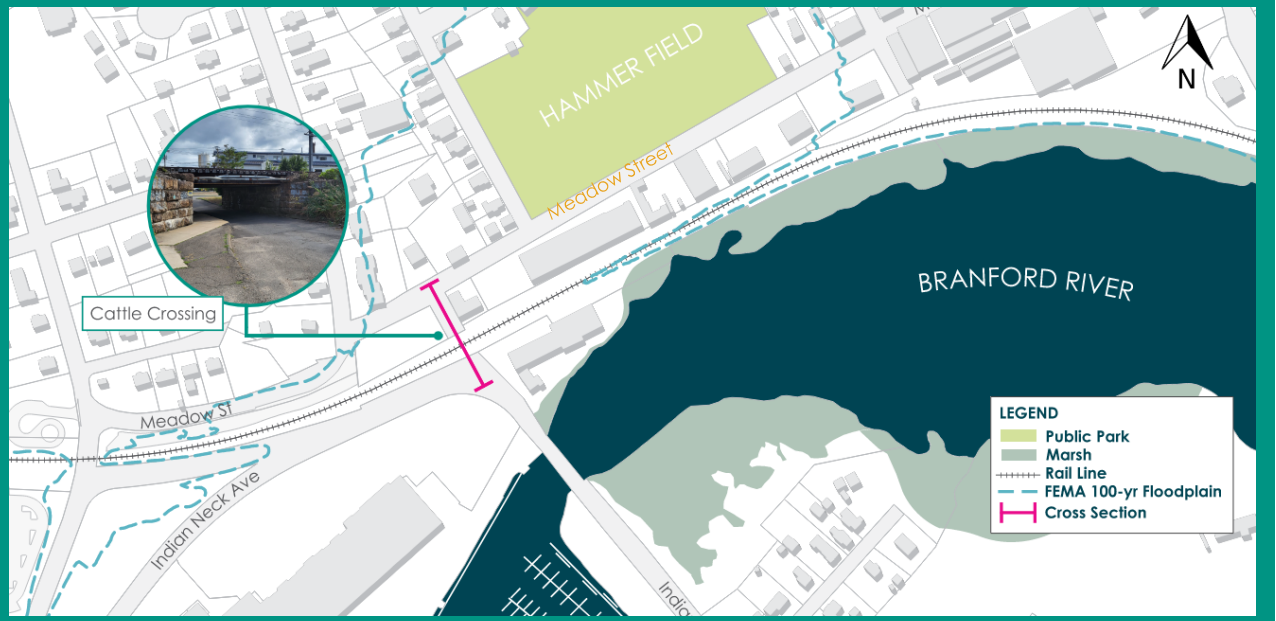

FIGURE 1: OVERVIEW OF PROJECT AREA

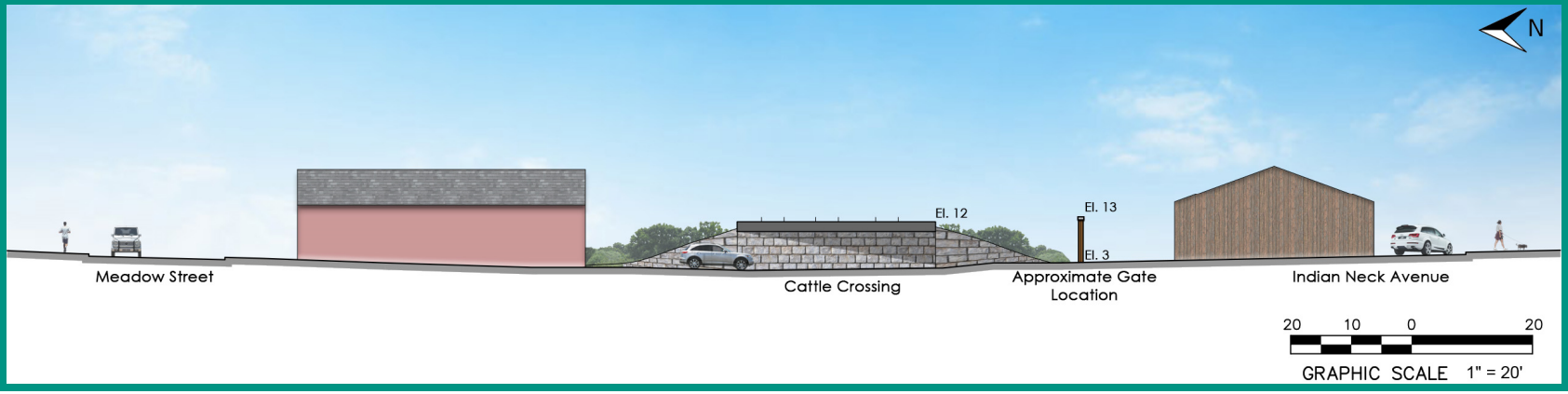

FIGURE 2: CROSS SECTION OF CATTLE CROSSING WITH PROPOSED FLOOD WALL

ALTERNATIVE 1: FLOOD GATE WITH FLOODWALL

Alternative 1 consists of installing a flood gate at the Cattle Crossing and floodwall between the Amtrak embankment and the Branford River. The floodwall would connect to the gate and run parallel to the Amtrak embankment.

The height of the flood gate and floodwall would be elevation 13 (NAVD88), which is dictated by FEMA flood protection design standards. The floodwall would be approximately one foot higher than the current Amtrak embankment. The tallest above ground portion of the floodwall is approximately 10 feet high and located at the Cattle Crossing.

The flood gate would be manually operated by the Town of Branford Department of Public Works (DPW) and allow for traffic through the Cattle Crossing when there is no risk of flooding. When a storm event is anticipated, a Town employee would swing the gate doors, and lock them into the closed position – temporarily blocking traffic.

A significant benefit of this Alterative is the potential for properties within the Meadow Street neighborhood to be removed from the FEMA 100-year Floodplain as well as the potential for construction to qualify for FEMA funding. Because the Amtrak embankment is not recognized by the FEMA levee program, the 100-year BFE extends beyond the Amtrak embankment into the Meadow Street neighborhood. By protecting the Amtrak embankment and Meadow Street neighborhood, the floodwall could be certified by FEMA and therefore qualify for FEMA funding.

A sheet pile floodwall is depicted in Figure 4. Sheet pile is often fitted with a concrete cap to protect the top of the wall from damage as well as provide additional structural reinforcement. Although the floodwall would be a major visual impact, there are options to use the floodwall to improve the overall aesthetics of the neighborhood. Options include incorporating vertical planters, installing a decorative geometric façade or procuring the installation of a mural by a local artist.

FIGURE 3: EXISTING CONDITIONS

FIGURE 4: PROPOSED CONDITIONS

ALTERNATIVE 1 CONTINUED: FLOOD GATE WITH FLOODWALL LAYOUT

Permission to work within the Amtrak right-of-way and on private property is necessary for construction of the floodwall. The proposed floodwall would be approximately 1,500-feet long and begin just east of Maple Street (Figure 5). The portion of the floodwall between Maple Street and the Cattle Crossing flood gate is municipal property. As the floodwall extends northeast, it enters private property, behind the warehouse at 46 Indian Neck Avenue and Amtrak right-of-way. At the floodwalls eastern terminus, it ties into the Amtrak embankment.

Coordination with Amtrak, and the private property owner of 46 Indian Neck Avenue, will impact both the project schedule and budget. Both Amtrak and the property owner would need to grant permission to access and install infrastructure on their property.

ALTERNATIVE SUMMARY

- FEMA Fundable: Yes
- Approximate Construction Cost: $4,900,000 to $10,300,000

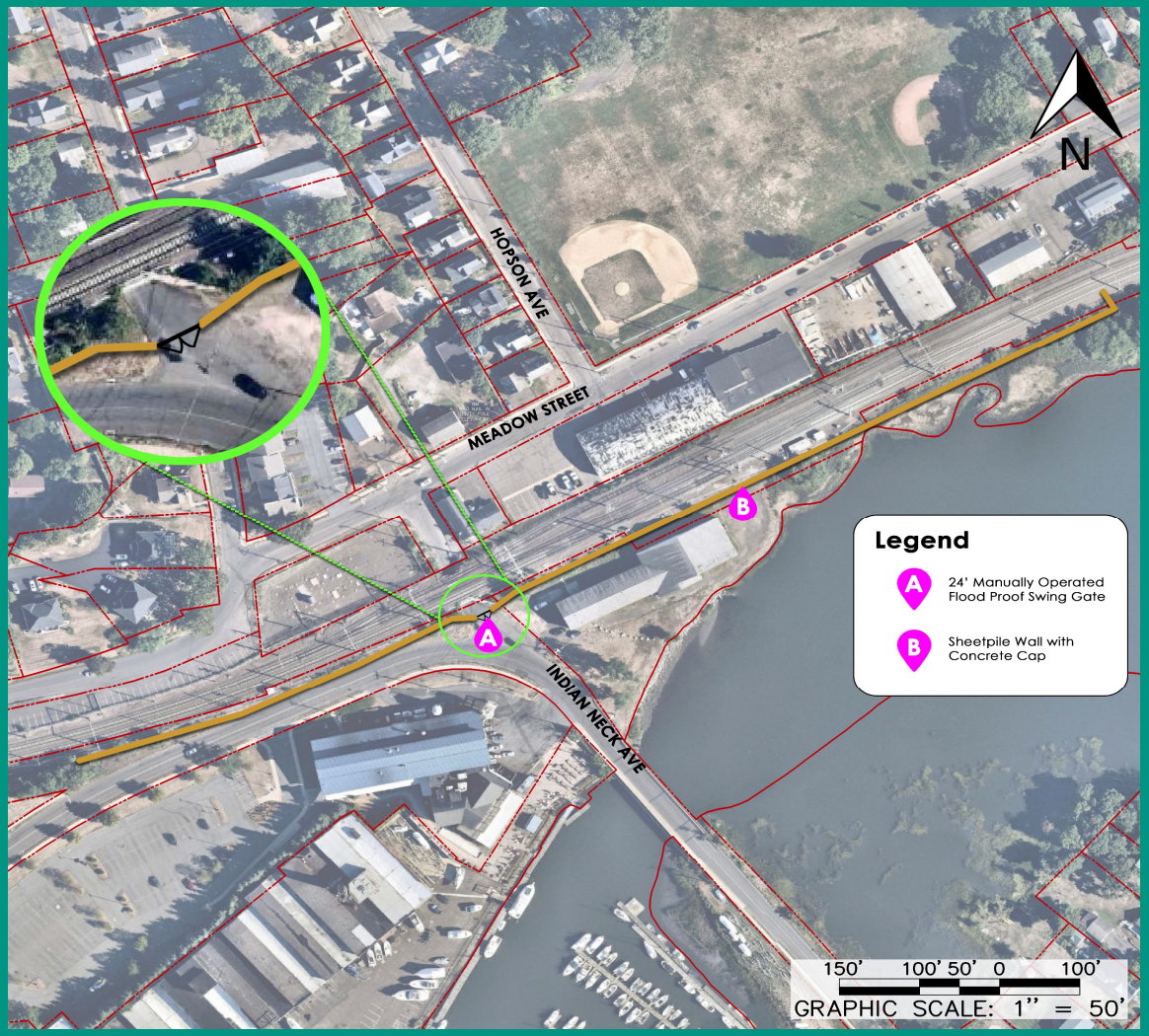

FIGURE 5: ALTERNATIVE 1 LAYOUT

ALTERNATIVE 2: FLOOD GATE

Alternative 2 consists of installing a flood gate with berms that tie into the existing Amtrak embankment. By installing the gate without the entire length of floodwall, Meadow Street would not be protected if floodwaters breached the Amtrak embankment.

Because FEMA does not recognize the Amtrak embankment as a flood protection measure, this Alternative is not eligible for FEMA funding and will not impact the existent of the current 100-year Floodplain. However, the floodwall from Alternative 1 could eventually be tied into the flood gate.

The location of the flood gate is proposed at the intersection of Indian Neck Avenue and the Cattle Crossing, as seen in Figure 6. Both Alternatives 1 and 2 include improvements to the intersection as well as regrading the intersection to allow for the gate doors to swing unobstructed.

This Alternative requires some Amtrak coordination (albeit less so than Alternative 1) and coordination with the property owner of 46 Indian Neck Ave. The private property owner would be engaged as a stakeholder, but the project would not require access to their property. Amtrak will be engaged to review the design as well as approve the connection between the berms and the embankment.

ALTERNATIVE SUMMARY

- FEMA Fundable: No
- Approximate Construction Cost: $800,000 to $ 1,700,000

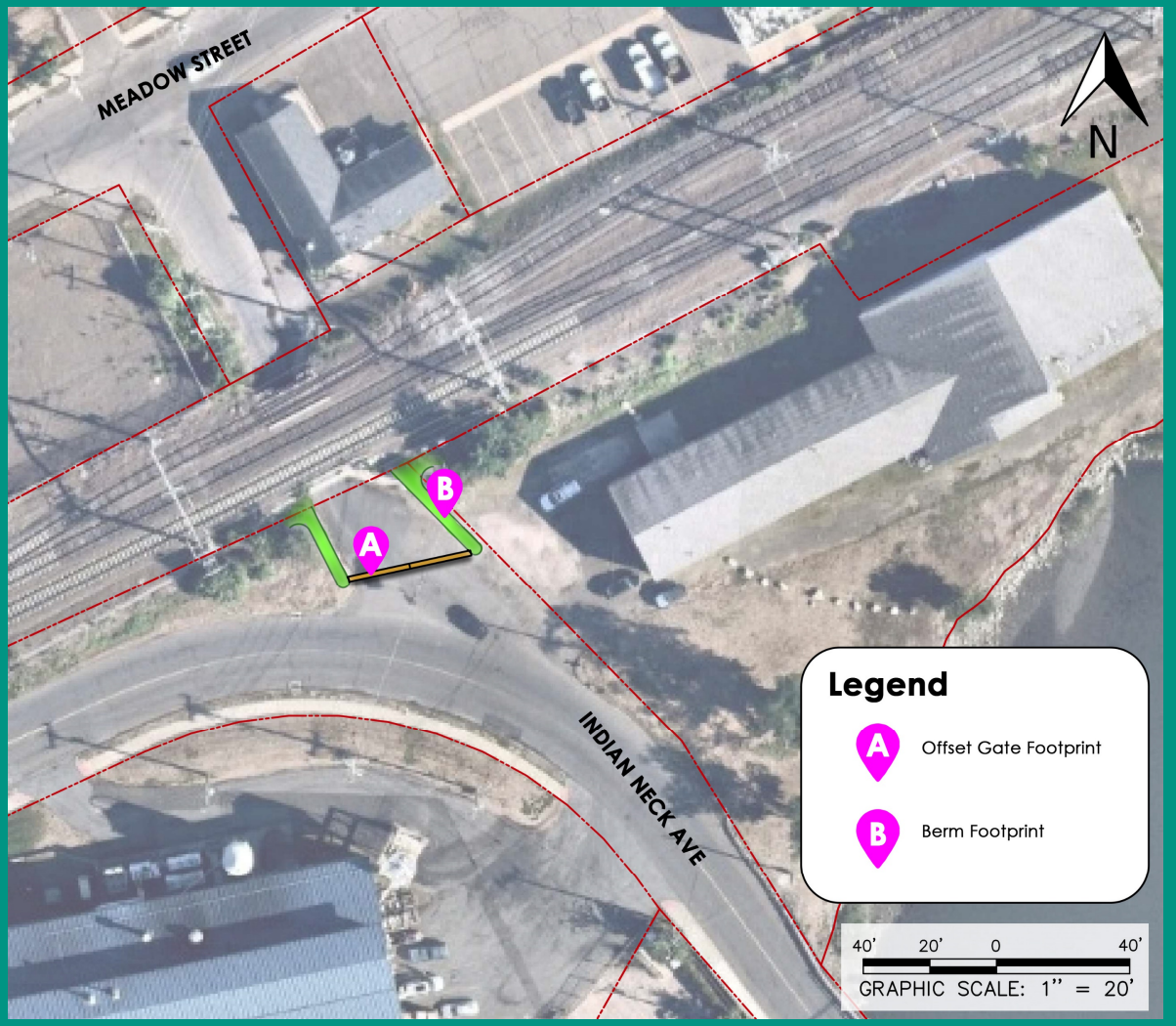

FIGURE 6: GATE-ONLY LAYOUT

ALTERNATIVE 3: CLOSE THE CATTLE CROSSING

The Cattle Crossing would be closed with earthen, structural fill and the slopes vegetated to match the existing embankment, as depicted in Figure 7. Traffic crossing the railroad would be permanently rerouted to the Maple Street overpass. Because cars routinely use the Cattle Crossing, and it is an important part of the Town's bike path network, there are considerable impacts of this Alternative to the community.

Closing access to the Cattle Crossing was previously proposed as an alternative during public outreach in 2016. At that time, it was reported that the public was generally against this alternative. However, at the 2023 public meeting, although this alternative was not presented, it was suggested as an option from some members of the public.

This Alternative would require access to the Amtrak right-of-way and therefore, Amtrak would need to approve any modifications to the Cattle Crossing. Maintenance of existing stormwater and sewer utilities, that currently span underneath the Cattle Crossing, would need to be considered with each utility owner. The costs listed below do not include utility coordination.

This Alternative would not remove the upland structures from the regulated 100-year Floodplain, and it would not be eligible for FEMA funding.

ALTERNATIVE SUMMARY

- FEMA Fundable: No
- Approximate Construction Cost: $300,000 to $600,000

FIGURE 7: CLOSING THE CATTLE CROSSING

ALTERNATIVE 4: DO NOTHING (MAINTAIN EXISTING CONDITIONS)

Alternative 4 is the "do nothing" option, where no mitigation actions are installed, and the Cattle Crossing remains as is. Although this option has no initial cost, the repetitive cost of flood damages to the Meadow Street neighborhood (i.e., the cost of inaction) should be considered. Flood modeling of the Branford River, completed by CIRCA, which accounts for 20 inches of sea level rise due to climate change, demonstrates that the risk of flooding will increase as climate change continues. By 2050, the flood extent generated by a 10-year storm event will impact as many neighborhood structures as the current 100-year storm event.

ALTERNATIVE SUMMARY

- FEMA Fundable: Not Applicable
- Approximate Construction Cost: $0

FIGURE 8: RECENT FLOODING DURING STORM EVENT IN DECEMBER 2022

RESILIENT
BRANFORD

ALTERNATIVES COMPARISON AND SUMMARY

OPTIONS	COST	ADVANTAGES	DISADVANTAGES
FLOOD GATE WITH FLOODWALL	$4,900,000 to $10,300,000	• Eligible for FEMA funding. • Eligible for FEMA LOMR that could remove upland structures from regulated floodplain.	• Multi-million dollar project (~ $7 million). • Major visual impact to neighborhood. • Requires installation on private property and in Amtrak right-of-way. • Requires human operation to be deployed.
FLOOD GATE	$800,000 to $ 1,700,000	• Relatively low cost (~$1 million). • Option to retrofit with floodwall later.	• Requires Amtrak coordination. • Likely not eligible for FEMA funding. • Requires human operation to be deployed. • Would not allow for upland structures to be removed from regulated floodplain.
CLOSING THE CATTLE CROSSING	$300,000 to $600,000	• No human operation required.	• Requires Amtrak approval. • Will complicate access to utilities. (Cost does not account for utility relocation, if necessary.) • Would not allow for upland structures to be removed from regulated floodplain. • Likely not eligible for FEMA funding. • Traffic would be redirected to Maple Street.
DO NOTHING	Construction Cost: $0	• No construction cost.	• High annualized cost of damages from flooding (houses, small businesses, roads, etc.). • Due to anticipated impacts of climate change, flooding risk will worsen over time.

RESILIENT BRANFORD CRITERIA TABLE

1. Based on long term cost effectiveness (benefits of the project divided by the cost of the project).
2. Amount of coordination with stakeholders required to build the project (i.e., Amtrak, utilities, private property owners, etc.). Including procuring easements for operation and maintenance.
3. Access impacts include car and pedestrian travel access through the Cattle Crossing as well as access to existing utilities (i.e., sewer and drainage).
4. Confidence that mitigation action will act as designed. For example, it is unknown how well the Amtrak embankment will continue to act as a flood control measure. The Amtrak embankment could fail under certain storm conditions. This criteria also considers the ability to apply for a FEMA Letter of Map Revision (LOMR).
5. How quickly project will be constructed.
6. Each of the matrix criteria are weighted based on their priority to the Town of Branford and feedback from project stakeholders.

WEIGHTED COMPARATIVE ANALYSIS MATRIX

ALTERNATIVE	MATRIX CRITERIA					OVERALL SCORE
	Capital Cost[1]	Impact to Amtrak/Private Property[2]	Access Impacts[3]	Effective Flood Control[4]	Implementation Time Frame[5]	
Criteria Weighting[6]	3	1	2	3	2	
1. Flood Gate with Floodwall	2	1	3	3	1	**2.2**
2. Flood Gate	3	2	3	2	2	**2.5**
3. Closing the Cattle Crossing	3	2	1	2	2	**2.1**
4. Do Nothing	1	3	3	1	3	**1.9**

NOTE: ALL CRITERIAL WEIGHTING, RATINGS, AND SCORES ARE BASED ON A SCALE OF 1-3