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Summary

At the conclusion of this screening process, neither alternative for adapting Penn Station within its existing footprint emerged as a feasible option for doubling trans-Hudson rail capacity at the station. These alternatives are not recommended for further study.

The results of this analysis are summarized in **Table 6-1**. Alternative 1 (Under Penn Station) was determined to be infeasible during Step 1 of the alternative screening process because both design concepts failed one or more of the technical feasibility fatal flaw criteria. Alternative 1, Design Concept 1 (Underpinning - Single Level) would require underpinning more than 1,000 existing columns west of Penn Station, an unprecedented task that is not considered technically feasible. Alternative 1, Design Concept 2 (Mined — Single Level) avoids this pitfall, but still has a critical remaining fatal flaw: the required operational capacity could not be achieved due to the configuration of the interlocking west of the existing station.

With several fatal flaws, Alternative 1 is deemed not technically feasible and is not recommended for further study.

For Alternative 2, there is no combination of through-running tracks and platforms that can meet the operational performance needs and still be constructed without massive and unacceptable disruption to service; and there is no lesser modification plan that can be constructed within acceptable limits of disruption of service and still meet the operational performance needs.

Alternative 2, Design Concept 1 provides acceptable track geometry, but the need to realign virtually every station track and reconstruct every platform renders it unbuildable. The reconstruction would require relocating or modifying more than 1,000 structural columns and transferring loads from four different overbuild structures, each of which superimpose different structural systems on top of the original Penn Station structure. The resulting level of structural complexity, the confined space within which the structural work would need to occur, the impacts of the resulting structure on the public space at concourse level, and the need to maintain operations of the station and all of the overbuild uses during a construction period lasting more than a decade, all lead to the finding that this concept is not constructable. Construction, even if phased over an extended time period, would result in unacceptable negative impacts to station operations and reduce the station's peak capacity to below the level needed to sustain reasonable commuter and intercity service. This concept also would not provide a reasonable way to deliver reverse-peak service to the suburban branch lines, without either sacrificing peak direction capacity (a shortfall of 8 tph) or requiring up-front investment in full network interoperability. Alternative 2, Design Concept 1 therefore fails both the constructability test and the operational performance test, and the concept does not advance for further study.

Alternative 2, Design Concept 2, like Concept 1, would be incompatible with the future vision for regional rail, since it would not be able to deliver robust regional rail and suburban rail services during peak periods in both the peak and reverse-peak directions through both the Hudson and East River tunnels at the required level of service frequency.

Alternative 2, Design Concept 2 would be constructible, but fails to meet the operational performance requirements for this project. It does not have the ability to reliably deliver 24 tph through each Hudson River and East River tunnel tube (48 tph total in each direction of travel). Like Design Concept 1, this design concept also would not provide a reasonable way to deliver reverse-peak service to the suburban branch lines, without either sacrificing peak direction capacity (a shortfall of 16 tph) or requiring up-front investment in full network interoperability. Alternative 2, Design Concept 2 therefore fails the operational performance test, and the concept does not advance for further study.

Conclusion

International best practice for achieving high-density cross-regional rail service includes building purpose-built tunnels and station expansions. Through this study, focused on the specific characteristics of New York Penn Station and its associated infrastructure, it has been found that achieving the needed doubling of trans-Hudson capacity and accommodating regional metro service entirely within the envelope of existing Penn Station is not feasible, so it will be necessary to evaluate the construction of an expansion of Penn Station beyond its existing footprint and provide additional tracks and platforms to meet the operational performance needs.

A separate, future analysis will evaluate alternatives that expand the footprint of Penn Station.

Table 6-1

Assessment Summary

		Step 1 (Pass / Fail)					Step 2*	
		Track Geometry	Constructability	Fire-Life Safety	Operational Performance	Future Regional Rail Vision	Construction Cost	Construction Schedule
Alternative 1: **Under Penn Station**	Design Concept 1: **Underpinning — Single Level**	Pass	Fail	Fail	Fail	Pass	-	-
	Design Concept 2: **Mined — Single Level**	Pass	Fail	Fail	Fail	Pass	-	-
Alternative 2: **Through-Running**	Design Concept 1: **Full Reconstruction**	Pass	Fail	Pass	Fail	Fail	-	-
	Design Concept 2: **Limited Track and Platform Reconfiguration**	Pass	Pass	Pass	Fail	Fail	-	-

* None of the design concepts evaluated in this report passed the Step 1 technical feasibility screening.