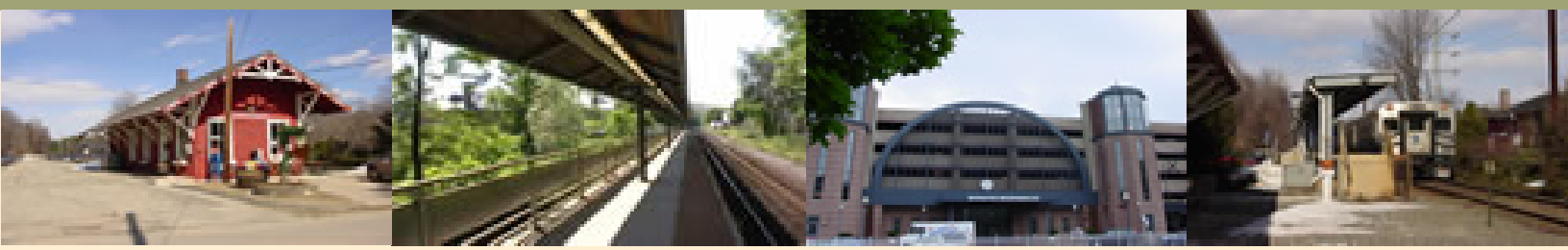
Feasibility Study Danbury Branch Electrification
Project No. 302-008

Washington Group International

Integrated Engineering, Construction, and Management Solutions



Task 5: Final Report

Volume 1

Executive Summary

May 2006

Connecticut Department of Transportation

Danbury Branch Electrification Study
Phase I

Executive Summary

May 1, 2006

PHASE I - TASK 5 – FINAL REPORT

EXECUTIVE SUMMARY

Study Background

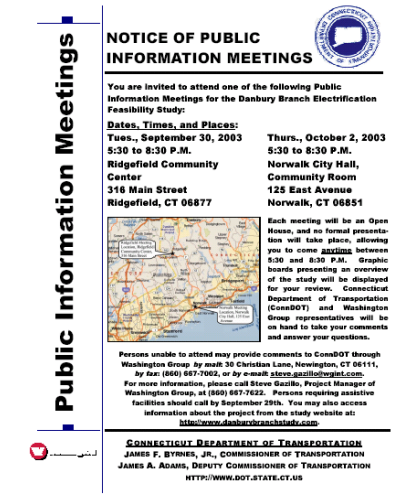
The Connecticut Department of Transportation (ConnDOT) is undertaking the Danbury Branch feasibility study to examine the needs of and identify potential improvements to the New Haven Line's commuter rail branch line service between Norwalk and Danbury. A Congressional earmark has provided the funding for the study, which has been divided into two phases. Phase I identified, reviewed, and evaluated a range of preliminary improvement alternatives to the Branch, including electrification, addition of passing sidings, extension of service to New Milford, and track realignment modifications. Phase II will address the development of an enhancement implementation plan, which will further evaluate five candidate alternatives selected from the Phase I analysis.

Phase II will constitute an environmental impact analysis and documentation for the proposed action(s) following the National Environmental Policy Act (NEPA) and Connecticut Environmental Policy Act (CEPA) processes. The overall goal of the study is to develop a single implementation plan that would be advanced to final design/engineering. This plan may consist of more than one of the candidate alternatives: a phased implementation approach may be considered, with near-term components being implemented as soon as possible and more complex components being implemented later. Such an implementation plan would consider the ability to fund each component.

This document is the Executive Summary of the Final Report for the *Feasiblity Study Danbury Branch Electrification*, Phase I. (The complete Phase I study report and all associated technical documents can be obtained by contacting the Danbury Branch Study Team, c/o Washington Group International, Inc., 30 Christian Lane, Newington, CT 06111 or by downloading it from the project website at http://www.danburybranchstudy.com) Phase I of the study consisted of five tasks:

- Task 1 – Public Outreach and Purpose and Need Report
- Task 2 – Evaluation of Engineering Alternatives
- Task 3 – Ridership Forecasting
- Task 4 – Evaluation of the Impact of Electrification
- Task 5 – Final Report

The study area corridor covers 23.6 miles of existing single-track railroad between South Norwalk and Danbury, which is owned by


Public Information Meetings

NOTICE OF PUBLIC INFORMATION MEETINGS

You are invited to attend one of the following Public Information Meetings for the Danbury Branch Electrification Feasibility Study:

Dates, Times, and Places:

Tues., September 30, 2003
5:30 to 8:30 P.M.
Ridgefield Community Center
316 Main Street
Ridgefield, CT 06877

Thurs., October 2, 2003
5:30 to 8:30 P.M.
Norwalk City Hall, Community Room
125 East Avenue
Norwalk, CT 06851

Each meeting will be an Open House, and no formal presentation will take place, allowing you to come anytime between 5:30 and 8:30 P.M. Graphic boards presenting an overview of the study will be displayed for your review. Connecticut Department of Transportation (ConnDOT) and Washington Group representatives will be on hand to take your comments and answer your questions.

Persons unable to attend may provide comments to ConnDOT through Washington Group *by mail:* 30 Christian Lane, Newington, CT 06111, *by fax:* (860) 667-7002, *or by e-mail:* steve.gazillo@wgint.com. For more information, please call Steve Gazillo, Project Manager of Washington Group, at (860) 667-7622. Persons requiring assistive facilities should call by September 29th. You may also access information about the project from the study website at: http://www.danburybranchstudy.com

CONNECTICUT DEPARTMENT OF TRANSPORTATION
JAMES F. BYRNES, JR., COMMISSIONER OF TRANSPORTATION
JAMES A. ADAMS, DEPUTY COMMISSIONER OF TRANSPORTATION
HTTP://WWW.DOT.STATE.CT.US

Public meetings and an active website highlighted some of the Phase I public involvement activities. The project website is www.danburybranchstudy.com

ConnDOT, and 14.3 miles of existing single-track railroad between Danbury and New Milford, which is owned by the Housatonic Railroad Company, Inc. MTA Metro-North Railroad, the nation's second largest commuter rail system, currently provides commuter rail service for ConnDOT. Stops on the existing branch are at South Norwalk, Merritt 7, Wilton, Cannondale, Branchville, Redding, Bethel and Danbury. Two freight companies operate limited service on the branch: the Housatonic Railroad and the Providence and Worcester Railroad.

TASK 1 –PUBLIC OUTREACH AND PURPOSE AND NEEDS REPORT

Public Outreach Plan

A Public Outreach Plan was developed at the study outset to underline the importance of public involvement and establish a road map for effective communication throughout the study. The goals of the Public Outreach Plan are:

- Establish effective communication with the public
- Encourage early and continuing pubic participation
- Present complete information to the public
- Determine public sentiment

A Study Advisory Committee was formed to participate as a steering committee throughout the study process. Study Advisory Committee members consist of representatives of the two regional planning agencies in the Corridor—the South Western Regional Planning Agency (SWRPA) and the Housatonic Valley Council of Elected Officials (HVCEO). In addition, the first elected official or their designated representative from each community within the study corridor was invited to participate, along with representatives of MTA Metro-North Railroad, Housatonic Area Regional Transit (HART), and the local rail freight operators. A complete listing of members is available in the Public Outreach Plan section of the Task 1 Report. Five Study Advisory Committee meetings and four Public Meetings were held during the course of Phase I and the committee will continue through Phase II. A project website, linked to the Connecticut DOT, (http://www.danburybranchstudy.com) was established and will be continued through Phase II.

Data Collection and Review

As a first step in this study, a review of all previous studies in the Route 7 Corridor and an updating of rail valuation maps were performed. A total of eight studies were reviewed, the most recent being the Route 7 Travel Options Implementation Plan completed in 2000. This study recommended commuter rail service improvements to the Danbury Branch, bus/shuttle service enhancements, and

The Genesis locomotive is the primary diesel electric equipment currently used on the Branch.

strategies to increase ridership. A complete listing and summary of all eight studies related to Danbury Branch improvements was posted on the project website and presented in the Phase I Purpose and Needs section of the Task 1 Report. Data collection efforts focused on current schedules, maintenance, crew requirements, and equipment storage. Input also was received from Metro-North Railroad, the Housatonic Railroad, Providence & Worcester Railroad and ConnDOT's real estate and rail operations divisions.

Purpose and Need

This study is being conducted to address two regional concerns: of primary concern is automobile congestion in the Route 7 and other adjacent north/south corridors; a second concern is the diversion of Connecticut rail commuters to the Harlem Line in New York. The purpose of Phase I was to develop and evaluate a range of infrastructure and service improvements on the Danbury Branch to determine their potential to significantly enhance the Branch's attraction as a competitive alternative to driving in the Route 7 and other adjacent north/south corridors. In addition, Phase I was to determine whether service on the Branch could be improved sufficiently to attract riders now commuting on the Harlem Line.

The results of the Danbury Branch Study will be incorporated into a comprehensive statewide commuter rail and transit plan, which will establish statewide priorities for transit improvements. Funding needs and opportunities as well as economic benefits will be identified in the plan. The future statewide transit plan will include the Connecticut Transportation Strategy Board's study of the Waterbury and New Canaan Branches, the Danbury Branch, as well as the New Haven-Hartford-Springfield line.

Need to Relieve Traffic Congestion in Route 7 Corridor

The Route 7 corridor between Norwalk and New Milford serves as a link between high-density employment areas and rapidly growing residential communities. Job growth is concentrated at the southern end of the corridor in Stamford, Greenwich, and Norwalk and residential growth is concentrated in the northern end of the corridor in Bethel, Brookfield, and New Milford. Strong job growth is projected along the I-95 highway corridor.[1] Route 7 traffic volumes far exceed intended capacity, and even with planned improvements, the ability to provide additional highway capacity is constrained by a number of issues including impacts on businesses, homes and the environment.[2]

Typical weekday southbound on Route 7 in Danbury around 8:30 AM.

Photo: Jack Deering, Bethel, CT.

[1] Source: *"Route 7 Corridor Travel Options Implementation Plan" published by Housatonic Valley Council of Elected Officials and South Western Regional Planning Agency, September 2000.*
[2] Source: Ibid.

A viable approach to relieving traffic demands is to improve and expand upon the corridor's existing public transportation resources, including the Danbury Branch commuter rail service, which runs parallel to Route 7.

Attractiveness of the Danbury Branch

Current Danbury Branch service offers three morning and three evening peak hour trains providing direct service from Danbury to Grand Central Terminal in New York City. There is no passenger rail service north of Danbury servicing Brookfield, New Milford, and adjacent communities. Harlem Line commuter rail service, approximately 12 miles to the west in New York State, provides faster running times and more frequent service to Grand Central Terminal. Bus shuttle services provide commuters service from Bethel or Danbury, CT to the Katonah and/or Brewster stations on the Harlem Line for their rail connections. The Danbury Branch is constrained as it is a single track rail line with only three passing sidings and a maximum speed of 50 mph. Greater frequency of service and faster running times potentially would make the Branch more attractive.

Curved track and rock cut typical of the Branch.

TASK 2 – EVALUATION OF ENGINEERING ALTERNATIVES

Task 2 of this study developed and examined a range of possible infrastructure and service improvement alternatives that would achieve two objectives: reduce travel times along the Danbury Branch of the New Haven Line and improve frequency.

The three major infrastructure improvements evaluated were:

- Track geometry improvements
- Addition of Double Tracking
- Passing Siding Improvements

These improvements were evaluated in terms of impacts to existing service between Danbury and South Norwalk, as well as to help determine whether a service extension to New Milford would be sustainable.

Track Geometry Improvements

A review of the current alignment of the Danbury Branch (South Norwalk to Danbury) identified three conceptual track realignment options, referred to as the Red, Blue and Green alignments, that would enable a reduction in current running time of approximately 5, 10, and 15 minutes respectively. The reductions in running time would be accomplished by a combination of enhancing superelevation (banking and tilting and the length or distance to achieve full superelevation) on the existing alignment and constructing new alignments to reduce overall track curvature. These improvements would allow an increase in maximum allowable speeds.

The study also considered extending commuter rail service northward approximately 14.3 miles from Danbury to New Milford. The study reviewed the current freight-only railroad alignment between Danbury and New Milford and identified conceptual track improvements that would enable a reduction in current running time of approximately 5, 10, and 15 minutes. Maximum passenger train track speed limits on the existing freight-only alignment would be 30 miles per hour if no track improvements were made.

Feasibility of Double Tracking

This effort consisted of identifying the engineering and construction issues associated with double tracking both the South Norwalk - Danbury and Danbury - New Milford segments. The analysis evaluated the construction of a second mainline track adjacent to the existing single track alignment as well as the conceptual alignments identified with the proposed 5, 10, and 15-minute running time reductions on both segments.

Passing siding on the Branch.

Feasibility of Passing Sidings as an Alternative to Double Tracking

This effort consisted of identifying the engineering and construction issues associated with locating passing sidings on both the South Norwalk - Danbury and Danbury - New Milford segments. The addition of passing sidings would allow for increased frequency of service and bi-directional service. The analysis evaluated the issues of locating both short or long passing sidings on the conceptual alignments identified with the proposed 5, 10, and 15-minute running time reductions on both segments.

Findings of the Task 2 Engineering Evaluation

Preliminary cost estimates were developed for each of the 32 conceptual improvement scenarios that were identified in Phase I of this study. The cost estimates include construction, engineering, and third party construction phase services, property acquisition, and contingency. The contingency factor covers items such as demolition, roadway reconstruction, and environmental mitigation. Due to the conceptual nature of the study, the estimates are regarded as order of magnitude rather than detailed engineering estimates.

The number of closely spaced, consecutive curves within the existing alignment between South Norwalk and Danbury precludes the opportunity to achieve any significant reduction in running time; major alignment changes would be required to improve maximum operating speed. The estimates for reducing running time by 10 or 15 minutes are in the hundreds of million dollars due to right of way and the extensive earthwork construction that would be required. However, upgrading the existing track and increasing the superelevation on most curves could substantially improve the current running time between

Danbury and New Milford; major alignment changes would not be required.

The following table* summarizes the estimated cost in 2005 dollars for each of the various options to reduce running times on the Branch. The estimated costs cover improvements such as alignment changes, construction of a second main track parallel to the existing or realigned single track, and the cost for short and/or long passing sidings on the new alignments.

IMPROVEMENT OPTIONS SOUTH NORWALK TO DANBURY			
	Type of Improvement		**Cost** *(millions)*
1	**Track Alignments**		
a.	Existing		N/A
b.	Red Alignment (5-minute time savings)	60 mph	$6.5
c.	Blue Alignment (10-minute time savings)	60 mph	$683
d.	Green Alignment (15-minute time savings)	70 mph	$1,115
2	**Double Tracking**		$270 to $1,159
3	**Short Passing Sidings**		$10 to $20
4	**Long Passing Sidings**		$32 to $37
5	**Electrification**		$37 to $117
6	**Equipment**		
a.	Locomotive (Genesis) with 7 coaches		$18.5 / consist
b.	Locomotive (Various) with 2 coaches		$11 / consist
c.	Diesel Multiple Units (DMUs)		$3 / car
d.	Electric Multiple Units (EMUs)		$4 / car
IMPROVEMENT OPTIONS DANBURY TO NEW MILFORD			
	Type of Improvement		**Cost** *(millions)*
7	**Track Alignments**		
a.	Existing		N/A
b.	Red Alignment (5-minute time savings)	60 mph	$19
c.	Blue Alignment (10-minute time savings)	60 mph	$20
d.	Green Alignment (15-minute time savings)	70 mph	$51
8	**Double Tracking**		$134 to $156
9	**Short Passing Sidings**		$9 to $15
10	**Long Passing Sidings**		$37 to $69
11	**Electrification**		$40 to $68
12	**Equipment**		
a.	Locomotive (Genesis) with 7 coaches		$18.5 / consist
b.	Locomotive (Various) with 2 coaches		$11 / consist
c.	Diesel Multiple Units (DMUs)		$3 / car
d.	Electric Multiple Units (EMUs)		$4 / car
13	**Passenger Stations and Parking**	**(Single Track)**	$11.5 to $17.5
		(Double Track)	$17.4 to $23.4

*Note: Certain costs are shown in a range on this table. This reflects the different costs associated with minimum versus maximum improvements affecting alignment changes, as well as the location, length and number of passing sidings constructed. Stations costs vary depending on the number of parking spaces and whether a garage is constructed at New Milford. For equipment, it is assumed that electrification would require replacing the entire diesel fleet with EMUs at a cost of $90 million.

Bordering vegetated wetlands and numerous ponds and streams are found along the Branch.

Existing Cannondale Station.

Environmental Review

The Study Team conducted a field survey and reviewed existing environmental documentation for the Branch to determine what potential environmental impacts would need to be addressed if various infrastructure and service improvements are implemented. Potential impacts resulting from construction, operational impacts of service improvements, as well as impacts to wetlands and other resource categories were identified. The categories that would be most impacted include: land use, especially in urban and developed areas (through potential acquisition and required roadway modifications); and water resources/wetlands. These impacts will be fully investigated in the Phase II environmental documentation.

Improvement Options

The information derived from the Task 2 engineering evaluation should be reviewed in the context of whether the expense to reduce running times of 5, 10, or 15 minutes south of Danbury is justified. This is defined in terms of a simple cost-benefit relationship, where benefit is defined in terms of how many potential new riders will be attracted to the Branch for each improvement option or combination implemented, with costs allocated to each option. The engineering evaluation determined half of the ratio – the costs. For example, it was determined that lower cost modifications can be implemented, such as reducing running time by 3.5 minutes on the existing single track between South Norwalk and Danbury, at a cost of $6.5M. Construction of passing sidings to facilitate operations and improve service ranges in cost from $10M to $37M, depending on length, number and location. Similarly, running time between Danbury and New Milford can be reduced by 10 minutes on the existing single track main line (at a cost of $20M plus station costs of $11.5M to $17.5M) and by constructing passing sidings to facilitate operations ($9M to $69M).

Task 2 also evaluated the potential of several innovative technology and service modification strategies to reduce train travel times. These include the possible use of innovative rail equipment, such as state-of-the-art Diesel Multiple Units (DMU) now in use in Florida and New Jersey for commuter rail service; tilt train equipment to reduce the need for alignment changes; the installation of four quadrant gates to increase train speeds through grade crossings; and the institution of skip-stop and express service to reduce travel times along the Branch.

It was determined that while DMU equipment could successfully operate along the Branch, DMU equipment has implications in terms of its compatibility with other existing and planned equipment purchases for the New Haven Line. Similarly, tilt train equipment is

generally not efficient or compatible with rail service under 100 miles per hour and therefore not appropriate for the Branch. The use of quad gate equipment is generally applied for higher speed train service than the Branch will be capable of implementing; however, this option could be reconsidered if speeds and service frequency on the Branch were improved. Finally, it was determined that skip stop and express service is generally most effective when frequencies of trains and ridership levels are relatively higher than existing Branch service. Increasing the frequency of service on the Danbury Branch would require additional equipment and crews. Without an overall increase in service frequency, passengers would perceive skip stop or express service as resulting in a reduction in service quality, which could adversely impact ridership levels. Skip stop service and express service will be more fully investigated in Phase II when infrastructure improvements are further defined.

The alternatives presented in this engineering task offer a framework from which to begin considering the advantages and disadvantages of each improvement option. Preliminary ridership projections – the benefits resulting from each option - are presented in Task 3 below. More detailed ridership projections and analysis will be performed in Phase II of the study.

Task 3 Ridership Impacts

Preliminary ridership projections were developed for each of the improvement options identified in Phase I, using ConnDOT's statewide Travel Demand Model. The table below shows the potential morning passenger count for persons boarding trains toward New York on the Danbury Branch, and are presented as preliminary examples of the benefits that can be realized if rail electrification and other improvement options were implemented. The increase is calculated comparing all numbers to the base year, 2000:

Alternative	YR 2000	YR 2020	# Increase	% Increase
No Build*	1133	1591	458	40%
Build** – S. Norwalk-Danbury	1223	1691	558	49%
N. Milford Extension	1665	2391	1258	111%

* No Build Alternative – assumes no new actions will be taken to improve service on the Branch

** Build Alternative – in Phase I, the build alternative assumes improvements will be implemented in a phased-in approach and would include a number of options, including track alignment modifications, addition of passing sidings and rail electrification. The next phase of the study will provide in-depth analysis of these options.

Example of electrified branch line: the New Canaan Branch with catenary poles and Electric Multiple Unit equipment.

Task 4 Evaluate the Impact of Electrification

The scope of work for Task 4 focuses on the costs and impacts of electrifying the Danbury Branch Line and how electrification impacts the other previously identified improvement options (track geometry, double tracking, passing sidings, etc.). The intent is to establish the basis for a cost/benefit analysis that will enable decision makers to determine the most viable options for improving service. This scope was the result of numerous discussions with regional and local planning agencies along the rail corridor as well as public officials, commuters, the general public, and the state's Transportation Strategy Board.

Findings of the Task 4 Impact of Electrification

Preliminary cost estimates were developed to electrify each of the 32 conceptual scenarios that were identified in Task 2. These cost estimates were developed from estimated quantities multiplied by current (4th Quarter 2005) unit costs. Due to the conceptual nature of the study, the estimates should be regarded as order of magnitude estimates rather than detailed engineering estimates.

The following tables summarize the estimated costs for the existing running times as well as the various scenarios for reduction in running times (by 5, 10 and 15-minutes), the estimated cost to construct a second main track adjacent to the existing single track, and short and long passing sidings:

Electrification Costs				
South Norwalk – Danbury Improvements				
Alignment	Existing	5-Min. (Red)	10-Min. (Blue)	15-Min. (Green)
Trip Time	45 min	41 min	35 min	32 min
Max. Speed	50 mph	60 mph	60 mph	70 mph
Single Track	$37M	$37M	$71M	$71M
Double Track	$94M	$94M	$117M	$117M
Passing Siding-Short	$37M	$37M	$81M	$71M
Passing Siding-Long	$40M	$40M	$84M	$74M
* Costs in 2005 dollars, include design, Construction Management, Force Account Protective Services and Construction Contingencies				

Danbury – New Milford Improvements				
Alignment	Existing	5-Min. (Red)	10-Min. (Blue)	15-Min. (Green)
Trip Time	39 Min	33 Min	30 Min	23 Min
Max. Speed	30 MPH	40 MPH	50 MPH	60 MPH
Single Track	$40M	$40M	$40M	$40M
Double Track	$68M	$68M	$68M	$68M
Passing Siding-Short	$43M	$43M	$42M	$41M
Passing Siding-Long	$51M	$51M	$48M	$44M
* Costs in 2005 dollars, include design, Construction Management, Force Account Protective Services and Construction Contingencies				

These costs assume one construction effort for each scenario; all planned track improvements have been implemented; and catenary is being constructed over existing rail using the poles that will be installed in ConnDOT's Danbury Branch Signalization Project (being designed for construction as a separate initiative, State Project #302-0007).

The tables above show total costs for the South Norwalk to Danbury section and for the Danbury to New Milford section. For example, the estimated cost to electrify the Blue Alignment with double track between South Norwalk and Danbury would be $117 million and to electrify the Red Alignment for single track from Danbury to New Milford would be $40 million.

Alternatives Summary Evaluation Report

The primary objective of the Alternatives Summary Evaluation report was to screen all of the extensive list of improvement options identified in Phase I of the Danbury Branch Feasibility Study and reduce the list to include only the most viable alternatives warranting further consideration in Phase II.

The Alternatives Screening Process

A first tier evaluation (Level 1 Screening)[3] provided an assessment of the 32 options that were presented in Task 2 and Task 4 of the Phase I

[3] Level 1 Screening (first tier evaluation): a long list of alternatives that fall into two broad categories, including service/operations improvements and infrastructure enhancements, were narrowed to identify those options that clearly do not meet the project's goals and objectives. The primary basis for eliminating an alternative at this stage was that it provided little or no benefit compared to the No Action

study. This covers two segments of the Danbury Branch corridor: South Norwalk to Danbury and Danbury to New Milford. The options considered for each segment were screened against six assessment factors (evaluation criteria) to determine whether or not they should be given further consideration. These evaluation criteria included:

1. **Operational Impact**—the degree of service flexibility offered by the proposed improvement. The key factors are trip speed, whether the option accommodates bi-directional service, and whether service frequency can be implemented.
2. **Environmental Impact**—the environmental areas of concern for each alternative presented were considered including land acquisition; water resources; natural habitat; environmental justice and cultural resources; noise and vibration; traffic, fatal flaw, and community acceptance; and construction location assessments.
3. **Fleet Equipment Impact**—in what ways does the proposed improvement impact the fleet? This includes passenger capacity, equipment performance (acceleration and braking), fleet maintenance, and compatibility with existing fleet.
4. **Travel Demand**—what impact does the alternative have on ridership for the current year, 2010, and 2020? (measured in terms of peak period riders)
5. **Time Savings**—what are the travel time savings in minutes that result from the improvement?
6. **Capital Cost**—what is the overall capital cost in dollars for the improvement?

Implementation of the Danbury Branch Signalization Project 302-0007 is an important first step in efforts to improve service on the Branch. This study has assumed that Project 302-0007 will be accomplished prior to any other improvement options. It is assumed that the signalization project is being designed to include installation of the catenary poles necessary to support a future electrification system.

A number of options were eliminated from further review based on the effect they would have regarding the above factors. Details of the screening and evaluation results are found in the Alternatives Summary Evaluation Report. A second tier evaluation was then initiated with the objective of establishing a final list of preferred alternatives for further study in Phase II. The first step in this process was to consolidate the improvement options into eight viable

alternative both in terms of the associated costs and impacts, and in terms of the extreme difficulty of implementation.

alternatives resulting from the initial screening using the same assessment factors identified above.

These eight alternatives were identified for further evaluation by the Study Advisory Committee. These alternatives, which were not ranked in any order of preference, were:

Alternative One	No Build/TSM. This alternative assumed no major new investments in the Danbury Branch Corridor other than what has already been approved in the Statewide Transportation Plan (as of November 2005) and earmarked for funding or that is required for ongoing maintenance. This Alternative is required as part of the National Environmental Policy Act (NEPA) process. The Transportation System Management option was combined with the initial No Build assumptions to include investigation of skip-stop and express service to reduce trip times for some peak trains.
Benefits:	No new expenditures other than those already planned or earmarked were required. Anticipated ridership increase would be due to population growth in the Route 7 corridor (Year 2020 = 1591 new riders) and, as noted by the HVCEO, the percentage of Route 7 corridor commuters using the Danbury Branch would be expected to remain unchanged.
Alternative Two	Extend Existing Diesel Service to New Milford Using Existing Trackage and Equipment. This alternative extended service 14.3 miles from Danbury north along the Housatonic Railroad's freight line to New Milford. It would add stops at Danbury North, Brookfield, and New Milford.
Benefits:	Ridership increase; relatively low cost improvement. The anticipated ridership increase above Year 2020 baseline is approximately 617 (39% increase). Estimated capital cost is $11.5 to $17.5 million for stations, plus $11 million per each new train set.
Alternative Three	Electrify Danbury Branch From South Norwalk to Danbury. This would install a new electrification system between South Norwalk and Danbury on the existing single-track alignment and include purchase of EMUs to replace the existing diesel equipment.
Benefits:	Improves travel time by nine minutes. Anticipated ridership increase above baseline is approximately 76 (5% increase). Estimated capital cost is $127 million. (This includes $37 million for electrification and another $90 million for 24 new EMU vehicles to replace existing diesel fleet).
Alternative Four	Enhance Passing Sidings From South Norwalk to Danbury. This alternative would install passing sidings along existing track in order to offer the potential of greater service flexibility.
Benefits:	Addition of sidings provides the potential to operate bi-directional service and hence greater operational flexibility. No anticipated ridership changes result directly from this alternative unless service changes and additional equipment are implemented to improve frequency of service, which would then impact ridership. Estimated capital cost is $10 to $37 million.

Alternative Five	Electrify and Enhance Passing Sidings From South Norwalk to Danbury. This alternative combined Alternative Three and Four.
Benefits:	Provides both travel time improvements and bi-directional service flexibility. Anticipated ridership increase above the baseline is approximately 76 (5% increase). Estimated capital cost is $137 to $167 million. (Electrification,$37- $40 million; EMU equipment, $90 million; Passing Sidings, $10-$37 million).
Alternative Six	Extend Existing Diesel Service to New Milford With Alignment Improvements between Danbury and New Milford. This was similar to Alternative Two but increased track speed to 50 MPH on the New Milford extension.
Benefits:	Improves travel times and stimulates increased ridership. Anticipated ridership increase above the baseline is approximately 800 (50% increase). Estimated capital cost is $31 to $37 million, plus $11 million per each new diesel train set.
Alternative Seven	Transportation Strategy Board (TSB) Option to Electrify to the South End of the Branch and Establish Feeder Bus/Rail Service. Installed partial electrification of the Branch to Wilton. Investigation of service impacts would be required in Phase II.
Benefits:	Improves travel time between Wilton and South Norwalk and allows for lower cost feeder service. This alternative was not part of the original Scope of Work for the study, and will be further investigated in Phase II.
Alternative Eight	Full Build. This alternative would implement extension of service to New Milford, utilizing Green alignments, double tracking and electrification the full length of the study corridor route (South Norwalk to New Milford). At the 2004 advisory committee meeting, State Representatives suggested that a highest cost alternative be carried throughout this study.
Benefits:	Improved travel times, service flexibility, and maximum increase in ridership of approximately 916 (58% increase). Estimated capital cost is $2.842 billion.

PREFERRED PHASE II ALTERNATIVES:

At the project's Fifth Study Advisory Committee meeting held on October 18, 2005 in Ridgefield, CT, a discussion and further screening of these eight alternatives was undertaken by Study Advisory Committee members, representatives of ConnDOT, and the Study Team.

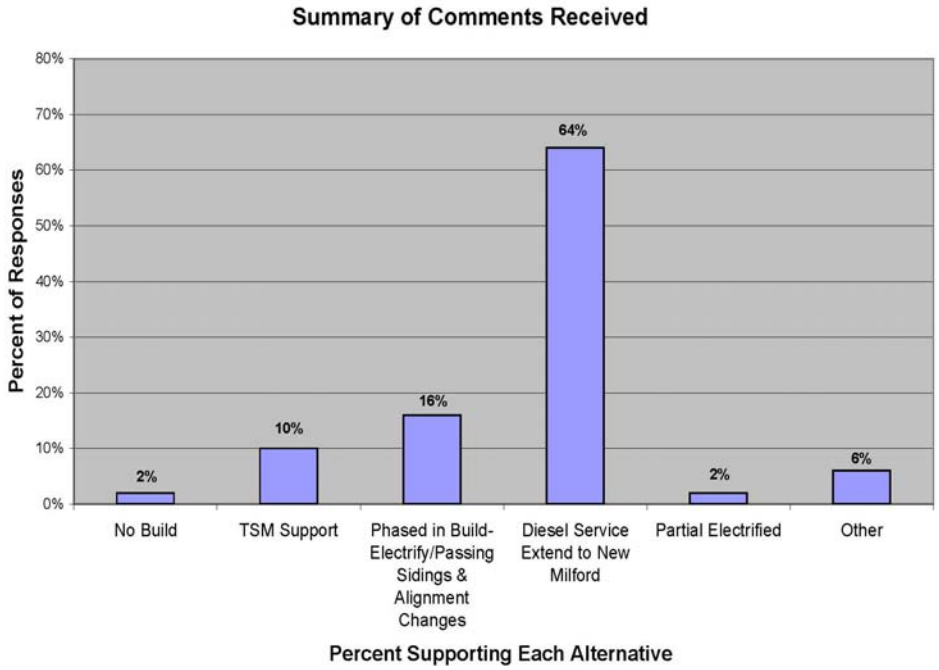
After lengthy discussion, the consensus was that the five preferred alternatives summarized below would be further evaluated in Phase II. These preferred alternatives (presented in Volume 4.0) were presented to the public for their input and comment at two public meetings and an open comment period through December 22, 2005.

Listed below is a summary of written comments received during the public comment period on the alternatives presented in Phase I. These comments and further screening and public involvement through the NEPA process will help determine the locally preferred alternative for the Danbury Branch.

Organizations in addition to the Study Advisory Committee providing comments were:

- MTA Metro-North Railroad
- South Western Regional Planning Agency
- Housatonic Valley Council of Elected Officials
- Regional Plan Association
- Housatonic Environmental Action League, Inc.
- Connecticut Rail Commuter Council

- Total e-mails received during comment period: 18
- Total comment forms received: 31
- Additional verbal comments at public meetings



As noted in the previous alternatives discussion, all of the alternatives identified in this study assume that the Danbury Branch Signalization Project will be installed as planned by ConnDOT. Currently, that project is in the Final Design stage with construction slated to begin in 2007. In the event the signalization project is not completed, it would have various impacts on the alternatives, which include higher cost of electrification and impediments to bi-directional service options (details are noted in the Alternatives Summary Evaluation report).

Alternative A No Build	This assumes no major new investments in the Danbury Branch Corridor other than what has already been approved or required for regular maintenance. This study assumes that the Danbury Branch Signalization project will be installed under existing Connecticut DOT plans. However, no change in ridership other than through normal population growth would occur without service changes. This alternative has no associated capital cost.
Alternative B Transportation System Management (TSM)	This option includes everything that can be done without new rail construction or new vehicle procurement. This includes service improvements such as new outbound service, express service, and skip-stop service. Frequency of service, additional service, and express service could lead to ridership gains. Phase II of the study would evaluate potential ridership gains through TSM alternatives. No capital cost.
Alternative C South Norwalk to Danbury Improvements	Improvements including electrification with passing sidings and the red track alignment that were presented in Task 2 of the study would be installed using a phased-in approach. Implementation begins with the Danbury Branch Signalization project and continues based on engineering requirements. The red alignment would decrease travel time by 3.5 minutes. Anticipated ridership growth is 80 over the Year 2020 baseline (5% increase). The estimated capital cost is $144-$174 million.
Alternative D Extension of Service	This option would extend diesel passenger service to New Milford using the blue alignment presented in Task 2 of the Study to improve the maximum speed along the 14.3-mile route to 50 mph. Ridership is projected to increase by 800 over the Year 2020 baseline (50% increase). The estimated capital cost is $32 to $38 million, plus $11 million per new diesel train set.
Alternative E TSB Option for Partial Electrification from South Norwalk to Route 15	This option would electrify the branch from South Norwalk to an area in the vicinity of the Merritt Parkway (Route 15), with feeder bus/rail service to complement the new service. This alternative was requested by the State of Connecticut's Transportation Strategy Board. Ridership gains would be determined through Phase II analysis and capital costs will be estimated in Phase II of the study.

Please note that the alternatives are not listed in any order of preference and are not ranked; they are assigned letters for ease of review. Also note that the Build Alternative incorporates prior Alternatives 3, 4, and 5 and that the previous Full Build Alternative has been dropped.. This is due to major environmental impacts and unacceptable cost to benefit comparisons uncovered in the Level 1 screening process (severe constraints related to implementation). More details on each alternative are presented in the following pages.

ALTERNATIVE A—NO BUILD

This Alternative assumes no major new investments other than what has already been approved or required for regular maintenance of the Danbury Branch line. There would be no major changes in service. It is assumed that the Communications and Train Control (CTC) system would be installed, but no service changes would accompany it. The existing route and stations would remain the same, with the possible exception of an additional station currently in planning at the Georgetown development near the existing Branchville station.

1. **Operational Impact - None**
   - Crew Requirements/Changes - none
   - Bi-directional service - no
   - Track speed increases - no

2. **Environmental Impact – No new impacts. No action could result in increased congestion on Route 7 and I-95.**
   - Historic Resources – not impacted
   - Noise and Vibration – no change
   - Visual/Aesthetic – no change
   - Water Resources – no change
   - Environmental Justice and Natural Habitat – no change
   - Displacements and Land Acquisitions - none

3. **Fleet Impact - None**
   - Conforms to existing Metro North Fleet - yes
   - Additional equipment required - no

4. **Travel Demand - Ridership will continue to grow**
   - Increase in ridership from the baseline (Year 2000) ridership of approximately 1133 to 1513 in 2010 to 1591 in 2020.

5. **Time Savings – No time savings achieved with this alternative.**
   - Amount of travel time savings - none; this is the baseline

6. **Financial – There are no capital costs associated with this alternative.**
   - Capital costs – none other than regular maintenance and planned expenditure for the CTC project.

ALTERNATIVE B—TRANSPORTATION SYSTEM MANAGEMENT (TSM)

This alternative encompasses everything that can be done without new construction or new vehicle procurement including service improvements such as new outbound service, express service, and skip stop service. Public and local officials have commented on the desire for expanded regional service in the corridor as well as skip stop or express service to reduce travel times for some trains without changing alignments or equipment. Discussion of this TSM Alternative in Phase II should include such a service adjustment and operations analysis regarding implementation.

1. **Operational Impact**
   - Crew Requirements/Changes – increased service/frequency
   - Bi-directional service - no
   - Track speed increases - no
2. **Environmental Impact – No new impacts.**
   - Historic Resources – not impacted
   - Noise and Vibration – no change
   - Visual/Aesthetic – no change
   - Water Resources – no change
   - Environmental Justice and Natural Habitat – no change
   - Displacements and Land Acquisitions - none
3. **Fleet Impact - None**
   - Additional equipment required - no
4. **Travel Demand**
   - To be determined in Phase II
5. **Time Savings –**
   - Time savings to be determined in Phase II
6. **Financial – There are no capital costs associated with this alternative.**
   - Capital costs – none

ALTERNATIVE C—SOUTH NORWALK TO DANBURY IMPROVEMENTS (BUILD OPTIONS)

This option would electrify the line from South Norwalk to Danbury using the Red Alignment (five minute time savings through alignment changes presented in Task 2 of the Study) and through the addition of passing sidings. Implementation begins with the CTC project and proceeds from there based on the sequence resulting from engineering and permitting requirements. New passing sidings would be located with consideration given to train operations, to minimize environmental impacts, and limit right-of-way acquisitions.

1. **Operational Impact**
   - Crew Requirements/Changes – Increased service/frequency
   - Bi-directional service - yes
   - Track speed increases - yes

2. **Environmental Impact – Primarily due to substations, sidings and overhead wire**
   - Historic Resources – TBD, based on substation and siding locations
   - Noise and Vibration – no change
   - Visual/Aesthetic – substations, sidings and overhead catenary
   - Water Resources – possible at substation and sidings
   - Environmental Justice and Natural Habitat – possible at substations and sidings
   - Displacements and Land Acquisitions – possible at substations and sidings

3. **Fleet Impact - Yes**
   - New equipment would conform to existing mainline fleet
   - New EMUs would replace existing diesel locomotives and coaches

4. **Travel Demand**
   - Ridership is shown to increase due to decrease in travel time
   - Extent of ridership increases to be further investigated in Phase II

5. **Time Savings – Yes**
   - Time savings of approximately 13 minutes over use of diesel equipment

6. **Financial**
   - Capital costs – approximately $37-$40 million for electrification, $10 - $37 million for passing sidings, $6.5 million for track improvements, and $90 million for EMU equipment. Total estimated capital costs are from $144-$174 million.

ALTERNATIVE D—DANBURY TO NEW MILFORD EXTENSION AND IMPROVEMENTS

This option would extend the existing diesel passenger service an additional 14.3 miles along the Housatonic Railroad's freight line from Danbury to New Milford with station stops at Danbury North, Brookfield, and New Milford. Improvements to the line would include three new stations with high-level platforms and improved track alignments using the blue alignment presented in Task 2 of the Study to allow track speeds up to 50 mph.

1. **Operational Impact – New Service**
   - Crew Requirements/Changes – new service
   - Bi-directional service - no
   - Track speed increases - yes

2. **Environmental Impact – Possible at new stations**
   - Historic Resources – not anticipated
   - Noise and Vibration – new service to New Milford
   - Visual/Aesthetic – no
   - Water Resources – possible at new station
   - Environmental Justice and Natural Habitat – possible at new stations
   - Displacements and Land Acquisitions – possible at new stations

3. **Fleet Impact**
   - Additional equipment would be required.
   - Equipment conforms to existing Metro-North fleet

4. **Travel Demand**
   - Increase in ridership over Year 2020 baseline is approximately 800
   - Extent of ridership increases to be further investigated in Phase II

5. **Time Savings –**
   - Trip time from New Milford to Danbury would be approximately 38 minutes (48 minutes using existing alignment)

6. **Financial**
   - Capital costs – approximately $11.5 - $17.5 million for new stations, $20 million for alignment improvements, plus $11 million per new train set. Total estimated capital costs are from $43 to $49 million.

ALTERNATIVE E—TSB OPTION FOR PARTIAL ELECTRIFICATION FROM SOUTH NORWALK TO THE VICINITY OF ROUTE 15 (MERRITT PARKWAY)

This option would electrify the line from South Norwalk to an area in the vicinity of Route 15 and the Wilton Station with the possibility of electrifying to Danbury in the future. Feeder Bus/Rail Service north to Danbury would be implemented to complement the new service and help expand commuter service further into the Route 7 Corridor.

1. **Operational Impact – To be determined in Phase II**
   - Crew Requirements/Changes
   - Bi-directional service - no
   - Track speed increases - yes
2. **Environmental Impact – Possible at new stations**
   - Historic Resources – no
   - Noise and Vibration – no
   - Visual/Aesthetic – yes, due to overhead catenary
   - Water Resources – possible at substation location(s)
   - Environmental Justice and Natural Habitat – possible at substation location(s)
   - Displacements and Land Acquisitions – possible at substation location(s)
3. **Fleet Impact – To be determined in Phase II**
   - Additional EMUs required
   - Equipment conforms to existing Metro-North fleet
4. **Travel Demand – To be determined in Phase II**
   - Extent of ridership increases to be further investigated in Phase II
5. **Time Savings**
   - Travel time savings of approximately 4 minutes between Wilton and South Norwalk.
6. **Financial**
   - Capital costs to be determined in Phase II.

Next Steps

Phase II of this study will be designed to satisfy the combined Federal Transit Administration (FTA), Federal Highway Administration (FHWA) National Environmental Policy Act (NEPA) and Connecticut Environmental Policy Act (CEPA) criteria for environmental documents. The Phase II Study, expected to begin Fall 2006, will also develop a recommended action(s) and implementation plan. Concurrently, it will also provide the documentation necessary to support an FTA New Starts/Small Starts application for the extension of service from Danbury to New Milford.

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GLOSSARY OF ACRONYMS AND TERMS

Blue Alignment– Defined in the Danbury Branch Study as the track alignment modification that will allow for a 10-minute travel time reduction along the Branch

Build Alternative – in the Phase I Danbury Branch Study, the Build Alternative refers to several improvements that can be implemented in a phased-in approach and which would include a number of options, including track alignment modifications, addition of rail passing sidings, and railway electrification. Phase II of the Study will provide in-depth analysis of these options.

Catenary – Defined as the system of overhead contact wires suspended above the tracks, which supply power to electric trains.

CEPA – Connecticut Environmental Policy Act, which runs in parallel with NEPA (See NEPA). The purpose of CEPA is to identify and evaluate the impacts of proposed state actions which may significantly affect the environment. This evaluation provides the decision maker with information necessary for deciding whether or not to proceed with the project. The process also provides opportunity for public review and comment.

ConnDOT – Connecticut Department of Transportation, lead agency responsible for the Danbury Branch Study

Connecticut Rail Commuter Council – Formed by the Connecticut State Legislature, this group consists of rail commuters who act as a consumer liaison between rail riders and the Connecticut Department of Transportation, Metro North and Shore Line East railroads and advise the legislature regarding commuter issues.

Corridor – within this study the corridor refers to a rail and highway transportation corridor consisting of the regional Route 7 highway and the Danbury Branch rail line running north-south connecting the population centers of Norwalk, Wilton, Redding, Ridgefield, Bethel and Danbury. The corridor extends north along Route 7 to the towns of Brookfield and New Milford, but rail passenger service currently stops at Danbury.

CSX – CSX Corporation, based in Jacksonville, Fla., owns companies providing rail, intermodal and rail-to-truck transload services that are among the nation's leading transportation companies, connecting more

than 70 river, ocean and lake ports, as well as more than 200 short line railroads.

CTC – Communication and Train Control Project, also known as the Danbury Branch Signalization Project 302-0007. This project would introduce an automated signal system on the Branch. This would allow automatic switching of equipment to passing sidings. Currently, the train conductor on the Branch is required to manually throw the switch allowing trains to enter a siding. The project is expected to also include construction of poles that can be used for eventual electrification of the Branch.

DMU – Diesel Multiple Unit is the general term for a diesel-powered train where a separate locomotive is not required because the engine and drivtrain are contained under various cars in the train. The rail vehicles are self-propelled coaches using a diesel-electric power supply.

Double Tracking – The current Danbury Branch line is a single-track railroad. Phase I of the study examined the feasibility of adding a second track to allow for bi-directional service on the Branch. The addition of the second track is typically referred to as "double tracking."

Electrification – For the Danbury Branch Study, the reference is to railway electrification, which refers to the way to supply electric power to electric locomotives and electric multiple unit vehicles (see EMUs). The typical railway electrification system in Connecticut includes an overhead contact system to conduct current to power the train, also known as catenary system using alternating current or ac; third rail systems using direct current, or dc power are found in other states. The Danbury Branch was electrified using an overhead catenary system until 1961, when the system was removed in favor of diesel equipment.

EMU – Electric Muliple Unit equipment, or rail vehicles that are self-propelled coaches using an electric power supply, either from overhead contact wires or a third rail contact system. On the New Haven Line, this equipment has been named M2, M4, M6, M7 and M8 depending on which generation of electric vehicle it is.

Environmental Justice – Environmental justice refers to the fair and equitable treatment of people regardless of race or income level in the implementation of environmental laws, regulations and policies. The

Federal Highway Administration and Federal Transit Administration has underlined three fundamental principles that define what environmental justice is. These are:

- Avoid, minimize, or mitigate disproportionately high and adverse human health or environmental effects, including social and economic effects, on minority and low-income populations.
- Ensure the full and fair participation by all potentially affected communities in the transportation decision-making process.
- Prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority and low-income populations.

Feeder Bus Service - Feeder bus service typically connects outlying areas to other bus routes or rail/multimodal transit stations where passengers can connect to direct service to urban areas. A feeder bus route to a Danbury Branch rail station would connect passengers to direct service to Grand Central Terminal, as example.

Four Quadrant Gates – These are a special series of automatic crossing gates used as an adjunct to flashing light signals to control traffic on all lanes at a highway – rail grade crossing.

FRA – U.S. Federal Railroad Administration was created by the Department of Transportation Act of 1966 (49 U.S.C. 103, Section 3(e)(1)). The purpose of FRA is to: promulgate and enforce rail safety regulations; administer railroad assistance programs; conduct research and development in support of improved railroad safety and national rail transportation policy; provide for the rehabilitation of Northeast Corridor rail passenger service; and consolidate government support of rail transportation activities.

FTA – Federal Transit Administration, one of ten modal administrations within the U.S. Department of Transportation. Headed by an Administrator who is appointed by the President of the United States, FTA functions through a Washington, DC, headquarters office and is responsible for supporting public transportation. This includes buses, subways, light rail, commuter rail, monorail, passenger ferry boats, trolleys, inclined railways, and people movers. The Federal government, through the FTA, provides financial assistance to develop new transit systems and improve existing ones.

GCT – Grand Central Terminal, New York City. This is the terminus of the New Haven Line, and is the final stop for Danbury Branch rail commuters in Manhattan.

Green Alignment – Defined in the Danbury Branch Phase I Study's Engineering Evaluation Task 2 report as the track alignment modification that will allow for a 15-minute travel time reduction along the Branch

Housatonic Railroad Company, Inc. – Headquartered in Canaan, CT, they operate freight rail service and owns track from Danbury to New Milford.

HVCEO – The Housatonic Valley Council of Elected Officials is a regional planning agency responsible for coordinating planning activities in ten municipalities in western Connecticut. These are Bethel, Bridgewater, Brookfield, Danbury, New Fairfield, New Milford, Newtown, Redding, Ridgefield and Sherman, CT. HVCEO has the responsibility under federal law to administer a transportation planning program, provides a continuing forum on municipal management and planning, and is the census data census for the area.

Meets – Where two trains meet going in opposite directions.

MNR – MTA Metro-North Railroad, second largest commuter railroad in the U.S. and the operator of commuter rail service in Connecticut.

MP – Milepost along the railroad right-of-way. For the Danbury Branch, Milepost (MP) 0 is the switchpoint in South Norwalk where the Branch line begins.

NEPA – National Environmental Policy Act, passed in 1969 and signed into law January 1, 1970, established an environmental policy for the nation and an interdisciplinary framework for environmental planning by federal agencies.

New Milford Extension – The Danbury Branch Phase I study includes evaluating the feasibility of extending passenger rail service from Danbury, currently the terminus of Branch line passenger service, to New Milford, a distance of approximately 14 miles. This section currently is a freight only line owned and operated by the Housatonic Railroad Company, Inc. of Canaan, CT.

New Milford Rail Service Restoration Society – Non-profit organization headquartered in New Milford supporting the return of rail passenger service to the towns of Brookfield and New Milford and possibly other communities.

No Build Alternative – The National Environmental Policy Act (NEPA) also refers to this as the "no action" alternative. When considering alternatives under the NEPA process to improve transportation, a "no build" alternative must be considered.

Overtakes – Where one train passes another train going in the same direction.

Passing Siding - For the Danbury Study, a passing siding refers to a stretch of rail tracks that provide a place for a train to wait temporarily while the other train passes, as the Danbury Branch is a single-track line. This configuration allows the sequence of trains along a track to change and trains to pass one another to better utilize the single track.

Peak Hour Service – This refers to morning and evening rush hour service on rail and transit systems, defined by MTA Metro North Railroad as occurring between the hours of 5:30 AM to 9 AM and 4 PM to 8PM. Higher fares are charged during peak hour periods.

Providence & Worcester Railroad (P&W) – P&W is a regional freight railroad operating in Massachusetts, Rhode Island, Connecticut and New York. The Company is the only interstate freight carrier serving the State of Rhode Island and possesses the exclusive and perpetual right to conduct freight operations over the Northeast Corridor between New Haven, Connecticut and the Massachusetts / Rhode Island border.

Public Outreach Plan - Also known as Public Involvement Plan (PIP), prepared at the beginning of a project. The public outreach plan is established to address the need to increase public awareness of the study amongst a divergent group of agencies, officials, commuters, stakeholders and interested parties; to solicit public opinion regarding study activities and provide input into the study's outcome. Overall, the plan is intended to enhance public involvement and support for the process that will lead to improvements in Danbury Branch commuter rail service.

Purpose and Need Report – in the majority of transportation studies, the two elements of this report are identification of the "need," which is defined as the transportation deficiency (ies) in the study area, and "purpose," which is defined as the objectives that will be met to address the/those deficiency (ies).

R.O.W. - Right of Way is used in this report as a general term denoting land, property, or interests therein acquired for or devoted to the railroad. It is typically land or property owned by the operating railroad, in this case either Connecticut Department of Transportation or the Housatonic Railroad company Inc.

Rail Valuation Maps – These are maps or plans that indicate property owned by a RR company. Most were originally prepared in the early 1900s, and subsequent property transactions such as sales and easements have been noted on them. The topographical features, however, are not kept current.

Red Alignment – Defined in the Danbury Branch Phase I Study's Engineering Evaluation Task 2 report as the track alignment modification that will allow for a 5-minute travel time reduction along the Branch

Skip Stop and Express Service – these are methods of modifying existing rail service patterns to improve travel times by reducing the number of station stops.

Superelevation – This refers to the differences in height between the outer and inner rail on a curved section of track, which affects how fast a train can travel through the curve. The amount of superelevation required is determined by what the proposed speed of the track is – the maximum allowed is four inches. In track geometry parlance, superelevation is the "intended increase in elevation of the outer rail above the inner rail in a curve"

SWRPA – South Western Regional Planning Agency **SWRPA** – The South Western Regional Planning Agency is the official regional planning organization for eight municipalities in lower Fairfield County, including Wilton, Darien, Greenwich, New Canaan, Norwalk, Stamford, Weston and Westport.

Tilt Train – A tilt train consists of rail vehicles equipped with a mechanism to induce added vehicle tilt in curves, thereby enabling the ability to increase speeds in curves while maintaining passenger comfort. Tilting compensates for the amount of centrifugal force a passenger experiences going through a curve. A tilt train system is typically employed on high speed rail equipment that uses conventional rail lines with numerous curved sections, such as the Northeast Corridor between New Haven, CT and Boston, MA. Amtrak's Acela is an example of a tilt train.

Track Alignment – refers to the horizontal layout of track in a rail system. Tangent track refers to track in a straight line.

Track Geometry – This refers to the levelness and alignment of the rails.

Traction Power Substation – transfers electric power usually from the local utility power grid, to a voltage and frequency required to supply power to the rail electrification system.

TSB – Connecticut Transportation Strategy Board – Fifteen-member board comprised of business, state agency and transportation investment area representatives appointed by the Governor of Connecticut, the Speaker of the State House of Representatives and the President Pro Tempore of the State Senate. Their role is to review transportation issues in the state and recommend a statewide transportation strategy and action plan.

TSM Alternative – Stands for 'Transportation System Management' alternative. The U.S. Department of Transportation's Federal Transit Administration defines TSM as an improvement that represents the "best you can do without a guideway investment." Typically this includes action items like adding skip stop and/or express rail service, new park and ride lots, and addition of transit user information systems.