Connecticut DOT Statewide Bus System Study

EXECUTIVE SUMMARY

Presented to
Connecticut DOT

Presented by
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In association with
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The Study

The Connecticut Statewide Bus System Study has been undertaken to ensure that bus transit in Connecticut serves continuing needs in the most efficient manner possible. Because land uses and the transportation demands that are determined by them are dynamic, fixed routes and other services must periodically be evaluated, and where necessary, modified to meet changing demand.

The Study has taken a comprehensive look at the state's twenty urban and rural transit systems and the statewide express bus network. It has analyzed how effectively each system operates currently and what opportunities exist for improvements in efficiency and service coverage. Some of the questions the study aims to address are:

•Do existing bus route networks efficiently serve areas with demand for public transportation at the times when that demand exists?

•Are there bus routes or segments of routes that have become underutilized and are obsolete due to changes in land use and demographics? Are there other routes that should be enhanced or expanded?

•Are there opportunities to introduce new types of service better-suited to changing customer demand and new land use?

Given the number of individual reports (20), this executive summary attempts to provide an overall picture of transit in Connecticut in the present and the future rather than describe individual systems in any detail. Readers interested in individual systems are encouraged to refer to the system reports, which can be obtained from the Connecticut Department of Transportation, Office of Intermodal Planning - 2800 Berlin Turnpike, Newington, CT 06131-7546 (telephone - 860-594-2143).

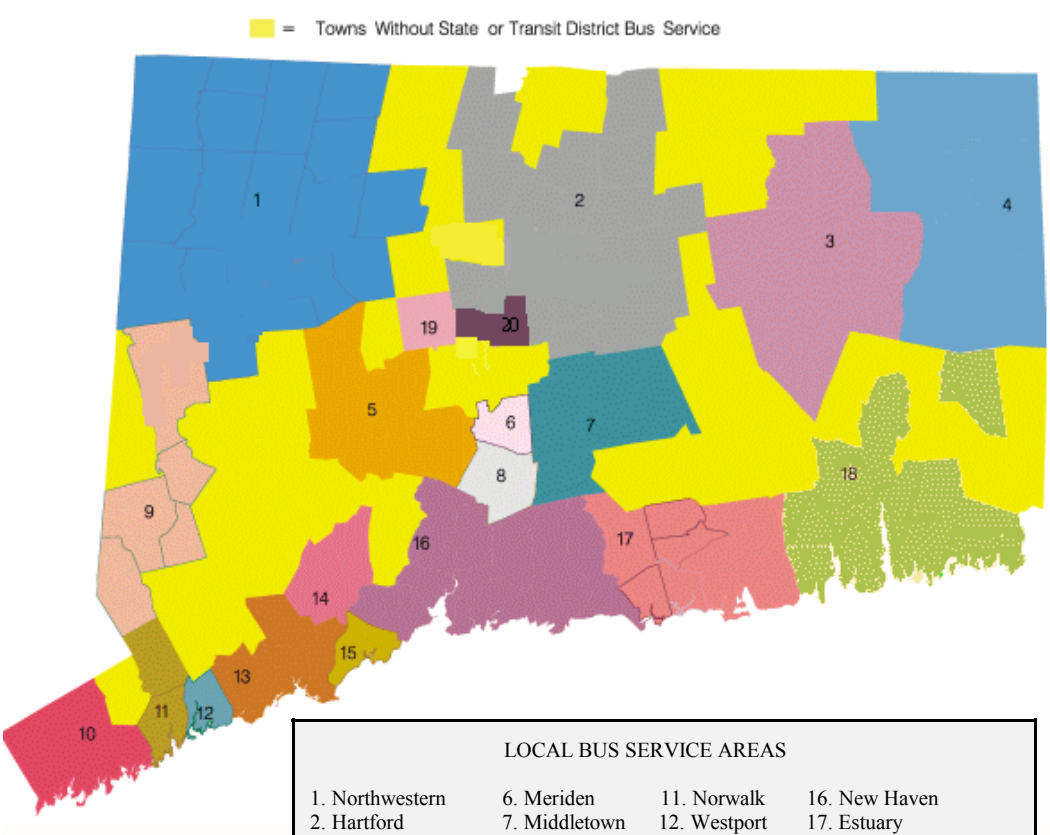
Continuing Needs and Opportunities

Bus Systems are all about...

...Providing vital transportation links for the young, elderly, mobility limited, and transit dependent
...Increasing transportation alternatives for all Connecticut residents
...Fulfilling statewide goals of improved air quality and quality of life

In Connecticut, this is provided by:

2 Major Urban Systems (Hartford and New Haven)
3 Large Urban Systems (Bridgeport, Stamford and Waterbury)
4 Medium Urban Systems (Danbury, New Britain, Norwalk and SEAT)
6 Small Urban Systems (Bristol, Meriden, Middletown, Milford, Wallingford and Westport)
5 Rural Systems (Estuary, Northeastern, Northwestern, Valley and Windham)
1 Express Bus Network



LOCAL BUS SERVICE AREAS

1. Northwestern	6. Meriden	11. Norwalk	16. New Haven
2. Hartford	7. Middletown	12. Westport	17. Estuary
3. Windham	8. Wallingford	13. Bridgeport	18. Southeast
4.Northeastern	9. HART	14. Valley	19. Bristol
5. Waterbury	10. Stamford	15. Milford	20. New Britain

Where Have We Been?...

Public bus systems have a well established history in the state. In many Connecticut cities, they replaced the trolley networks that allowed residents to work, shop, and recreate before automobile ownership became widespread. Smaller cities and regions introduced bus systems as their population grew and demanded basic transportation options. In addition, twenty-one express bus routes have developed to serve commuters and longer distance travelers.

Public bus systems have by no means become obsolete despite significant growth in automobile travel. In recent years, decade long declines in transit use have been halted and, in some cases, reversed. This has occurred throughout the nation and in Connecticut - an indication that transit is not only relevant, but demanded. Growing congestion as an obstacle to convenient automobile travel and quality of life, welfare to work initiatives that often require "reverse commuting" to suburban work sites, and federal mandates to reduce air pollution in most urban areas all work in the favor of transit, and buses will be, in many cases, the most flexible and cost-effective transit mode.

Where Are We Now?...

The Connecticut Department of Transportation (ConnDOT), aware of the new roles and opportunities for bus transit, as well as constantly changing land use patterns in the state, has undertaken a significant and comprehensive evaluation of Connecticut's bus systems at the beginning of the new century. Involved were the state-owned systems in urban service areas including Hartford, New Haven, Waterbury, Stamford, New Britain, Bristol, Meriden, and Wallingford; as well as urban and rural transit districts throughout the state.

Where Are We Going?

The recommendations presented in this study focus on efficiency improvements, which include both reductions and additions in service, and "enhancements" which offer new services or additions to existing services to meet untapped demand or take advantage of new opportunities. The implementation of these changes will result in more effective bus systems, both considered on their own and as a part of a coordinated statewide network. This study was intended to yield recommendations that could be implemented in the short term. For that reason, all of the recommendations can be implemented in a zero to five year time frame.

Successful implementation will hinge upon the availability of federal, state, and local funds, as well as buy-in and cooperation from transit operators and other local stakeholders. The study made a concerted effort to involve transit agencies, regional planning organizations, and members of the public. As a result, several recommendations reached the implementation phase even before the study was finalized, due to proactive efforts of local transit operators.

The Planning Process

A consultant team led by Urbitran Associates of New Haven was chosen by ConnDOT to conduct this planning study. Participants included ConnDOT, the regional planning agencies, the transit agencies, and the public, through the process outlined below.

Step One
Goals and objectives were developed, both for bus transit in the state and for each individual transit district. For the latter, transit agencies and public focus groups were instrumental in allowing the team to define these goals and objectives.

Step Two
Community characteristics were evaluated, including demographics and travel patterns in each region, in order to develop a representation of transit needs and potential.

Step Three
Performance standards were developed for each category of transit systems. This helped place each system in context, using as a background comparable peers in other states.

Step Four
An inventory of existing transit services was performed to complete a baseline from which issues could be identified and recommendations set forth.

Step Five
A transit analysis of each system was undertaken and issues and opportunities were identified. The team looked at strengths and weaknesses, and began to focus on changes that might improve and enhance the services offered in each district. These were presented to regional focus groups of stakeholders in order to gain further input.

Step Six
Recommendations to improve services were developed. These were formed with input from each region's transit providers and shared as preliminary recommendations at public meetings throughout the state. Once finalized, cost and ridership analyses and an implementation plan were developed. Strong partnerships with the transit providers were critical to the development of community-sensitive recommendations.

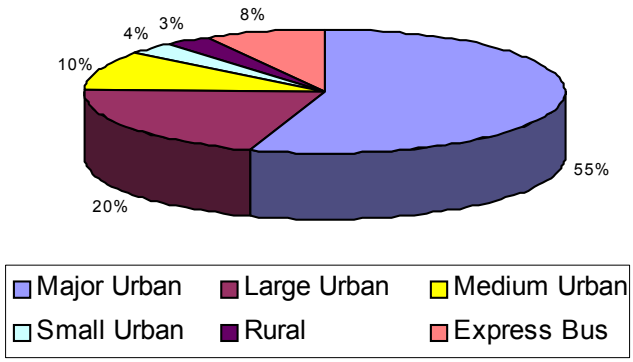
Existing Conditions -Transit in Connecticut Today

•**Service Provided -** Approximately 21.5 million miles of revenue service were provided in 1998. Nearly half of those miles were provided by the systems in New Haven and Hartford.

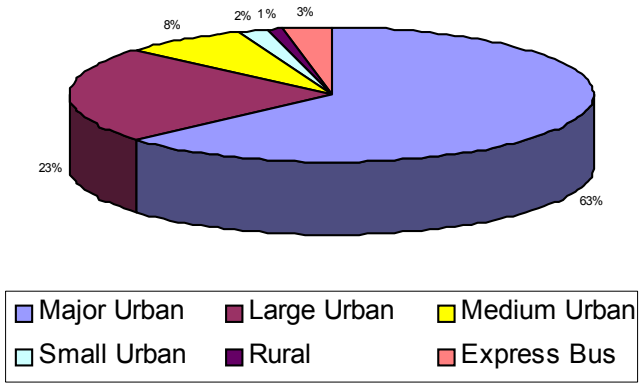
•**Ridership -** Connecticut public bus systems provided approximately 40 million trips in 1998. This amounts to 12.2 trips for every resident of the state. The majority of these trips were in Hartford and New Haven - which together provided over 25 million passenger trips.

•**Operating Expenses -** Providing these trips required considerable resources, as approximately $90 million was spent on public transportation. Hartford and New Haven accounted for more than half of this amount, with no other city or region spending more than $10 million, and express buses requiring $7.2 million.

Connecticut Statewide Bus System Study
Operating Expense by System Type - 1998

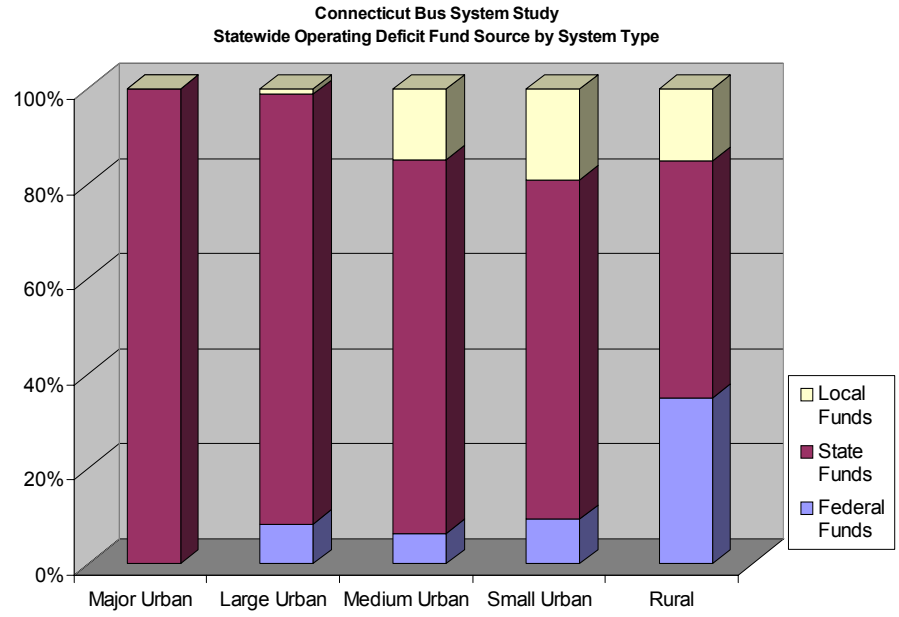


Connecticut Statewide Bus System Study
Ridership by System Type - 1998



•**Revenues -** Expenses were partially offset by revenues taken in by each system. $32 million was collected at fareboxes throughout the state, with better than half collected in Hartford and New Haven. Consistent with its peers across the country, Connecticut public transit systems were unable to recover the entire cost of providing service. In 1998, 36% of operating funds were recovered through the farebox statewide.

•**Federal/State/Local Funding Breakdown -** All systems relied upon sources of government funding to cover the portion of expenses not covered by the farebox, or the operating deficit. In Connecticut, the state is relied upon to provide most of the operating deficit funding to systems. Of the total $55,882,229 spent on the operating deficit in Connecticut, $2,604,101 of funds came from the federal government, which is 5% of the total government transit funding in the state. Local sources contributed a similar amount of funds, $2,171,540, which is 4% of the state total. This leaves it to the state to provide 91% of the funds, which amounted to $51,106,588 in 1998.



•**Individuals Employed in Transit** - The economic importance of transit is difficult to measure without a detailed econometric study. But clearly, it is very important, given that a high percentage of the 40 million annual trips enable Connecticut residents to get to jobs all across the state. In addition, the public transit industry itself is a significant employer in the state, with over 1,400 individuals working for bus systems receiving government funding.

Existing Conditions - Connecticut vs. Peers

Bus systems can be evaluated in a number of different ways. Using standard transit indicators allows for comparisons between systems of similar sizes. The study conducted a peer review in order to determine how Connecticut's systems compared with systems in other states using the following criteria and indicators:

Criteria	Indicator
Financial Efficiency	Operating Cost per Revenue Hour
Productivity	Passenger Trips per Revenue Hour
Cost Effectiveness	Operating Cost per Passenger Trip
Availability	Service Hours per Capita

Major Urban Transit Systems (Hartford and New Haven)
Both systems, when compared with other systems of similar size and characteristics, performed at the top of their respective peer groups in terms of productivity and cost effectiveness. However, both systems are lower in the category of availability of service than many of their peers. These rankings indicate that both systems are doing an excellent job of using available resources to serve passengers, but provide less service than other peer systems to residents on a per capita basis.

Large Urban Transit Systems (Bridgeport, Stamford and Waterbury)
These systems, Bridgeport and Waterbury in particular, tended to be close to the average of their peer group in all categories. Stamford had the best productivity among the three systems.

Medium Urban Transit Systems (Danbury, New Britain, Norwalk and SEAT)
These systems, which reflect a wide range of urban models, also showed a wide variation in terms of how they compared with their peers in other states. Few generalizations can be made, except to say that none of the systems demonstrated any significant weaknesses.

Small Urban Transit Systems (Bristol, Meriden, Middletown, Milford, Wallingford and Westport)
These systems tended to perform at or around the average for their peer group. Westport stood out by ranking first in availability, while Middletown was ranked second among peers in productivity.

Rural Transit Systems (Estuary, Northeastern, Northwestern, Valley and Windham)
As a group, Connecticut's rural transit systems were not characterized as very strong or very weak in any of the criteria categories. However, differences among the systems could be seen. Windham stood out as it was average or above in all categories. Valley Transit, although primarily within the Bridgeport metropolitan area, has been classified as rural for the purpose of comparison because it has demand responsive service.

Issues and Opportunities

Although every transit system naturally has unique characteristics, a number of issues emerged that were common to multiple systems. They include the following:

•**Service Duplication** - Two or more routes serve the same corridor section when an efficient level of service could be provided by one route.

•**Branching** - A single route has multiple routing variations or branches, often creating confusion for transit users.

•**Opportunities for Schedule Adjustments** - A given bus route's hours of operation (span of service) or its frequency of service (headways) should be altered to better match demonstrated or potential demand.

•**Interregional Connections -** Better connections are warranted between metropolitan areas within the state where significant demand for travel exists.

•**Unserved Markets** - Opportunities exist for routes or services to serve newer commercial, industrial or residential areas.

Resolving efficiency issues such as service duplication and branching has the potential to save resources which can in turn be applied to enhance existing service, make new interregional connections or tap unserved markets.

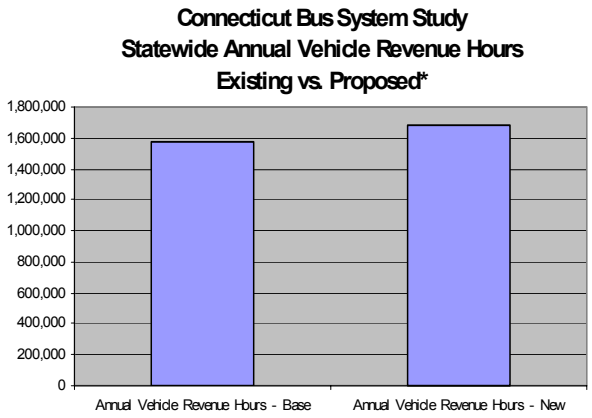
The proposed changes, when considered from a statewide perspective, place an emphasis on **efficient reallocation of resources** where possible, rather than either an overall cutback of services or tremendous increase of service. These investments are consistent with the continued importance of transit in the state.

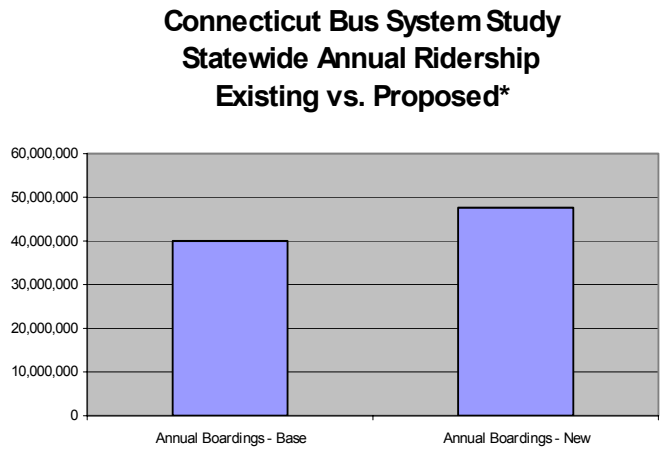
Overall Impact of Recommendations

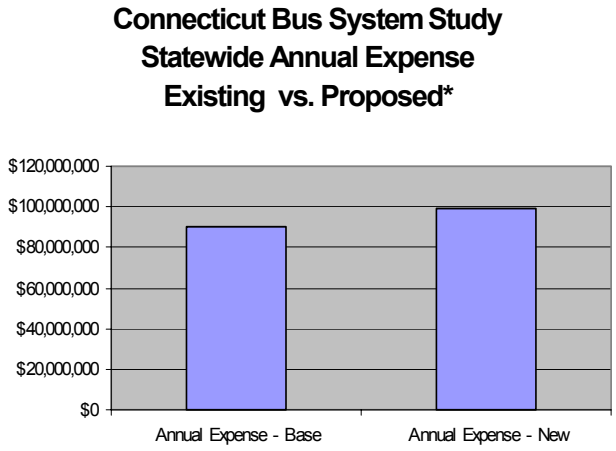
A majority of the recommendations made could be termed efficiency changes, which may consist of either reductions or additions of service in order to make existing routes more effective. Most of the remainder of the recommendations could be termed enhancements, insofar as they offer additional service to new origins and destinations. The overall impact of these two types of changes will be increases in miles traveled, passengers carried and operating expenses, but these increases will be small on a percentage basis.

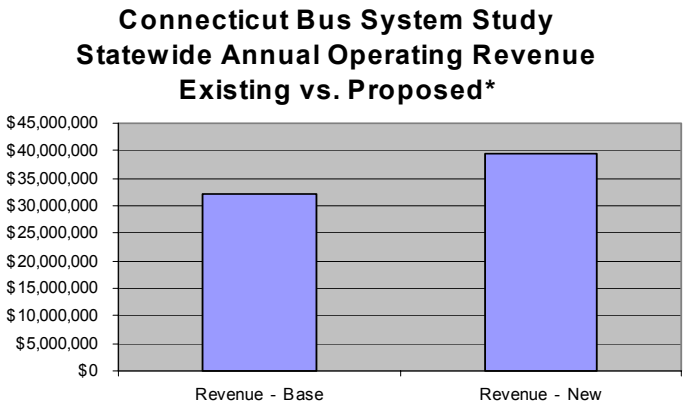
System Category	Proposed Change in...							
	Vehicle Hours		Annual Boardings		Operating Expense		Operating Revenue	
	Efficiency Changes	Enhancements	Efficiency Changes	Enhancements	Efficiency Changes	Enhancements	Efficiency Changes	Enhancements
Major Urban	***(19,853)***	***64,647***	***(48,801)***	***1,758,491***	***$ (1,230,249)***	***$ 3,978,389***	***$ (83,311)***	***$ 1,138,500***
Large Urban	***12,336***	***18,992***	***378,200***	***339,123***	***$ 694,924***	***$ 1,096,211***	***$ 278,380***	***$ 331,889***
Med. Urban	***55,291***	***8,560***	***1,009,145***	***91,339***	***$ 2,569,055***	***$ 437,254***	***$ 832,447***	***$ 54,549***
Small Urban	***15,562***	***5,967***	***167,431***	***112,801***	***$ 568,879***	***$ 300,622***	***$ 97,014***	***$ 78,508***
Rural	***5,804***	***5,275***	***32,536***	***16,900***	***$ 174,752***	***$ 155,100***	***$ 24,456***	***$ 12,800***
Express Bus	***(2,226)***	***1,368***	***29,121***	***18,360***	***$ (155,412)***	***$ 69,494***	***$ 67,006***	***$ 31,579***
Total Change	***66,914***	***104,809***	***1,567,632***	***2,337,014***	***$ 2,621,949***	***$ 6,037,070***	***$ 1,215,992***	***$ 1,647,825***
FY98 State Totals	***1,568,338***		***40,079,521***		***$90,292,143***		***$32,137,653***	
Perc. Change	***4.3%***	***6.7%***	***3.9%***	***5.8%***	***2.9%***	***6.7%***	***3.8%***	***5.1%***

* Proposed includes efficiency changes and enhancements


Connecticut Bus System Study
Statewide Annual Vehicle Revenue Hours
Existing vs. Proposed*
1,800,000
1,600,000
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
Annual Vehicle Revenue Hours - Base
Annual Vehicle Revenue Hours - New


Connecticut Bus System Study
Statewide Annual Ridership
Existing vs. Proposed*
60,000,000
50,000,000
40,000,000
30,000,000
20,000,000
10,000,000
0
Annual Boardings - Base
Annual Boardings - New


Connecticut Bus System Study
Statewide Annual Expense
Existing vs. Proposed*
$120,000,000
$100,000,000
$80,000,000
$60,000,000
$40,000,000
$20,000,000
$0
Annual Expense - Base
Annual Expense - New


Connecticut Bus System Study
Statewide Annual Operating Revenue
Existing vs. Proposed*
$45,000,000
$40,000,000
$35,000,000
$30,000,000
$25,000,000
$20,000,000
$15,000,000
$10,000,000
$5,000,000
$0
Revenue - Base
Revenue - New

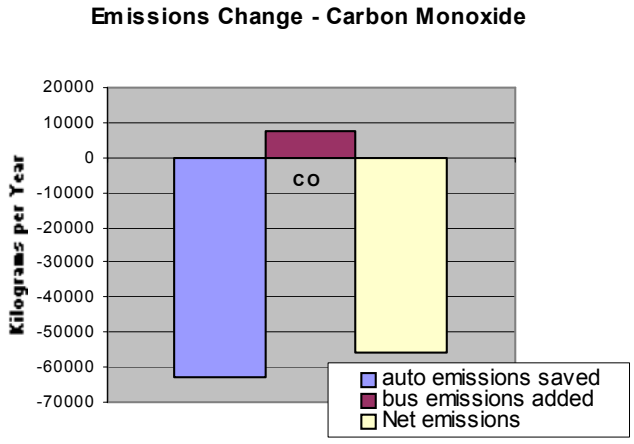
Air Quality Impacts

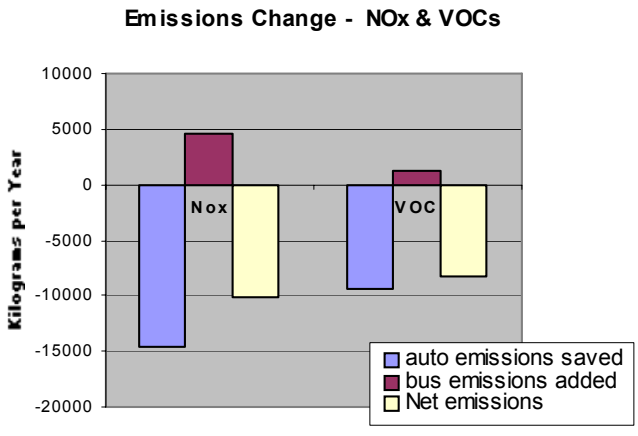
One of the benefits of increasing ridership and increasing the efficiency of a transit system should be a reduction in emissions that contribute to air pollution which endangers the public's health. Part of the ridership increase on the bus systems will be from individuals switching from private vehicles. The table below shows the magnitude of that projected ridership increase.

	Vehicle Trips		Vehicle Miles of Travel (VMT)	
	Daily	Annual	Daily	Annual
Bus			+1,194	+435,810
Automobile	-20,382	-5,401,230	-70,115	-25,591,975

It is estimated that the reduction in automobile vehicle miles of travel (VMT's) will result in annual reductions of tens of thousands of kilograms of pollution. Three automobile emissions that the U.S. Environmental Protection Agency is particularly concerned with are Carbon Monoxide (CO), Nitrous Oxides (NO_x) and Volatile Organic Compounds (VOCs). An air quality analysis for the year 2002 was performed to determine the impact of the recommendations in this study on all of these pollutants. It was found that the amount of pollutants that would be reduced as a result of individuals exchanging auto trips for bus trips far outweighs emissions from the extra bus vehicle mileage proposed in the study. The following table shows the results of the air quality analysis:

	Auto Emissions (kilograms per year)	Bus Emissions (kilograms per year)	Net Emissions (kilograms per year)
CO	-63,183	+7,677	-55,506
NO_x	-14,685	+4,577	-10,108
VOCs	-9,431	+1,189	-8,242





See Appendix B for Air Quality Analysis and Assumptions

Strengths & Challenges

The statewide bus study demonstrated that most Connecticut systems are average or better than average when compared to national peers in the areas of productivity and cost effectiveness. This is primarily due to the fact that more service is being offered where and when it will be used by the most riders – in high density areas, during peak period and midday hours. Many of the smaller transit service areas provide limited or no evening or weekend service. Availability of service per capita was usually lower than peer systems.

The greatest challenge to the state and transit districts lies in providing increased amounts of service to their residents while still maintaining high levels of productivity and cost effectiveness. On the one hand, implementation of the efficiency-oriented recommendations should strengthen productivity. On the other hand, productivity and cost effectiveness can be expected to decline slightly where service enhancements introduce buses into new markets and during evening and weekend hours. However, the introduction of new or enhanced services in many cities and regions should result in greater service availability, as measured in service hours per capita.

It is unrealistic to expect that all issues will be resolved through the study recommendations. Issues that will likely require continued attention are:

•Effectively implementing study recommendations at the local level

•Gaining necessary funding to implement the recommendations and ensuring a steady stream of revenue so that services may be maintained

•Serving less densely populated areas using flexible services

•Attracting "choice riders" to buses

•Creating seamless and coordinated interregional connections

•Responding to changing demographics and land use by continuing to monitor bus routes and making changes when necessary

Implementation Schedule

This study was intended to produce primarily short-term recommendations to make Connecticut bus systems more effective and efficient, as well as to enhance existing systems by suggesting the addition of new services or new routing where it was reasonable to do so. As individual systems were investigated, opportunities for these sort of improvements were uncovered and short-term recommendations were made. In addition, some systems yielded recommendations that could not be immediately funded or had barriers to immediate implementation, but that could be realized in the longer term. By contrast, many systems included recommendations that transit agencies agreed to implement even before the study was completed.

With this in mind, a three or four year implementation plan was developed for each system, spelling out which recommendations should be implemented in which year. In general, the efficiency and effectiveness changes were proposed for the 1st or 2nd year of the plan, given that they involved modifications, many of them minor, to existing routes. System enhancements in many cases involved new routes, and therefore additional funding as well as some amount of planning are required. In many cases, service enhancements are scheduled for implementation in the second, third or fourth years.

Long- range recommendations tended to be subject to conditions beyond present control or knowledge (e.g., funding availability) and therefore were not assigned particular implementation years.

Appendix A offers a summary of recommendations by systems. For detailed implementation plans, refer to individual system reports.

Appendix A - Recommendations

Note: Italics indicates that recommendation was implemented before study was complete

CTTRANSIT Hartford Division

•**A Asylum** - Change Saturday Fern Street Branch service to serve Bishops Corner via Asylum Avenue.
•**A Hillside Avenue** - Split A3 branch at Hillside/New Britain Avenue to cover Q4 loop service on the Asylum Avenue branch to Bishops Corner.
•**B Silver Lane -** Modify Manchester routing for more direct service on Bidwell Street. Provide hourly service on Sundays.
•**F Broad Street** - Operate F3 service via Prospect Street to Berlin Turnpike (Ames and ConnDOT) to replace T9 service that currently operates to this area.
•**H East Windsor Hill** - Provide inbound service via John Fitch Boulevard to Chapel Street.
•**K North Main Street** - Provide 20 minute service on North Main Street trunk line on Saturdays
•**K Park Avenue** - Extend K4 to BJ's Club Plaza on 40 minute headways.
•**M Middletown** - Eliminate M2 service through Wethersfield. Replace with Wethersfield Circulator to serve major town generators on an hourly basis.
•**N Windsor** - Eliminate midday service on the N2 and provide interchange between N2 and Bradley Flyer.
•**O Glastonbury** - Eliminate O2 service south of Somerset Square. Replace O2 with community circulator route.
•**P New Britain** - End current alignment at Newington Center. Replace Hartford New Britain Link with extension of Q2 service from Westfarms Mall to downtown New Britain via Route 9. Run hourly New Britain service to Newington Center.
•**Q New Britain Avenue** - Extend Q2 to downtown New Britain via Route 9.
•**Q Vine Street** - Modify Q1 service to replace S2 service along Garden Street and Capen Street, splitting service between Vine Street and Garden Street.
•**S Granby** - Replace service north of Copaco Shopping Center with Bloomfield circulator.
•**T Blue Hills** - Replace Q4,5,6 with Bloomfield circulator, connecting with buses at Copaco.
•**T Franklin** - Replace T9 service to Berlin Turnpike with F extension. Terminate T1 service at Wethersfield Shopping Center. Wethersfield Community Circulator will serve town generators.
•**U Albany** - Eliminate U service north of Wintonbury Avenue; replace with Bloomfield circulator.
•**W Capitol Street** - Eliminate peak service to Newington Center.
•**New Cross-town Route** - Copaco - Buckland Hills Mall via Blue Hills Avenue, Tower Avenue, North Main Street, Bissell Bridge, SR 291 and Tolland Turnpike.
•**New Cross-town Route** - Copaco - West Farms Mall - Copaco via New Britain Avenue, Hillside Avenue, Sigourney Street, Albany Avenue, and Blue Hills Avenue.

CTTRANSIT New Haven Division

•**A Railroad Station** - Extend service to City Point via Spring, Hallock, **and** Sea Street Terminus weekdays and Saturdays.
•**C Wallingford/North Haven** - Run all buses express via I-91 (peak service currently express) **and** extend Saturday runs terminating at Meriden border to Meriden Mall (Westfield Shopping Town).
•**D Grand -** Run hourly service via Quinnipiac Avenue to Super KMart from buses terminating at Front Street **and** run hourly service from Bella Vista, alternating between Super Kmart and Ames/Waldbaums, creating 120 minute intervals to each.
•**DE Dixwell/Circular** - Extend to North Haven Route 5 at Waldbaum's Plaza.
•**F East Haven** - Run Branford service hourly via US 1, with two AM and two PM trips via Short Beach Road.

•**F East Haven/Branford** - Add one Branford run to the end of weekday service.
•**FN West Chapel/Seymour** - Extend Seymour service to Waterbury along Route 8, local from Naugatuck.

•**JU Savin Rock/ Milford -** Modify service in Milford, integrated with Milford Transit District Route 4, for quicker access to CT Post Mall. Terminate service at CT Post Mall.
•**JU Whitney Avenue Waterbury** - Terminate current Waterbury runs at Cheshire Center.
•**L North Branford** - Eliminate route.
•**M Washington Avenue** - Extend Greta Terminus runs to US 1/Bull Hills Lane Terminus via Meloy Road.
•**M State Street** - Extend Northside Branch to Hamden Plaza **and** extend Devine Street Branch to Universal Drive **and** establish Hamden/North Haven Circulator.
•**O Sylvan Avenue** - Modify route leaving and entering New Haven along Winthrop Street to Davenport.
•**Q Edgewood Avenue -** Run bus directly down Chapel Street to Winthrop for outbound trips **and** extend hourly service to Amity Shopping Center.
•**Z Savin Rock** - Remove Howard Hallock Loop in City Point (covered by A extension) **and** turn back half of runs at Sea Street Terminus creating hourly service to Savin Rock.
•**Z Goffe Street** -Extend hourly service to Amity Shopping Center.
•**New Cross-town Route** - City Point to Acme Plaza Hamden.
•**New Cross-town Route** - Long Wharf Mall to Fair Haven/Bella Vista.
•**New CBD Shuttle** - Long Wharf Mall to downtown central business district (CBD).

Bridgeport Transit Authority

•**Route 2 -** Direct Service to Dock Shopping Center via Barnum Avenue.
•**Route 4 -** Change route to reflect GE plant shift times - if ridership does not improve, eliminate GE plant diversion.
•**Route 5 -** Eliminate Wigwam lane, Hilltop Drive and Cutspring Road segment, use Boston Avenue instead of Barnum Avenue.
•**Route 6 -** Decrease headway from 24 to 20 minutes**.**
•**Route 8 -** Decrease headway from 17 to 12 minutes.
•**Route 10 -** Extend to Dock Shopping Center and eliminate 10B segment - 10B segment would be served by paratransit.
•**Route 11 -** Improve headway from 60 to 30 minutes and divide western portion into another branch serving Kings Highway**.**
•**Route 12 -** Extend early AM service to Trumbull Shopping Center and eliminate service on Old Town Road between Oakview Drive and Reservoir Avenue.
•**Route 13 -** Adjust schedule leave time 13 minutes later.
•**Route 15 -** Operate on Grant and Arctic Streets instead of Barnum Avenue**.**
•**Route 17 -** Adjust schedule leave times so as to coordinate with Route 13.
•**New Route** - Provide a direct connection between the Hawley Lane Mall and the Trumbull Industrial Park and downtown Bridgeport.
•**New Cross-town Route -** Connect outlying area malls**.**
•**Long Term (5+ years) Recommendations -** Expand weekday evening service, increase weekend service, and establish transit centers in outlying areas.

CTTRANSIT Stamford Division

•**F-Norwalk** - Add one bus to ease loading during weekday peak-usage periods (7 AM-9 AM, 2-6 PM).
•**H-South End/H-Strawberry Hill** - Lengthen midday headways to 60 minutes to better match service to level of demand.
•**J-Route** - Modify to serve assisted living facility located on Palmers Hill Road, just north of Connecticut Avenue.
•**New Peak Period Express Bus Route** - Implement between New Canaan and downtown Stamford to supplement New Canaan Branch commuter rail service.
•**New Peak Period Express Bus Route** - Implement between Trumbull (Rt 8/Rt 108) and downtown Stamford.

•**New Cross-town route** - Implement east-west service using smaller buses connecting Springdale to Stamford Hospital.
•**New Cross-town route** - Implement east-west service using smaller buses connecting Springdale to High Ridge/Long Ridge.

Northeast Transportation - Waterbury Service

•**Route 12 Hill Street** - Eliminate portion of route west of Cooke Street.
•**Route 13 Oakville/Fairmount** - Eliminate Buckingham Street/French Street/Tarbell Avenue loop **and** add service to the Department of Motor Vehicles.
•**Route 15 Bucks Hill/Farmcrest** - Eliminate Kearney Drive side trip.
•**Route 20 Walnut Street** - Reconfigure route to incorporate additional portions of Walnut St., Oak St., and East Farm Rd., and to serve the Brass Mill Center Mall.
•**Route 25 Hitchcock Lake** - Eliminate Hitchcock Lake loop and make Mansfield loop request only throughout the day.
•**Route 26 Fairlawn/East Main** - Reconfigure to serve Readville Drive, the Scott Road area and Brass Mill Center mall by eliminating Frost Road segment and increasing round trip time to 60 minutes.
•**Route 31 East Mountain** - Eliminate route.
•**Route 32 Hopeville/Sylvan** - Move current alignment from Baldwin Street to South Main Street and serve Edgewood Avenue east of Sylvan on every other trip.
•**Route 42 Chase Parkway** - Discontinue service to Yale Avenue/Middlebury Road and Judd's Corner.
•**Route 44 Bunker Hill** - Add 4:00 PM trip to meet peak hour demand.
•**N1 Naugatuck/Millville** - Eliminate Seale Factory to Maple/Church segment, reduce headways to 60 minutes, and coordinate schedule with proposed **CT**Transit Route FN.
•**N2 Naugatuck/New Haven Road** - Reduce headways to 60 minutes and coordinate schedule with proposed **CT**Transit Route FN.
•**Various Routes** - Eliminate early morning Saturday trips.
•**Sunday Service** - Implement service from 9 AM to 5 PM on Routes 11,15,18,22,33, and 44.

Norwalk Transit District

•**Route 1** - Terminate at Ponus Middle School rather than operating out to Fox Run Elementary School.
•**Route 3** - Increase service level to provide service at 20 minute headways.
•**Routes 5 and 6** - Combine lower portion of Route 5 to operate as part of a combined Route 5/6 that would operate north from the WHEELhub along Newtown and Wolfpit to Starlight Drive and Starlight at S.T.A.R., and then down Wolfpit to Westport Ave., and back to the WHEELhub. The new route would operate on a 30 minute headway during the peak and 60 minutes during the off-peak and Saturdays.
•**Route 8** - Operate on alternate runs into the unserved area off Strawberry Hill Avenue.
•**Route 9 -** Increase the service level to provide service at 20 minute headways.
•**Route 10** - Increase the service level to provide service at 20 minute headways.
•**Day Tripper 10 -**Eliminate tripper service in the peak periods.
•**Routes 11 and 12**- Reconfigure two loop routes (11 and 12) into two new routes, one which would operate from East Norwalk to Norwalk Technical Community College, and the other one which would operate from South Norwalk to Rowayton, terminating at Jacob Street/Rowayton Avenue.
•**Route 13** - On its return trip, modify the route so that it uses Connecticut Avenue rather than West Cedar **and** increase frequency to 20 minute headways.
•Lengthen weekday off-peak headways on Route 1 & new Route 5/6 to 60 minutes.
•Change off-peak headways on all other routes from 35 to 30 minutes.
•Lengthen Saturday headways on Routes 1 and 7.
•**New Sunday Feeder/Distributor Service -** In conjunction with Coastal Link service, three routes similar to the three evening shuttles should be implemented to complement this service.

Housatonic Area Regional Transit

•**Route 1** - Operate via Golden Hill area, Super Food Mart, and North Street Shopping Center to Saint Gregory the Great Church, discontinue service to Danbury Hospital and Sandpit Medical Center **and** eliminate 3:44 PM trip to Danbury High School.
•**Route 2** - Eliminate all service east of Payne Road, serve Commerce Park outbound during AM peak period and inbound during PM peak period, serve Eden Drive on 12:20 PM inbound trip.
•**Route 3** - Discontinue Mill Ridge Road diversion.
•**Route 4 -** Operate hourly service throughout the entire day and operate between pulse point and DATAHR via Danbury Hospital and Sandpit Medical Center.
•**Route 5 -** Indicate route configurations on bus destination signs.
•**Route 6 -** Operate half hourly service on weekdays and Saturdays, with :00 trips to serve Jensen's Trailer Park via malls and :30 trips to divert to Mill Ridge Road and end at malls.
•**Route 7 -** Serve DATAHR facility and operate via White Street and Federal Road on all trips.
•**New Route 8 -** Provide service between pulse point and Jungle Garden via I-84 and US Route 6 during weekday peak periods only using a small transit vehicle.
•**New Route 10 -** Provide weekday hourly service between pulse point, Danbury Fair Mall and Ridgefield Town Hall via U.S. Route 7 and State Route 35.
•Provide hourly weekday evening service on all routes between 6 PM and 9 PM (longer term).
•Provide hourly Saturday evening service on all routes between 6 PM and 9 PM (longer term).
•Provide hourly Sunday service on all routes except Route 7 between 9 AM and 4 PM (longer term).
•Provide half hourly weekday midday service on all routes (longer term).

New Britain

•Arch Street - Extend service to Meriden Square.
•Arch Street - Convert the Corbin Avenue/Shuttle Meadow Avenue loop to "upon request" service.
•Berlin-Kensington - Extend Route to Cromwell to make connection with Middletown Area Transit & extend service to Lowe's on Berlin Turnpike to make a connection with the Berlin Turnpike Flyer.
•Berlin-Kensington - Eliminate the Alling-Harris-Main loop and the Lower/Hudson/Worthington Ridge loop.
•**Berlin-Kensington** - Eliminate the Bassett Street / Ellis Street loop.
•**Oak Street** - Eliminate the Eddy Glover Boulevard / Commonwealth Avenue loop **and** combine this route with the Stanley Street Route to serve the West Farms Mall.
•**Stanley Street** - Eliminate the Country Club Route, convert the loop on Brittney Farms Road to upon request service, **and** combine this route with the oak street route to serve the West Farms Mall.
•**East Street** - Reduce headways to 60 minutes and pair bus with South Street Route.
•**South Street** - Reduce headways to 60 minutes and pair bus with East Street Route.
•**Burritt Street** - Add one bus to create 30 minute headways.
•**New Route** - Provide hourly service to Newington Center via East Main Street and Newington Avenue.

Southeastern Area Transit

•**Route 1** - Change headway from 2 hours to 1 hour.
•**Route 2** - Change headway from 2 hours to 1 hour.
•**Route 3** - Change headway from 2 hours to 1 hour and cease Route 3 operations between New London Transit Center and Groton Transit Center after Route 2 begins hourly service.
•**Route 4** - Split into two routes - 4A operating between the Norwich Transportation Center and Occum, and 4B operating between Norwich Transportation Center and Mohegan Campus, with each route operating hourly from Norwich.
•**Route 9** - Promote ridership in conjunction with new retail project at Interchange 84 of I-395 and seek to establish a park & ride at this location.

•**Route 10** - Cease service to Mystic, Mistick Village, and portions of SR 184 east of SR 117 **and** operate the trunk portion of Route 10 between Grasso Gardens/Midway Oval and Wal-Mart, with alternate trips to Noank and SR 117/184.
•**Route 11** - Cease service on Route 11 to the Grasso Gardens/Midway Oval area, **and** operate between Wal-mart and Plaza Court using in both directions the route now used for travel from Plaza Court to Wal-mart.
•**New Route Mystic Shuttle** - Replace Route 10 through Mystic with seasonal shuttle operating between Mistick Village and the A&P with a possible extension to Noank.
•**Route 12** - Delete or shorten the Broad Street loop in downtown New London operating via Ledyard, Blackhall, Williams, and Lincoln.
•**Route 14** - Adopt a revised schedule based on maintaining connections at the New London Transportation Center if recommended Route 12 actions fail to resolve on time performance problems.
•**Route 108** - Continue to develop arrangements with hotels and motels along I-95 to provide free or reduced fare transportation for guests in return for annual contributions.
•**Commuter Routes 103,105,106, and 116** - Replace with vanpools.

Middletown Transit District

•Route D Newfield Street - Create a more direct alignment through the residential neighborhood north of downtown and State Route 66.
•**Route F Portland/East Hampton -** Add a 4:00 PM round trip.
•**Route G Durham** - Eliminate mid-morning trips and replace with additional trips in the AM and PM peaks.
•**New Pratt & Whitney Work Shuttle** - Initiate a work shuttle from downtown to Pratt & Whitney worksite in the eastern part of Middletown.
•**New Middletown-Meriden Route -** Initiate a route between Middletown and Meriden connecting the downtowns and transit pulse centers of both cities as well as shopping and employment centers.

Meriden

•**Route A/Route B** - Reconfigure existing Route A and Route B segments to provide better through service from Caldor Plaza to Meriden Square.
•Improve marketing and bus stop signage to create greater awareness of the system.
•Extend operating hours of Meriden Railroad Station (also Meriden Bus pulse point) and provide complete schedule information and system maps at this location.

Bristol

•**Route 1** - Expand the weekday span of service to 7 AM to 6 PM, and the Saturday service from 9 AM to 5 PM, **and** provide service to Central High School and Eastern High School with one morning and one afternoon run each, **and** provide several daily trips to Tunxis Community College.
•**Route 2 -** Modify the route to extend from Downtown Bristol to Connecticut Commons Shopping Center via Route 372 and Route 72, providing connections to downtown New Britain and Tunxis Community College **and** provide shift runs to the Middle Street Industrial Park.

Westport Transit District

•Set productivity standards for employer shuttles.
•Implementation of signed bus stops along daytime routes.

Milford Transit District

•Combine Routes 1 and 2 to integrate with Coastal Link.
•Integrate Route 4 with **CT**TRANSIT JU to better serve Woodmont neighborhood and provide more direct access to CT Post Mall.
•Create CT Post Mall mini-hub.

Wallingford

•Extend existing fixed route for a coordinated transfer with Meriden Route B. Modify route to eliminate unproductive Woodhouse Avenue segment and provide new service to South Colony Street.

Estuary Transit District

•No changes recommended.

Northwestern Connecticut Transit District

•**Candystriper Local Service Route 1** - Add evening round trip.
•**Candystriper Local Service Route 3/4** - Add evening round trip.
•**Candystriper Commuter Service Torrington Industrial Park Route** - Add earlier evening round trip.

•**Candystriper Commuter Service** - Expand route deviation on demand to most trips.
•**Rural Transit Service** - Extend service to access proposed regional hub at Torrington City Hall.
•Expand public information and marketing program.
•Explore improved vehicle communications system.
•Coordinate service with neighboring operators.
•Expand Torrington City Hall site into regional transportation hub.
•Expand the guaranteed ride home program.
•Promote commuter van program and alternate transportation options.
•Consolidate all functions in a single administrative/operating/maintenance facility.

Northeastern Connecticut Transit District

•Consolidate the 3 town fixed route and ADA service into a single point-deviation corridor service.
•Add evening service to adult education campuses.
•Add evening service to selected area hospitals.
•**New Route** - Add Plainfield- Sterling-Canterbury "lifeline" shuttle, two days per week.
•**New Route** - Add Eastford-Woodstock "lifeline" service, two days per week.
•Reconfigure funding formula to provide financial resources for optimum transit service.
•Expand system promotion to increase visibility and acceptance in the community.
•Install signs and amenities at formal bus stop locations.
•Establish a general system focal point, possibly at Putnam Stop and Shop Market.
•Establish public-private day care facility and commuter focal point at the NECTD headquarters.
•Expand coordinated marketing programs with activity centers served by NECTD.
•Coordinate connections with WRTD and SEAT at strategic points near NECTD service area boundaries.
•Focus on commuter market through participation in other regional transportation-related programs.

Valley Transit District

•Provide more and better public information and marketing of services.
•Expand the administrative staff size by at least one person.

Windham Region Transit District

•**High Street City Bus -** Eliminate service on west end of route and serve areas south of the Willimantic River.
•**Storrs-Willimantic Route -** Increase frequency of Saturday service.
•**Arrow Line Inc. Willimantic-Hartford Commuter Services** - Eliminate fare zone differential and push back 5:30 PM outbound bus to 6:30 or reroute all Coventry bus routes to Willimantic.
•**City Bus** - Add second bus in order to decrease headways.

Express Buses

•Route 1 - Operate two fewer inbound morning peak period trips.
•Route 2 - Operate two fewer inbound morning peak period trips from Corbins Corner.
•Routes 5 & 13 - Serve the park & ride lot located at the interchange of State Route 75 & I-91 with a separate vehicle.
•Madison-Guilford Express - Operate primarily via US 1 when traveling between Guilford and Madison.
•Routes 30 and 31- Discontinue a single round trip via Tunxis Community Technical College.
•Route 60 - Eliminate and replace with a subscription club bus demonstration project.
•New Route 72 - Initiate a New Britain-Hartford express route.

Overall Recommendations

•Install bus stop signage at more bus stops, update design and ensure consistency of design within a system, and implement a no-parking enforcement and maintenance program.
•Install shelters at all stops with more than 25 boardings per day and ensure that they are well maintained.
•Where necessary, update timetables and ensure that they are widely distributed and widely available.
•As a long term goal, implement Global Positioning Systems (GPS) in transit systems to improve data collection, vehicle tracking, and customer information.

Appendix B - Air Quality Analysis

CONNDOT BUS SYSTEM STUDY STATEWIDE AIR QUALITY IMPACTS	
AIR QUALITY ANALYSIS	**Year**
Part 1 - Annual Automobile Emissions Reduced	**2002**
Annual Bus passenger trips added	7,630,265
Ave. Daily passenger trips added	20,905
Trip diversion factor	0.75
Automobile passenger trips replaced	15,679
Average vehicle occupancy	1.3
Automobile vehicle trips replaced	12,060
Average trip length	3.4
Estimated Daily Automobile VMT replaced	41,488
Emissions Decrease	
CO	
Mobile 5.0b emissions factor (grams/mile)	4.17
Kgs/day	173.10
Kgs/year	63,183
NO_X	
Mobile 5.0b emissions factor (grams/mile)	0.97
Kgs/day	40.23
Kgs/year	14,685
VOCs	
Mobile 5.0b emissions factor (grams/mile)	0.62
Kgs/day	25.84
Kgs/year	9,431
Part 2 - Annual Bus Emissions Added	**2002**
Annual Bus Miles Added	435,675
Average Daily Bus Miles Added	1,194
Emissions Increase	
CO	
Mobile 5.0b emissions factor (grams/mile)	17.62
Kgs/day	21.03
Kgs/year	7,677
NO_X	
Mobile 5.0b emissions factor (grams/mile)	10.51
Kgs/day	12.54
Kgs/year	4,577
VOCs	
Mobile 5.0b emissions factor (grams/mile)	2.73
Kgs/day	3.26
Kgs/year	1,189

Part 3 - Net Emissions Change		2002
CO		
	Automobile Kgs/year reduced	63,183
	Diesel Bus Kgs/year added	7,677
	Net Kgs/year change	-55,506
NO_X		
	Automobile Kgs/year reduced	14,685
	Diesel Bus Kgs/year added	4,577
	Net Kgs/year change	-10,108
VOCs		
	Automobile Kgs/year reduced	9,431
	Diesel Bus Kgs/year added	1,189
	Net Kgs/year change	-8,242

Notes & Assumptions

Part 1

Annual Bus passenger trips added based upon ridership projections for each transit system
Ridership projections took existing trends and effect of proposed recommendations into account
Annual trips divided by 365 to calculate average daily trips (average of weekday, Sat. and Sun trips)
Trip Diversion factor - 75% of new transit trips assumed to be replacing auto trips
Source = CMAQ Analysis Process for Pennsylvania, COMSIS corporation, 1994
Factor of .75 is average of local & express service changes & new service
Average vehicle occupancy(work & non-work) = 1.3; ConnDOT statewide model
Average trip length = 3.44 miles - ConnDOT statewide model , series 25, year 2000
Est. Daily VMT = (((Annual trips/365)*75%)/Veh. Occupancy)*3.8)
CO= Carbon Monoxide, Nox=Nitrous Oxide, VOCs= Volatile Organic Compounds

Emissions Factors

Source = EPA Mobile 5.0b Emissions Model, Greater Hartford Area
Year 2002 used to approximate analysis year
Additional guidance from Pennsylvania CMAQ Analysis Process
Default national characteristics used for passenger vehicle type breakdown
Assumptions - Avg. speed - 37 m.p.h., 20% cold starts, all times of day
Factors are weighted averages of 6 of 8* Mobile 5 vehicle categories**
*heavy duty gas & diesel trucks excluded
**weights assigned according to default national characteristics of passenger vehicle fleet
(VMT * Factor * 313)/1000= Kgs of emissions per year

Part 2

Annual Bus Miles added based upon individual system recommendations
Annual miles divided by 365 to calculate average daily trips
CO= Carbon Monoxide, Nox=Nitrous Oxide, VOCs= Volatile Organic Compounds

Emissions Factors

Source = EPA Mobile 5.0b Emissions Model, Greater Hartford Area
Additional guidance from Pennsylvania CMAQ Analysis Process
Assumptions - Avg speed - 15 m.p.h., 20% cold starts, all times of day.
Factors are weighted averages of gas and diesel heavy duty vehicles***
***weights assigned according to default national characteristics of passenger vehicle fleet
(VMT * Factor * 313)/1000= Kgs of emissions per year

Part 3

Net Kgs change per year = automobile emissions reduction minus bus emissions increase