Metro-North Penn Station Access
Major Investment Study/Draft Environmental Impact Statement

TASK 6

TECHNICAL MEMORANDUM:

PRELIMINARY ALTERNATIVES

Prepared for Metro-North Railroad

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TABLE OF CONTENTS

TABLES

FIGURES

Technical Memorandum: Preliminary Alternatives

A. INTRODUCTION

1. Study Overview

In order to better serve Metro-North Railroad (Metro-North) customers through provision of improved access to and from Pennsylvania Station, New York (Penn Station), and to destinations on the West Side of Manhattan, Metro-North initiated the Penn Station Access Major Investment Study/Draft Environmental Impact Statement (MIS/DEIS). The MIS/DEIS will examine the potential benefits, costs, and social, economic, and environmental impacts of reasonable and feasible alternatives for improving access to Penn Station to/from the Metro-North service area. Options for consideration will include connecting Metro-North's Hudson, Harlem, and New Haven Line services – which currently terminate at Grand Central Terminal (GCT) on the East Side of Manhattan – to Penn Station. Penn Station access would benefit Metro-North passengers traveling to the West Side of Manhattan. It would also improve regional connectivity by providing direct passenger connection between Metro-North and Long Island Rail Road (LIRR), New Jersey Transit (NJ Transit), and Amtrak services at Penn Station. Access to Penn Station by Metro-North would also complement LIRR East Side Access service.

There are existing track connections from Metro-North's Hudson and New Haven Lines to Amtrak's Empire Connection and Hell Gate Line, respectively, which could be used to provide access for Metro-North trains into Penn Station. Alternatives using the Harlem Line may require track reconstruction. In addition, the study will examine the potential to construct and provide service at new, intermediate station(s) as part of the analysis of Penn Station access alternatives.

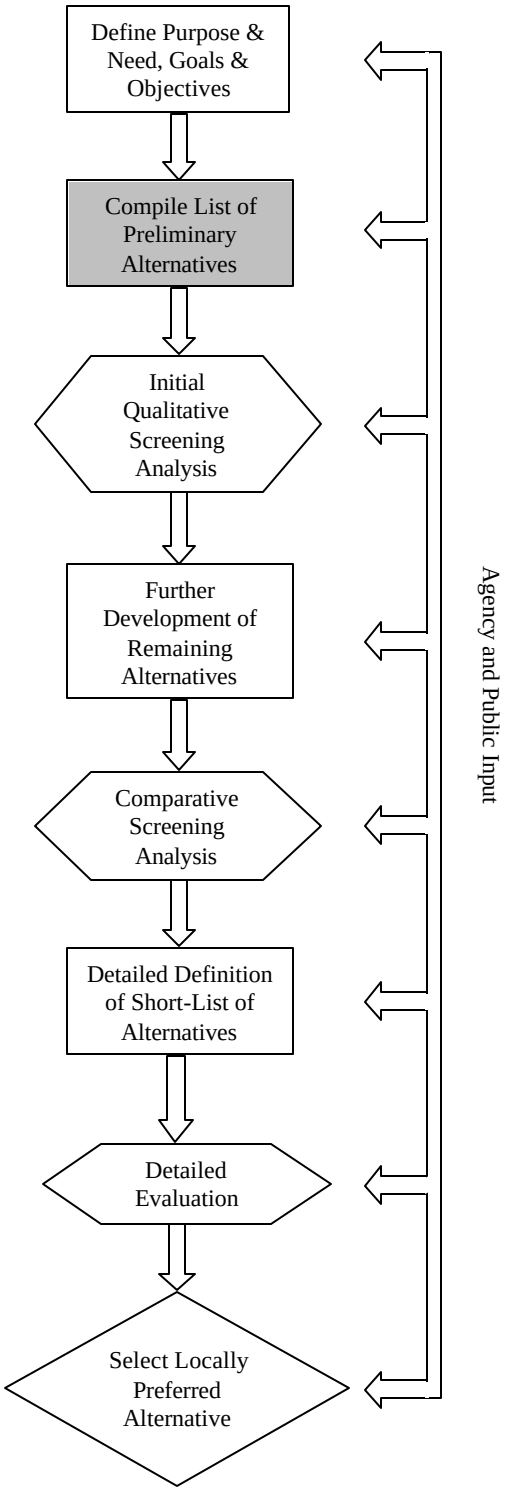
The principal elements of the Penn Station Access MIS/DEIS include definition and analysis of alternatives, environmental documentation, and proactive public outreach and interagency coordination.

2. Purpose of Document

This Technical Memorandum presents the preliminary alternatives that have been identified for initial consideration for improving access between Penn Station and the Metro-North service territory. The list of preliminary alternatives reflects the Metro-North Penn Station Access MIS/DEIS purpose and need, the related goals and objectives, and agency and public input received during the MIS/DEIS scoping process, conducted in Fall 1999.

The list of preliminary alternatives has been developed based on knowledge of the study area's transportation network; data and information regarding existing transportation services and identified travel needs and markets between the Metro-North service territory and Penn Station; and review of alternatives presented in previous and ongoing studies. An initial list of preliminary alternatives was provided in the study's Draft Scoping Document (September 1999). The list has been expanded and refined to incorporate comments and suggestions received during the scoping process. The alternatives are described qualitatively in this memorandum, appropriate to the initial screening evaluation which will be conducted to identify alternatives for further, progressively more detailed evaluation. Figure 1 illustrates the phases of the alternatives development and evaluation process; this technical memorandum documents step two of the process. Each of the steps illustrated in Figure 1 will be documented in reports and technical memoranda as the Penn Station Access MIS/DEIS progresses.

Figure 1
Alternatives Development and Evaluation Process



With each successive phase in the full process, the definitions of remaining alternatives will be more detailed and their evaluation will be progressively more quantitative, as follows:

- initial qualitative screening analysis of the preliminary alternatives, to eliminate those deemed infeasible or not reasonable and to identify an intermediate list of alternatives for further development and evaluation;
- comparative screening analysis of the intermediate list of alternatives surviving the initial screening, to select those which warrant further, detailed evaluation; and
- detailed analysis of the alternatives remaining after the comparative screening analysis, to provide sufficient technical basis for selecting the locally preferred alternative.

The preliminary alternatives have been defined at the sketch level for the initial qualitative screening based on identified travel needs and markets between the Metro-North service area and Penn Station, and the different transportation modes that might serve those needs. For rail and transit alternatives selected from the preliminary list for further development and evaluation, following the initial qualitative screening, operating plans will be defined based on forecasted travel demand. The second, comparative screening analysis will have the benefit of travel demand forecasts sufficient for comparative screening of intermediate alternatives. Travel demand forecasts will be substantially refined for the detailed, third phase of alternatives analysis.

The Study recognizes current capacity constraints and issues at Penn Station and the increasing future demand projected by the rail operators now using Penn Station. It is also recognized that some Penn Station access alternatives may require completion of the LIRR East Side Access project in order to be implementable. The Study is being coordinated with related, concurrent studies pertaining to Penn Station. However, the initial qualitative screening and the second, comparative screening analyses will assess alternatives with the assumption that Penn Station capacity constraints can be resolved to accommodate Metro-North Penn Station access. The final, detailed evaluation of short-listed alternatives will address capacity issues, and will be conducted using criteria and measures consistent with the MTA's Long Range Planning Framework and the FTA's New Starts criteria for assessing major transportation investments. Major areas of analysis for each alternative will include forecasts of potential ridership, travel time savings, system capacity, and accessibility improvements; capital and operation costs, cost-effectiveness, and benefit-cost ratio; potential operations-related effects on other providers' rail services, particularly within the Penn Station complex; potential reductions in auto usage and emissions; construction complexity and potential impacts; and potential significant adverse environmental effects.

A summary of the purpose and need for Penn Station access and a list of the study's goals and objectives are presented below. The preliminary alternatives are listed and described in Sections B. and C., respectively.

3. Study Purpose and Need

The purpose of the Metro-North Penn Station Access MIS/DEIS is to thoroughly examine the demand for, and the opportunities and constraints related to, improving access to Penn Station from the Metro-North service territory, and to identify a preferred investment strategy to address the forecasted demand in a cost-effective, environmentally sound, and equitable way.

Current Metro-North service terminates at Grand Central Terminal on the East Side of Manhattan, necessitating up to two transfers on additional modes to reach destinations on the West Side. From Penn Station, travelers have immediate pedestrian access to the West Side and to an extensive local and regional transit distribution network available at and near the Station. Provision of more direct access to

Penn Station from the Metro-North service area would both improve access to West Side destinations and enhance the region's connectivity. Having two terminals in Manhattan could also provide added flexibility in the event of service disruptions.

Provision of service to the Penn Station area would address the following types of travel:

- Commutation to Manhattan's West Side (Penn Station and Upper West Side areas);
- Commutation to Long Island and New Jersey (via transfer at Penn Station to LIRR or NJ Transit service);
- Commutation to workplaces in the vicinity of possible new intermediate station(s);
- Reverse commutation from the Penn Station area and possible new station(s) to communities in the Metro-North service area;
- Discretionary (non-work-related) travel to Long Island and New Jersey in peak periods, off-peak periods, and on weekends;
- Discretionary (non-work-related) travel to Manhattan's West Side in peak periods, off-peak periods, and on weekends for visits to shops, shows, museums, and sporting events; and
- Improved access via connection to Amtrak service at Penn Station for long-distance travel.

Penn Station access may also serve to increase Metro-North ridership and improve system flexibility by offering direct service to a second major transportation hub in Manhattan. From a longer-term perspective, Penn Station access might also enhance Metro-North's ability to accommodate potential future ridership growth.

Finally, rail transit systems serving the New York Metropolitan region are currently undergoing a period of growth, change, and enhancement. Significant transportation investments currently contemplated include the LIRR's East Side Access project, the Metropolitan Transportation Authority's (MTA) Lower Manhattan Access study, and the MTA, NJ Transit, and Port Authority of New York and New Jersey's Access to the Region's Core (ARC) study, among others. Metro-North Penn Station access would serve as an element of this improved regional connectivity by providing direct connection between Metro-North Railroad, LIRR, NJ Transit, and Amtrak services at Penn Station. In addition to providing a specific Metro-North service expansion, it would also support regional economic development goals and improvements in regional air quality and quality of life.

4. Goals and Objectives

The mission of Metro-North is to preserve and enhance the quality of life and economic health of the region through the efficient provision of transportation service of the highest quality. The goals and objectives defined specifically for the Penn Station Access MIS/DEIS reflect Metro-North's mission and the identified purpose and need for proposed access to Penn Station. The goals and objectives are as follows:

Goal 1: Provide improved access for existing Metro-North customers between Metro-North's service area and the West Side of Manhattan and, from there, to other regional destinations.

Objectives:

- Reduce travel times to destinations on the West Side of Manhattan for daily commuters and excursion travelers.

- Reduce the need for transfers between Metro-North service and other modes for commutation from the Metro-North service area to West Side destinations.
- Provide improved reverse (outbound) service from Manhattan and the Bronx to selected destinations in the Metro-North service area.
- Provide convenient connection and potentially one-seat service from the Metro-North service area to Amtrak, LIRR, and NJ Transit service at Penn Station for travel to regional destinations outside the Metro-North service area.

Goal 2: Provide additional transportation options and increased flexibility and connectivity in the New York Metropolitan area's transportation network.

Objectives:
- Provide direct commuter service from the Metro-North service area to destinations on the West Side of Manhattan.
- Provide service between the Metro-North service area and the West Side of Manhattan for discretionary and intermediate travel.
- Provide increased flexibility for commutation between the Metro-North service area and Manhattan destinations during service disruptions.
- Provide additional Metro-North system capacity to accommodate potential future ridership growth.
- Provide improved connections between the Metro-North service area and LIRR, NJ Transit, Amtrak, and NYC Transit services at and near Penn Station.
- Provide a new station(s) as intermediate stop(s) between the Metro-North service area and Penn Station.

Goal 3: Provide cost-effective transportation improvements that can be implemented while minimizing adverse social, economic, and environmental effects.

Objectives:
- Maximize the use of existing rail infrastructure to implement improved Metro-North service between the Metro-North service area and the Penn Station area and the West Side of Manhattan, and to introduce new station(s) in areas not currently served by Metro-North.
- Identify transportation improvements that would minimize acquisition of property or displacement of residential, business, and other viable uses.
- Identify transportation improvements whose construction and operations impacts could be reasonably and cost-effectively mitigated, as appropriate.

Goal 4: Promote the economic and environmental health and vitality of the New York Metropolitan area.

Objectives:
- Provide improved commuter accessibility from the Metro-North service area to employment locations on the West Side of Manhattan.
- Provide improved rail service options that encourage modal shifts from single-occupant-vehicle travel and thereby reduce traffic congestion on the region's roadway network and improve regional air quality.
- Provide transportation improvements that will comply with Clean Air Act Amendments of 1990 and State Implementation Plan provisions.
- Attract new ridership to mass transit.

- Identify transportation improvements for which there is a very reasonable chance that federal, state, and/or local funding will be available for implementation.
- Support local and regional economic growth by improving mobility in the study area.

B. LIST OF PRELIMINARY ALTERNATIVES

The list of preliminary alternatives includes both a No-Build alternative and a Transportation Systems Management (TSM) alternative, which will be retained as alternatives throughout the course of the study, in accordance with Federal Transit Administration (FTA) Major Investment Study guidance. Following the MIS principle that each reasonable mode should be considered in order to offer a range of options for addressing the stated purpose, defined goals, and identified travel markets, the list of preliminary build alternatives includes:

- strategies for providing Metro-North service to Penn Station; and
- non-commuter-rail options (e.g., subway/light rail transit/bus service, ferry service, and roadway expansions/improvements) for improving access to Penn Station and its environs.

The initial list of preliminary alternatives included in the Draft Scoping Document (September 1999) was modified and expanded to reflect comments and suggestions received during the MIS/DEIS scoping process and other outreach activities. Table 1 provides the revised list of preliminary alternatives, each of which is described in individual Fact Sheets within this Technical Memorandum. The alternatives are not ranked in any particular order of importance.

Table 1 also shows the approximate time frame within which an alternative might be fully implemented. The time frame indicated for each alternative is the estimated duration of required environmental review and permitting processes and construction of any required physical improvements. (This in turn, is based on a rough estimate of the complexity of any construction required for the alternative.) Other factors considered in estimating time frames for the preliminary alternatives include acquisition or conversion of a train set(s) for Penn Station service, which would be capable of operating with available power sources to/from Penn Station.

One objective of the study is to provide intermediate service to/from one or more new stations between the Metro-North service area and Penn Station. Agency representatives and members of the public suggested numerous potential locations for such stations during the scoping process. Potential new intermediate station locations will be identified specific to a particular rail line and alternative during later phases of the alternatives development process and will not be considered in the initial qualitative screening analysis of preliminary alternatives.

Preliminary alternatives are defined at a sketch level for the initial qualitative screening. Service levels and service patterns have not yet been defined for these alternatives. Determination of appropriate service levels will be based on forecasted travel demand in the intermediate and detailed phases of alternatives development and evaluation. In turn, the service levels will determine each alternative's infrastructure needs, including new station(s), rolling stock/equipment, signals, improvements to/additional capacity in yards, etc. Potential infrastructure needs of each alternative are noted on the Fact Sheets.

Alternatives are shown as discrete means of addressing a study objective for a specific market, e.g., peak-period service for New Haven Line riders to the West Side of Manhattan. In later stages in the development and evaluation of Penn Station access alternatives, it is likely that some of the preliminary alternatives that survive the initial screening analysis will be combined to address multiple objectives for multiple travel markets.

Table 1
Preliminary Alternatives for Penn Station Access[1]

Alternatives[2]	Time Frame[3]
1. No-Build Alternative	
2. Transportation Systems Management (TSM) Alternative	
Consisting of such elements as new ferry, express bus, enhanced subway services, transfer to "commuter fare" Amtrak service, et al.	Short
Commuter Rail Alternatives with Direct Connection to Penn Station	
3. Peak-Period Hudson Line Service via the Empire Connection between Riverdale and Penn Station	Medium
4. Peak-Period Harlem Line Service to/from Penn Station	
4A. Via the Hudson Line and Empire Connection	Medium
4B. Via the New Haven Line and Hell Gate Line	Medium
4C. Via the Port Morris Branch and Hell Gate Line	Medium
5. Peak-Period New Haven Line Service via the Hell Gate Line between New Rochelle and Penn Station	Medium
6. Off-Peak/Weekend Hudson Line Service to/from Penn Station via the Empire Connection	Short
7. Off-Peak/Weekend Harlem Line Service to/from Penn Station	
7A. Via the Hudson Line and Empire Connection	Medium
7B. Via the New Haven Line and the Hell Gate Line	Medium
7C. Via the Port Morris Branch and the Hell Gate Line	Medium
8. Off-Peak/Weekend New Haven Line Service to/from Penn Station via the Hell Gate Line	Short
Commuter Rail Alternative to Penn Station via GCT	
9. Extension of Metro-North Service to 34th Street/Penn Station via a New Tunnel between GCT and 34th Street/Penn Station	Long
Commuter Rail Alternatives with Indirect Access to Penn Station	
10. Metro-North Service to Penn Station via Connection to LIRR near Woodside	Medium
11. Metro-North Service Between New Rochelle and GCT via the Hell Gate Line	Medium/Long

1. *Station location options for each alternative will be determined as part of subsequent alternatives development and will not be considered in the initial qualitative screening analysis of preliminary alternatives.*
2. *For some alternatives, service to/from Penn Station may terminate/originate there or may continue through to terminate/originate in New Jersey or Long Island.*
3. *Time frames are defined as follows: Short Term (1-5 years), Medium Term (5-15 years), and Long Term (15+ years).*

Table 1
Preliminary Alternatives for Penn Station Access[1]
(continued)

Alternatives[2]	Time Frame[3]
Other Mode Alternatives	
12. Significantly Expanded Express Bus Service between the Metro-North Service Area and the West Side and Penn Station	Medium
13. Significantly Expanded Ferry Service between the Metro-North Service Area and the West Side (using connecting shuttle bus services to/from terminals in Manhattan)	Medium
14. Light Rail Transit between GCT and Penn Station	Long
15. Extension of the #7 (Flushing) Subway Line to Penn Station	Long
16. Direct Subway Shuttle between GCT and Penn Station via a New Tunnel	Long
17. Extension of PATH Train to GCT	Long
18. Highway Capacity Expansion between Metro-North Service Area and the West Side and Penn Station	Long

1. *Station location options for each alternative will be determined as part of subsequent alternatives development and will not be considered in the initial qualitative screening analysis of preliminary alternatives.*
2. *For some alternatives, service to/from Penn Station may terminate/originate there or may continue through to terminate/originate in New Jersey or Long Island.*
3. *Time frames are defined as follows: Short Term (1-5 years), Medium Term (5-15 years), and Long Term (15+ years).*

C. DESCRIPTIONS OF PRELIMINARY ALTERNATIVES

The following pages contain Fact Sheets describing each of the alternatives identified for initial screening evaluation, including the No-Build and TSM alternatives which will be retained through all stages of the alternatives evaluation process, consistent with FTA guidance for MISs. They have been grouped by category, as follows:

- No-Build Alternative
- Transportation Systems Management Alternative
- Commuter Rail Alternatives with Direct Connection to Penn Station
- Commuter Rail Alternative with Access to Penn Station via GCT
- Commuter Rail Alternatives with Indirect Access to Penn Station
- Other Mode Alternatives

The descriptions of several alternatives contain references to Control Point (CP) numbers. These are locations of interlockings (switches and/or other equipment controlling train movements between two sections of track). Some of these are quite close together, and several are in the general vicinity of a station or other named location; therefore, the CP number is used to more precisely describe where a connection or improvement is needed with a given alternative.

The Fact Sheets also note where coordination would be needed with other transportation providers for a given alternative. Alternatives that involve use of Penn Station and its ancillary facilities, in particular, will affect and be affected by the service plans of existing Penn Station operators. Implementation of such alternatives would require prior coordination with Penn Station operating agencies.

In addition, the Fact Sheets note locations at which coordination with existing Metro-North service to Grand Central Terminal would be needed or where service provided by one Penn Station access alternative may be constrained by another Penn Station access alternative, were both to be implemented. For this last case, locations requiring coordination are defined as those where service in one direction would cross the tracks used by service in another direction.

NO-BUILD ALTERNATIVE

Preliminary Alternatives Fact Sheet

Alternative Number	1
Alternative Name	**No-Build Alternative**

Alternative Description

Represents environmental baseline for the future analysis year of 2020. Consistent with requirements of the National Environmental Policy Act (NEPA) of 1969, as amended, this alternative projects future conditions that would occur without implementation of the proposed project. The No-Build alternative includes no change to transportation services or facilities in the study area beyond projects that are already programmed and committed. The programmed and committed projects assumed in the Penn Station access No-Build alternative are consistent with those included in other studies being conducted in the context of the Metropolitan Transportation Authority's Long Range Planning Framework; listed by agency, they are:

Long Island Rail Road
East Side Access to GCT
LIRR Third Track Project

MTA NYC Transit
Queens Connection/63rd Street Tunnel subway service

Port Authority of New York and New Jersey
JFK International Airport-Jamaica Airport Access rail link
Newark International Airport-Northeast Corridor new station rail link

Amtrak
Acela high speed rail service in the Northeast Corridor

New Jersey Transit
Montclair Connection
Secaucus Transfer
High-density signaling and other improvements on the Northeast Corridor High Line

New York Metropolitan Transportation Council (NYMTC)
All highway improvements in the NYMTC 2015 Highway Network/2020 Base Case

Alignment and Penn Station Approach	None
No. of Transfers from Metro-North Service Area to Access Penn Station	1 minimum, average of 2
Study Goals Targeted by Alternative	None of the Study Goals is addressed by the No-Build Alternative
Relationship to Other Alternatives	Stands alone; required by state and federal procedures to represent baseline conditions in the future "build" year without the project.

TRANSPORTATION SYSTEMS MANAGEMENT (TSM) ALTERNATIVE

Transportation Systems Management (TSM) Alternative

A TSM alternative is a comprehensive, but realistic, near-term package of low-cost actions/improvements that represents the best that can be done to address identified transportation problems with existing infrastructure. Given the objective of the Penn Station access study to maximize use of existing rail infrastructure, many of the preliminary build alternatives under consideration might be classified as TSM alternatives in any other study. Therefore, the Penn Station access TSM alternative will be defined to include a variety of actions and improvements that together constitute an optimum mix at a relatively lower cost, while recognizing that a TSM alternative is not likely to achieve all of the benefits of the build alternatives. There may be several iterations to the definition of the TSM alternative, as components are added and deleted as the analysis proceeds.

Preliminary Alternatives Fact Sheet

(See Figures 2, 3 and 4)

Alternative Number	2
Alternative Name	**TSM**
Mode	Bus, Ferry, Subway, Regional Rail
Alternative Description Consists of a combination of several relatively low capital cost elements that address the study purpose and need by improving the existing transportation system. This alternative might include some of the following elements: • New express bus service between the Metro-North service area and the West Side (e.g., BxM4C Bee-Line route extension and variations of BMC2A and BMC3B New York Bus routes) • Express bus service between Co-Op City and major employment centers in the New Haven Line corridor (e.g., Bee-Line routes 30, 42, 45, 61); • Expanded and/or new semi-express (skip-stop) New York City Transit (NYCT) subway service from common NYCT/Metro-North stations (e.g., #2 Line at Wakefield/241st or Woodlawn/233rd; #1,9 Line at Marble Hill/225th Street) to the West Side and Penn Station, possibly including improved pedestrian connections at such stations; • Improved and premium intra-Manhattan NYCT bus connections between GCT and West Side locations, such as modifications to the M4 and Q32 routes, particularly during peak periods; shorter headways between buses; and/or a new route connecting GCT North End access via designated cross-town HOV lanes (49th/50th Streets) to West Side locations (*see Figures 2 and 3*); • Increased cross-town NYCT subway service (#7 Line and Times Square Shuttle) • Increased service on the NYCT #1,2,3,9 (7th Avenue) and A,C,E (8th Avenue) Lines in connection with improved cross-town bus and subway services • New ferry services from locations with existing usable piers near Metro-North stations (e.g., Yonkers, Stamford) connecting to existing terminals at West 38th Street and East 34th Street in Manhattan, and to extensive free cross-town shuttle service within Midtown (*see Figure 4*) • Convenient/affordable transfers for Metro-North passengers to/from Amtrak Penn Station service at Stamford, New Rochelle, Croton-Harmon, and Yonkers or other stations where physically feasible (could also include introduction of a commuter fare on Amtrak for Metro-North riders traveling to Penn Station)	
Alignment and Penn Station Approach	Various
Primary Market(s) Served	Metro-North Service Area
No. of Transfers from Metro-North Service Area to Access Penn Station	1-2
Operator(s)	NYCT, Amtrak, bus/ferry providers
Required Operational Coordination	Amtrak on Empire Connection NYCT/bus/ferry providers at transfer stations
Infrastructure Improvement Required	Possible upgrade of subway lines, ferry piers, and associated stations; buses, rolling stock, ferries.
Implementation Time Frame	Short (1-5 years)
Study Goals Targeted by Alternative • **Improve Access between Metro-North Service Area and Penn Station and West Side of Manhattan** • **Improve Regional Connectivity** • **Provide Cost-Effective Transportation Improvements** • **Promote the Economic and Environmental Health of the Region**	 ✓ ✓ ✓ ✓
Relationship to Other Alternatives	As required by FTA, the TSM alternative provides an additional future baseline against which the potential effects of the study's Build alternatives are evaluated. Elements also can be incorporated into other alternatives.

Figure 2
Alternative 2: TSM Improvements to Existing Bus Services

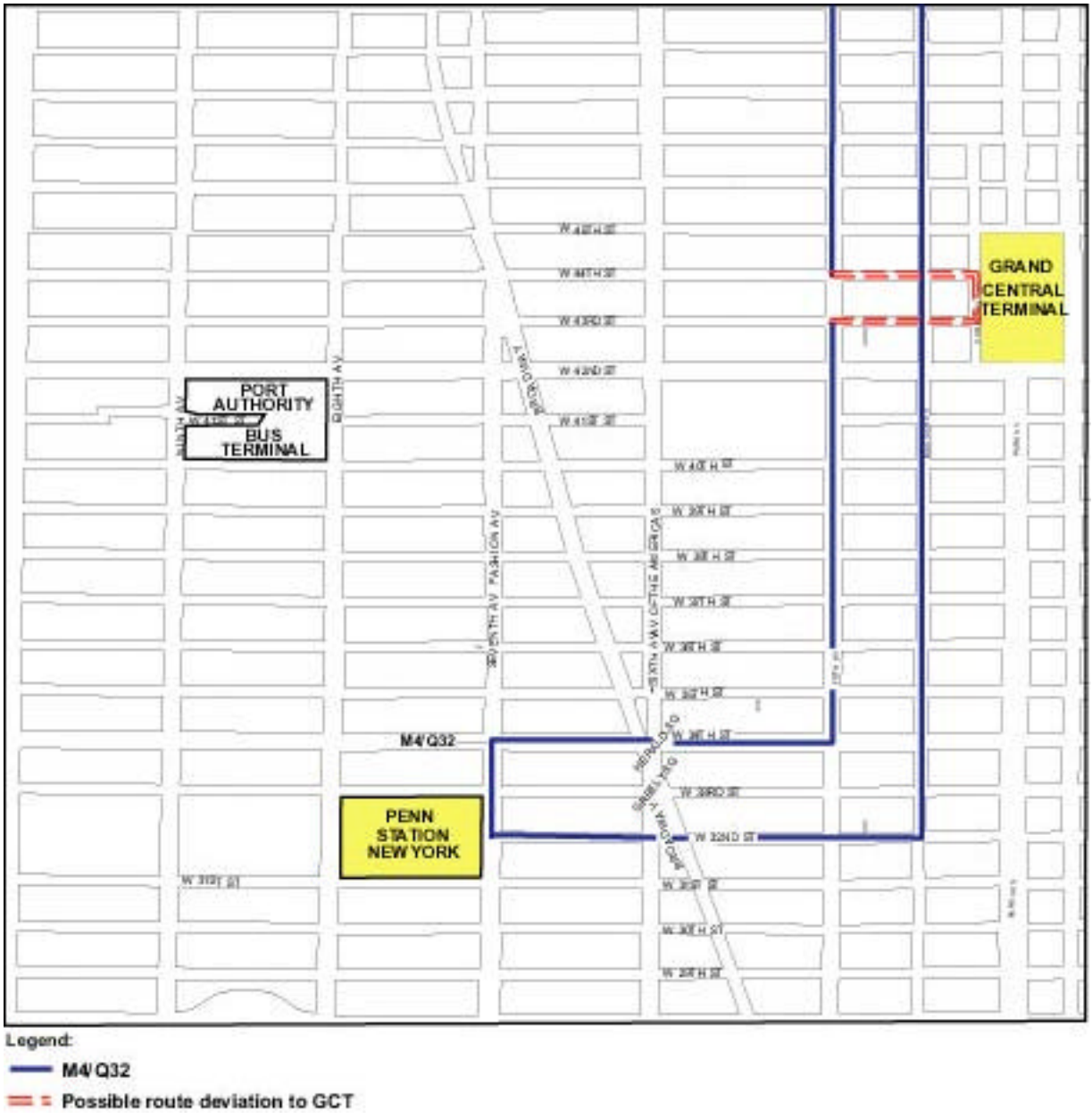


Figure 3
Alternative 2: Example of Potential New Bus Service (TSM)

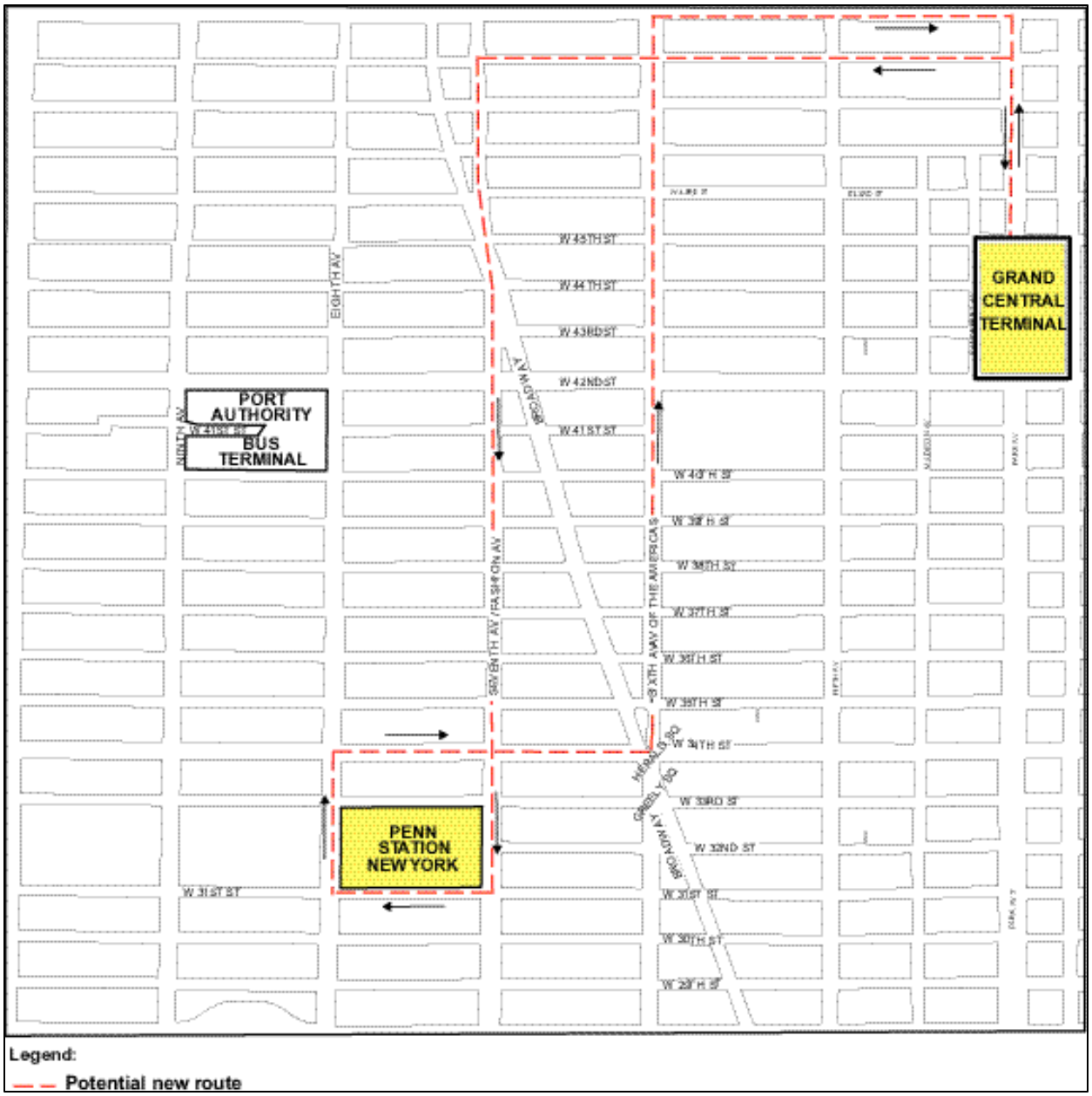
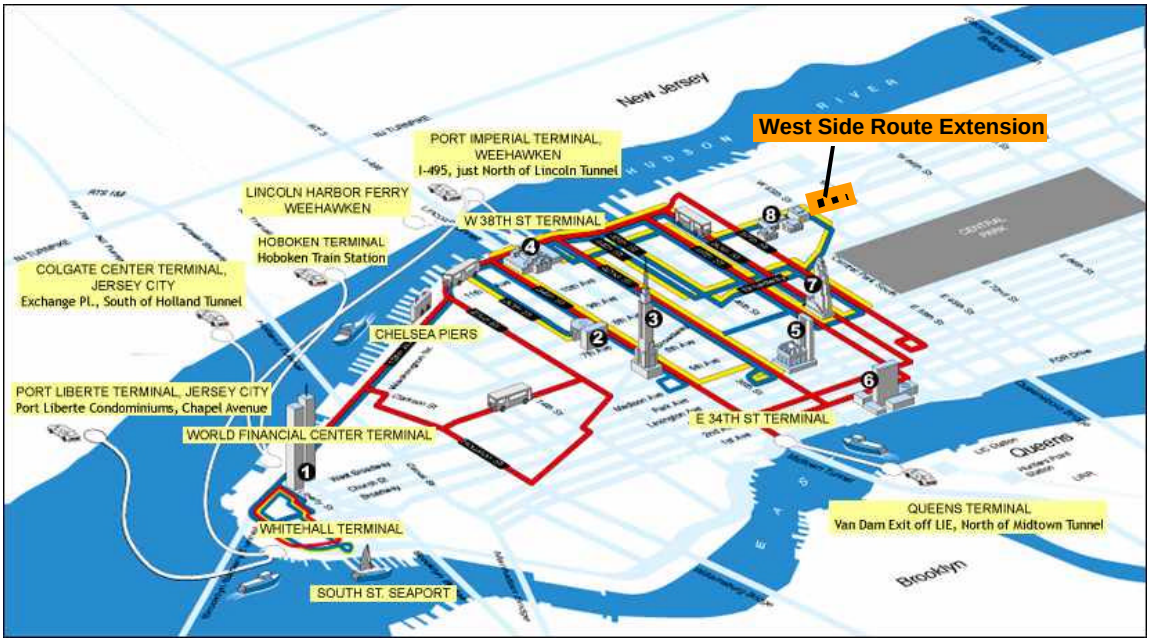


Figure 4
Alternative 2: Ferry Shuttle Bus Service Improvements (TSM)



COMMUTER RAIL ALTERNATIVES WITH DIRECT CONNECTION TO PENN STATION

Commuter Rail Alternatives with Direct Connection to Penn Station

These Metro-North rail alternatives would predominantly use existing Metro-North and Amtrak (i.e., Empire Connection, Hell Gate Line) tracks for service to and from Penn Station.

The alternatives within this category have been categorized by types of service for different travel markets, consistent with the project's multiple objectives:

- Peak-period service
- Off-peak and weekend service.

The alternatives within each of these service/travel market groups have been further subdivided into the geographical market areas served by the three west-of-Hudson Metro-North lines – Hudson Line, Harlem Line and New Haven Line – because of the differences in infrastructure, geography, and operational constraints particular to each.

It is possible to define alternatives for connecting the Hudson and New Haven Lines with Penn Station using the most direct routes for each. However, given the constraints of existing infrastructure and geography, there are no similarly direct routes for connecting the Harlem Line service area and Penn Station. For each of the service/travel market groups listed above, three potential alternatives for connecting the Harlem Line and Penn Station are described; all of the Harlem Line alternatives involve indirect routing in order to make the connection.

Peak-Period Service

In the New York metropolitan region, 26 percent of total daily trips (by all modes) occur during the 4-hour morning peak period (6:00–10:00 AM) and 27 percent of total daily trips occur during the 4-hour evening peak period (4:00-8:00 PM). The comparable statistics for commuter rail trips alone are more dramatic, with 43 percent occurring during the AM peak and 37 percent during the PM peak.[1] Because these are the periods of greatest demand, they are also the periods when each rail service operator generally provides the most service in the peak direction (inbound in AM, outbound in PM), which means that tracks and station platforms are heavily used, and at or near capacity, especially during the peak hour (i.e., the single hour during which there is the highest demand and highest volume of trains providing service in the peak direction).

For alternatives that remain under consideration following the initial screening evaluation, options for service levels and service patterns will be identified as the alternatives are defined in greater detail for further evaluation. Service-level options for rail alternatives may be defined by such parameters as:

- Optimal, e.g., providing the level of peak period service, commensurate with demand, that is comparable to the level of service provided by Metro-North to GCT from any station;
- Constrained, e.g., the number of trains that can be accommodated in the available peak hour "slots" through access routes to Penn Station given infrastructure constraints; or
- Minimal, e.g., one train/hour during the peak hour.

Service-pattern options, to be defined in further stages of alternatives development, might include:

- express,
- semi-express (skip-stop),
- shuttle, or
- local service.

Because of Metro-North's existing zoned service operations to GCT, it is possible that the semi-express or local service patterns cannot be accommodated without adversely affecting all service on the associated Metro-North line, or without major capital improvements, such as expansion of interlockings, bypass tracks, etc.

Reverse peak-period service must be inserted within the return trip (revenue and non-revenue service) cycles of peak-direction service, and is constrained by peak-direction service equipment and track demands. Reverse peak-period service in this category of alternatives would provide service between Penn Station and potential new station(s) and between the new station(s) and:

- Stations at which current/planned reverse peak-period service from GCT also stops, or
- Convenient transfer points (e.g., Yonkers and Croton on the Hudson Line, Mt. Vernon West and White Plains on the Harlem Line, New Rochelle on the New Haven Line), or
- Major employment centers, or
- All local stops within a set time/distance from potential new station(s).

[1] Parsons Brinckerhoff Quade & Douglas, Inc., "Regional Travel-Household Interview Survey," 1997-98, New York Metropolitan Transportation Council and North Jersey Transportation Planning Authority.

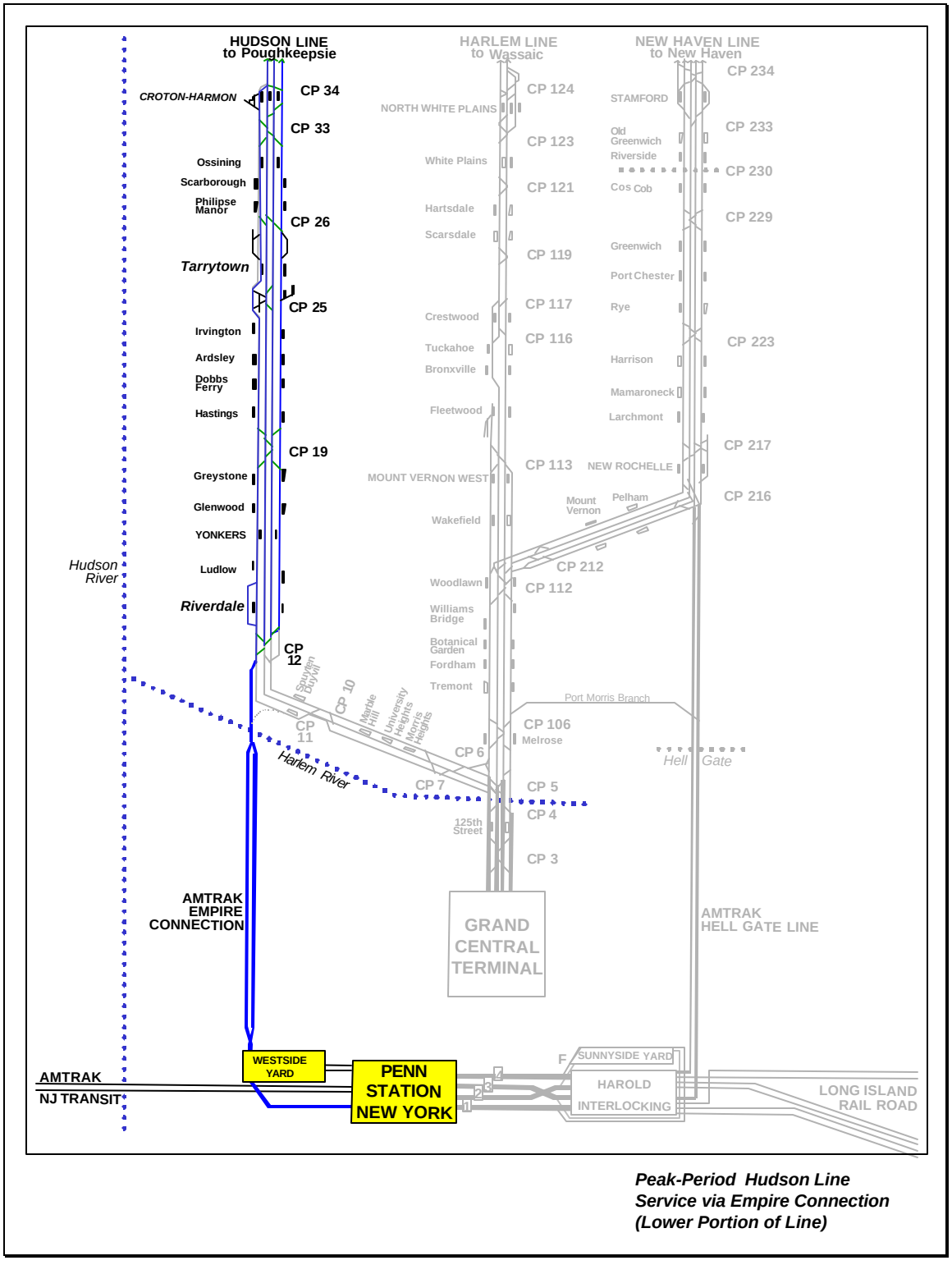
Preliminary Alternatives Fact Sheet

(See Figure 5)

Alternative Number	3
Alternative Name	**PEAK-PERIOD HUDSON LINE SERVICE VIA THE EMPIRE CONNECTION BETWEEN RIVERDALE AND PENN STATION**
Mode	Metro-North Commuter Rail
Alternative Description	This alternative would connect the Hudson Line service area (from Riverdale north) and Penn Station via the Amtrak Empire Connection between Riverdale and Penn Station, with potential new West Side Manhattan station(s).
Alignment and Penn Station Approach	Hudson Line between Poughkeepsie and Spuyten Duyvil, and Empire Connection in Manhattan. West Side connection into Penn Station via box tunnel under West Side Yard or via Yard C tracks.
Primary Market(s) Served	Peak-period commuters between western Dutchess, Putnam, and Westchester Counties and Riverdale (Bronx County), and Penn Station and potential new West Side Manhattan station(s) areas. Hudson Line service area commuters to Long Island and Long Island commuters to Hudson Line service area (potentially without transfer); Hudson Line service area commuters to New Jersey and New Jersey commuters to Hudson Line service area (with additional transfer).
No. of Transfers from Metro-North Service Area to Access Penn Station	0*
Operator(s)	Metro-North Railroad
Required Operational Coordination	Amtrak on Empire Connection Amtrak, NJ Transit, LIRR in Penn Station complex
Infrastructure Improvement Required	Signals, stations, yards, rolling stock equipment; possible upgrade of power systems and double-tracking on portions of the Empire Connection, including at CP 12/on the Spuyten Duyvil bridge; track and platform level improvements, ticket sales area and administrative space at Penn Station, or possible new West Side stub-end Metro-North terminal along West Side Yard tracks.
Implementation Time Frame	Medium (5-15 years)
Study Goals Targeted by Alternative	
• **Improve Access between Metro-North Service Area and Penn Station and West Side of Manhattan**	✓
• **Improve Regional Connectivity**	✓
• **Provide Cost-Effective Transportation Improvements**	✓
• **Promote the Economic and Environmental Health of the Region**	✓
Relationship to Other Alternatives	Only alternative to serve this market with direct connection to Penn Station. Could be combined with alternatives serving other markets. Reverse-peak service would be constrained at Spuyten Duyvil by peak-direction service under Alternative 4A Peak-Period Harlem Line service to Penn Station via the Hudson Line and Empire Connection.

* Assuming zoned service that includes stops at every station in the service market area. One transfer may be required from some stations under different operational scenarios, e.g., express, semi-express, skip-stop, shuttle service. See also discussion of primary markets served.

Figure 5
Alternative 3: Peak-Period Hudson Line Service via Empire Connection between Riverdale and Penn Station (Lower Portion of Line)



Peak-Period Hudson Line Service via Empire Connection (Lower Portion of Line)

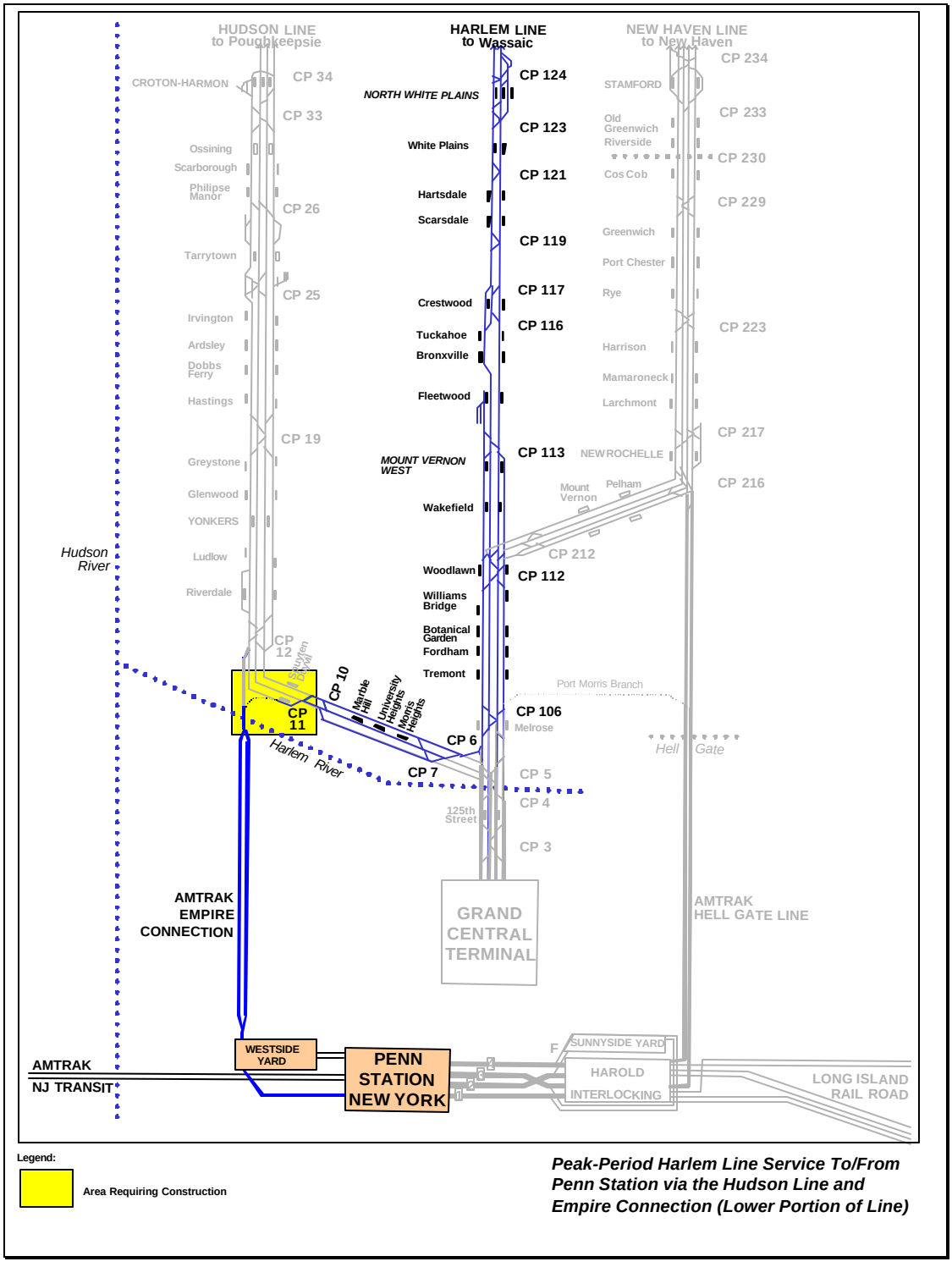
Preliminary Alternatives Fact Sheet

(See Figure 6)

Alternative Number	4A.
Alternative Name	**PEAK-PERIOD HARLEM LINE SERVICE TO/FROM PENN STATION VIA THE HUDSON LINE AND EMPIRE CONNECTION**
Mode	Metro-North Commuter Rail
Alternative Description	This alternative would connect the Harlem Line service area (north of Manhattan) and Penn Station via the Hudson Line and Amtrak Empire Connection, with stops at potential new West Side Manhattan station(s).
Alignment and Penn Station Approach	Inbound: Harlem Line from Wassaic to the Mott Haven wye track (at CP 5) to travel northbound on the Hudson Line, then cross to track 4 and connect to the southbound Empire Connection to Manhattan via a reconstructed south leg of the former Spuyten Duyvil wye track. West Side connection into Penn Station via box tunnel under West Side Yard or via Yard C tracks. Outbound: Reverse of above.
Primary Market(s) Served	Peak-period commuters between central Dutchess, Putnam, Westchester, and Bronx Counties, and Penn Station and potential new West Side Manhattan station(s) areas. Harlem Line service area commuters to Long Island and Long Island commuters to the Harlem Line service area (potentially without transfer); Harlem Line service commuters area to New Jersey and New Jersey commuters to the Harlem Line service area (with additional transfer).
No. of Transfers from Metro-North Service Area to Access Penn Station	0*
Operator(s)	Metro-North Railroad
Required Operational Coordination	Amtrak on Empire Connection Amtrak, NJ Transit, LIRR in Penn Station complex Metro-North Hudson Line peak GCT service west of CP 5 and at Spuyten Duyvil wye (with respect to reverse-peak service) and peak-period Harlem/New Haven Line service to GCT (north of CP 5 at CP 106) CSX on the wye track at CP 5
Infrastructure Improvement Required	Reconstruction of Spuyten Duyvil wye; signals, stations, yards and rolling stock/equipment and/or possible upgrade of power systems; possible double-tracking on portions of the Empire Connection, including on the Spuyten Duyvil bridge; track and platform-level improvements, ticket sales area and administrative space at Penn Station, or possible new West Side stub-end Metro-North terminal along West Side Yard tracks.
Implementation Time Frame	Medium (5-15 years)
Study Goals Targeted by Alternative	
• **Improve Access between Metro-North Service Area and Penn Station and West Side of Manhattan**	✓
• **Improve Regional Connectivity**	✓
• **Provide Cost-Effective Transportation Improvements**	✓
• **Promote the Economic and Environmental Health of the Region**	✓
Relationship to Other Alternatives	Serves similar (but not identical) markets as Alternatives 4B and 4C. Peak-direction operations would be constrained by reverse-peak Hudson Line service (part of Alternative 3) at Spuyten Duyvil. Could be combined with alternatives that serve other markets.

* Assuming zoned service that includes stops at every station in the service market area. One transfer may be required from some stations under different operational scenarios, e.g., express, semi-express, skip-stop, shuttle service. See also discussion of primary markets served.

Figure 6
Alternative 4A: Peak-Period Harlem Line Service To/From Penn Station via the Hudson Line and Empire Connection (Lower Portion of Line)



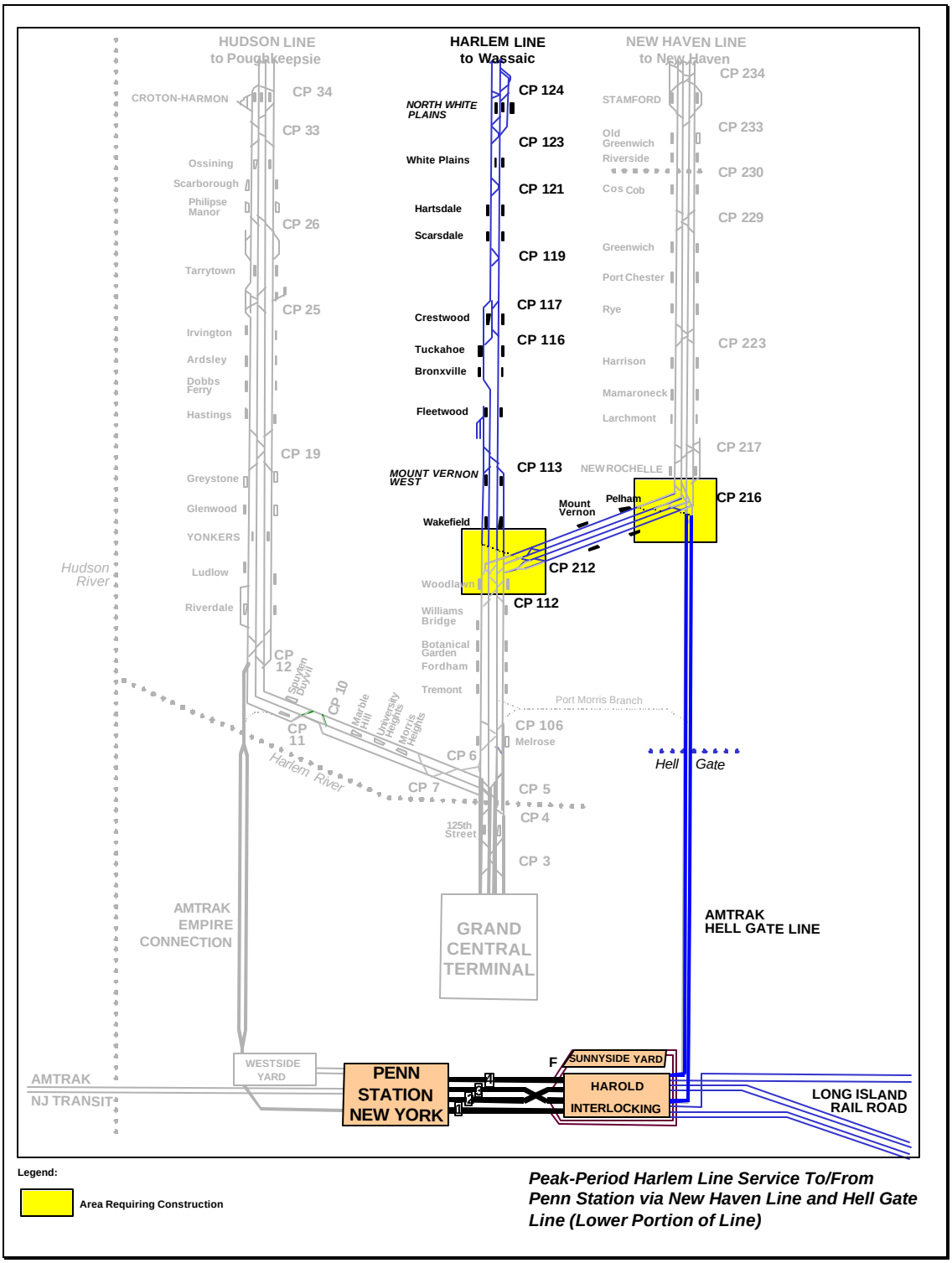
Preliminary Alternatives Fact Sheet

(See Figure 7)

Alternative Number	4B
Alternative Name	**PEAK-PERIOD HARLEM LINE SERVICE TO/FROM PENN STATION VIA THE NEW HAVEN LINE AND HELL GATE LINE**
Mode	Metro-North Commuter Rail
Alternative Description	This alternative would connect the Harlem Line service area (from Wakefield north) to Penn Station via the New Haven Line and the Amtrak Hell Gate Line, with stops at potential new station(s) in the Bronx and Queens.
Alignment and Penn Station Approach	Inbound: Harlem Line from Wassaic to new connection at CP 112 with New Haven Line eastbound, then via modified interlockings at CP 216/217 to the Hell Gate Line in Queens. Connection to Penn Station via East River tunnels. Outbound: Reverse of above.
Primary Market(s) Served	Peak-period commuters between central Dutchess, Putnam, and Westchester Counties, and Penn Station and potential new station(s) areas in the Bronx and Queens. Harlem Line service area commuters to New Jersey and New Jersey commuters to the Harlem Line service area (potentially without transfer); Harlem Line service area commuters to Long Island and Long Island commuters to the Harlem Line service area (with additional transfer).
No. of Transfers from Metro-North Service Area to Access Penn Station	0*
Operator(s)	Metro-North Railroad
Required Operational Coordination	Amtrak on Hell Gate Line Amtrak, LIRR in East River Tunnels Amtrak, NJ Transit, LIRR in Penn Station complex Metro-North GCT-bound New Haven Line trains between CP 112 and CP 216, and (with reference to peak-direction service) reverse-peak Harlem Line trains from GCT (depending on extent of new connection at CP 112 and specific track alignment).
Infrastructure Improvement Required	New connections at CP 112 from Harlem Line southbound to New Haven Line eastbound and between New Haven Line westbound and Harlem Line northbound; modification of CPs 216 and 217 to handle movements between the Hell Gate Line and the New Haven Line; signals, stations, yards, rolling stock/equipment and/or possible upgrade of power systems; track and platform level improvements, ticket sales area and administrative space at Penn Station.
Implementation Time Frame	Medium (5-15 years)
Study Goals Targeted by Alternative	
• **Improve Access between Metro-North Service Area and Penn Station and West Side of Manhattan**	✓
• **Improve Regional Connectivity**	✓
• **Provide Cost-Effective Transportation Improvements**	✓
• **Promote the Economic and Environmental Health of the Region**	✓
Relationship to Other Alternatives	Serves similar (but not identical) market as 4A and 4C. Could be combined with alternatives that serve other markets. Reverse-peak operations could be constrained near CP 216/217 by Alternative 5 peak-direction New Haven Line service to Penn Station.

* Assuming zoned service that includes stops at every station in the service market area. One transfer may be required from some stations under different operational scenarios, e.g., express, semi-express, skip-stop, shuttle service. See also discussion of primary markets served.

Figure 7
Alternative 4B: Peak-Period Harlem Line Service To/From Penn Station via New Haven Line and Hell Gate Line
(Lower Portion of Line)



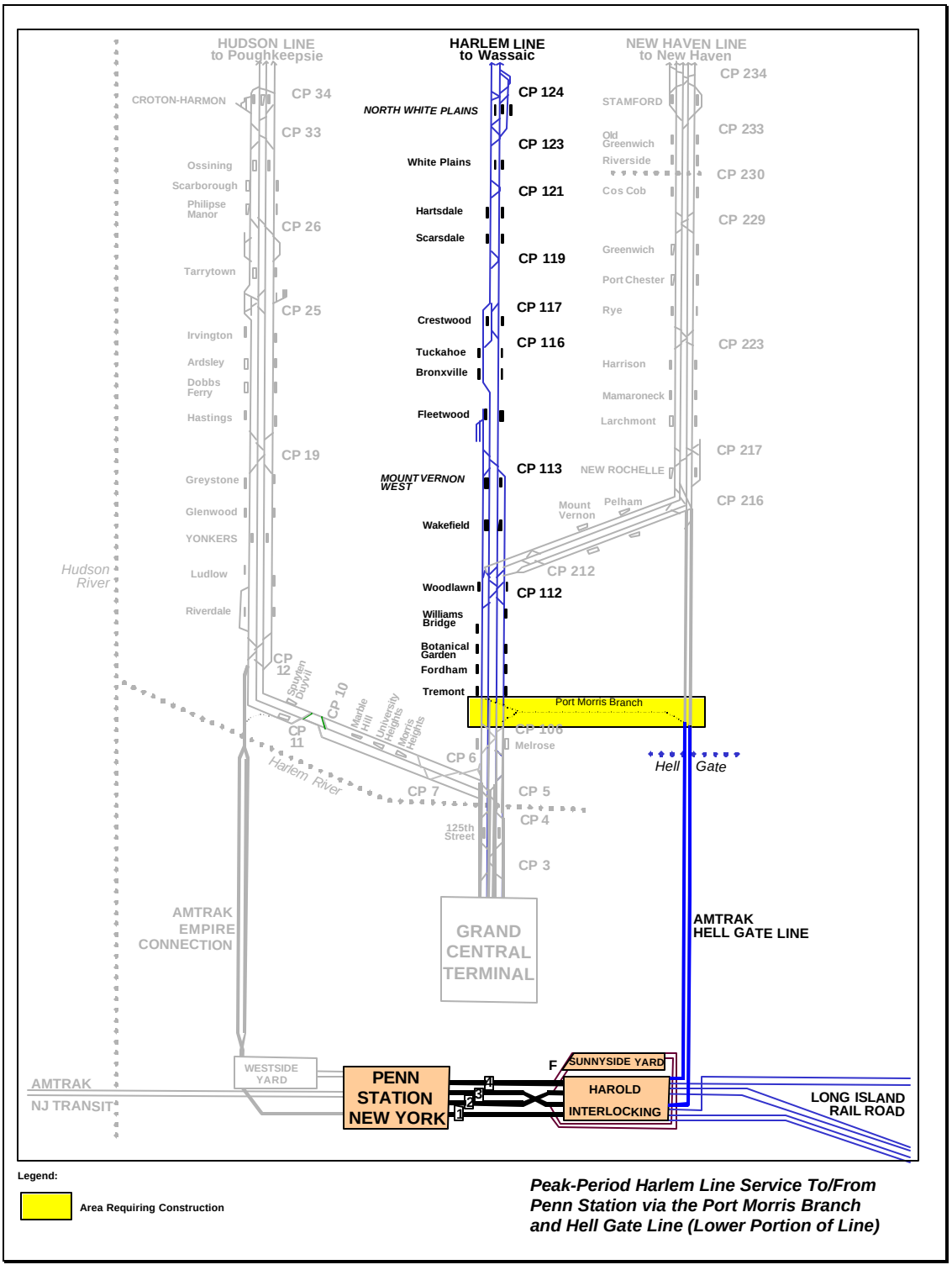
Preliminary Alternatives Fact Sheet

(See Figure 8)

Alternative Number	4C
Alternative Name	**PEAK-PERIOD HARLEM LINE SERVICE TO/FROM PENN STATION VIA THE PORT MORRIS BRANCH AND THE HELL GATE LINE**
Mode	Metro-North Commuter Rail
Alternative Description	This alternative would connect the Harlem Line service area (from Tremont north) and Penn Station, via the Port Morris Branch and the Amtrak Hell Gate Line, with stops at potential new station(s) in Queens.
Alignment and Penn Station Approach	Inbound: Harlem Line from Wassaic to modified interlocking just north of CP 106 to Port Morris Branch (between Tremont and Melrose stations), and then via a new interlocking to the Hell Gate Line in the Bronx. Connection to Penn Station via East River tunnels. Outbound: Reverse of above.
Primary Market(s) Served	Peak-period commuters between central Dutchess, Putnam, Westchester, and Bronx Counties, and Penn Station and potential new station(s) areas in Queens. Harlem Line service area commuters to New Jersey and New Jersey commuters to the Harlem Line service area (potentially without transfer); Harlem Line service area commuters to Long Island and Long Island commuters to the Harlem Line service area (with additional transfer).
No. of Transfers from Metro-North Service Area to Access Penn Station	0*
Operator(s)	Metro-North Railroad
Required Operational Coordination	Amtrak on Hell Gate Line Amtrak, LIRR in East River Tunnels Amtrak, NJ Transit, LIRR in Penn Station complex Metro-North Harlem and New Haven Lines GCT service CSX on Port Morris Branch
Infrastructure Improvement Required	Modification of CP 106 and a new interlocking at the Hell Gate Line. The Port Morris branch is a single-track line, but the right-of-way can accommodate a second track. Where it merges with the Harlem Line just north of CP 106, on track 3, the switch now permits only northbound movements from the branch; a universal interlocking with the southbound tracks would be needed. Also, signals, stations, yards, rolling stock/equipment and/or possible upgrade of power systems; track and platform level improvements, ticket sales area and administrative space at Penn Station.
Implementation Time Frame	Medium (5-15 years)
Study Goals Targeted by Alternative	
• **Improve Access between Metro-North Service Area and Penn Station and West Side of Manhattan**	✓
• **Improve Regional Connectivity**	✓
• **Provide Cost-Effective Transportation Improvements**	✓
• **Promote the Economic and Environmental Health of the Region**	✓
Relationship to Other Alternatives	Serves similar (but not identical) market as 4A and 4B. Could be combined with alternatives that serve other markets.

* Assuming zoned service that includes stops at every station in the service market area. One transfer may be required from some stations under different operational scenarios, e.g., express, semi-express, skip-stop, shuttle service. See also discussion of primary markets served.

Figure 8
Alternative 4C: Peak-Period Harlem Line Service To/From Penn Station via the Port Morris Branch and Hell Gate Line (Lower Portion of Line)



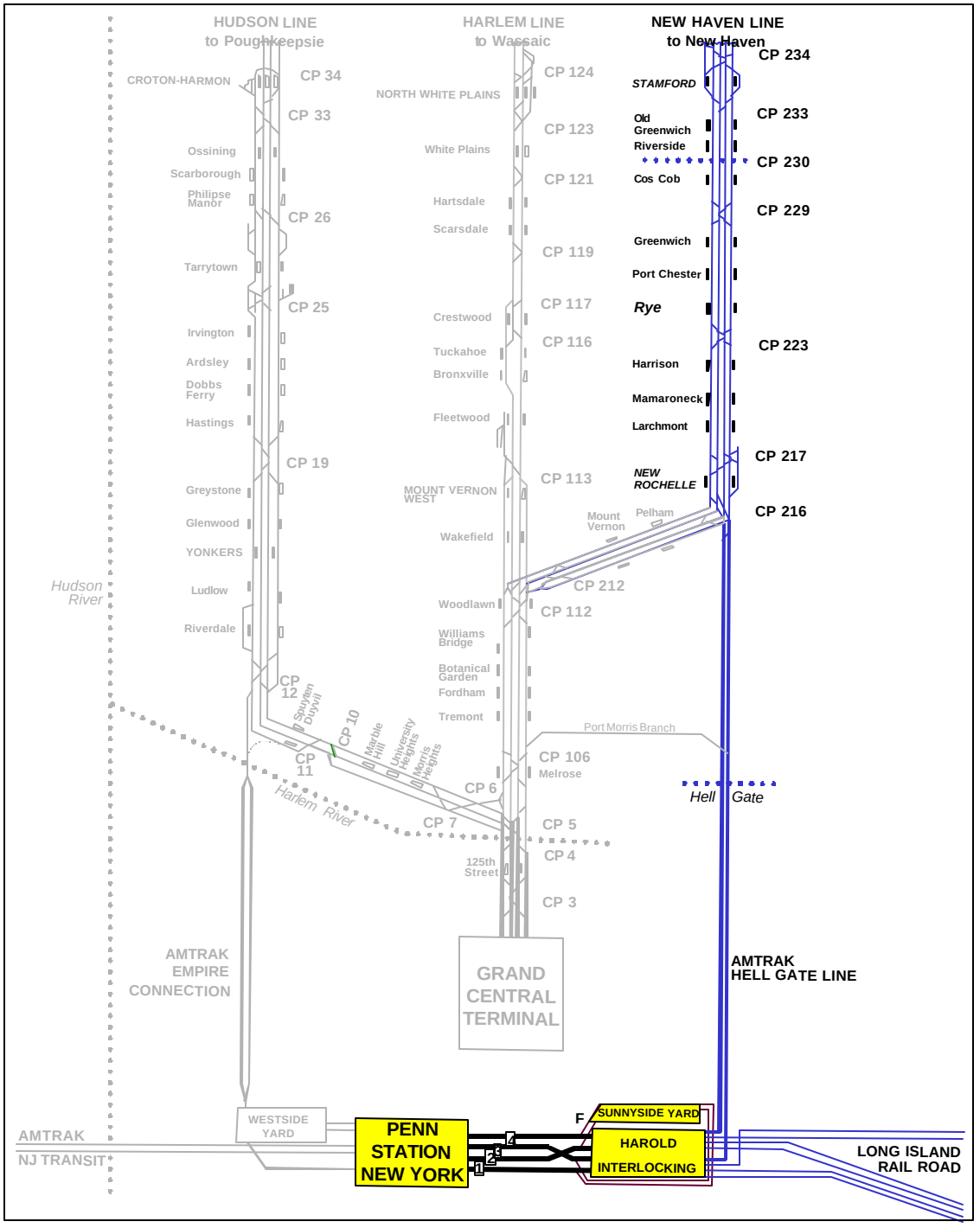
Preliminary Alternatives Fact Sheet

(See Figure 9)

Alternative Number	5
Alternative Name	**PEAK-PERIOD NEW HAVEN LINE SERVICE VIA THE HELL GATE LINE BETWEEN NEW ROCHELLE AND PENN STATION**
Mode	Metro-North Commuter Rail
Alternative Description	This alternative would connect the New Haven Line service area (from New Rochelle east) and Penn Station via the Amtrak Hell Gate Line between New Rochelle and Penn Station, with stops at potential new station(s) in the Bronx and Queens.
Alignment and Penn Station Approach	New Haven Line between New Haven and New Rochelle, and Hell Gate Line through Queens. Connection to Penn Station via East River tunnels.
Primary Market(s) Served	Peak-period commuters between Fairfield, New Haven, and eastern Westchester Counties, and Penn Station potential new station(s) areas in the Bronx and Queens. New Haven Line service area commuters to New Jersey and New Jersey commuters to the New Haven Service area (potentially without transfer); New Haven Line service area commuters to Long Island and Long Island commuters to the New Haven Line service area (with additional transfer).
No. of Transfers from Metro-North Service Area to Access Penn Station	0*
Operator(s)	Metro-North Railroad
Required Operational Coordination	Amtrak on Hell Gate Line Amtrak, LIRR in East River Tunnels Amtrak, NJ Transit, LIRR in Penn Station complex (with regard to peak-direction service) Metro-North reverse-peak New Haven Line service (revenue and non-revenue) from GCT
Infrastructure Improvement Required	Signals, stations, yards, rolling stock/equipment and/or possible upgrade of power systems; track and platform level improvements, ticket sales area and administrative space at Penn Station.
Implementation Time Frame	Medium (5-15 years)
Study Goals Targeted by Alternative	
• **Improve Access between Metro-North Service Area and Penn Station and West Side of Manhattan**	✓
• **Improve Regional Connectivity**	✓
• **Provide Cost-Effective Transportation Improvements**	✓
• **Promote the Economic and Environmental Health of the Region**	✓
Relationship to Other Alternatives	Only alternative to serve this market with direct connection to/from Penn Station. Peak-direction operations could be constrained by reverse-peak Harlem Line service from Penn Station near CP 216-217 (part of Alternative 4B). Could be combined with alternatives that serve other markets.

* Assuming zoned service that includes stops at every station in the service market area. One transfer may be required from some stations under different operational scenarios, e.g., express, semi-express, skip-stop, shuttle service. See also discussion of primary markets served.

Figure 9
Alternative 5: Peak-Period New Haven Line Service Via the Hell Gate Line Between New Rochelle and Penn Station (Lower Portion of Line)



Peak-Period New Haven Line Service Via the Hell Gate Line Between New Rochelle and Penn Station (Lower Portion of Line)

Off-Peak and Weekend Service

This set of alternatives would provide hourly service at mid-day (between the peak periods), late evenings (after 8:00 PM) and weekends for each of the geographical market areas (Hudson Line, Harlem Line, New Haven Line service areas). Such service could serve commuters who work non-standard shifts, and discretionary travel to major West Side venues (e.g., Lincoln Center, Broadway theaters, Madison Square Garden) and/or for shopping, without the inconvenience of traffic congestion en route and parking in Manhattan.

Weekend (Saturday/Sunday/Holiday) service would be designed specifically for the most likely market. Service would be Semi-Express, aimed at providing approximately a 1-hour trip time to Manhattan from the farthest point/station. The first train would be scheduled to arrive in Manhattan around 10:00 AM, with the last departure from Manhattan around 11:00 PM.

Preliminary Alternatives Fact Sheet

(See Figure 5 on page 22 for alignment)

Alternative Number	6
Alternative Name	**OFF-PEAK AND WEEKEND HUDSON LINE SERVICE TO/FROM PENN STATION VIA THE EMPIRE CONNECTION**
Mode	Metro-North Commuter Rail
Alternative Description	This alternative would connect Hudson Line service area (from Riverdale north) to/from Penn Station using the Amtrak Empire Connection between Riverdale and Penn Station, with potential new West Side Manhattan station(s).
Alignment and Penn Station Approach	Hudson Line to Spuyten Duyvil, and Empire Connection in Manhattan. West Side connection into Penn Station via box tunnel under West Side Yard or via Yard C tracks.
Primary Market(s) Served	Off-peak commuters and discretionary shopping, entertainment, and recreational trips between western Dutchess, Putnam, Westchester, and Bronx Counties and Penn Station and potential new West Side Manhattan station(s) areas (and Long Island, potentially without transfer; New Jersey, with additional transfer).
No. of Transfers from Metro-North Service Area to Access Penn Station	0*
Operator(s)	Metro-North Railroad
Required Operational Coordination	Amtrak on Empire Connection Amtrak, NJ Transit, LIRR in Penn Station complex
Infrastructure Improvement Required	Rolling stock/equipment capable of operating with power sources to/from Penn Station; signals, stations, yards improvements, possible additional capacity; track and platform level improvements, ticket sales area and administrative space at Penn Station, or possible new West Side stub-end Metro-North terminal along West Side Yard tracks.
Implementation Time Frame	Short (1-5 years)
Study Goals Targeted by Alternative	
• **Improve Access between Metro-North Service Area and Penn Station and West Side of Manhattan**	✓
• **Improve Regional Connectivity**	✓
• **Provide Cost-Effective Transportation Improvements**	✓
• **Promote the Economic and Environmental Health of the Region**	✓
Relationship to Other Alternatives	Only alternative to serve this market with direct connection to/from Penn Station. Could be combined with alternatives that serve other markets.

* Assuming off-peak zoned service that includes stops at every station in the service market area. Transfers may be required from some stations under different operational scenarios, e.g., express, semi-express, skip-stop, shuttle service. Effective weekend operations might be designed to provide hourly "clocker" service from selected stations. See also discussion of primary markets served.

Preliminary Alternatives Fact Sheet

(See Figure 6 on page 24 for alignment)

Alternative Number	7A
Alternative Name	**OFF-PEAK AND WEEKEND HARLEM LINE SERVICE TO/FROM PENN STATION VIA THE HUDSON LINE AND EMPIRE CONNECTION**
Mode	Metro-North Commuter Rail
Alternative Description	This alternative would connect Harlem Line service area (north of Manhattan) to/from Penn Station through connections between the Harlem Line and Hudson Line at Mott Haven and then between the Hudson Line and the Amtrak Empire Connection, with stops at potential new West Side Manhattan station(s).
Alignment and Penn Station Approach	Harlem Line to the wye track connection with the Hudson Line (northbound) at Mott Haven (CP 5), then cross to track 4 and connect to the southbound Empire Connection via the reconstructed south leg of the former Spuyten Duyvil wye track (and vice versa for reverse move). West Side connection from the Empire Connection into Penn Station via box tunnel or Yard C.
Primary Market(s) Served	Off-peak commuters and discretionary shopping, entertainment, and recreational trips between central Dutchess, Putnam, Westchester, and Bronx Counties and Penn Station, and potential new West Side Manhattan station(s) areas (and Long Island, potentially without transfer; New Jersey, with additional transfer).
No. of Transfers from Metro-North Service Area to Access Penn Station	0*
Operator(s)	Metro-North Railroad
Required Operational Coordination	CSX on the wye track Amtrak on Empire Connection Amtrak, NJ Transit, LIRR in Penn Station complex
Infrastructure Improvement Required	Reconstruction of the Spuyten Duyvil wye tracks; rolling stock/equipment capable of operating with power sources to/from Penn Station and/or possible upgrade of power systems; signals, stations, yards improvements, possible additional capacity; track and platform level improvements, ticket sales area and administrative space at Penn Station, or possible new West Side stub-end Metro-North terminal along West Side Yard tracks.
Implementation Time Frame	Medium (5-15 years)
Study Goals Targeted by Alternative	
• **Improve Access between Metro-North Service Area and Penn Station and West Side of Manhattan**	✓
• **Improve Regional Connectivity**	✓
• **Provide Cost-Effective Transportation Improvements**	✓
• **Promote the Economic and Environmental Health of the Region**	✓
Relationship to Other Alternatives	Serves similar (but not identical) market as 7B and 7C. Could be combined with alternatives that serve other markets.

* Assuming off-peak zoned service that includes stops at every station in the service market area. Transfers may be required from some stations under different operational scenarios, e.g., express, semi-express, skip-stop, shuttle service. Effective weekend operations might be designed to provide hourly "clocker" service from selected stations. See also discussion of primary markets served.

Preliminary Alternatives Fact Sheet

(See Figure 7 on page 26 for alignment)

Alternative Number	7B
Alternative Name	**OFF-PEAK AND WEEKEND HARLEM LINE SERVICE TO/FROM PENN STATION VIA NEW HAVEN AND HELL GATE LINES**
Mode	Metro-North Commuter Rail
Alternative Description	This alternative would connect Harlem Line service area (from Wakefield north) to/from Penn Station via connections to the New Haven Line near Woodlawn and connections from the New Haven Line to the Amtrak Hell Gate Line west of New Rochelle, with stops at potential new station(s) in the Bronx and Queens.
Alignment and Penn Station Approach	Harlem Line to CP 112, New Haven Line to CP 216/217, and Hell Gate Line in Queens. West Side/Penn Station connection via East River tunnels.
Primary Market(s) Served	Off-peak commuters and discretionary shopping, entertainment, and recreational trips between central Dutchess, Putnam, Westchester, and Bronx Counties and Penn Station and potential new station(s) areas in the Bronx and Queens (and New Jersey, potentially without transfer; Long Island, with additional transfer).
No. of Transfers from Metro-North Service Area to Access Penn Station	0*
Operator(s)	Metro-North Railroad
Required Operational Coordination	Amtrak on Hell Gate Line Amtrak, LIRR in East River Tunnels Amtrak, NJ Transit, LIRR in Penn Station complex Metro-North GCT service at CP 216
Infrastructure Improvement Required	Interlocking modifications at CPs 112, 216, and 217; rolling stock/equipment capable of operating with power sources to/from Penn Station and/or possible upgrade of power systems; signals, stations, yards improvements, possible additional capacity; track and platform level improvements, ticket sales area and administrative space at Penn Station.
Implementation Time Frame	Medium (5-15 years)
Study Goals Targeted by Alternative	
• **Improve Access between Metro-North Service Area and Penn Station and West Side of Manhattan**	✓
• **Improve Regional Connectivity**	✓
• **Provide Cost-Effective Transportation Improvements**	✓
• **Promote the Economic and Environmental Health of the Region**	✓
Relationship to Other Alternatives	Serves similar (but not identical) market as 7A and 7C. Could be combined with alternatives that serve other markets.

* Assuming off-peak zoned service that includes stops at every station in the service market area. Transfers may be required from some stations under different operational scenarios, e.g., express, semi-express, skip-stop, shuttle service. Effective weekend operations might be designed to provide hourly "clocker" service from selected stations. See also discussion of primary markets served.

Preliminary Alternatives Fact Sheet

(See Figure 8 on page 28 for alignment)

Alternative Number	7C
Alternative Name	**OFF-PEAK AND WEEKEND HARLEM LINE SERVICE TO/FROM PENN STATION VIA THE PORT MORRIS BRANCH AND THE HELL GATE LINE**
Mode	Metro-North Commuter Rail
Alternative Description	This alternative would connect Harlem Line service area (from Tremont north) to/from Penn Station via connections from the Harlem Line to the Port Morris Branch (between the Tremont and Melrose stations) and from the Port Morris Branch to the Amtrak Hell Gate Line, with stops at potential new station(s) in Queens.
Alignment and Penn Station Approach	Harlem Line to Port Morris Branch (just north of CP 106 on track 3) to new interlocking at Hell Gate Line, and Hell Gate Line through Queens. West Side/Penn Station connection via East River tunnels.
Primary Market(s) Served	Off-peak commuters and discretionary shopping, entertainment, and recreational trips between central Dutchess, Putnam, Westchester, and Bronx Counties and Penn Station, and potential new station(s) areas in Queens (and New Jersey, potentially without transfer; Long Island, with additional transfer).
No. of Transfers from Metro-North Service Area to Access Penn Station	0*
Operator(s)	Metro-North Railroad
Required Operational Coordination	Amtrak on Hell Gate Line Amtrak, LIRR in East River Tunnels Amtrak, NJ Transit, LIRR in Penn Station complex Metro-North Harlem and New Haven Line GCT service
Infrastructure Improvement Required	Modified interlocking at CP 106 (the switch now permits only northbound movements; a universal interlocking allowing southbound movements would be needed), and new interlocking at the Hell Gate Line; rolling stock/equipment capable of operating with power sources to/from Penn Station and/or possible upgrade of power systems; signals, stations, yards improvements, possible additional capacity; track and platform level improvements, ticket sales area and administrative space at Penn Station.
Implementation Time Frame	Medium (5-15 years)
Study Goals Targeted by Alternative	
• **Improve Access between Metro-North Service Area and Penn Station and West Side of Manhattan**	✓
• **Improve Regional Connectivity**	✓
• **Provide Cost-Effective Transportation Improvements**	✓
• **Promote the Economic and Environmental Health of the Region**	✓
Relationship to Other Alternatives	Serves similar (but not identical) market as 7A and 7B. Could be combined with alternatives that serve other markets.

* Assuming off-peak zoned service that includes stops at every station in the service market area. Transfers may be required from some stations under different operational scenarios, e.g., express, semi-express, skip-stop, shuttle service. Effective weekend operations might be designed to provide hourly "clocker" service from selected stations. See also discussion of primary markets served.

Preliminary Alternatives Fact Sheet

(See Figure 9 on page 30 for alignment)

Alternative Number	8
Alternative Name	**OFF-PEAK AND WEEKEND NEW HAVEN LINE SERVICE TO/FROM PENN STATION VIA THE HELL GATE LINE**
Mode	Metro-North Commuter Rail
Alternative Description	This alternative would connect New Haven Line service area (from New Rochelle east) to/from Penn Station using the Amtrak Hell Gate Line between New Rochelle and Penn Station, with stops at potential new station(s) in the Bronx and Queens.
Alignment and Penn Station Approach	New Haven Line to New Rochelle, and Hell Gate Line in Queens. West Side/Penn Station connection via East River tunnels.
Primary Market(s) Served	Off-peak commuters and discretionary shopping, entertainment, and recreational trips between Fairfield, New Haven, and eastern Westchester Counties and Penn Station and potential new station(s) areas in the Bronx and Queens (and New Jersey, potentially without transfer; Long Island, with additional transfer).
No. of Transfers from Metro-North Service Area to Access Penn Station	0*
Operator(s)	Metro-North Railroad
Required Operational Coordination	Amtrak on Hell Gate Line Amtrak, LIRR in East River Tunnels Amtrak, NJ Transit, LIRR in Penn Station complex
Infrastructure Improvement Required	Rolling stock/equipment capable of operating with power sources to/from Penn Station; signals, stations, yards improvements, possible additional capacity; track and platform level improvements, ticket sales area and administrative space at Penn Station.
Implementation Time Frame	Short (1-5 years)
Study Goals Targeted by Alternative	
• **Improve Access between Metro-North Service Area and Penn Station and West Side of Manhattan**	✓
• **Improve Regional Connectivity**	✓
• **Provide Cost-Effective Transportation Improvements**	✓
• **Promote the Economic and Environmental Health of the Region**	✓
Relationship to Other Alternatives	Only alternative that serves this market with direct connection to/from Penn Station and potentially Queens and the eastern Bronx. Could be combined with alternatives that serve other markets.

* Assuming off-peak zoned service that includes stops at every station in the service market area. Transfers may be required from some stations under different operational scenarios, e.g., express, semi-express, skip-stop, shuttle service. Effective weekend operations might be designed to provide hourly "clocker" service from selected stations. See also discussion of primary markets served.

COMMUTER RAIL ALTERNATIVE TO PENN STATION VIA GCT

Commuter Rail Alternatives to Penn Station via GCT

The Access to the Region's Core (ARC) Study has focused on a comprehensive alternative for facilitating regional rail access and includes major infrastructure improvements to increase the capacity of Penn Station and connect Penn Station to GCT. At the conclusion of Phase I of the Study, Alternative AA remained as a base build alternative that involves construction of direct rail tunnel links between the lower level of GCT and Penn Station for use by Metro-North, LIRR, and NJ Transit. Under this concept, Metro-North would access a new two-track platform station on the West Side at 34th Street, with connections to an expanded West Side Yard. The ARC study is also examining variants to Alternative AA, some of which do not provide a Metro-North connection to Penn Station via GCT.

As part of the Penn Station Access Study, extension of Metro-North service from GCT to 34th Street/Penn Station via a new tunnel between GCT and 34th Street/Penn Station is included in the list of preliminary alternatives.

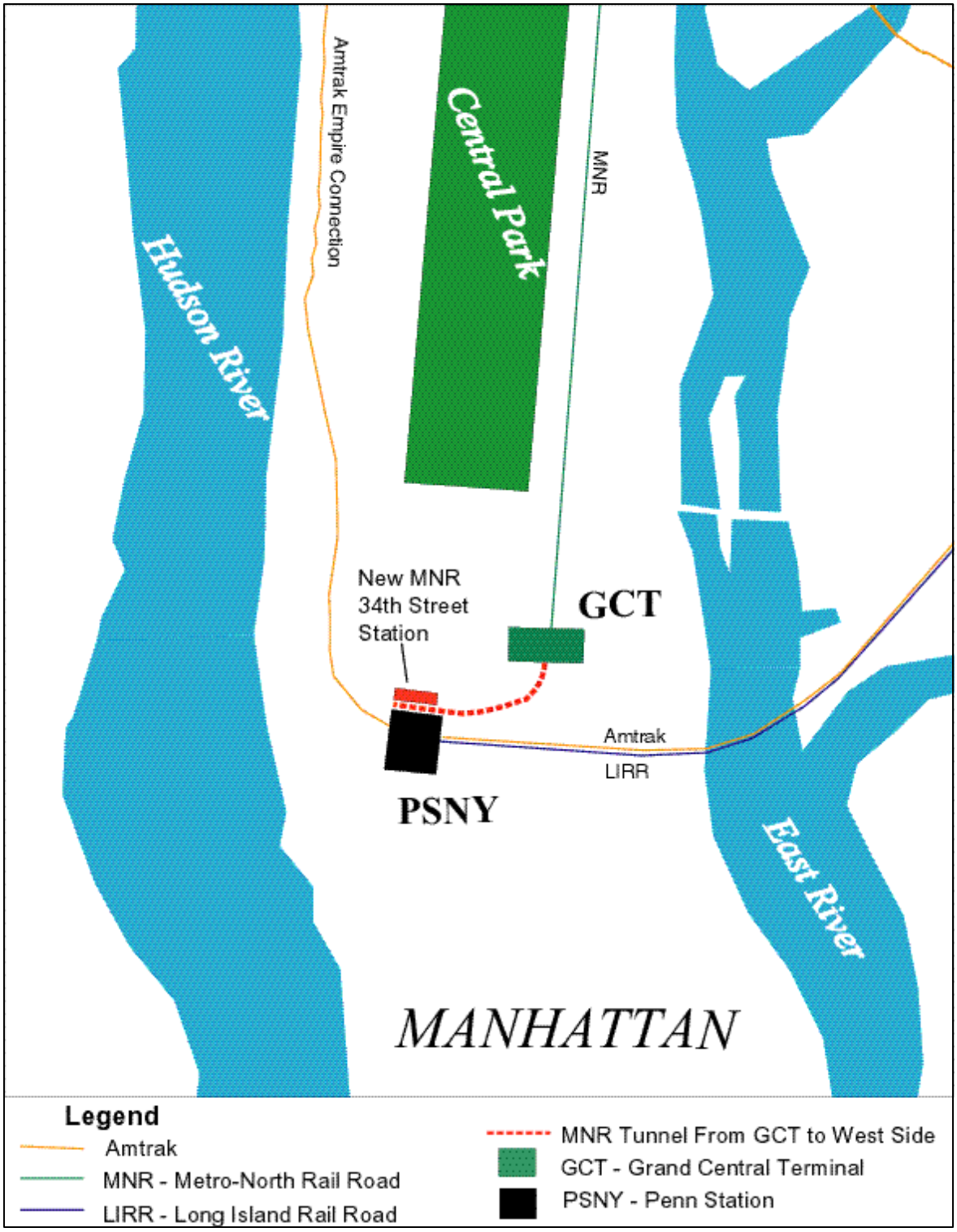
Preliminary Alternatives Fact Sheet

(See Figure 10)

Alternative Number	9
Alternative Name	**EXTENSION OF METRO-NORTH SERVICE TO 34TH STREET/PENN STATION VIA A NEW TUNNEL BETWEEN GCT AND 34TH STREET/PENN STATION**
Mode	Metro-North Commuter Rail
Alternative Description	This alternative would connect all of the Metro-North service area to Penn Station via a direct tunnel between GCT and Penn Station. (Alternative is based on concepts developed by other studies, such as the Access to the Region's Core Study.)
Alignment and Penn Station Approach	Metro-North trains to GCT, continuing in new tunnel to a new two-track platform station at West 34th Street (north of Penn Station), with connections to an expanded West Side Yard.
Primary Market(s) Served	Metro-North service area for all trip purposes (peak-period commute, reverse peak-period commute, off-peak and weekend) now served by Metro-North GCT service.
No. of Transfers from Metro-North Service Area to Access Penn Station	0*
Operator(s)	Metro-North Railroad
Required Operational Coordination	None
Infrastructure Improvement Required	Construction of new tunnel connection between GCT and Penn Station; new Metro-North station at West 34th Street and connections to existing Penn Station complex; rolling stock/equipment to accommodate longer running times/schedules; signals; possible improvements to yards, additional capacity.
Implementation Time Frame	Long (15+ years)
Study Goals Targeted by Alternative	
• **Improve Access between Metro-North Service Area and Penn Station and West Side of Manhattan**	✓
• **Improve Regional Connectivity**	✓
• **Provide Cost-Effective Transportation Improvements**	
• **Promote the Economic and Environmental Health of the Region**	✓
Relationship to Other Alternatives	Would replace, and not be combined with (and would not be completed in the same time frame as) Alternatives 3, 4A, 4B, 4C, 5, 7A, 7B, 7C, 8.

* Assuming passengers bound for Penn Station board a train with that destination at their point of trip origin.

Figure 10
Alternative 9: Extension of Metro-North Service to 34th Street/Penn Station Via a New Tunnel Between GCT and 34th Street



COMMUTER RAIL ALTERNATIVES WITH INDIRECT ACCESS TO PENN STATION

Preliminary Alternatives Fact Sheet

(See Figure 11)

Alternative Number	10
Alternative Name	**METRO-NORTH SERVICE TO PENN STATION VIA CONNECTION TO LIRR**
Mode	Metro-North/LIRR Commuter Rail
Alternative Description	This alternative would connect New Haven Line service area east of New Rochelle (and possibly Harlem Line Service area from Wakefield north) and Queens/Long Island via the Hell Gate Line and a potential new connection to the LIRR Main Line to permit through running service to Jamaica. Access to Penn Station would be via a transfer to LIRR trains at Jamaica.
Alignment and Penn Station Approach	New Haven Line to New Rochelle, and Hell Gate Line in Queens. New connection to LIRR for through running service to Jamaica. Access to Penn Station would be via transfer to LIRR trains through the East River Tunnels.
Primary Market(s) Served	Could serve peak-period commuter, reverse peak-period commuter, and off-peak and weekend service between eastern Westchester, Fairfield, and New Haven Counties and Queens/Long Island, and Penn Station with additional transfer. Also, existing LIRR Stations in Queens (to Jamaica) and potential new station(s) areas in the Bronx and Queens. Service might include, for example, Stamford to Jamaica/Shea Stadium and White Plains to Jamaica/Shea Stadium.
No. of Transfers from Metro-North Service Area to Access Penn Station	1
Operator(s)	Metro-North/LIRR
Required Operational Coordination	Amtrak on the Hell Gate Line CSX on most likely rail corridor connection between Hell Gate Line and LIRR LIRR on the Main Line to Jamaica
Infrastructure Improvement Required	Signal improvement on the CSX line and construction of connection between CSX Line and LIRR main line, just east of the Port Washington Junction; possible power system upgrades (service could be offered by using a form of dual-mode locomotive that accepts power from either agency's power system); rolling stock/equipment, signals, stations, possible improvements to yards, additional capacity; possible improvements at Penn Station.
Implementation Time Frame	Medium (5-15 years)
Study Goals Targeted by Alternative	
• **Improve Access between Metro-North Service Area and Penn Station and West Side of Manhattan**	Addresses objective of convenient connection from Metro-North to LIRR
• **Improve Regional Connectivity**	✓
• **Provide Cost-Effective Transportation Improvements**	✓
• **Promote the Economic and Environmental Health of the Region**	✓
Relationship to Other Alternatives	Could replace and/or be combined with other alternatives.

Figure 11
Alternative 10: Metro-North Service to Penn Station Via Connection to LIRR Near Woodside

Preliminary Alternatives Fact Sheet

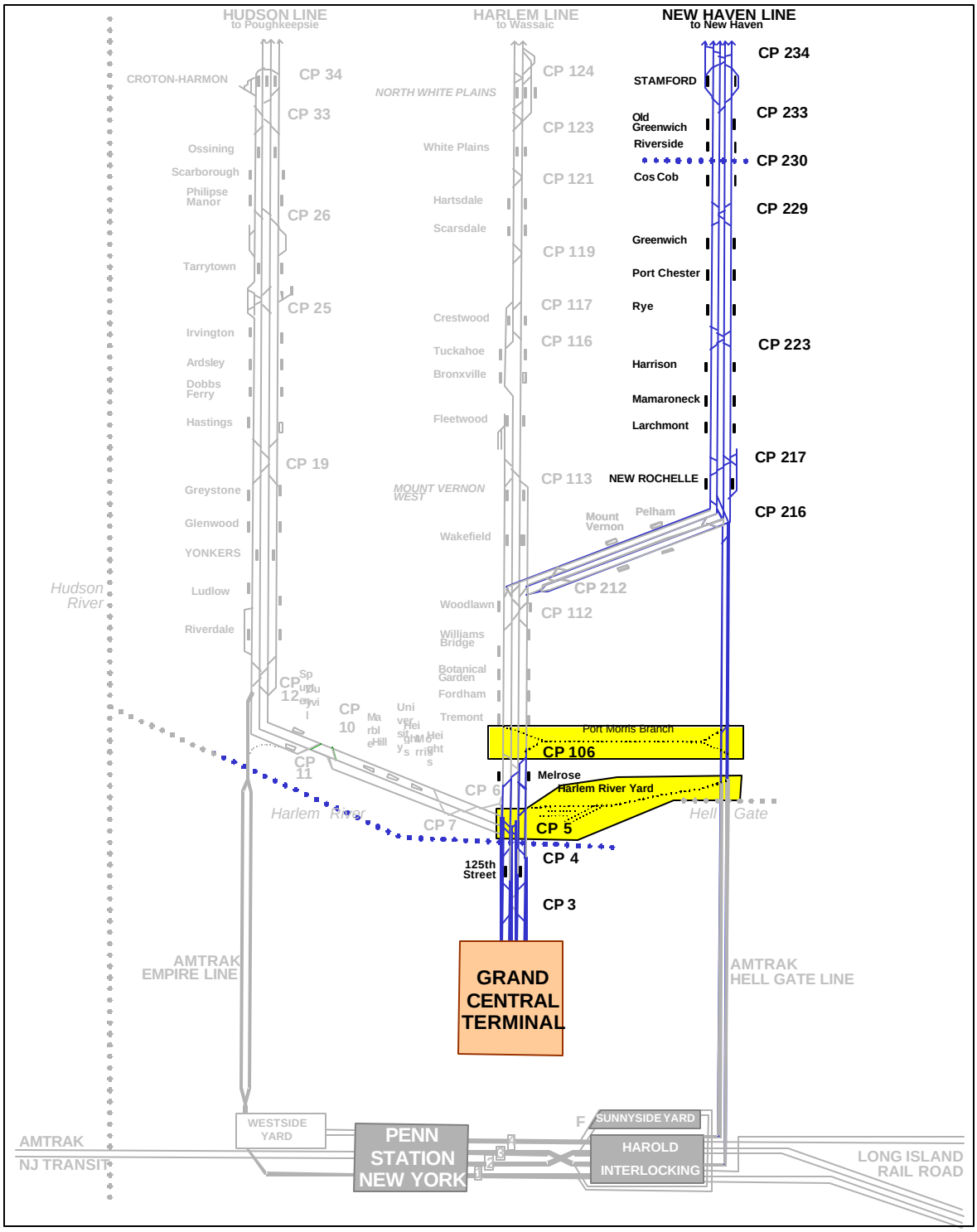
(See Figure 12)

Alternative Number	11
Alternative Name	**METRO-NORTH SERVICE BETWEEN NEW ROCHELLE AND GCT VIA THE HELL GATE LINE**
Mode	Metro-North Commuter Rail
Alternative Description	This alternative would run rail service between New Rochelle and GCT via the Hell Gate Line by either a) utilizing the Port Morris Branch as a link between the Hell Gate and Metro-North Main Line just north of Melrose Station, or b) by utilizing tracks in Harlem River Yards as a link between the Hell Gate Line and Metro-North Main Line at the Harlem River Bridge.
Alignment and Penn Station Approach	Inbound: Hell Gate Line from New Rochelle to a) a new connection to the Port Morris Branch; then via a modified interlocking to the Harlem Line (near CP 106, between Tremont and Melrose stations), and continuing on the Harlem Line south to GCT, or b) a new connection to the existing freight tracks into the Harlem River Yards; then, possibly using a portion of the recently-completed Oak Point Link and major new construction to connect to the elevated Hudson Line tracks to GCT. Access to Penn Station would be via transfer to another mode (subway, bus, taxi, walk) at GCT. Outbound: Reverse of above.
Primary Market(s) Served	Potential intermediate station(s) along the Hell Gate Line corridor for peak-period service to/from GCT, including reverse commutation to/from locations further north in the Metro-North service area, and off-peak/weekend services to/from GCT and such locations.
No. of Transfers from Metro-North Service Area to Access Penn Station	1 or 2
Operator(s)	Metro-North Railroad
Required Operational Coordination	Amtrak on the Hell Gate Line CSX in Harlem River Yard and on Oak Point Link tracks, or Port Morris Branch Metro-North current reverse-commute service originating at GCT
Infrastructure Improvement Required	a) New connection on Hell Gate Line and modification of CP 106, or b) new connection between Hell Gate Line and Harlem River Yard tracks and major new connection between Harlem River Yard and Hudson Line at the Harlem River Bridge. Rolling stock/equipment; possible double-tracking of Port Morris Branch or new track construction within Harlem River Yard, signals, station(s), possible improvements to yards/increased capacity; possible power system upgrades or new power systems for the Hell Gate Line, Harlem River Yard, Oak Point Link.
Implementation Time Frame	Long (15+ years)

Study Goals Targeted by Alternative	
• **Improve Access between Metro-North Service Area and Penn Station and West Side of Manhattan**	Addresses objective of improved outbound service from Manhattan and the Bronx to selected locations in Metro-North service area
• **Improve Regional Connectivity**	✓
• **Provide Cost-Effective Transportation Improvements**	TBD
• **Promote the Economic and Environmental Health of the Region**	✓

Relationship to Other Alternatives	Could be combined with alternatives serving other markets.

Figure 12
Alternative 11: Metro-North Service Between New Rochelle and GCT via the Hell Gate Line



OTHER MODE ALTERNATIVES

Preliminary Alternatives Fact Sheet

(See Figure 13)

Alternative Number	12
Alternative Name	**SIGNIFICANTLY EXPANDED EXPRESS BUS SERVICES (INCLUDING HOV LANES, SIGNAL PRIORITY) BETWEEN METRO-NORTH SERVICE AREA AND THE WEST SIDE AND PENN STATION**
Mode	Express Bus

Alternative Description

This alternative would provide peak-period express bus service from locations in the Metro-North service area, including select Metro-North transfer stations, to the West Side of Manhattan and Penn Station. On the New Haven Line, New Rochelle would act as the principal transfer site between Metro-North and the express bus service, as this station is undergoing redevelopment as a major multimodal facility. Spuyten Duyvil station on the Hudson Line and Mount Vernon West station on the Harlem Line would be the principal transfer sites to/from those service areas. In contrast to TSM (Alternative 2) elements that share similar objectives, Alternative 10, by definition, involves infrastructure costs and right-of-way issues (such as specially designated lanes on highways and arterials and signal priority systems that give preference to buses) comparable to other Build alternatives.

Alignment and Penn Station Approach

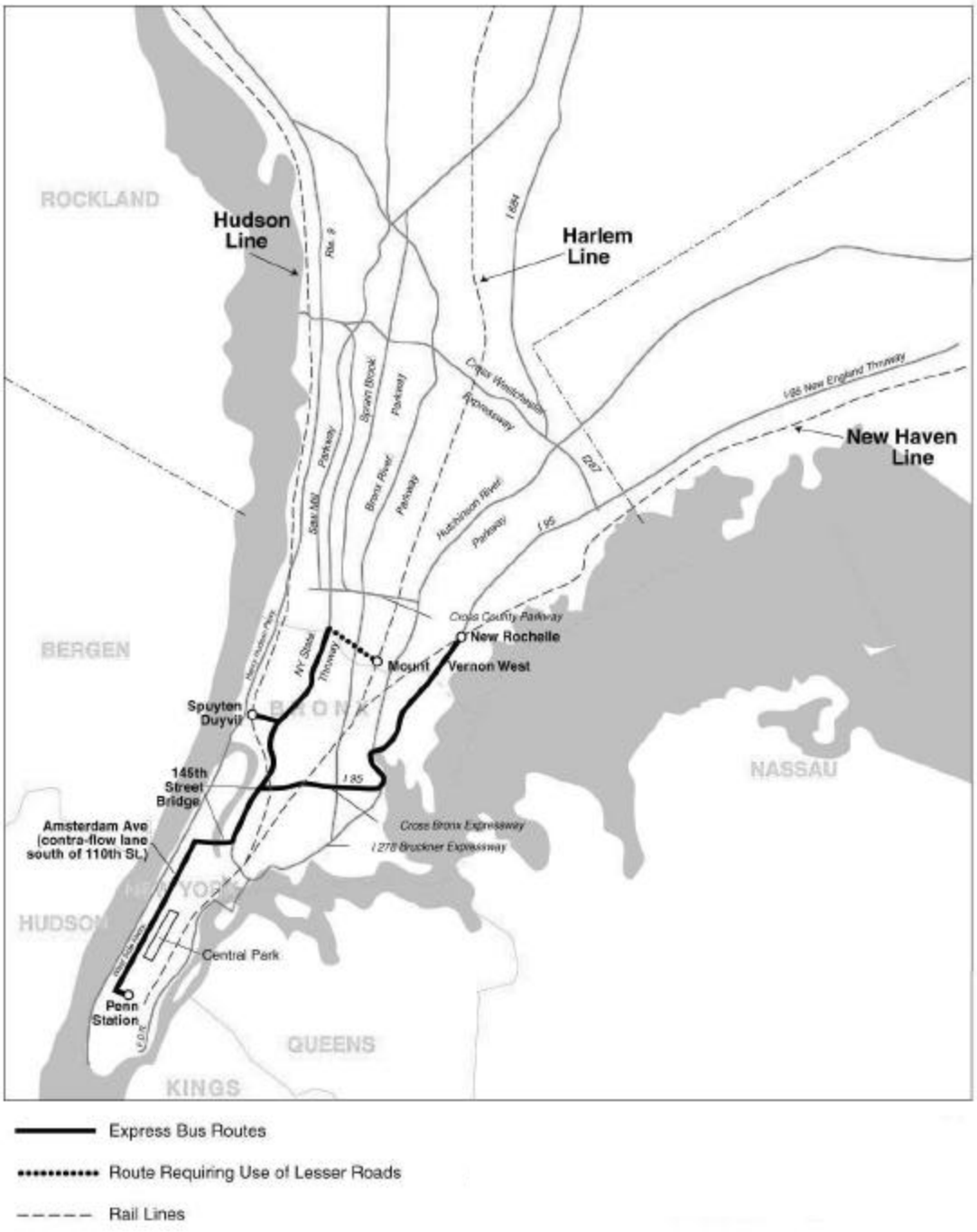
Routes would operate as direct connections between transfer stations on each Metro-North Line and Penn Station. Primary route would follow the NY State Thruway or I-95, the 145th Street Bridge, to the Columbus Avenue/Amsterdam Avenue corridor, to West 34th Street and finally to Penn Station. (Buses from New Rochelle would be routed via I-95 and the Major Deegan Expressway to the 145th Street Bridge; the route from Spuyten Duyvil would be I-87 to the Major Deegan and then the bridge. The major arterial routes closest to the Mount Vernon West station are all parkways that do not permit buses, which forces consideration of an extended route similar to those described above.) If physical and legal access restrictions on parkways could be overcome (see Alternative 2), the express bus routes to/from both the Hudson and Harlem Line service areas to Penn Station would be much more direct, and travel times faster. [Express bus operators now typically use Fifth Avenue to travel southbound in Manhattan because it has fewer cross-streets (due to its location adjacent to Central Park) and the signal timing is well synchronized. North/South connections between the Bronx/Westchester and the West Side avenues are less direct in northern Manhattan. Because only Amsterdam Avenue is continuous through this area, an express route corridor might involve creating a contra-flow bus lane on this Avenue in the AM peak period.]

Primary Market(s) Served	Peak-period commuters in Metro-North service area from Spuyten Duyvil, Mount Vernon West, and New Rochelle stations .
No. of Transfers from Metro-North Service Area to Access Penn Station	1
Operator(s)	TBD
Required Operational Coordination	NYSDOT, NYCDOT, New York Bus/Bee-Line/other bus operator
Infrastructure Improvement Required	Creation of HOV lanes (possibly contraflow lane on Amsterdam Avenue), signal prioritization system; possibly additional vehicles.
Implementation Time Frame	Medium (5-15 years)

Study Goals Targeted by Alternative	
• **Improve Access between Metro-North Service Area and Penn Station and West Side of Manhattan**	✓
• **Improve Regional Connectivity**	✓
• **Provide Cost-Effective Transportation Improvements**	TBD
• **Promote the Economic and Environmental Health of the Region**	✓

Relationship to Other Alternatives	Could replace some or all of the following alternatives: 3, 4A, 4B, 4C, 5, and/or 9 for cost or other reasons. Could be implemented in part and combined with some of the above and/or other alternatives.

Figure 13
Alternative 12: New Express Bus Routes between the Metro-North Service Area and West Side and Penn Station



Preliminary Alternatives Fact Sheet

Alternative Number	13
Alternative Name	**SIGNIFICANTLY EXPANDED FERRY SERVICES BETWEEN THE METRO-NORTH SERVICE AREA AND THE WEST SIDE (USING CONNECTING SHUTTLE BUSES TO/FROM TERMINALS IN MANHATTAN)**
Mode	Express Ferry
Alternative Description	This alternative calls for express ferry service from locations in the Metro-North service area not currently served by ferry service to the West Side of Manhattan. In contrast to TSM (Alternative 2) elements with similar objectives, significant expansion of ferry service from a number of locations along the Hudson River and Long Island Sound would require creation of new docking and passenger facilities and feeder services to connect population centers to the waterfront.
Alignment and Penn Station Approach	Routes would operate as direct connections between transfer stations on Metro-North Lines and a Manhattan ferry terminal, with exclusive shuttle bus connections within Manhattan to/from West Side locations.
Primary Market(s) Served	Peak-period commuter and reverse peak-period commuter trips (once improvements are established, could also serve off-peak and weekend trips) between Metro-North's Hudson and New Haven Line service areas and the West Side of Manhattan.
No. of Transfers from Metro-North Service Area to Access Penn Station	2
Operator(s)	Ferry and feeder bus operator(s)
Required Operational Coordination	To be determined
Infrastructure Improvement Required	Construction of ferry piers at candidate transfer stations; ferry boats; possible additional facilities in Manhattan; possibly additional shuttle buses.
Implementation Time Frame	Medium (5-15 years)
Study Goals Targeted by Alternative	
• **Improve Access between Metro-North Service Area and Penn Station and West Side of Manhattan**	✓
• **Improve Regional Connectivity**	✓
• **Provide Cost-Effective Transportation Improvements**	TBD
• **Promote the Economic and Environmental Health of the Region**	✓
Relationship to Other Alternatives	Serves similar markets to and could replace some or all of the following alternatives: 3, 5, 6, 8, and/or 9 for cost or other reasons. Could be implemented in part and combined with some of the above and/or other alternatives.

Preliminary Alternatives Fact Sheet

Alternative Number	14
Alternative Name	**LIGHT RAIL TRANSIT BETWEEN GCT AND PENN STATION**
Mode	Light Rail Transit
Alternative Description	This alternative calls for light rail transit service from GCT to the West Side of Manhattan including Penn Station.
Alignment and Penn Station Approach	A loop service could be created to link GCT with 42nd Street/Times Square's major activity centers and Penn Station; alternatively, east-west service might use the 34th Street corridor.
Primary Market(s) Served	Peak-period and off-peak/weekend travelers among the GCT area, Penn Station area, other Midtown West Side locations, and the Upper West Side of Manhattan.
No. of Transfers from Metro-North Service Area to Access Penn Station	1
Operator(s)	To be determined
Required Operational Coordination	NYCDOT, NYCT
Infrastructure Improvement Required	Construction of light rail transit system and ancillary facilities.
Implementation Time Frame	Long (15+ years)
Study Goals Targeted by Alternative	
• **Improve Access between Metro-North Service Area and Penn Station and West Side of Manhattan**	✓
• **Improve Regional Connectivity**	✓
• **Provide Cost-Effective Transportation Improvements**	TBD
• **Promote the Economic and Environmental Health of the Region**	✓
Relationship to Other Alternatives	Like Alternatives 15, 16, and 17, is intended to serve Metro-North peak, reverse peak, and off-peak/weekend travelers through transfer to intra-Manhattan connecting service.

Preliminary Alternatives Fact Sheet

Alternative Number	15
Alternative Name	**EXTENSION OF #7 (FLUSHING) SUBWAY LINE TO PENN STATION**
Mode	Subway
Alternative Description	This alternative would extend the #7 Flushing Line to follow the 8th Avenue right-of-way to Penn Station.
Alignment and Penn Station Approach	Via 8th Avenue right-of-way beneath the existing 8th Avenue A/C/E Lines tunnel.
Primary Market(s) Served	Peak-period and off-peak/weekend travelers among the GCT area, Penn Station area, other Midtown West Side locations, and the Upper West Side of Manhattan, as well as subway riders to/from other parts of the City and region.
No. of Transfers from Metro-North Service Area to Access Penn Station	1
Operator(s)	NYCT
Required Operational Coordination	None
Infrastructure Improvement Required	Construction of subway extension; rolling stock/equipment, signals, possible improvements at yards, additional capacity; possible changes in Penn Station-Farley Building complex.
Implementation Time Frame	Long (15+ years)

Study Goals Targeted by Alternative	
• **Improve Access between Metro-North Service Area and Penn Station and West Side of Manhattan**	✓
• **Improve Regional Connectivity**	✓
• **Provide Cost-Effective Transportation Improvements**	TBD
• **Promote the Economic and Environmental Health of the Region**	✓

Relationship to Other Alternatives	Like Alternatives 14, 16 and 17, is intended to serve Metro-North peak, reverse peak, and off-peak/weekend travelers through transfer to intra-Manhattan connecting service.

Preliminary Alternatives Fact Sheet

Alternative Number	16
Alternative Name	**DIRECT SUBWAY SHUTTLE BETWEEN GCT AND PENN STATION VIA NEW TUNNEL**
Mode	Subway
Alternative Description	This alternative would create a new direct subway shuttle between GCT and Penn Station.
Alignment and Penn Station Approach	Via the shortest-path tunnel between GCT and Penn Station. (Could be constructed in a new two-track deep tunnel, or as a modification of the current 42nd Street Shuttle by connecting to the A, C, E (8th Avenue) Line.)
Primary Market(s) Served	Peak and off-peak/weekend travelers between the GCT area and Penn Station area, and other subway system riders.
No. of Transfers from Metro-North Service Area to Access Penn Station	1
Operator(s)	NYCT
Required Operational Coordination	None
Infrastructure Improvement Required	Construction of new subway tunnel; rolling stock/equipment, signals, possible improvements at Penn Station.
Implementation Time Frame	Long (15+ years)
Study Goals Targeted by Alternative	
• **Improve Access between Metro-North Service Area and Penn Station and West Side of Manhattan**	✓
• **Improve Regional Connectivity**	✓
• **Provide Cost-Effective Transportation Improvements**	TBD
• **Promote the Economic and Environmental Health of the Region**	✓
Relationship to Other Alternatives	Like Alternatives 14, 15 and 17, is intended to serve Metro-North peak, reverse peak, and off-peak/weekend travelers through transfer to intra-Manhattan connecting service.

Preliminary Alternatives Fact Sheet

Alternative Number	17	
Alternative Name	**EXTENSION OF PATH TRAIN TO GCT**	
Mode	PATH	
Alternative Description	This alternative would extend the Port Authority Trans-Hudson (PATH) System to GCT.	
Alignment and Penn Station Approach	The 33rd Street PATH line, one block from Penn Station, would be extended to a new station in the vicinity of GCT.	
Primary Market(s) Served	Peak-period and off-peak/weekend travelers between the GCT area and Penn Station area, and all other PATH riders.	
No. of Transfers from Metro-North Service Area to Access Penn Station	1 (plus walk)	
Operator(s)	Port Authority of New York and New Jersey	
Required Operational Coordination	None	
Infrastructure Improvement Required	Tunnel, tracks, signals, rolling stock/equipment, new station and changes at existing 33rd Street terminal; possible improvements at yards, additional capacity.	
Implementation Time Frame	Long (15+ years)	
Study Goals Targeted by Alternative		
• **Improve Access between Metro-North Service Area and Penn Station and West Side of Manhattan**		✓
• **Improve Regional Connectivity**		✓
• **Provide Cost-Effective Transportation Improvements**		TBD
• **Promote the Economic and Environmental Health of the Region**		✓
Relationship to Other Alternatives	In part, may serve portion of same market as Alternatives 14, 15, and 16.	

Preliminary Alternatives Fact Sheet

Alternative Number	18
Alternative Name	**HIGHWAY CAPACITY EXPANSION BETWEEN METRO-NORTH SERVICE AREA AND THE WEST SIDE AND PENN STATION**
Mode	Automobile
Alternative Description	This alternative would include highway capacity improvements in the corridors between the Metro-North service area and the West Side of Manhattan (in addition to those that are already programmed for implementation as part of NYMTC's 2015 Highway Network/2020 Base Case), using general or special purpose lanes and/or anticipated Intelligent Transportation System and Advanced Vehicle Control System technologies.
Alignment and Penn Station Approach	Various roadways in the Metro-North service area leading to the West Side of Manhattan
Primary Market(s) Served	Automobile Users
No. of Transfers from Metro-North Service Area to Access Penn Station	0
Operator(s)	NYSDOT/NYCDOT
Required Operational Coordination	NYSDOT/NYCDOT
Infrastructure Improvement Required	Possible additions of lanes, other roadway changes, signage, equipment, including possible Intelligent Transportation (IT) systems.
Implementation Time Frame	Long (15+ years)
Study Goals Targeted by Alternative • **Improve Access between Metro-North Service Area and Penn Station and West Side of Manhattan** • **Improve Regional Connectivity** • **Provide Cost-Effective Transportation Improvements** • **Promote the Economic and Environmental Health of the Region**	Does not address objectives Addresses objective of service between Metro-North service area and West Side for discretionary and intermediate travel. TBD Addresses objective of improved commuter accessibility from the Metro-North service area to West Side employment, but is likely to conflict with other objectives
Relationship to Other Alternatives	May serve similar locations, although not necessarily similar market, as alternatives 3, 4, 5, 6, 7, 8, and 9.