

What Is This Study About?

The Connecticut Department of Transportation (CTDOT) conducted an Alternatives Analysis (AA) for the future of the aging Hartford rail viaduct. The viaduct is an elevated track structure adjacent to Hartford’s historic Union Station that serves both Amtrak intercity passenger trains and freight trains. This AA developed and evaluated options to maintain, reconstruct, or relocate the rail corridor in this area (track and station). The study results will help guide the local decision-making process toward selection of a locally preferred alternative to address the stated need.

Why Is This Project Needed?

The purpose of this project is to address the ongoing **serviceability** of the aging rail viaduct infrastructure, increase regional rail **mobility**, improve local **connectivity**, and create a gateway that spurs **economic development**. These are wide-ranging themes that go beyond simply building a piece of transportation infrastructure to also address large community goals.

How Were The Alternatives Defined?

A series of rail alternatives was defined based on options to “maintain”, “reconstruct”, or “relocate” the Hartford rail viaduct and associated infrastructure. The maintenance option preserves the existing structure and continues to use the current station location; the reconstruction option rebuilds and expands the current infrastructure generally in its current location, and relocation options result in a new alignment and a new Hartford station location.

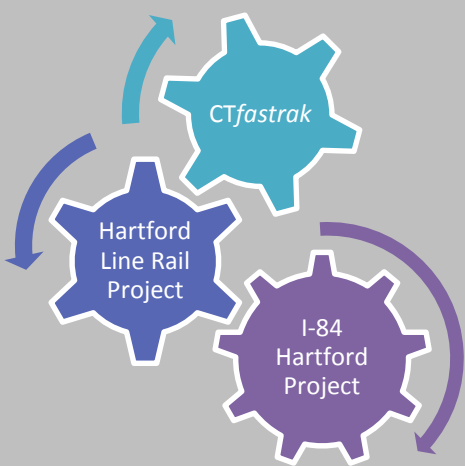
The rail options developed and analyzed during this study should be treated not as a complete assessment of all available design options, but rather as a representative sample of the spectrum of options that could be implemented. The conclusions of this analysis provide a starting point for more detailed design development that addresses the relationships between all transportation infrastructure in the study corridor.

Integration with I-84 Hartford Project

The alternatives for the Hartford Rail Alternatives Analysis must be closely coordinated with the I-84 Hartford Project, which is the parallel planning program to rebuild and possibly realign I-84 through the city of Hartford. Currently, the rail line crosses I-84 at two locations in close proximity to the existing station. Thus, any realignment of either the rail line or the highway necessarily impacts the other, and coordination and integration of the two projects is essential. Additionally, impacts on the CTfastrak alignment must also be considered.

As technical work has been advancing on both the highway and rail projects, it has become increasingly apparent that neither the highway nor the rail program can be “solved” without the other. These two projects require a single and integrated approach that yields the best possible results for these two high-priority and visionary projects.

It is impossible for this rail AA to develop a rail “answer” without a highway “answer”, and the reverse is also true for the highway study. Therefore, the approach taken for the rail AA is to present a range of rail options that reflects the spectrum of possible highway solutions.

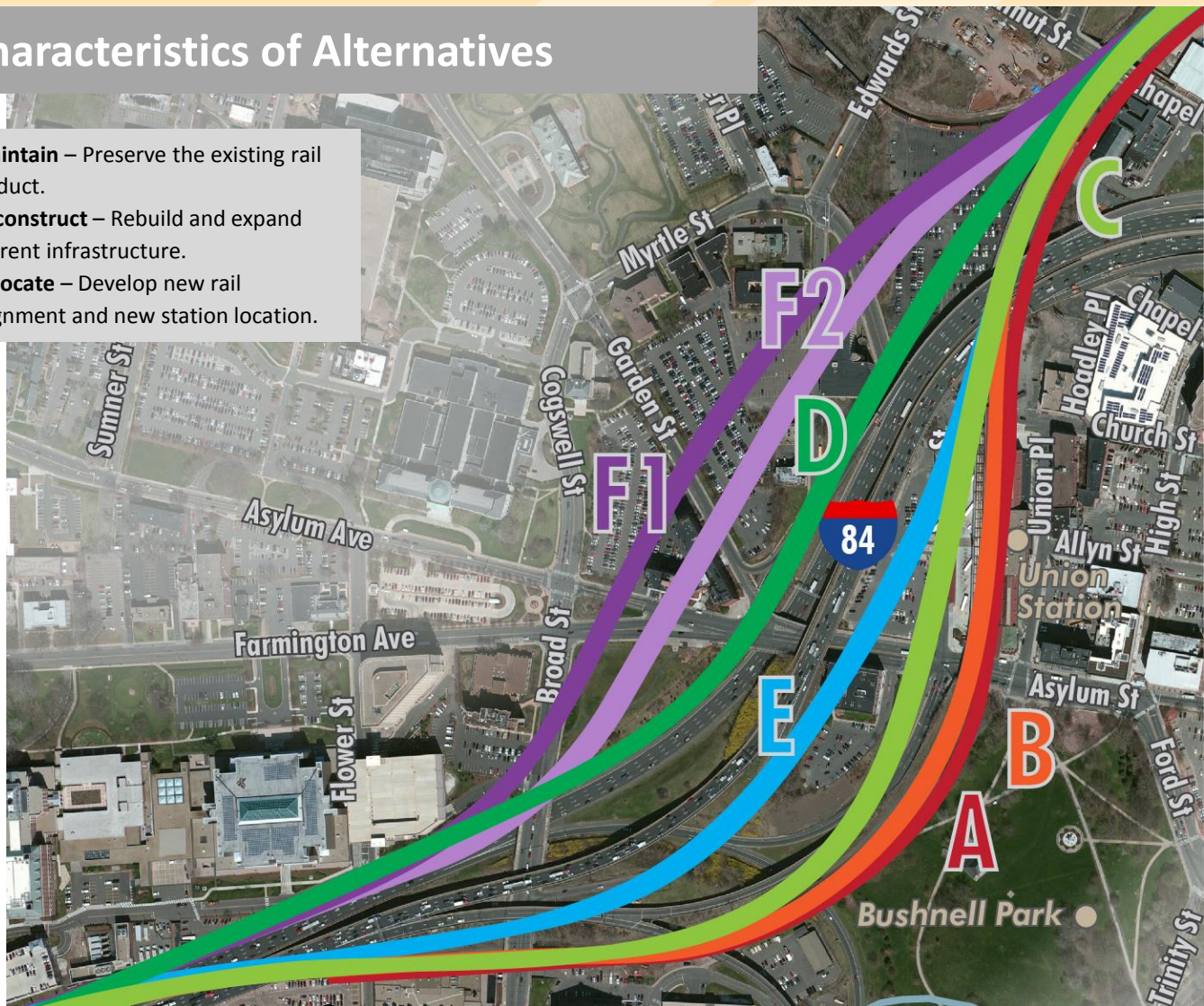


# Characteristics of Alternatives

**Maintain** – Preserve the existing rail viaduct.

**Reconstruct** – Rebuild and expand current infrastructure.

**Relocate** – Develop new rail alignment and new station location.



		A	B	C	D	E	F1	F2
Key Characteristics	<b>Future Alignment of Rail Infrastructure</b>							
	Maintenance of Existing Rail Infrastructure	✓						
	Reconstruction of Rail Infrastructure		✓					
	Rail Relocation South of I-84			✓		✓		
	Rail Relocation North of I-84				✓		✓	✓
	<b>Vertical Alignment of Future I-84</b>							
	I-84 remains in place (elevated)	✓	✓	✓	✓			
	I-84 rebuilt at or below ground level (open cut)					✓	✓	✓
	I-84 rebuilt at least partially in a tunnel			✓			✓	✓
Physical Attributes	<b>Track and Rail Operations</b>							
	Number of tracks	1	2	2	2	2	2	2
	Gauntlet track for oversize freight trains		✓	✓	✓	✓	✓	✓
	Rail service maintained during construction	✓	✓	✓	✓		✓	✓
	Future connection to Griffin Line not precluded			✓	✓	✓	✓	✓
	<b>Station Infrastructure</b>							
	Renovation to current station building	✓	✓					
	New station building location			✓	✓	✓	✓	✓
	Platform location relative to ground	Above	Above	Above	Below	Below	Below	Below
	Longer platform than existing		✓	✓	✓	✓	✓	✓

# Primary Conclusions

Any transportation improvement project must balance many needs and many potential impacts to attempt to arrive at the best possible and practical solution and one which can be embraced by transportation agencies, regulatory agencies, communities, and the public. There is no magic formula for doing so. However, a qualitative and quantitative review of each of the evaluation criteria and each of the impact areas is a helpful tool in getting to the right decisions. Ideally, one or several alternatives will emerge which meet the purpose and need for the project, provide the desired benefits, and have impacts that are either acceptable or able to be mitigated.

In this corridor, the added challenge is that there are major improvement programs for two transportation modes in the corridor, both of which are important initiatives for the State of Connecticut.

The following are primary conclusions drawn from the analysis:

- Alternatives **A** and **B** are relatively inexpensive from a capital cost perspective, but the construction impacts of maintaining service during station renovation are severe. From a constructability perspective, these alternatives would be more attractive with a full shutdown of rail services during the construction period.
- Very few benefits can be gained by moving the rail alignment closer to I-84 while remaining on the south side of the highway (Alternative **C**). This option would be somewhat more attractive with a modified track alignment to minimize impacts to Bushnell Park, but such a change would force the existing tight curvature in the station area to remain.
- Alternative **D** is the “best” of the options that assume I-84 remains in its current location, and offers notable benefits with relatively modest potential adverse impacts. The capital costs compare favorably to reconstruction in place.
- Alternative **E** is effectively fatally flawed if active rail service must be maintained during construction. Even if service could be shut down for an extended period during construction, the cost is much higher than that of other options.
- Alternatives **F1** and **F2** have very similar overall characteristics. Alternative **F1** does better in improving vehicular connectivity, whereas **F2** offers better urban design features and pedestrian improvements. Alternative **F1** is slightly more difficult to construct, whereas Alternative **F2** has slightly more potential adverse environmental impacts. Alternative **F2** requires less tunneling, contributing to its lower capital cost than Alternative **F1**.
- When viewed holistically in their current configurations, only Alternatives **D**, **F1**, and **F2** have perceived benefits greater than the costs. All of these are the options in which the rail line would be moved north of I-84, resulting in benefits such as 2-3 minutes of travel time savings and decreased track maintenance. However, all of these options have strong interactions with the I-84 mainline and interchanges, requiring a fully-integrated design effort for the highway and rail components of the overall corridor program.

All of the rail options – whether maintenance, reconstruction, or relocation – require close coordination with the I-84 Hartford project. Based on this assessment, none of the rail reconstruction or relocation options can be constructed in such a way to be fully completed and “out of the way” of the highway project without causing significant impacts to the highway as well as the local street network during the course of construction.

Based on the results of this evaluation, and setting the stage for further coordination with the I-84 Hartford Project, the focus moving forward should be on options that relocate the rail alignment north of I-84.





## Primary Benefits and Costs of Each Alternative

Alternative	Benefits (Opportunities)			Costs (Impacts)		
	LOW	MEDIUM	HIGH	LOW	MEDIUM	HIGH
<b>A</b>						
<b>B</b>						
<b>C</b>						
<b>D</b>						
<b>E</b>						
<b>F1</b>						
<b>F2</b>						

Alternative	Conclusions
<b>A</b>	Alternative A does not achieve the project goals to increase mobility, improve connectivity, or spur economic development. Although the financial cost is comparatively low, completing the work at the station while maintaining active rail operations would be extremely challenging.
<b>B</b>	Alternative B introduces operational benefits from the provision of two tracks, as well as additional parking capacity. However, it does little to enhance urban design, and although this option is relatively inexpensive, it potentially impacts Bushnell Park.
<b>C</b>	Alternative C offers modest additional benefits as compared to Alternative B, primarily because of the much easier station construction. However, the capital cost is higher than that of Alternative B, and the potential impact to Bushnell Park is a significant concern.
<b>D</b>	Alternative D offers the most benefits to the multimodal transportation program and TOD capacity when compared to Alternatives A-C (i.e. those that assume I-84 remains in its current location). The capital cost is projected to be less than that of Alternative C, and the potential adverse environmental impacts are not as severe.
<b>E</b>	Alternative E provides significant urban design benefits, but the cost is much higher than that of any other option. In addition, Alternative E is impossible to construct while maintaining continuous and active rail service.
<b>F1</b>	Alternative F1 generates the most vehicular connectivity-related benefits, and also fares well in enhancing urban design. The capital costs, while higher than most options, are half of that of Alternative E. However, there are notable potential property impacts.
<b>F2</b>	Alternative F2 offers significant benefits like Alternative F1, but is distinguished through the development of an optimal station area plan enhancing urban design and local connectivity. The capital cost is lower than that of Alternative F1 and is in the middle of all options. There are slightly more potential property impacts, but constructability fares better than Alternative F1.

# Overview of Alternatives

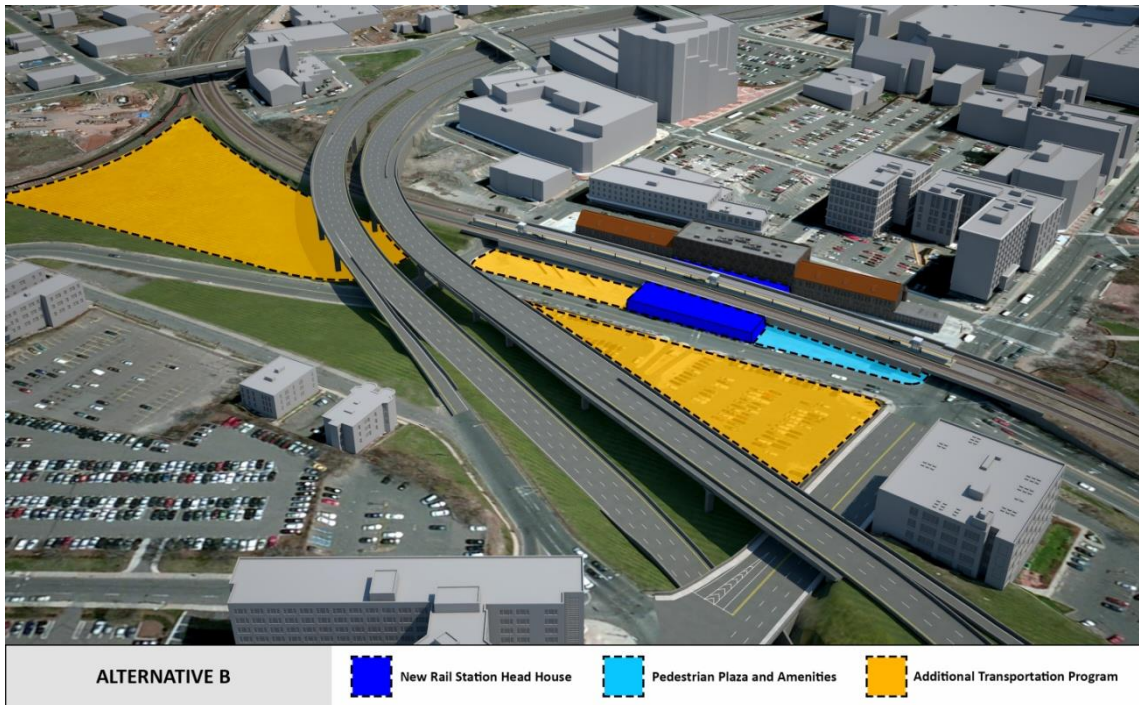
## Alternative A - Maintenance of Existing Rail Infrastructure

- Intended to bring infrastructure to a state of good repair to remain safe and fully functional for the next 25 years.
- Improves serviceability of existing infrastructure, but does not add new capacity (i.e. maintenance of the one existing serviceable track only).
- Consists of a series of individual projects related to the viaduct itself, as well as other affected bridges / structures within the study area. Also includes projects related to station building maintenance, which are also directly impacted by structural needs (in the case of the Transportation Center and the platform).
- It is assumed for purposes of this analysis that the platform upgrades planned for the initiation of NHHS service will be in place.



## Alternative B – Reconstruction of Rail Infrastructure

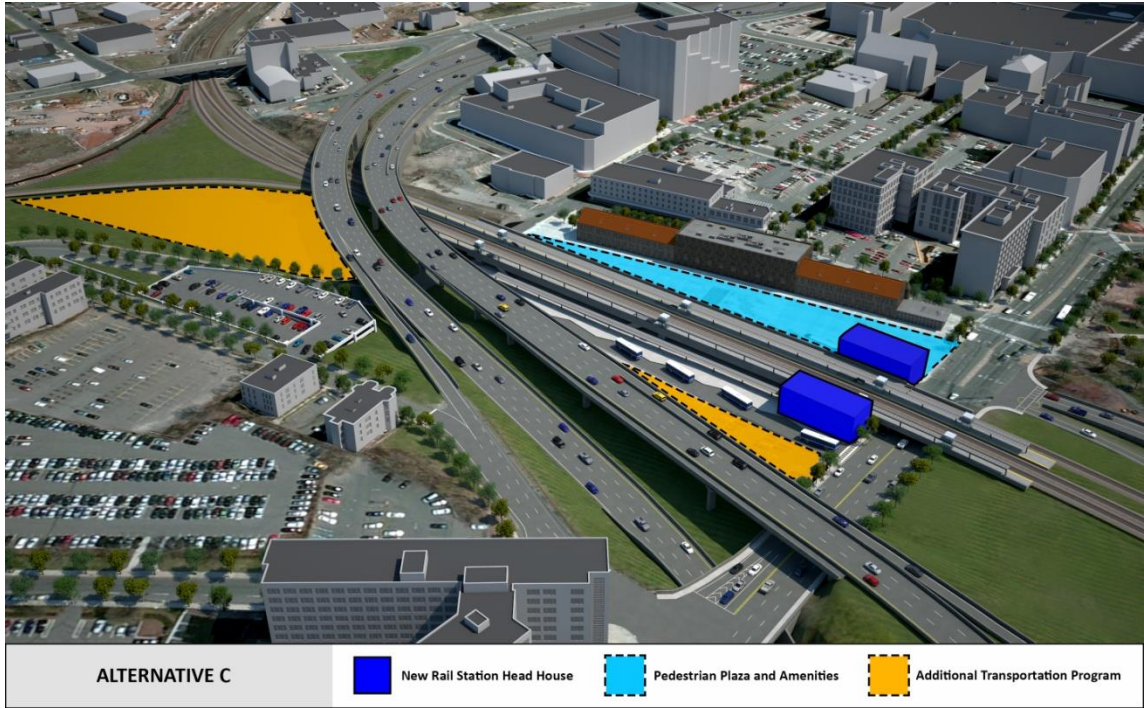
- Consists of a series of projects to fully reconstruct the Hartford rail viaduct and other associated facilities as needed based on condition and ability to support additional capacity.
- Creates new track capacity (provision for two through tracks and gauntlet track in the station area). Gauntlet tracks will be located in the station area to allow oversized freight trains the extra clearance they require by moving the train farther away from the platform edge.
- Existing track and platform reconstructed largely in place with a similar vertical profile as current
- Crosses underneath I-84 at same location as current.
- Modest track curvature at the platform enables alignment to avoid impacts at Bushnell Park.
- Transportation Center building reconstructed generally in the same location, but expanded to support additional passenger activity.





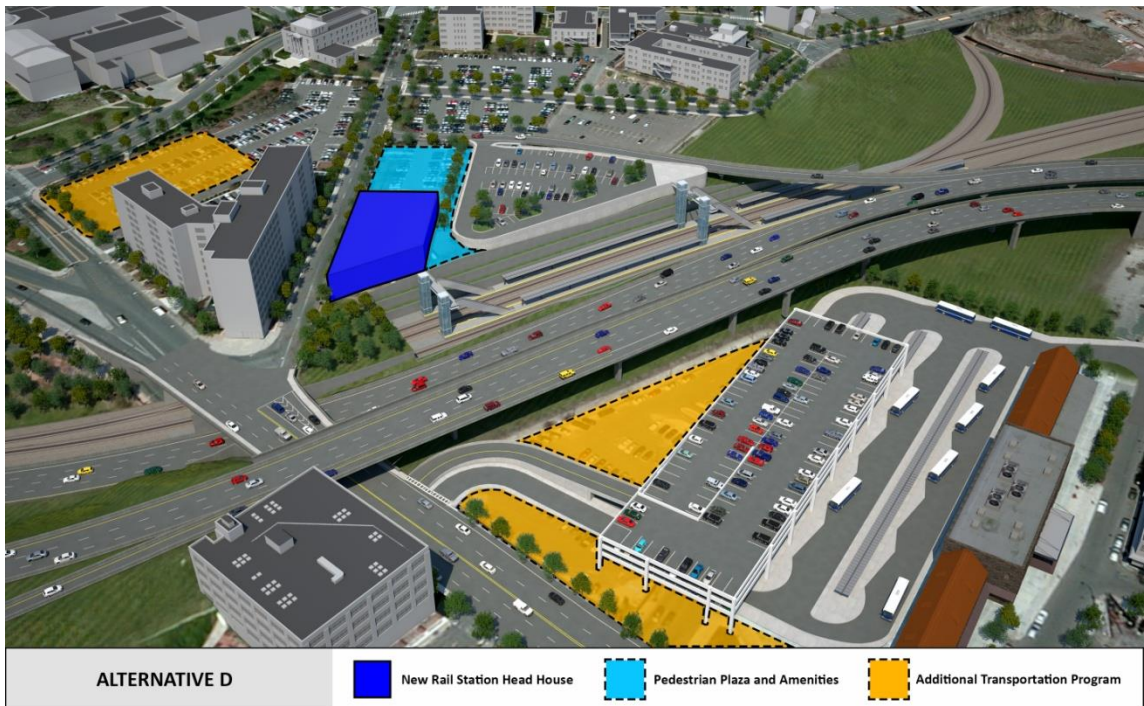
## Alternative C – Relocation South of Current I-84 (Or I-84 in Tunnel)

- Relocates track south of I-84 in close proximity to existing alignment.
- Creates new track capacity (provisions for two through tracks; gauntlet or by-pass track in the station area); does not preclude capability for track connection to Griffin Line.
- Generally maintains existing profile.
- Provides new elevated platform generally above Spruce Street; constructs new station services building adjacent to platform.
- Modest improvements to existing track curvature approaching the station from the west.
- Platform length of 1050' (significantly longer than the existing platform).



## Alternative D – Relocation North of Current I-84

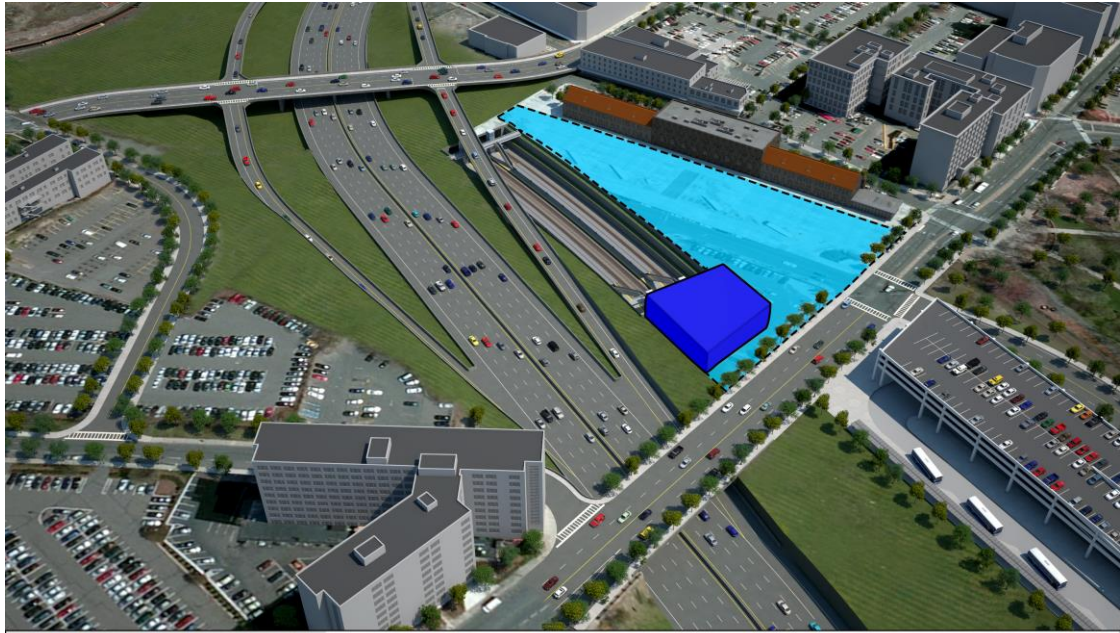
- Relocates track north of I-84 (on opposite side of the highway from the current station), with much of the alignment through the study area below grade in an open cut.
- Creates new track capacity (provisions for two through tracks, gauntlet or by-pass track in the station area); does not preclude capability for future track connection to Griffin Line.
- Significant improvements to track geometry results in 2-3 minutes of travel time savings.
- Provides new below-grade platform (in an open cut) from Asylum Ave. continuing northeast beyond Myrtle St.
- Modest track curvature at the platform enables a length of 1050'.





## Alternative E – Relocation South of Potential At-Grade I-84

- Relocates track south of I-84 mostly in a tunnel section.
- Creates new track capacity (provisions for two through tracks, gauntlet or by-pass track in the station area); does not preclude capability for future track connection to Griffin Line (though the connection would occur in a tunnel).
- Provides new platform generally along Spruce Street below-grade in a tunnel with an open-cut section along a portion of the platform itself; constructs new station services building at ground level above the platform.
- Modest track curvature at the platform enables a length of 1050'.
- Modest improvements to track curvature approaching the station from the west.
- Crosses underneath I-84 at same locations as current, but would be below-grade rather than on the surface.



ALTERNATIVE E



New Rail Station Head House



Pedestrian Plaza and Amenities



Additional Transportation Program

## Alternative F1 – Relocation North of Potential At-Grade I-84 (Or I-84 in Tunnel)

- Relocates track north of I-84 (on opposite side of the highway from the current station), with much of the alignment through the study area in an open cut. The alignment would be farther to the north than the Alternative D alignment.
- Creates new track capacity (provisions for two through tracks, gauntlet or by-pass track in the station area); does not preclude capability for future track connection to Griffin Line.
- Significant improvements to track geometry results in 2-3 minutes of travel time savings.
- Constructs new bridges / tunnels as needed to support realignment.
- Provides new below-grade platform between Asylum Avenue and Myrtle Street with a portion of the platform in a tunnel and a portion in an open cut section; constructs new station services building at ground level.
- Modest track curvature at the platform enables a length of 1050'.





## Alternative F2 – Relocation North of Potential At-Grade I-84 (Or I-84 in Tunnel)

- Relocates track north of I-84 (on opposite side of the highway from the current station), with much of the alignment through the study area in an open cut. The alignment would be farther to the north than the “Alternative D” alignment.
- Creates new track capacity (provisions for two through tracks, gauntlet or by-pass track in the station area); does not preclude capability for future track connection to Griffin Line.
- Significant improvements to track geometry results in 2-3 minutes of travel time savings.
- Constructs new bridges / tunnels as needed to support realignment.
- Provides new below-grade platform between Asylum Avenue and Myrtle Street primarily in an open cut section; constructs new station services building at ground level.
- Modest track curvature at the platform enables a length of 1050’ (significantly longer than existing).
- Expands and relocates ancillary facilities such as parking lot and bus staging area.



## Next Steps

The findings and conclusions establish the case for focusing on a smaller set of options as the planning process moves forward. The focus of the next phase of study, including environmental review, should be on the options that relocate the rail alignment north of I-84. This subset of rail options should be more fully detailed as part of an integrated approach that also includes highway options being considered as part of the I-84 Hartford Project.

It is clear that all of the most likely alternatives for implementation of a rail project will have significant interaction with I-84, whether in its current alignment or in a potential relocated alignment through the study area. This situation provides the opportunity for CTDOT to create a true transportation solution, rather than a modal solution. Addressing this critical corridor in such a creative way is a forward-looking approach consistent with the principles of the recently-published Let's Go CT! statewide transportation plan – a “transformative strategy to provide the transportation foundation for the future of Connecticut’s economy”.

For this reason, the best opportunity to generate a holistic result that is in Connecticut’s best interest is by creating a truly integrated NEPA process that combines both rail and highway modes to produce a single corridor answer, rather than separate rail and highway answers.