

Chapter	Title	Page
1	Introduction	1-1
1.1	Background.....	1-1
1.1.1	Project Study Area.....	1-1
1.1.2	Purpose and Need.....	1-2
1.1.3	Notice of Intent and Alternatives Analysis.....	1-2
1.1.4	Revised Notice of Intent.....	1-4
1.1.5	Tiered Analysis Approach.....	1-4
1.1.6	Level 3 Screening.....	1-4
1.1.7	Mode Alternatives/Options Under Study.....	1-4
1.2	Public Involvement Process.....	1-6
1.2.1	Briefings and Meetings.....	1-6
1.2.2	Project Web Site.....	1-7
1.2.3	Community Outreach Centers.....	1-7
1.2.4	Stakeholder Advisory Working Groups.....	1-7
1.2.5	Scoping Meetings.....	1-7
1.3	Existing Travel Patterns.....	1-8
1.3.1	Journey-to-Work Patterns of Rockland County Residents.....	1-8
1.3.2	Journey-to-Work Patterns of Westchester County Residents.....	1-10
1.3.3	Journey-to-Work Patterns of Orange County Residents.....	1-13
1.3.4	Key Corridor Markets.....	1-14
2	Bus Rapid Transit in the Corridor	2-1
2.1	Description of BRT Systems.....	2-1
2.1.1	Types of Transitway.....	2-2
2.1.2	Key Vehicle Concepts.....	2-3
2.1.3	Key Station Concepts.....	2-4
2.1.4	Intelligent Transportation System (ITS) Components.....	2-5
2.1.5	US Cities with BRT or BRT Projects.....	2-6
2.2	Application of BRT Technology to the TZB/I-287 Corridor.....	2-8
2.3	Description of BRT Alternatives/Options.....	2-9
2.3.1	Alternative 3 – Full-Corridor BRT.....	2-9
2.3.2	Description of Option 3A.....	2-14
2.3.3	Description of Option 3B.....	2-14
3	Light Rail Transit in the Corridor	3-1
3.1	Description of LRT Systems.....	3-1
3.1.1	Types of Guideway.....	3-2
3.1.2	Key Vehicle Concepts.....	3-3

Chapter	Title	Page
3.1.3	Key Station Concepts.....	3-4
3.1.4	ITS Components.....	3-4
3.2	Application of LRT Technology to the Tappan Zee Bridge/I-287 Corridor.....	3-4
3.3	Description of the LRT Alternatives/Options.....	3-5
3.3.1	Full-Corridor LRT.....	3-5
3.3.2	Option 4B – LRT in Westchester.....	3-11
4	Commuter Rail Transit in the Corridor	4-1
4.1	Description of CRT Systems.....	4-2
4.1.1	Types of Guideway, Grades, and Geometry.....	4-3
4.1.2	Key Vehicle Concepts.....	4-4
4.1.3	Key Station Concepts.....	4-5
4.1.4	ITS Components.....	4-6
4.2	Application of CRT Technology to the Tappan Zee Bridge/I-287 Corridor.....	4-6
4.2.1	Technology.....	4-6
4.2.2	System Connectivity.....	4-6
4.3	Description of CRT Alternatives/Options.....	4-6
4.3.1	Alternative 4A.....	4-6
4.3.2	Option 4A-X.....	4-10
4.3.3	Alternative 4B.....	4-11
4.3.4	Alternative 4C.....	4-11
4.3.5	Option 4D.....	4-11
5	Transportation Evaluation	5-1
5.1	Transportation Demand Modeling.....	5-1
5.1.1	BPM Structure.....	5-1
5.1.2	No Build.....	5-3
5.1.3	Coding of Alternatives/Options.....	5-3
5.2	Transit Ridership.....	5-5
5.2.1	Criterion.....	5-5
5.2.2	Comparison of Transit Modes.....	5-6
5.3	Transit Travel Time.....	5-10
5.3.1	Description of Criterion.....	5-10
5.3.2	Comparison of Transit Modes.....	5-11
5.4	Capacity.....	5-15
5.4.1	Description of Criteria.....	5-15
5.4.2	Comparison of Transit Modes.....	5-16
5.5	Roadway Congestion.....	5-16
5.5.1	Description of Criteria.....	5-16
5.5.2	Comparison of Transit Modes.....	5-16
5.6	Summary.....	5-17

Chapter	Title	Page
6	Environmental Evaluation	6-1
6.1	Consistency with Land Use Plans.....	6-1
6.1.1	Description of Criterion	6-1
6.1.2	Comparison of Transit Modes	6-1
6.2	Residential and Commercial Acquisitions/Displacements	6-1
6.2.1	Description of Criterion	6-1
6.2.2	Comparison of Transit Modes	6-1
6.3	Transit-Oriented Development (TOD) Potential	6-2
6.3.1	Description of Criterion	6-2
6.3.2	Comparison of Transit Modes	6-2
6.4	Wetlands	6-2
6.4.1	Description of Criterion	6-3
6.4.2	Comparison of Transit Modes	6-3
6.5	Parklands.....	6-3
6.5.1	Description of Criterion	6-3
6.5.2	Comparison of Transit Modes	6-3
6.6	Historic and Archaeological Resources	6-4
6.6.1	Description of Criterion	6-4
6.6.2	Comparison of Transit Modes	6-5
6.7	Hudson River Habitat Disturbance	6-6
6.7.1	Description of Criterion	6-6
6.7.2	Comparison of Transit Modes	6-7
6.8	Air Quality	6-7
6.8.1	Description of Criterion	6-7
6.8.2	Comparison of Transit Modes	6-7
6.9	Energy/Greenhouse Gases	6-8
6.9.1	Description of Criterion	6-8
6.9.2	Comparison of Transit Modes	6-8
6.10	Summary of Environmental Evaluation.....	6-9

Chapter	Title	Page
7	Cost Evaluation	7-1
7.1	Capital Cost.....	7-1
7.1.1	Description of Criterion	7-1
7.1.2	Comparison of Transit Modes	7-2
7.2	Annual Operating Costs.....	7-4
7.2.1	Description of Criterion	7-4
7.2.2	Comparison of Transit Modes	7-4
7.3	Fare Revenue	7-5
7.3.1	Description of Criterion	7-5
7.3.2	Comparison of Transit Modes	7-5
7.4	Cost/Net Cost Per Passenger and Passenger-Mile	7-5
7.4.1	Description of Criteria	7-5

Chapter	Title	Page
7.4.2	Comparison of Transit Modes	7-6
7.5	Travel Time Benefits	7-6
7.5.1	Description of Criterion.....	7-6
7.5.2	Comparison of Transit Modes	7-7
7.6	Summary of Cost Evaluation.....	7-7

Chapter	Title	Page
8	Transit Mode Evaluation and Recommendation	8-1
8.1	Planning Context	8-1
8.2	Transportation Criteria.....	8-2
8.2.1	Ridership on New Transit Services	8-2
8.2.2	Travel Time Benefits	8-2
8.3	Environmental Criteria	8-3
8.4	Cost Criteria.....	8-3
8.4.1	Capital Costs.....	8-3
8.4.2	Operating Costs and Fare Revenues	8-4
8.4.3	Cost per Passenger and Passenger-Mile	8-4
8.5	Recommendation	8-5
8.6	Transit Components to be Studied in the DEIS.....	8-6

Chapter	Title	Page
9	References	9-1

Chapter	Title	Page
Appendix A	BPM Model Inputs	A-1

List of Figures

Chapter	Title	Page
1-1	Tappan Zee Bridge/I-287 Corridor	1-1
1-2	Corridor-Wide Scenarios	1-3
1-3	Alternatives/Options	1-5
1-4	Work Destinations of Rockland Residents	1-8
1-5	Major Intra-Rockland Work Journeys Crossing the I-287 Corridor	1-9
1-6	Work Destinations of Westchester Residents	1-11
1-7	Major Intra-Westchester Work Journeys within the I-287 Corridor	1-12
1-8	Residential Origins of White Plains Workers	1-12
1-9	Work Destinations of Orange Residents	1-14
2-1	BRT Range of Options	2-1
2-2	BRT Service Concept	2-2
2-3	BRT Propulsion Systems	2-4
2-4	US BRT Systems	2-6
2-5	East Bay BRT Berkeley to San Leandro Route	2-6
2-6	East Bay BRT Cross Section	2-6
2-7	Pittsburgh West Busway	2-6
2-8	Pittsburgh M.L. King East Busway	2-7
2-9	Pittsburgh South Busway	2-7
2-10	Dual Hub (Euclid) Corridor BRT Route	2-7
2-11	Houston Busway/HOV Network	2-8
2-12	Houston Remote Park and Ride Lots	2-8
2-13	Alternative 3 – Full-Corridor Bus Rapid Transit in Rockland County	2-10
2-14	Alternative 3 – Full-Corridor Bus Rapid Transit in Westchester County	2-11
2-15	Key Destinations and Walk Distances in White Plains	2-13
2-16	BRT White Plains Alignment Option 1	2-13
2-17	BRT White Plains Alignment Option 3	2-13
2-18	Option 3A – Full-Corridor Bus Rapid Transit in Rockland County	2-16
2-19	Option 3A – Full-Corridor Bus Rapid Transit in Westchester County	2-17
2-20	Alternative 3B – Full-Corridor Bus Rapid Transit in Rockland County	2-18
2-21	Alternative 3B – Full-Corridor Bus Rapid Transit in Westchester County	2-19
3-1	Range of Options Available for LRT	3-1
3-2	Typical LRT In-Street Configurations	3-2
3-3	Full-Corridor Light Rail Transit in Rockland County	3-6
3-4	Full-Corridor Light Rail Transit in Westchester County	3-7
3-5	LRT White Plains Alignment Option 2	3-10
3-6	LRT White Plains Alignment Option 4	3-10
3-7	LRT White Plains Alignment Option 5	3-10
3-8	LRT White Plains Alignment Option 12	3-10
4-1	MTA Metro-North Railroad Map	4-1
4-2	Typical Guideway Segment	4-3
4-3	Alternative 4A-4B-4C Full-Corridor Commuter Rapid Transit in Rockland County	4-8
4-4	Alternative 4A – Full-Corridor Commuter Rapid Transit in Westchester County	4-9

List of Figures (con't)

Number	Title	Page
4-5	Alternative 4B – Manhattan-Bound Commuter Rail Transit with Light Rail Transit in Westchester County	4-12
4-6	Alternative 4C – Manhattan-Bound Commuter Rail Transit with Bus Rapid Transit in Westchester County	4-13
4-7	Option 4D – Manhattan-Bound Commuter Rail Transit with Cross Corridor Bus Rapid Transit in Rockland County	4-14
4-8	Option 4D – Manhattan-Bound Commuter Rail Transit with Cross Corridor Bus Rapid Transit in Westchester County	4-15
5-1	BPM Study Area	5-1
5-2	Zone Structure in the Corridor	5-2
5-3	BPM Flow Chart	5-2
5-4	CRT Route Coding	5-4
5-5	Light Rail Route Coding	5-4
5-6	BRT Route Coding	5-5
5-7	Daily Transit Ridership on New Service (Weekday)	5-8
5-8	Commuter Rail Sheds from Orange County (Alternatives 4A, 4B, 4C)	5-12
5-9	Commuter Rail Sheds from Spring Valley (Alternatives 4A, 4B, 4C)	5-13
5-10	Commuter Rail Sheds to Rockefeller Center (East Side)	5-13
5-11	Commuter Rail Sheds to Rockefeller Center (West Side)	5-14
5-12	Commuter Rail Sheds to Empire State Building	5-14
7-1	Capital Cost Estimate	7-3
7-2	Capital Cost Estimate – Transit Split	7-3
8-1	Description of Alternatives/Options	8-1
8-2	Ridership on New Transit Service (2035)	8-2
8-3	Travel Time Savings (AM Peak Period, 2035)	8-2
8-4	Transit Mode Capital Cost Estimate (Year 2012 dollars)	8-3
8-5	Transit Annual Operating Costs and Fare Revenues (2035)	8-4

List of Tables

Number	Title	Page
1-1	Work Destinations of Rockland Residents	1-8
1-2	Distribution of Manhattan-Bound Work Journeys of Rockland Residents	1-9
1-3	Major Intra-Rockland Work Journeys Crossing the I-287 Corridor	1-10
1-4	Work Destinations of Westchester Residents	1-10
1-5	Distribution of Manhattan-Bound Work Journeys of Westchester Residents	1-11

List of Tables (con't)

Number	Title	Page
1-6	Leading Intra-Westchester Work Journeys within the I-287 Corridor	1-11
1-7	Residential Origins of White Plains Workers	1-13
1-8	Work Destinations of Orange Residents.....	1-13
1-9	Distribution of Manhattan-Bound Work Journeys of Orange Residents	1-14
1-10	Specific Markets Served by the Tappan Zee Corridor Based on 2000 Journey-to-Work.....	1-14
2-1	BRT Alignment Options in White Plains – Performance Summary.....	2-13
3-1	Summary of LRT Options in White Plains.....	3-9
5-1	Demographic Forecasts by County, 2005 and 2035	5-3
5-2	Daily Transit Trips for Selected Major Markets (Weekday)	5-7
5-3	Daily Transit Ridership on New Service (Weekday).....	5-9
5-4	Transit Accessibility, West of Hudson	5-9
5-5	AM Peak Passenger Miles (Thousands of Miles).....	5-10
5-6	AM Peak Travel Time, Selected Trip Pairs (Minutes)	5-10
5-7	AM Peak Travel Time Savings, Selected Trip Pairs (Minutes).....	5-11
5-8	AM Peak Transfers, Selected Trip Pairs.....	5-11
5-9	Distribution of Manhattan Jobs by Best Commuter Rail Station from Orange County, Alternatives 4A, 4B, 4C (2035)	5-12
5-10	Aggregate Travel Time Savings (Hours in the Peak Period [6-10AM]).....	5-15
5-11	Transportation Criteria – Capacity (2035).....	5-16
5-12	Transportation Criteria – Roadway Congestion (2035).....	5-17
6-1	Displacements, Acquisitions, and Easements	6-2
6-2	Wetlands	6-3
6-3	Parklands.....	6-4
6-4	Historic and Archaeological Resources	6-6
6-5	Hudson River Habitat Disturbance	6-7
6-6	Mesoscale Air Emissions.....	6-8
6-7	Energy and Greenhouse Gases.....	6-9
7-1	Vehicle Equipment Capital Costs	7-2
7-2	Cost Per Revenue Vehicle Hour	7-4
7-3	Annual Operating Costs (2012)	7-5
7-4	Fare Revenue	7-5
7-5	Cost/Net Cost Per Passenger Per Passenger-Mile.....	7-6
7-6	Travel Time Savings	7-7
7-7	Cost Criteria – Project Costs.....	7-8
7-8	Cost Criteria – Transit Costs.....	7-8
8-1	Potential Environmental Impacts/Benefits.....	8-3
8-2	Cost/Net Cost per Passenger and Passenger-Mile	8-4
8-2	Summary Performance Ratings	8-5

List of Acronyms and Abbreviations

3A	Option 3A (Full-Corridor BRT) – Alternative 3 (full-corridor BRT in high-occupancy toll [HOT] lanes in Rockland) but with an enhanced service plan (including additional stations), extended dedicated bus lanes on Westchester Avenue, and connection to Port Chester Station. Option 3A includes both dedicated bus lanes as well as busways.
3B	Option 3B (Full-Corridor BRT) – combined HOT and BRT lanes in Rockland and a dedicated grade-separated busway across Westchester.
4A	Alternative 4A (Full-Corridor CRT) - as developed to date for the project, with a direct connection to the Hudson Line.
4A-X	Option 4A-X (Full-Corridor CRT) - as developed to date for the project, but without a direct connection to the Hudson Line. A new local Tarrytown Station at the Tappan Zee Bridge is assumed, with a shuttle bus connection to the existing Tarrytown Station.
4B	Alternative 4B (CRT/LRT) - as developed to date for the project, with CRT in Rockland with a direct CRT connection to the Hudson Line and LRT in Westchester.
4C	Alternative 4C (CRT/BRT) - as developed to date for the project, with CRT in Rockland with a direct CRT connection to the Hudson Line and BRT in Westchester.
4D	Option 4D (CRT/BRT) – CRT from Suffern with a direct connection to the Hudson Line and full-corridor BRT as per Option 3A above. However, the Airmont and Tappan Zee CRT Stations of Alternatives 4A, 4B, and 4C are eliminated.
AA	Alternatives Analysis
ACHP	Advisory Council on Historic Preservation
AGT	Automated Guideway Transit
APE	Area of Potential Effect
APTA	American Public Transportation Association
ARC	Access to the Region’s Core
AVL	Automated Vehicle Locator
BPM	Best Practice Model
BRT	Bus Rapid Transit
BTU	British Thermal Unit
CBD	Central Business District
CCTV	Closed-Circuit Television
CO	Carbon Monoxide
CO ₂	Carbon Dioxide
ConnDOT	Connecticut Department of Transportation
CRT	Commuter Rail Transit
CSI	Construction Specifications Institute

List of Acronyms and Abbreviations (con't)

DEIS	Draft Environmental Impact Statement
DMU	Diesel Multiple Unit
EIS	Environmental Impact Statement
EMU	Electric Multiple Unit
FHWA	Federal Highway Administration
FRA	Federal Rail Administration
FTA	Federal Transit Administration
GCT	Grand Central Terminal
GIS	Geographic Information System
GPS	Global Positioning System
GSP	Garden State Parkway
HAI	Household Auto-Journey
HOT	High-Occupancy Toll
HOV	High-Occupancy Vehicle
HOV+3	High-Occupancy Vehicle-3
ITS	Intelligent Transportation System
LRT	Light Rail Transit
MDSC	Mode Destination Stops Choice
MPO	Metropolitan Planning Organization
MTA	Metropolitan Transportation Authority
μm	micrometer
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHL	National Historic Landmark
NHPA	National Historic Preservation Act
NJT	New Jersey Transit
NO _x	Nitrogen Oxides
NOI	Notice of Intent
NRE	National Register Eligible
NRL	National Register Listed
NYC	New York City
NYMTC	New York Metropolitan Transportation Council
NYSDEC	New York State Department of Environmental Conservation
NYSDOT	New York State Department of Transportation
NYSHPO	New York State Historic Preservation Office
NYSM	New York State Museum
NYSTA	New York State Thruway Authority

List of Acronyms and Abbreviations (con't)

O ₃	Ozone
PAP	Pre-Assignment Processor
Pb	Lead
PM	Particulate Matter
PM ₁₀	Particulate Matter with Diameters up to 10 μm
PM _{2.5}	Particulate Matter with Diameters up to 2.5 μm
ROD	Record of Decision
ROI	Return on Investment
ROW	Right of Way
RRT	Rail Rapid Transit
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
SAWG	Stakeholder Advisory Working Group
SHPA	State Historic Preservation Act
SHPO	State Historic Preservation Office
SO ₂	Sulfur Dioxide
SOV	Single-Occupant Vehicle
TDM/TSM	Transportation Demand Management/Transportation Systems Management
TIP	Transportation Improvement Program
TOD	Transit-Oriented Development
TZB	Tappan Zee Bridge
USEPA	US Environmental Protection Agency
VMT	Vehicle Miles Traveled
WPTC	White Plains Transportation Center



BRT



LRT



CRT

