The *New Mix:* Project Advisory Committee (PAC) Meeting #4A July 25, 2022











- Welcome Back!
- Review of PAC Milestone 3
- Level 1 Screening Preliminary Results
- Next Steps





New Mix Program PEL Study PAC Milestone 3 Review





Universe of Alternatives: Conceptual Alternatives

23 Alternatives

Identified in the Universe for the PEL Study process



1. No-Build Alternative

2. Alternate Travel Modes

Rehabilitation Alternatives

- 3. I-84/Route 8 True Rehabilitation
- I-84 WB Bridge Rehabilitation with Construction of New I-84 EB Mainline
- 5. I-84 Bridge Rehabilitation with Bypass Reused as Frontage Road
- 6. I-84 Bridge Rehabilitation with Widening to Facilitate Staging Replacement Alternatives
- 7. At Grade System Connections
- 8. Modern Crossover Interchange with Route 8 Split to the South
- 9. Interchange Shifted East

10. Combined System Connections

- 11. I-84 Reconstruction In-Place
- 12. Interchange Shifted East with Inner Loop Ramp
- 13. Partial System Crossover Interchange
- 14. Modified Diverging Diamond
- 15. Half Diverging Diamond
- 16. Partial System Interchange with Freight Street Interchange
- 17. Route 8 Boulevard
- 18. Modern Crossover Interchange
- 19. Washington Street Bypass
- 20. South City Bypass
- 21. Keeping Route 8 Stacked
- 22. Tunnel
- 23. Naugatuck River Shift

Level 1 Analysis Review: Engineering-Based on Improving the Identified Deficiencies (Needs) and Feasible Solutions (Purpose) Can the Alternative Satisfy the Purpose of the Project? Does it have any fatal flaws?

NEEDS	PURPOSE
Structural Deficiencies	Improve bridge conditions.
Geometric Deficiencies	Improve roadway conditions.
Operational Deficiencies	Improve operational conditions.

Fatal Flaws:

Cost Feasibility Additional pending Agency coordination



Level 1	Analysis: Evaluation Criteria Review		
Criteria Category	Evaluation Criteria		
Structural	Improves or replaces deteriorating bridge structures	-	Pass
Geometric	Addresses and improves conditions not meeting current design standards.		Fass
Operational	High-volume movements as direct connections; Lower-volume movements as indirect connections. Adequate capacity for current traffic and future traffic forecasts is provided.		
Fatal Flaws		Fail	ι έ _λ υ Ι
Cost	Financial resources can be made available (order of magnitude cost).		
Feasibility	Can be constructed using proven technology, engineering, construction techniques, and general constructability – allowing traffic to operate during construction.		new 🔊
Additional pe	ending Agency coordination	64	mix Sur

New Mix PEL Study Screening Process Review: Level 1

Can the Alternative Satisfy the Purpose of the Project? Does it have any fatal flaws?



Structural Geometric Operational Cost Feasibility



New Mix Program PEL Study Level 1 Screening Preliminary Results



Preliminary Level 1 Screening Results*

23

Total Conceptual Alternatives

Conceptual Alternatives proposed to be **DISMISSED**: <u>Failed to address</u> the transportation need or is fatally flawed

9

1

13

Conceptual Alternatives proposed to **ADVANCE**: <u>Appear to address</u> the transportation need and not fatally flawed

No-Build Alternative must be retained for future evaluations⁺

*Results are not final until after public input is received

⁺ The No-Build Alternative failed to meet the criteria but must be retained for evaluation in the subsequent screening levels and NEPA analyses as required.

Preliminary Level 1 Screening Results



*The No-Build Alternative failed to meet the criteria but must be retained for evaluation in the subsequent screening levels and NEPA analyses as required.

Preliminary Level 1 Screening Matrix

			Preliminary Purpose and New	be		nfers killing College
	Lavel 1	Structural Criteria	Geometric Criteria	Traffic Operations Criteria		incarring Criteria
Conceptual Alternative Name	Overall Pass / Fail	Addresses the need to improve and/or replace deteriorating bridge structures that have outlived their original intended 50-year service lives.	Demonstrates ability to address and correct geometric deficiencies that do not meet current design standards.	Provides connections between I-84, Route 8, and the City of Waterbury <u>and</u> provides adequate capacity based on current traffic and future traffic forecasts on mainlines and system and service interchanges.	Costs: The cost of the alternative demonstrates viability, and can the fitrancial resources reasonably be made available.	Feasibility: Demonstrates ability to be implemented using proven technology, engineering, construction techniques, and general constructability – allowing mainlines and system namps to continue to operate.
No-Build Alternative	Faith	Fail	Fail	Fall	Pass	Fail
Travel Modes	Fall	Fall	Fall	Fall	N/A	743
1-84/Route II True Rehabilitation	140	Pana	Pail.	Fail	Pass	Fail
3-84 WB Bridge Rehabilitation with Construction of New 1-84 EB Mainline	Fait	Pass	Fall	Fall	Pass	Paus
584 Bridge Rehabilitation with Bypass Repurposed as Frontage Road	Pall	Pass	141	Fall	Pass	Pass
1-84 Bridge Rehabilitation with Widening to Facilitate Staging	Fall	Pass	Fall	Fall	Pass	Pass
184 Reconstruction In-Place	Pall	Pass	Pass	Pass	Pass	Fall
Interchange Shifted East	Pasa	Pass	Pasa	Pase	Pass	Pass
interchange Shifted East with Inner Loop Ramp	Fall	Paux	548	Fail	Pasa	Pars
Combined System Connections	Pass	Paus	Pass	Pass	Pass	Paul
Modern Crossover Interchange	Pasa	Pana	Pasa	Pasa	Pass	Pan
Modern Crossover Interchange with Route 8 Split to the South	Pase	Pan	Pase	Pass	Pan	Pan
Resping House & Stacked	Pase	Pass	Pasa	Pass	Pass	Pass
Naugatusck River Shift	Pase	Fam	Pass	Pass	Pasa	Fan
Partial System Crossover Interchange	Fall	Pass	Pasa	Full	Pass	Fall
Partial System Interchange with Freight Street Interchange	Pass	Pass	Pass	Pass	Pass	Pass
Modified Diverging Diamond	Fail	Past	Fall	Fall	Pass	Pass
Half Diverging Diamond	Pass	Paus	Pasa	Pass	Pass	Pass
At Grade System Connections	Fall	Pass	Fall	Pass	Pass	Fall
Route & Roulevard	Rall	Pass	Tall	Tall	Pana	Fall
Washington Street Bypass	Fail	Paul	Fall	Fall	Pass	Fall
South City Bypess	Pass	Paus	Pass	Pase	Pass	Pers
Tunnel	Fail	N/A	Fall	N/A	Fall	Fall

The No-Build Alternative does not meet Preliminary Purpose and Need and is impractical, however, it was retained as a comparison that other alternatives will be evaluated against during Lavel 2 and 3 of the PEL Study screening process. Advancement of a No-Build Alternative for this purpose is a requirement for PEL and NEPA malyses.



Preliminary Level 1 Screening Results: No-Build Alternative

		Prelim	inary Purpose and	Needs	Practicabil	ity Criteria
Conceptual Alternative Name	Pass / Fail	Structural Criteria	Geometric Criteria	Traffic Operational Criteria	Cost Criteria	Feasibility Criteria
No-Build Alternative*	Fail	Fail	Fail	Fail	Pass	Fail



Baseline condition = No Improvements of deficiencies

- No change in system connections, left hand entrance and exit ramps, local roadway associated with the Mixmaster
- Improvements only include those identified in Transportation Improvement Plans.
 - Safety and maintenance activities:
 - E.g., pavement resurfacing or reconstruction, signing improvements, and guiderail improvements



*The No-Build Alternative failed to meet the criteria but must be retained for evaluation in the subsequent screening levels and NEPA analyses as required.



Preliminary Level 1 Screening Results: Travel Modes

		Prelim	inary Purpose and	Needs	Practicabil	ity Criteria
Conceptual Alternative Name	Pass / Fail	Structural Criteria	Geometric Criteria	Traffic Operational Criteria	Cost Criteria	Feasibility Criteria
Travel Modes	Fail	Fail	Fail	Fail	N/A	Fail





- I al I SIL
 - Arterial Bus Transit
 - Arterial Bus Rapid Transit
 - Bus Lanes
 - Light Rail
 - Heavy Rail
 - Commuter Rail
 - High Speed Rail

Pedestrian/Bicycle



No Improvements of deficiencies

Travel modes will be considered as potential

Complementary Features

Improves structural conditions Improves geometrics to achieve modern design standards Provides adequate capacity (existing & future)

Practicable cost

Practicable construction

- Limited upgrades to local roadway: e.g., sidewalks, bike lanes, etc.
- Potential reduction in congestion; does not meet capacity.



Rehabilitation Alternatives Recap



- Require 80+ year-old structures to remain.
 Complex/lengthy construction sequencing is needed.
- Concerns with return on investment (benefits vs. cost)

Category	Evaluation Criteria				
Structural	Improves structures				
Geometric	Achieves modern design standards				
Operational	Provides adequate capacity				
Fatal Flaws					
Cost	Practicable in cost				
Feasibility	Practicable construction				
Additional pending Agency coordination					

Preliminary Level 1 Screening Results: *Rehabilitation Alternatives*

		Preliminary Purpose and Needs			Practicability Criteria	
Conceptual Alternative Name	Pass / Fail	Structural Criteria	Geometric Criteria	Traffic Operational Criteria	Cost Criteria	Feasibility Criteria
I-84 / Route 8 True Rehabilitation	Fail	Pass	Fail	Fail	Pass	Fail
I-84 WB Bridge Rehabilitation with Construction of New I-84 EB	Fail	Pass	Fail	Fail	Pass	Pass
I-84 Bridge Rehabilitation with Bypass Repurposed as Frontage Rd	Fail	Pass	Fail	Fail	Pass	Pass
I-84 Bridge Rehabilitation with Widening to Facilitate Staging	Fail	Pass	Fail	Fail	Pass	Pass



Preliminary Level 1 Screening Results: *I-84/Route 8 True Rehabilitation*

		Prelim	inary Purpose and	Practicability Criteria		
Conceptual Alternative Name	Pass / Fail	Structural Criteria	Geometric Criteria	Traffic Operational Criteria	Cost Criteria	Feasibility Criteria
I-84 / Route 8 True Rehabilitation	Fail	Pass	Fail	Fail	Pass	Fail



✓ Improves aging structures

- Achieves modern design standards
 - No improvements to geometric deficiencies: e.g., sharp curves, insufficient design speeds, travel lane/shoulder widths

Provides adequate capacity

- Poor level of service (LOS) in future conditions
- ✓ Practicable cost
- Practicable construction
 - Major traffic disruptions due to construction





Preliminary Level 1 Screening Results: *I-84 WB Bridge Rehabilitation with construction of New I-84 EB*

		Preliminary Purpose and Needs			Practicabil	ity Criteria
Conceptual Alternative Name	Pass / Fail	Structural Criteria	Geometric Criteria	Traffic Operational Criteria	Cost Criteria	Feasibility Criteria
I-84 WB Bridge Rehabilitation with Construction of New I-84 EB	Fail	Pass	Fail	Fail	Pass	Pass



Improves aging structures

- Achieves modern design standards
 - Minor improvements to geometric deficiencies (only EB structure); many remain (e.g., sharp curves, insufficient design speeds, travel lane/shoulder widths)
- Provides adequate capacity
- Poor level of service (LOS) in future conditions
- Practicable cost

✓ Practicable construction







Preliminary Level 1 Screening Results: *I-84 Bridge Rehabilitation with Bypass Repurposed as Frontage Rd*

		Prelimi	inary Purpose and	Practicability Criteria		
Conceptual Alternative Name	Pass / Fail	Structural Criteria	Geometric Criteria	Traffic Operational Criteria	Cost Criteria	Feasibility Criteria
I-84 Bridge Rehabilitation with Bypass Repurposed as Frontage Rd	Fail	Pass	Fail	Fail	Pass	Pass



Improves aging structures

- Achieves modern design standards
 - No improvements to geometric deficiencies (e.g., sharp curves, insufficient design speeds, travel lane/shoulder widths)
- Provides adequate capacity
- Poor LOS in future conditions
- ✓ Practicable cost
- ✓ Practicable construction







Preliminary Level 1 Screening Results: *I-84 Bridge Rehabilitation with <u>Widening to Facilitate Staging</u>*

	Pass / Fail	Preliminary Purpose and Needs			Practicability Criteria	
Conceptual Alternative Name		Structural Criteria	Geometric Criteria	Traffic Operational Criteria	Cost Criteria	Feasibility Criteria
I-84 Bridge Rehabilitation with Widening to Facilitate Staging	Fail	Pass	Fail	Fail	Pass	Pass



Improves aging structures

- Achieves modern design standards
 - Minor improvements to geometric deficiencies (widened 1-84)
 - Deficiencies remain along ramps (e.g., sharp curves, insufficient design speeds, etc.)
- X Provides adequate capacity
 - Poor LOS in future conditions
- \checkmark Practicable cost
- Practicable construction







Preliminary Level 1 Screening Results: *Rehabilitation Alternatives*

		Prelimi	Practicability Criteria			
Conceptual Alternative Name	Pass / Fail	Structural Criteria	Geometric Criteria	Traffic Operational Criteria	Cost Criteria	Feasibility Criteria
I-84 / Route 8 True Rehabilitation	Fail	Pass	Fail	Fail	Pass	Fail
I-84 WB Bridge Rehabilitation with Construction of New I-84 EB	Fail	Pass	Fail	Fail	Pass	Pass
I-84 Bridge Rehabilitation with Bypass Repurposed as Frontage Rd	Fail	Pass	Fail	Fail	Pass	Pass
I-84 Bridge Rehabilitation with Widening to Facilitate Staging	Fail	Pass	Fail	Fail	Pass	Pass

Improves aging structural conditions
 Improves geometrics to achieve modern design standards
 Provides adequate capacity (existing & future)
 Practicable cost

Improved structures, but obsolete geometric and operational features remain



Replacement Alternatives Recap



Replacement Alternatives Includes options for the complete replacement of the I-84 and Route 8 structures.
 New structures = new connections
 Constraints affect feasibility of improvements

Category	Evaluation Criteria
Structural	Improves aging structures
Geometric	Achieves modern design standards
Operational	Provides adequate capacity
Fatal Flaws	
Cost	Practicable in cost
Feasibility	Practicable construction
Additional pe	ending Agency coordination

WATERBURY, CT I-84/ROUTE 8 "MIXMASTER" INTERCHANGE EXISTING CONDITIONS





Preliminary Level 1 Screening Results: Dismissed Replacement Alternatives

		Prelimi	nary Purpose and	Needs	Practicabil	ity Criteria
Conceptual Alternative Name	Pass / Fail	Structural Criteria	Geometric Criteria	Traffic Operational Criteria	Cost Criteria	Feasibility Criteria
I-84 Reconstruction In-Place	Fail	Pass	Pass	Pass	Pass	Fail
Interchange Shifted East with Inner Loop Ramp	Fail	Pass	Fail	Fail	Pass	Pass
Partial System Crossover Interchange	Fail	Pass	Pass	Fail	Pass	Fail
Modified Diverging Diamond	Fail	Pass	Fail	Fail	Pass	Pass
At Grade System Connections	Fail	Pass	Fail	Pass	Pass	Fail
Route 8 Boulevard	Fail	Pass	Fail	Fail	Pass	Fail
Washington Street Bypass	Fail	Pass	Fail	Fail	Pass	Fail
Tunnel	Fail	N/A	Fail	N/A	Fail	Fail



Preliminary Level 1 Screening Results: *I-84 Reconstruction In-Place*

		Prelimi	inary Purpose and	Practicability Criteria		
Conceptual Alternative Name	Pass / Fail	Structural Criteria	Geometric Criteria	Traffic Operational Criteria	Cost Criteria	Feasibility Criteria
I-84 Reconstruction In-Place	Fail	Pass	Pass	Pass	Pass	Fail



- Replaces aging structures
- Achieves modern design standards
- Provides adequate capacity
- Practicable cost
- Practicable construction
 - The in-place reconstruction would result in major traffic disruptions







Preliminary Level 1 Screening Results: Interchange Shifted East with Inner Loop Ramp

		Preliminary Purpose and Needs			Practicability Criteria	
Conceptual Alternative Name	Pass / Fail	Structural Criteria	Geometric Criteria	Traffic Operational Criteria	Cost Criteria	Feasibility Criteria
Interchange Shifted East with Inner Loop Ramp	Fail	Pass	Fail	Fail	Pass	Pass



- Replaces aging structures
- Achieves modern design standards
 - Inner loop ramp fails to meet geometric standards
- Provides adequate capacity
 - Conceptual layout of inner loop ramp demonstrates inadequate LOS
- Practicable cost
- Practicable construction





Preliminary Level 1 Screening Results: Partial System Crossover Interchange

		Prelimi	nary Purpose and	Practicability Criteria		
Conceptual Alternative Name	Pass / Fail	Structural Criteria	Geometric Criteria	Traffic Operational Criteria	Cost Criteria	Feasibility Criteria
Partial System Crossover Interchange	Fail	Pass	Pass	Fail	Pass	Fail



- Replaces aging structures
- Achieves modern design standards
- Provides adequate capacity
 - Indirect connections would require the use of the local road network resulting in an increase of traffic at unacceptable levels
- Practicable cost

Practicable construction

- Significant issues with moving
 I-84 north of its current alignment
- Major construction issues





Preliminary Level 1 Screening Results: *Modified Diverging Diamond*

		Preliminary Purpose and Needs			Practicability Criteria		
Conceptual Alternative Name	Pass / Fail	Structural Criteria	Geometric Criteria	Traffic Operational Criteria	Cost Criteria	Feasibility Criteria	
Modified Diverging Diamond	Fail	Pass	Fail	Fail	Pass	Pass	



Replaces aging structures

- Achieves modern design standards
 - For a DDI to function, the geometry of certain system ramps would not meet current design standards
- Provides adequate capacity
 - The heavy traffic volume on two of the system movements would not function adequately due to poor geometry and high traffic volumes resulting in poor LOS
- Practicable cost
- Practicable construction







Preliminary Level 1 Screening Results: At Grade System Connections

		Preliminary Purpose and Needs				Practicability Criteria		
Conceptual Alternative Name	Pass / Fail	Structural Criteria	Geometric Criteria	Traffic Operational Criteria	Cost Criteria	Feasibility Criteria		
At Grade System Connections	Fail	Pass	Fail	Pass	Pass	Fail		



Replaces aging structures

Achieves modern design standards

- A significant deviation from design standards would be required to construct the system connections from I-84 EB to Route 8 NB and Route 8 NB to I-84 WB
- Provides adequate capacity

Practicable cost

- Practicable construction
 - The topography of Waterbury the close proximity of the I-84 EB system ramp to the RR result in construction challenges that are infeasible to overcome.





Preliminary Level 1 Screening Results: Route 8 Boulevard

		Preliminary Purpose and Needs				Practicability Criteria		
Conceptual Alternative Name	Pass / Fail	Structural Criteria	Geometric Criteria	Traffic Operational Criteria	Cost Criteria	Feasibility Criteria		
Route 8 Boulevard	Fail	Pass	Fail	Fail	Pass	Fail		



Replaces aging structures

- X Achieves modern design standards
 - Would require overcoming significant geometric challenges resulting in deviation from current design standards

Provides adequate capacity

 Would require signalized intersections severely impacting the traffic operations, reducing LOS

Practicable cost

Practicable construction

Would require significant disruption
 to I-84 and Route 8 traffic





Preliminary Level 1 Screening Results: Washington Street Bypass

		Prelimi	inary Purpose and	Practicability Criteria		
Conceptual Alternative Name	Pass / Fail	Structural Criteria	Geometric Criteria	Traffic Operational Criteria	Cost Criteria	Feasibility Criteria
Washington Street Bypass	Fail	Pass	Fail	Fail	Pass	Fail



Replaces aging structures

Achieves modern design standards

- The geometry of the roadway to match into Route 8, north of the existing I-84 crossing of the Naugatuck River and Railroad crossing near Bank St. fail to meet design standards
- Provides adequate capacity
 - The weave distance of the minimum five (5) lane wide highway (in each direction) does not meet operational criteria for adequate LOS

Practicable cost

- Practicable construction
 - Significant construction challenges at locations of steep vertical variances and existing infrastructure





Preliminary Level 1 Screening Results: *Tunnel*

		Preliminary Purpose and Needs			Practicability Criteria		
Conceptual Alternative Name	Pass / Fail	Structural Criteria	Geometric Criteria	Traffic Operational Criteria	Cost Criteria	Feasibility Criteria	
Tunnel	Fail	N/A	Fail	N/A	Fail	Fail	



Conceptual graphic not produced



Replaces aging structures

Achieves modern design standards

 Any tunneling of highway segments near the core of the interchange would be incompatible with system ramp geometry

Provides adequate capacity

Practicable cost

- Unreasonable and impractical projected construction and maintenance costs
- Practicable construction
 - Significant engineering challenges associated with topographical site constraints

Will be considered as a potential

Complementary Feature

Preliminary Level 1 Screening Results: Dismissed Replacement Alternatives

		Prelimi	nary Purpose and	Needs	Practicabil	ity Criteria
Conceptual Alternative Name	Pass / Fail	Structural Criteria	Geometric Criteria	Traffic Operational Criteria	Cost Criteria	Feasibility Criteria
I-84 Reconstruction In-Place	Fail	Pass	Pass	Pass	Pass	Fail
Interchange Shifted East with Inner Loop Ramp	Fail	Pass	Fail	Fail	Pass	Pass
Partial System Crossover Interchange	Fail	Pass	Pass	Fail	Pass	Fail
Modified Diverging Diamond	Fail	Pass	Fail	Fail	Pass	Pass
At Grade System Connections	Fail	Pass	Fail	Pass	Pass	Fail
Route 8 Boulevard	Fail	Pass	Fail	Fail	Pass	Fail
Washington Street Bypass	Fail	Pass	Fail	Fail	Pass	Fail
Tunnel	Fail	N/A	Fail	N/A	Fail	Fail



Complementary Features

(not to be confused with "complimentary" features)

• • • •

Complementary features are favorable aspects of an alternative that could be feasibly incorporated into advancing alternatives for future consideration.



Complementary Features

"Tunneling" limited portions of the mainline (cap concept)
General local road improvements
Fifth crossing of Naugatuck River
Roundabout
Other modes of travel
Additional could be identified as the PEL Study progresses



Preliminary Level 1 Screening Results: Advancing Alternatives

		Preliminary Purpose and Needs				Practicability Criteria	
Conceptual Alternative Name	Pass / Fail	Structural Criteria	Geometric Criteria	Traffic Operational Criteria	Cost Criteria	Feasibility Criteria	
Interchange Shifted East	Pass	Pass	Pass	Pass	Pass	Pass	
Combined System Connections	Pass	Pass	Pass	Pass	Pass	Pass	
Modern Crossover Interchange	Pass	Pass	Pass	Pass	Pass	Pass	
Modern Crossover Interchange with Route 8 Split to the South	Pass	Pass	Pass	Pass	Pass	Pass	
Keeping Route 8 Stacked	Pass	Pass	Pass	Pass	Pass	Pass	
Naugatuck River Shift	Pass	Pass	Pass	Pass	Pass	Pass	
Partial System Interchange with Freight Street Interchange	Pass	Pass	Pass	Pass	Pass	Pass	
Half Diverging Diamond	Pass	Pass	Pass	Pass	Pass	Pass	
South City Bypass	Pass	Pass	Pass	Pass	Pass	Pass	

Conceptual Alternatives that pass the Level 1 screening are called **Initial Alternatives** to be further evaluated in Level 2 screening





Questions on the Preliminary Level 1 Screening Results?



PAC Comments Due

Comments / Input Due: August 29, 2022 Email: Nhodges@hntb.com



Comments on Preliminary Level 1 Screening Results comments are due August 29th for incorporation into the PEL Documents.

Upcoming Meetings and Future PAC Agenda Items

PAC Mtg #4B Anticipating September 2022

Where:

Virtual via Zoom

Topics:

Present Potential Early Action
 Projects

Open Discussion

Public Meeting #2 Anticipating Early Fall 2022

Where:

Virtual via Zoom

Topics:

Present Universe of Alternative and Level 1 Screening Criteria
Obtain Input from the Public PAC Mtg #4C Anticipating October 2022

Where:

Virtual via Zoom

Topics:

- Present Level 2 Screening
 Measures and
- •Obtain Input from PAC





Before the Next Meeting Continue to...



Review PAC Meeting #4A Information Materials and provide input on the preliminary results of the Level 1 Screening.



Explore the Program Website.

Check email for information about the next PAC meeting and scheduling.

Remain excited to participate in our next meeting.





Questions & Comments







End of PAC Meeting 4A