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

INITIAL SCREENING RESULTS REPORT

Prepared for Metro-North Railroad

Prepared by Parsons Brinckerhoff Quade & Douglas, Inc.

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Initial Screening Results Report

SUMMARY

This report documents the first technical milestone of the Metro-North Penn Station Access Major Investment Study/Draft Environmental Impact Statement. This milestone is the decision on which preliminary Penn Station access alternatives should proceed for more detailed study, as intermediate alternatives in the second, comparative screening phase of analysis.

The principal activities leading to this decision were: identification of potentially reasonable and feasible alternatives of different modes; definition of qualitative screening evaluation criteria to examine fundamental strengths and weaknesses of the identified preliminary alternatives; evaluation of the preliminary alternatives against the criteria and summarizing the results; and consideration of public and agency input.

The following five alternatives are recommended for further, more detailed study:

- ✓ Weekday Hudson Line Service via the Empire Connection;
- ✓ Off-Peak and Weekend Hudson Line Service via the Empire Connection;
- ✓ Weekday Harlem Line Service via the Hudson Line and Empire Connection;
- ✓ Weekday New Haven Line Service via the Hell Gate Line; and
- ✓ Off-Peak and Weekend New Haven Line Service via the Hell Gate Line.

A. INTRODUCTION

1. Study Overview

Metro-North Railroad (Metro-North) is preparing a Major Investment Study/Draft Environmental Impact Statement (MIS/DEIS) to examine the potential benefits, costs, and social, economic, and environmental impacts of reasonable and feasible alternatives for improving access between the Metro-North service area, east of the Hudson River, and Penn Station and destinations on the West Side of Manhattan. The purpose of the MIS/DEIS is to examine the demand for, and the opportunities and constraints related to, providing improved access, and to identify a preferred study alternative that addresses the forecasted demand for such service in a cost-effective, environmentally sound, and equitable way.

Current Metro-North service terminates at Grand Central Terminal, necessitating up to two transfers on additional modes to reach destinations on the West Side. An earlier study,[1] commissioned by Metro-North to investigate the market potential for Metro-North service to/from Penn Station, indicated the need for a project that would provide such service and identified Penn Station access as a means of increasing ridership, supporting regional development, and improving the quality of life in the region. In addition to providing benefits to Metro-North's riders traveling to/from the West Side of Manhattan, improved access to Penn Station would also improve regional connectivity by providing direct connection from Metro-North territory to Long Island Rail Road, New Jersey Transit, and Amtrak services at Penn Station. Metro-North Penn Station access would also complement Long Island Rail Road East Side Access service to Grand Central Terminal.

[1] *Exploration of Market Potential for Metro-North Railroad Service in the Northeast Bronx and West Side of Manhattan Study*, 1995.

The Penn Station Access MIS/DEIS is being performed in accordance with Federal Transit Administration regulations and guidelines for preparing a Major Investment Study and an Environmental Impact Statement, in accordance with the National Environmental Policy Act (NEPA). The MIS/DEIS will include analysis of alternatives, environmental documentation, and public outreach and interagency coordination. Agency and public scoping meetings, and other outreach activities, have been held to receive comments and suggestions on the study scope and approach from agencies, the general public, and interest groups, and pertinent input has been incorporated in the Study. The MIS/DEIS is being conducted in coordination with the Metropolitan Transportation Authority, its constituent agencies, and other regional transportation agencies that are examining a number of major network expansion proposals with relevance to the Penn Station Access MIS/DEIS.

2. Purpose of This Report

This report documents the initial screening evaluation of the preliminary alternatives identified for improving Penn Station access, and identifies the alternatives that have been selected for further development and evaluation. Section B. of this report provides an overview of the MIS/DEIS' three-tiered alternatives evaluation process. It also describes the methodology, criteria, and assumptions used in the initial screening evaluation. Section C. identifies the preliminary alternatives investigated in the initial screening evaluation. Section D. provides the screening evaluation's results and identifies which alternatives have been advanced and which have not been advanced for further consideration. Section E. provides an overview of the next steps in the development and evaluation of the alternatives advanced.

B. ALTERNATIVES EVALUATION PROCESS

1. Process Overview

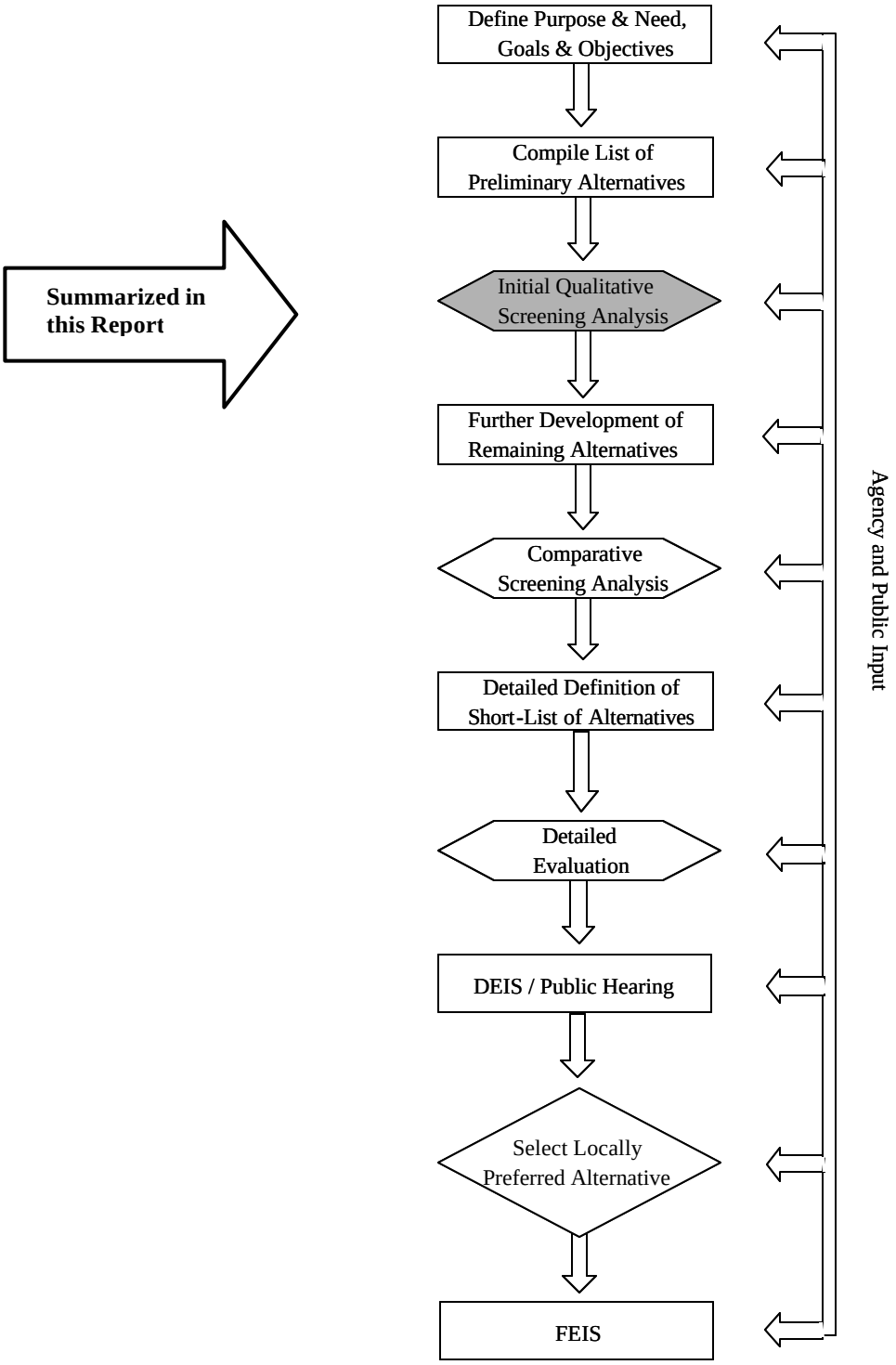
The methodology for evaluating alternatives for improving Penn Station access to/from the Metro-North east-of-Hudson territory has been structured to facilitate selection, ultimately, of a preferred alternative from among competing transportation options. The alternatives evaluation methodology consists of three levels of progressively more detailed evaluation, as follows:

1. *initial qualitative screening* analysis of preliminary alternatives, evaluating each one independently of the others, to identify an intermediate list of alternatives for further development and evaluation; this report document the results of the initial screen;
2. *comparative qualitative and quantitative screening* analysis of the intermediate list of alternatives to select those which, when compared to other options, warrant further, detailed evaluation; this will be documented in the Intermediate Alternatives Screening Report; and
3. *detailed, quantitative analysis*[1] of a short-list of alternatives remaining after the comparative screening analysis, to provide sufficient technical basis for selecting the locally preferred alternative; this will be documented in the MIS/DEIS.

Figure 1 illustrates the phases of the alternatives development and evaluation process. The initial qualitative screening analysis documented in this report is highlighted on Figure 1.

[1] Existing and forecasted Penn Station capacity constraints will be addressed in the detailed analyses of the short-listed alternatives, using data and information provided by the current operations at Penn Station, i.e., Amtrak, Long Island Rail Road, and New Jersey Transit.

Figure 1
Alternatives Development and Evaluation Process



This Study recognizes that current capacity constraints at Penn Station, and increases in future demand projected by the current operators at the Station, pose obstacles for introducing Metro-North Penn Station access service during peak periods of Station utilization, especially in the near term. The Study also recognizes that some Penn Station access alternatives may require completion of the LIRR East Side Access project in order to be implementable.

The initial and intermediate alternatives are being evaluated based on how they perform individually and in comparison with each other. The degree of complexity with which these alternatives can be constructed and their maximum potential benefit in terms of ridership growth are the major factors to be considered in these first two screens. Operating capacity is not being considered in the first two screens so that the maximum potential ridership benefits for each alternative can be identified. Penn Station-related data and information provided by the current operators will be used to assess the capacity and operating issues in the Penn Station complex as they relate to the *short-listed* Penn Station access alternatives. Based on this assessment, the short-listed alternatives will be refined, within the context of the Study's goals and objectives, to reflect Penn Station conditions and potential opportunities. The analyses will be coordinated with other concurrent studies pertaining to Penn Station and, through the Study's interagency coordination activities, with the current operators in Penn Station.

2. Initial Screening Criteria

The purpose of the initial screening analysis is to qualitatively assess each preliminary alternative's strengths and weaknesses relative to the fundamental goals and objectives of the Study. Four screening criteria were defined for this purpose and are listed in Table 1, below. Each of these criteria is equally applicable to different modal options, without bias towards one or against another.

Table 1
Initial Screening Criteria

Criterion 1	An alternative must have the theoretical capability to *improve access* between Penn Station and the Metro-North service area by reducing travel time and/or the need for transfers.
Criterion 2	An alternative must be theoretically *operationally and physically feasible*.
Criterion 3	An alternative must be theoretically capable of being implemented principally with *existing infrastructure* and/or committed infrastructure improvements.
Criterion 4	An alternative must substantially support public transportation, economic, and environmental policies and goals to *enhance transit* and reduce single-occupant-auto travel.

Each of the preliminary alternatives was assessed qualitatively to identify its likely strengths and/or weaknesses, relative to each of the defined criteria. The alternatives were evaluated individually, without comparison to other preliminary alternatives, as the purpose of the initial screening is to assess a given alternative's fundamental feasibility and reasonableness for improving Penn Station access. Assessments were made on the basis of knowledge of the region's existing transportation system; programmed and committed transportation initiatives and projects that would be in place in the future; and regional initiatives and goals pertaining to enhanced transit use and reduced reliance on single-occupant-vehicle travel.

Alternatives that, on balance, have more pronounced strengths than weaknesses relative to the defined criteria are recommended for further study, as intermediate alternatives. Conversely, alternatives that, on

balance, have more pronounced weaknesses than strengths are not recommended for advancing to the next stage of screening. Several of the alternatives not recommended for further study have significant merit, separate from this Study, and are either currently being evaluated in other ongoing studies or may be in the future.

As part of the initial screening evaluation, the Study's Technical Advisory Committee (TAC) was convened in April 2000 to provide input on each alternative's strengths and weaknesses. TAC members were provided with Study materials documenting the preliminary alternatives and the initial screening methodology, criteria, and assumptions. Each TAC member was also provided with a set of worksheets, one for each alternative, on which to note each alternative's strengths and weaknesses relative to the criteria. TAC comments were received verbally and in writing at the TAC meeting, and via correspondence after the meeting. Preliminary results of the initial screening evaluation were reviewed with the TAC at a meeting in October 2000, and were also discussed at an October 2000 meeting of the Study's Community Liaison Committee.

C. PRELIMINARY ALTERNATIVES

Preliminary Penn Station access alternatives were identified and defined based on knowledge of the region'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; review of alternatives presented in previous and ongoing studies; and public and agency input received during the MIS/DEIS scoping process. While No-build and transportation system management (TSM) alternatives were also defined, they were not subjected to the initial screening evaluation. They will be advanced through all stages of the alternatives evaluation process, consistent with Federal Transit Administration guidance for Major Investment Studies.

Following the MIS principle that each potentially reasonable and feasible mode for achieving the stated goals and objectives should be considered, the list of preliminary build alternatives includes both Metro-North service options and non-commuter-rail options for improving Penn Station access from the Metro-North east-of-Hudson service area. The preliminary Penn Station access alternatives were categorized as follows:

- commuter rail alternatives with direct connection to Penn Station;
- commuter rail alternatives with access to Penn Station via Grand Central Terminal;
- commuter rail alternatives with indirect access to Penn Station; and
- other mode alternatives, including bus, light rail, subway, ferry, and roadway options.

Table 2 lists the preliminary Penn Station access alternatives that were identified for the initial screening evaluation. The alternatives were described in the Preliminary Alternatives Technical Memorandum, dated March 2000. Each of the alternatives was defined at sketch level, appropriate to and sufficient for the initial qualitative screening evaluation. As noted earlier, the preliminary alternatives were defined without consideration of Penn Station capacity issues and constraints, which will be addressed in the third, detailed phase of evaluation of short-listed alternatives, using data and information provided by the Station's current operators.

In this initial screening phase, alternatives were identified as independent, discrete options for addressing an objective for a specific market. Based on the results of the initial screening, certain of the alternatives that will be advanced for further consideration can be combined to address multiple objectives for multiple travel markets (as described below in Section D.2).

Table 2
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. *Potential new station locations along a given alternative's alignment were not considered in the initial screening analysis, but will be addressed in subsequent phases of the alternatives development and evaluation process.*
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 2
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. *Potential new station locations along a given alternative's alignment were not considered in the initial screening analysis, but will be addressed in subsequent phases of the alternatives development and evaluation process.*
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).*

D. RESULTS OF THE INITIAL SCREENING EVALUATION

1. Summary

Table 3 summarizes the findings of the initial screening evaluation. Each criterion for which a given alternative exhibits some degree of strength is noted by a checkmark. Blank cells indicate an alternative's weakness in terms of the particular criterion.

On the basis of this qualitative screening, five of the preliminary build alternatives are recommended for further, more detailed definition and comparative screening analysis. These are identified in the last column of Table 3. The justification and rationale for advancing these five alternatives for further study and not advancing the others is presented below, in Sections D.2 and D. 3, respectively.

2. Alternatives Advanced for Further Consideration

Six of the preliminary alternatives will be advanced for further study, either in combination with another of the preliminary alternatives and/or independently. The following text identifies the resultant intermediate alternatives and provides the rationale for their advancement to the comparative screening phase of evaluation.

Alternative 3. Peak-Period Hudson Line Service to/from Penn Station via the Empire Connection between Riverdale and Penn Station

This alternative would improve travel time and provide a one-seat ride between the Metro-North service area and Penn Station by providing service via direct connection between the Metro-North Hudson Line and the Amtrak Empire Connection at Spuyten Duyvil. It is both operationally and physically feasible, and would use existing infrastructure to make the connection between the Hudson Line and Empire Connection alignments. By providing improved commuter rail access to Penn Station, this alternative would enhance transit service for the Metro-North service area. More broadly, this alternative would improve the region's transportation connectivity by providing improved access to Amtrak, Long Island Rail Road (LIRR), New Jersey Transit (NJTransit), and New York City Transit (NYCT) services available at Penn Station.

Alternative 4A. Peak-Period Harlem Line Service to/from Penn Station via the Hudson Line and Empire Connection

This alternative would improve access between the Metro-North service area and Penn Station by eliminating the need for a transfer and thus providing a direct, one-seat ride. It is both operationally and physically feasible. While primarily using existing infrastructure, i.e., Harlem and Hudson Line and Empire Connection tracks, it would require track reconstruction at Spuyten Duyvil to connect the Hudson and Harlem Line track alignments. This alternative would enhance transit service for the Metro-North service area and also improve regional connectivity by improving access to Amtrak, LIRR, NJTransit, and NYCT services available at Penn Station.

Alternative 5. Peak-Period New Haven Line Service to/from Penn Station via the Hell Gate Line between New Rochelle and Penn Station

Alternative 5 would improve Penn Station access by providing a direct, one-seat ride and improving travel time between the Metro-North service area and Penn Station by providing service via direct connection between the Metro-North New Haven Line and the Amtrak Hell Gate Line at New Rochelle. It is both operationally and physically feasible, and would use existing infrastructure to make the connection between the New Haven and the Hell Gate Line track alignments. This alternative would both enhance transit service for the Metro-North service area and improve regional connectivity by improving access to Amtrak, LIRR, NJTransit, and NYCT services available at Penn Station.

Table 3
Summary of Initial Screening Results

Alternative		Improved Access	Operationally and Physically Feasible	Principally Existing Infrastructure	Supports Transit Policies & Goals	Disposition of Alternatives
No.	**Name**					
3	Peak-Period Hudson Line Service via the Empire Connection	✓	✓	✓	✓	Combined with Alt. 6 and advanced
4A.	Peak-Period Harlem Line Service via Hudson Line and Empire Connection	✓	✓	✓	✓	Combined with Alt. 7A and advanced
4B.	Peak-Period Harlem Line Service via New Haven and Hell Gate Lines	✓			✓	Not Advanced
4C.	Peak-Period Harlem Line Service via Port Morris Branch and Hell Gate Line	✓			✓	Not Advanced
5.	Peak-Period New Haven Line Service via the Hell Gate Line	✓	✓	✓	✓	Combined with Alt. 8 and advanced
6.	Off-Peak Hudson Line Service via Empire Connection	✓	✓	✓	✓	Advanced; also combined with Alt. 3
7A.	Off-Peak Harlem Line Service via Hudson Line and Empire Connection	✓	✓	✓	✓	Combined with Alt. 4A and advanced
7B.	Off-Peak Harlem Line Service via New Haven and the Hell Gate Lines	✓			✓	Not Advanced
7C.	Off-Peak Harlem Line Service via Port Morris Branch and the Hell Gate Line	✓			✓	Not Advanced
8.	Off-Peak New Haven Line Service via Hell Gate Line	✓	✓	✓	✓	Advanced; also combined with Alt. 5
9.	Tunnel from GCT to new West Side 34th Street Station	✓	✓		✓	Not Advanced (See Text)
10.	Metro-North to LIRR Territory for Connection to Penn Station		✓		✓	Not Advanced
11.	Metro-North Service to GCT via Hell Gate Line (2 variations) to Park Ave. Viaduct		✓		✓	Not Advanced
12.	Significantly Expanded Express Bus Service		✓	✓	✓	Not Advanced
13.	Significantly Expanded Ferry Service		✓		✓	Not Advanced
14.	Light Rail Transit from GCT to Penn Station	✓			✓	Not Advanced
15.	#7 Flushing Line Extension	✓	✓		✓	Not Advanced (See Text)
16.	Direct Subway Shuttle from GCT to Penn Station	✓	✓		✓	Not Advanced
17.	PATH Extension to GCT				✓	Not Advanced
18.	Highway Capacity Expansion		✓			Not Advanced

Alternative 6. Off-Peak/Weekend Hudson Line Service to/from Penn Station via the Empire Connection between Riverdale and Penn Station

This alternative would have the same strengths for each of the defined criteria as Alternative 3. Peak-Period Hudson Line Service via the Empire Connection, but would improve Penn Station access during non-peak, rather than peak, periods.

Alternative 7A. Off-Peak/Weekend Harlem Line Service to/from Penn Station via the Hudson Line and Empire Connection

As with Alternative 4A, which would provide peak-period Harlem Line service via the same connections, this alternative would improve Penn Station access by providing a direct, one-seat ride. Also as with the comparable peak-period alternative, construction of a track connection between the Harlem and Hudson Lines at Spuyten Duyvil would be necessary. However, unlike the peak-period Harlem Line alternative via this alignment, this off-peak service alternative's ridership potential would probably not justify the cost of infrastructure construction and property acquisition that would be necessary for its implementation. Therefore, this alternative has been advanced to be combined with Alternative 4A to create a full-day service alternative.

Alternative 8. Off-Peak/Weekend New Haven Line Service to/from Penn Station via the Hell Gate Line between New Rochelle and Penn Station

This alternative would have the same strengths for each of the defined criteria as Alternative 5. Peak-Period New Haven Line Service via the Hell Gate Line, but would improve Penn Station access during non-peak, rather than peak, periods.

Following the initial screening evaluations of these six preliminary alternatives, the peak and off-peak service options for the Hudson, New Haven, and Harlem Lines, respectively, were combined to create more comprehensive alternatives that would provide all-day service. The off-peak Hudson and New Haven Line service options were also advanced as independent alternatives (see Section E. NEXT STEPS).

3. Alternatives Not Advanced for Further Consideration

Fourteen of the preliminary alternatives will not be advanced for further consideration as options for improving access between the Metro-North service area and Penn Station because they did not satisfy one or more of the criteria specific to this Study (see Table 3). Nevertheless, as noted in the following discussion of the justification and rationale for not advancing each of these alternatives, several of them have significant merit, separate from this Study, and are either currently being evaluated in other contexts or may be in the future.

Alternative 4B. Peak-Period Harlem Line Service to/from Penn Station via the New Haven Line and Hell Gate Line

While this alternative would provide a direct, one-seat ride to/from Penn Station, it may increase travel time due to its circuitous routing via reverse-direction connections, first to the New Haven Line and, then, to the Hell Gate Line. This alternative would be physically feasible, though requiring construction of new connections from the Harlem Line southbound to the New Haven Line eastbound, and between the New Haven Line westbound and the Harlem Line northbound. Its operational feasibility is questionable, except at minimum service levels, as the turning radii of the required new track connections would limit train operating speeds, and the trains providing service to and from Penn Station would conflict with existing Grand Central Terminal-bound trains' operations. Construction of the necessary track connections would potentially adversely affect existing New York City parkland along the Bronx River Parkway and would require acquisition of an active industrial property to avoid taking of parkland.

Alternative 4C. Peak-Period Harlem Line Service to/from Penn Station via the Port Morris Branch and the Hell Gate Line

This alternative would improve Penn Station access from the Metro-North service area by providing a direct, one-seat ride but would increase the travel time between Penn Station and the service area due to the Port Morris connection. While physically feasible, this alternative would require extensive track construction and reconstruction in the Port Morris corridor, which is currently a single-track line. Track construction would also require re-design and re-construction of supports under a portion of elevated Melrose Avenue, and acquisition of up to two industrial properties. The alternative may not be operationally feasible, except at minimum service levels, as the turning radii of the connection between the Port Morris and Hell Gate Line portions of the alignment would limit train operating speeds.

Alternative 7B. Off-Peak/Weekend Harlem Line Service to/from Penn Station via the New Haven Line and Hell Gate Line

This alternative's strengths and weaknesses are the same as discussed, above, for Alternative 4B., the peak-period service alternative using this alignment. An additional weakness of this off-peak service alternative, however, is that the costs and potential parkland and acquisition impacts associated with its implementation would be incurred for fewer riders, as the ridership potential would be lower than for peak-period services.

Alternative 7C. Off-Peak/Weekend Harlem Line Service to/from Penn Station via the Port Morris Branch and the Hell Gate Line

This alternative's strengths and weaknesses are the same as discussed, above, for Alternative 4C., the peak-period service alternative using this alignment. Additionally, however, the costs and property acquisitions associated with track construction and reconstruction in the Port Morris corridor would be incurred for lower ridership than with the peak-period option.

Alternative 9. Extension of Metro-North Service to 34th Street/Penn Station via a New Tunnel between Grand Central Terminal and 34th Street/Penn Station

While this alternative would improve Penn Station access from the Metro-North service area by providing a direct, one-seat ride, it would require construction of significant new infrastructure. Penn Station access would be provided to a new, two-track platform Metro-North station at West 34th Street (just north of Penn Station); additional new infrastructure would include a new cross-town tunnel and a connection from the new station at West 34th Street to the existing Penn Station complex. Implementation of this alternative would be both at very high cost and over a long timeframe. While this alternative will not be advanced for further evaluation in this Study, the Access to the Region's Core (ARC) Study—sponsored by New Jersey Transit, the Port Authority of New York and New Jersey, and the Metropolitan Transportation Authority—is evaluating this alternative in the form of a new tunnel between Penn Station and Grand Central Terminal as an element of a larger-scale, more regional transportation improvement.

Alternative 10. Metro-North Service to/from Penn Station via Connection to LIRR

This alternative would provide service via the New Haven Line and Hell Gate Line, a newly constructed track connection to the LIRR Main Line, and transfer to LIRR trains at Jamaica Station to reach Penn Station. As this circuitous path would both increase travel time to Penn Station and still require a transfer, it would not improve travel between the Metro-North service area and Penn Station. While it would be physically and operationally feasible, its implementation would require significant new infrastructure to connect tracks to the LIRR Main Line. (While this alternative will not be advanced as an option for improving Penn Station access from the Metro-North service area, it may merit separate study to determine its possible utility and reasonableness for improving travel between Connecticut and Long Island.)

Alternative 11. Metro-North Service between New Rochelle and Grand Central Terminal via the Hell Gate Line

As this alternative would merely provide a new option for reaching Grand Central Terminal – via the Hell Gate Line to a new track connection either via the Port Morris Branch or existing freight tracks through the Harlem River Yards for ultimate connection to the Metro-North Main Line's Park Avenue viaduct – it would not improve access between the Metro-North service area and Penn Station. While it may be physically and operationally feasible, its implementation would require significant new infrastructure for the track connection between the New Haven and Metro-North Main Lines. (This alternative will not be advanced as an option for improving Penn Station access from the Metro-North service area but, as it would potentially enhance transit in the region, it may merit separate study as an option for improving access to Grand Central Terminal from the southeast Bronx.)

Alternative 12. Significantly Expanded Express Bus Services between Metro-North Service Area and the West Side of Manhattan and Penn Station

This alternative proposes peak-period express bus services from locations within the Metro-North service area, including from principal transfer sites at existing Metro-North stations, via bus priority or high-occupancy-vehicle (HOV) lanes on primary roadways, to Penn Station. Penn Station access would probably not be improved with this alternative as travel times, compared to other travel options, would be longer. As buses are not permitted on parkways, express buses receiving transfers at certain stations, e.g., Mount Vernon West on the Harlem Line, would be restricted to using circuitous routes to reach Penn Station. More direct routes would be possible if physical (i.e., clearance) and legal restrictions on bus use of parkways could be reversed. While this alternative would be physically feasible, its implementation would require creation of HOV lanes – either through conversion of general-purpose lanes to express bus or contra-flow lanes, or addition of HOV lanes -- and a signal prioritization system. These actions, while not necessarily requiring significant infrastructure modifications, would potentially exacerbate vehicular traffic congestion on the connecting roadways were general-purpose lanes to be converted to bus-priority lanes.

Alternative 13. Significantly Expanded Ferry Services between the Metro-North Service Area and the West Side of Manhattan

This alternative proposes greatly expanded express ferry services from locations in the Hudson and New Haven Lines' service areas to the West Side of Manhattan, via transfer from existing Metro-North stations to new ferry terminals on the Hudson River and Long Island Sound, respectively. Within Manhattan, exclusive bus shuttle services would be provided to/from the ferry terminals and the West Side. This alternative would require either one or two transfers and increase travel time. While potentially operationally and physically feasible, significant expansion of ferry services would require construction of new docking and passenger facilities near selected Metro-North transfer stations, as well as possible new ferry facilities in Manhattan.

Alternative 14. Light Rail Transit (LRT) Between Grand Central Terminal and Penn Station

This alternative's ability to improve access between Penn Station and the Metro-North service area is uncertain; cross-town travel times may not be reduced unless the LRT is in a dedicated right-of-way, and transfer between modes would still be necessary. Its operational feasibility is questionable, as it would require implementation of an entirely new transit mode, with associated operational and institutional mechanisms, in Midtown Manhattan. While probably physically feasible, it would require construction of significant new infrastructure, at high cost with a long development timeframe. While supportive of transit-enhancement policies and goals, a LRT line in Midtown Manhattan would be potentially disruptive of vehicular traffic flows and exacerbate traffic congestion.

Alternative 15. Extension of #7 (Flushing Subway) Line to Penn Station

This alternative proposes Penn Station access via transfer at Grand Central Terminal to the #7 subway line, which would be physically extended from its current terminus at Times Square westward to Eighth Avenue, and then southward beneath the existing Eighth Avenue subway tunnel (used by the A, C, and E lines), to Penn Station. This alternative would not reduce transfers and may not reduce travel time between the Metro-North service area and Penn Station. While operationally and physically feasible and supportive of transit-enhancement policies and goals, its implementation would require construction of significant new infrastructure for the subway line's extension, at very high cost and with a long development timeframe. While this alternative will not be advanced for further study as a Penn Station access alternative, the extension of the #7 subway line is under separate study, by New York City Transit, as a potential access enhancement for the West Side of Manhattan.

Alternative 16. Direct Subway Shuttle between Grand Central Terminal and Penn Station via a New Tunnel

This alternative would improve access between the Metro-North service area and Penn Station by reducing travel time, although still requiring a transfer. While this alternative may be operationally and physically feasible and is transit-supportive, its implementation would require significant new infrastructure at very high cost and with a long development timeframe, i.e., construction of a new subway tunnel in new right-of-way for a direct shuttle connection between Grand Central Terminal and Penn Station.

Alternative 17. PATH Extension to Grand Central Terminal

This alternative, proposing extension of the 33rd Street PATH Line via new tunnel to a new station near Grand Central Terminal, would provide indirect Penn Station access from the Metro-North service area, as the 33rd Street PATH station is one block from Penn Station. It may increase travel time, compared to existing options, and would still require a transfer. While this alternative may be both operationally and physically feasible and is transit-supportive, its implementation would require significant new infrastructure at very high cost and over a long development timeframe.

Alternative 18. Highway Capacity Expansion between Metro-North Service Area and West Side of Manhattan and Penn Station

Capacity expansion of various roadways between the Metro-North service area and the West Side and Penn Station could include addition of general purpose and/or special use lanes, and/or implementation of Intelligent Transportation System and Advanced Vehicle Control System technologies beyond improvements that are already programmed for implementation. While this alternative may reduce travel time in certain corridors, and thereby improve Penn Station access, overall existing and projected traffic conditions are anticipated to remain congested. This alternative is operationally and physically feasible, but fundamentally contrary to public policies and goals that seek to enhance transit use and reduce single-occupant-vehicle travel in the region. As Midtown Manhattan is an air-quality non-attainment area, increased traffic congestion would further exacerbate air quality conditions. Highway capacity expansion would require significant infrastructure improvements, with potentially significant property acquisition requirements and adverse environmental effects.

E. NEXT STEPS

On the basis of the initial screening evaluation, five intermediate alternatives will be considered in the next phase. As these alternatives represent the combination of several of the preliminary alternatives, they have been renumbered for ease of reference. The originally defined Hudson, New Haven, and

Harlem Line peak-period alternatives have been refined and optimized by combining them with their off-peak service counterparts. Therefore, intermediate Alternatives 1, 2, and 3 represent full-day service options between the Hudson, New Haven, and Harlem Line service areas, respectively, and Penn Station and the West Side of Manhattan. Based on the initial screening evaluations, the off-peak/weekend service options have also been advanced as separate alternatives for the Hudson and New Haven Lines. As off-peak/weekend ridership potential on the Harlem Line, via connection to the Hudson Line and Empire Connection, would not likely justify the infrastructure improvements required for implementation of only off-peak/weekend service, it will not be carried forward as a separate alternative.

The intermediate alternatives are as follows:

- **Alternative 1. Weekday Hudson Line Service via Empire Connection**
- **Alternative 1A. Off-Peak and Weekend Hudson Line Service via Empire Connection**
- **Alternative 2. Weekday New Haven Line Service via Hell Gate Line**
- **Alternative 2A. Off-Peak and Weekend New Haven Line Service via Hell Gate Line**
- **Alternative 3. Weekday Harlem Line Service via Hudson Line and Empire Connection**

Each of these intermediate alternatives will be defined in greater detail, sufficient to permit comparative evaluation among them, in terms of alignment, operating and service characteristics, and infrastructure requirements. The alternatives' service plans will be designed to reflect service levels similar to those provided by Metro-North to/from Grand Central Terminal, as a representation of "desirable" service, without consideration of capacity constraints at Penn Station and its approaches, and the operational constraints imposed by other services on portions of the same infrastructure. Consequently, the ridership forecasted for each intermediate alternative will represent *potential* patronage, for purposes of comparing the alternatives' potential optimum ridership benefits. Penn Station capacity constraints and operational issues will be addressed in the final, detailed definition and evaluation of alternatives that are advanced after the next, comparative screening, and will use data and information provided by the current operators at Penn Station.

The screening evaluation of the intermediate alternatives will compare the alternatives against a broader set of criteria and related qualitative and quantitative measures. The alternatives will also be compared against each other to determine which would provide benefits most cost-effectively and with the least potential adverse effects. The criteria will address the following:

- travel time;
- ridership potential;
- initial capital costs;
- initial operating costs;
- engineering feasibility and constructibility; and
- potential key social, economic, and environmental impacts.

In a separate but related screening evaluation, the potential introduction of one or more new stations along Penn Station access alternative alignments will be evaluated to identify those that may be reasonable and feasible. The criteria against which potential new station locations will be assessed will address a station location's physical and construction feasibility; potential ridership benefits; potential adverse social, economic, and environmental effects; and station siting and design considerations.

Results of the comparative screening analysis of the intermediate alternatives and related, potential new station(s) will be presented in a series of matrices and documented in the Intermediate Alternatives

Screening Report. Alternatives, including any new intermediate station(s), which warrant comprehensive investigation, will be recommended for the final phase of the process, leading to selection of a locally preferred alternative.