CITY OF NEWTON

IN BOARD OF ALDERMEN

PUBLIC SAFETY & TRANSPORTATION COMMITTEE REPORT

WEDNESDAY, JUNE 20, 2012

Present: Ald. Ciccone (Chairman), Harney, Johnson, Swiston, Yates, Fuller, Schwartz and Kalis
Also present: Ald. Linsky, Lennon, Albright and Danberg
City Staff: Clint Schuckel, Director of Transportation; Officer Rocco Marini, Newton Police Department; David Koses, Transportation Planner, Planning & Development Department; Amanda Stout, Senior Economic Development Planner, Planning & Development, David Turocy, Commissioner Public Works and Captain Matthew Cummings, Newton Police Department
Others Present: Frank Stearns, K&L Gates, LLP; P.J. Cappadona, Boston College and Stephanie Pollack, Chair, Transportation Advisory Committee

DISCUSSION ITEM: Chairman's Note: Stephanie Pollack, Chair, Transportation Advisory Committee (TAC) will provide Committee members with a brief presentation followed by questions and answers.

NOTE: Stephanie Pollack provided Committee members with a PowerPoint presentation on moving forward with the recommendations of the Newton Transportation Advisory Committee (TAC), attached to this report.

The TAC was appointed by Mayor Warren in July 2010 in order to undertake a wide-ranging review of transportation issues in Newton. The Committee examines all transportation decision making, policy, planning, investments and craft recommendations for making changes both small and large. Engineering, enforcement and education are necessary.

Ms. Pollack reviewed the context for TAC, recommendations, transportation goals and a governance and policy setting. Recommendations crafted by subcommittees are safety, transportation planning, complete streets, bicycle accommodations, transit, parking, urban fabric, youth/senior travel and outreach/engagement. Ms. Pollack described the concept of complete streets. Complete streets are about safety, traffic calming and the economic vitality for commercial centers and the community.

The context for TAC includes a comprehensive plan and other planning efforts. There are many types of residents with many different needs. 22% of Newton residents are under the age of 18, 15% are over age 65. Newton is both a city and suburb with a density population of 4,700 plus persons/square mile but the "walk score" remains 60.

Complete streets are a process, not just a result including the following:
Existing and future conditions: Define land-use context and define transportation context.
Goals and objectives: Identify deficiencies and describe future objectives.

Decision-making: Define street type, initial cross sections, describe tradeoffs and select cross-sections.

Committee members asked if raised traffic calming devices impact the response time for emergency vehicles. Ms. Pollack said that other methods are available and designed for clearance issues without affecting emergency vehicles response time.

Chair Ciccone and Committee members thanked Ms. Pollack for her presentation. They realize TAC is facing a difficult task to bring recommendations to fruition in Newton.

Additional Information:
Andreae Downs provided Committee members with a "Complete Streets" flyer, attached to this report. Also attached are "Complete Streets: We Can Get There from Here" and "Complete Streets: Best Policy and Implementation Practices" from Stephanie Pollack.

REFERRED TO PUBLIC SAFETY & TRANS. AND FINANCE COMMITTEES

#186-12 HIS HONOR THE MAYOR requesting authorization to transfer the sum of ten thousand dollars ($10,000) from Executive Department Salaries to the Police Gasoline Account for the purpose of covering the Police Department's gasoline needs through the end of the year and transfer the sum of fifty thousand dollars ($50,000) from Executive Department Salaries to the Police Department's Overtime Account. [06/11/12 @ 5:51 PM]

ACTION: APPROVED 7-0, Ald. Harney not voting

NOTE: Chief Cummings joined the Committee to discuss transfers to cover the Police Department's gasoline and overtime accounts.

Chief Cummings said that the transfer of $10,000 would cover the costs for gasoline through the end of the year. He said that it is difficult to estimate the departments' needs for gasoline. They use approximately 80 gallons of gasoline per year. Last year, the cost was $2.62 per gallon, this year the cost was $3.21 per gallon.

The transfer of $50,000 would cover the costs of overtime. The department conducted background checks for the Fire Department but has not been reimbursed. The department has been working overtime to cover injuries, burglary squad and an incident requiring 24/7 coverage.

Chair Ciccone asked Chief Cummings if the study has been performed assessing the need for additional officers. Chief Cummings answered the assessment is complete but the description of deployment needs to be complete. His goal is to complete the assessment early next week.

Ald. Johnson made the motion to approve these transfers. Committee members agreed 7-0, Ald. Harney not voting.

#167-12 POLICE DEPARTMENT submitting reports of semi-annual taxi license/public auto inspections for review. [05/21/12 @ 3:48 PM]

ACTION: APPROVED 8-0

NOTE: Officer Marini joined the Committee for discussion on this item. Committee members were provided with a copy of the semi-annual inspection report, dated June 13, 2012, and an updated copy, dated June 20, 2012. Both are attached to this report.

Officer Marini stated that Weldon Executive Coach and Boston City Limousine have passed inspection. Veteran's Taxi #124 has front-end damage and #52 vehicle is being replaced. Newton Cab #1 has a cracked tail light on the passenger side, medallion is not affixed and the cab light is not working. He has informed Weldon Executive Coach that they have three months to replace Public Auto #17. Newton Car Service Public Auto #16 has been asked to remove the meter. Officer Marini stated that he would remove these medallions if the companies do not comply to repair or replace their vehicle. All other vehicles passed inspection and he recommends approval for those public autos and taxi medallions.

Ald. Yates made the motion to approve this item. Committee members agreed 8-0.

#166-12 BOSTON COACH TRANSPORTATION request for annual renewal of the Boston College Bus Licenses. There are no changes proposed to last year's licenses. [05/21/12 @ 3:34 PM]

ACTION: APPROVED 7-0, Ald. Kalis recused

NOTE: Mr. Stearns and Mr. Cappadona joined the Committee for discussion on this item.

Mr. Stearns spoke briefly about the Boston College bus service. He stated bus routes have remained the same. They have not received any complaints in the past year. Boston College has replaced three older buses with newer environmental friendly buses.

Mr. Cappadona said that there are two inter-campus bus routes used primarily for students and staff. It appears they are meeting the demands, the system is efficiently working and routes appear utilized.

Ald. Johnson asked if the number of passengers using the bus service has increased or decreased this year and requested a utilization report. She then asked if staff or faculty were using the bus. Mr. Cappadona reported that each bus counts boarders and that they are in the process of fine-tuning a utilization report. Faculty and staff are now using the bus service, especially during commute hours and the summer. Adjustments will be made if necessary to meet demands.

Ald. Fuller asked if they have considered extending their routes to and from Newton Centre. Mr. Stearns answered that at this time it is not in their budget to expand their route. She then asked him to conduct an informal poll and ask students, staff and faculty if they would be interested in Boston College expanding their bus routes. She feels the service would be very beneficial.

Ald. Yates made the motion to approve this item. Committee members agreed 7-0, Ald. Kalis recused.

REFERRED TO PUBLIC SAFETY&TRANSPORTATION & FINANCE COMMITTEES

#363-10(2) ALD. ALBRIGHT proposing a trial of parking meter free Saturdays between Thanksgiving and New Year for the shopping areas to support shopping at local businesses in Newton. [02/10/12 @ 9:13 AM]

ACTION: HELD 7-0, Ald. Johnson not voting

NOTE: Ald. Albright and Ms. Stout joined the Committee for discussion on this item. Ms. Stout provided Committee members with a PowerPoint presentation, attached to this report.

Ms. Stout said that the Commissioner of Department of Public Works could waive meter fees. The City's Law Department has stated the City must recoup any lost revenue for providing free parking. Ms. Stout stated that the Nonantum Neighborhood Association is interested in promoting business and plan to fundraise for "free" parking during the holidays.

The proposed Nonantum Pilot Program would include "free" 2-hour parking at 62 on-street meters. Enforcement is necessary to assure turnover, which is important to merchants. Ms. Stout provided two scenarios including 1) 4 metered Saturdays and 2) 14 consecutive metered days. The presentation includes cost estimates on meter revenue, DPW overtime and the cost for decorative meter bags.

Total Cost Estimates

	Scenario 1	Scenario 2
Meter revenue	$1,860	$5,580
DPW overtime	$1,040	$ 390
Decorative bags	$ 400	$ 400
TOTAL	$3,300	$6,370

Committee members and Aldermen present expressed their concerns, questions, requests and suggestions regarding this item.

Concerns

Committee members said that they are most concerned regarding enforcement and promoting the program carefully.

Questions

Committee members asked if merchants had a preference of 4 Saturdays or 14 consecutive days. Ms. Stout said they do not. They then asked how the Police Department could enforce a 2-hour limit and how would the parking control officers be able to identify a 2-hour period. Chair Ciccone answered that the license plate recognition system could identify the time. Committee members asked if the free parking would benefit merchants and what else will be done to promote the program. Ms. Stout said that the program would be promoted in different villages, shops and restaurants perhaps providing merchant discounts.

Requests/Suggestions

Committee members suggested installing additional signs informing patrons where free parking is available in the two municipal parking lots to encourage shopping. Chair Ciccone suggested promoting this program during the Holiday lighting ceremony.

Ms. Stout provided possible next steps on the program including the following suggestions:
Summer: Nonantum Neighborhood Association fundraising

September: Determine scenario based on funds raised
Fall: Promote program and order bags
December: Implement Nonantum Pilot Program
January 2013: Roundtable discussion with merchants to gauge success of the project including was there lack of turnover, enforcement issues and revenue gains

Some Committee members said that they could not support this item without the Police Department's involvement, input and suggestions for the program. Other members suggested promoting the program since merchants have requested it.

Ald. Kalis made the motion to hold this item until September 2012 pending enforcement availability or issues, quantitative data and the assurance the majority of merchants are on board with implementing the program. Committee members agreed 7-0, Ald. Johnson not voting.

#417-11 ALD. JOHNSON requesting a discussion with the Department of Transportation regarding sound barriers along the Turnpike. [12/07/11 @ 9:29 PM]
ACTION: NO ACTION NECESSARY 6-0, Ald. Swiston and Fuller not voting

NOTE: Mr. Schuckel provided Committee members with a PowerPoint presentation provided by MassDOT on transportation Type I and Type II noise abatement policies and procedures dated July 13, 2011, attached to this report.

Ald. Johnson said that this item was docketed because of concerns regarding the installation of sound barriers since the merging of the Department of Transportation (DOT) and the Massachusetts Turnpike. It is necessary to learn how lists are prioritized. She then said Representative Kay Khan recently informed her that the sound barrier status is zero.

Mr. Schuckel provided Committee members with Type I and Type II policies regarding sound barriers. Type I involves the construction of a highway at a new location. Type II involves the construction of noise barriers on existing highways. He quoted "the then-Massachusetts Highway Department (Mass Highway) decided to implement a type II noise abatement program because of the high cost of design and construction (approximately $3 million to $5 million per mile in 2010), noise barrier projects could not be constructed along all highways under Mass Highway's jurisdiction".

The State conducted two studies in 1988 and 1992 as follows:

In 1988, Mass Highway completed a statewide noise study to determine areas most adversely affected by noise from interstate highways. The study allowed Mass Highway to develop an equitable approach to mitigating noise and establish a final priority list to rank 53 locations along interstate highways under their jurisdiction most seriously affected by noise from the highways. In Mass Highway's Type II priority list, Newton ranks #8, 12 and 25.

In 1992, the then-Massachusetts Turnpike Authority established a priority listing of areas where noise barriers were determined to be cost effective. In their noise barrier priority list, Newton ranked #1.

Mr. Schuckel said that the Massachusetts Transportation Reform Act was signed into law in June 2009 consolidating all transportation agencies into one established MassDOT. Because there is one MassDOT, there is no need to have two separate type II noise barrier priority lists. Moving forward, MassDOT will then systematically examine these locations listed in the combined list, in the order of their ranking, to determine the feasibility and reasonableness of future Type II noise barriers and bring the lists to one list.

Ald. Johnson asked Mr. Schuckel to provide the Massachusetts Turnpike noise study. Mr. Schuckel said that he would forward the web link and the noise study when received.

Ald. Johnson made the motion for no action necessary. Committee members agreed 6-0, Ald. Swiston and Fuller not voting.

#279-10 ALD. JOHNSON, ALBRIGHT & LINSKY, requesting the development of a comprehensive traffic and parking plan for the Newton North High School neighborhood with the following streets as its borders: Commonwealth Avenue, Washington, Harvard and Valentine Streets. This plan to be completed by November 30, 2010 will include a fix to short term (immediate needs) and longer term needs to effectively manage the traffic circulation within the neighborhood, provide pedestrian and vehicular safety, and preserve quality of life for the neighborhood, school staff and faculty. [10/06/10 @ 12:33 PM]

ACTION: HELD 6-0, Ald. Harney and Swiston not voting

NOTE: Ald. Albright, Ald. Linsky and Mr. Koses joined the Committee for a follow-up discussion to address the development of a comprehensive traffic and parking plan for the Newton North High School neighborhood. The Ward 2 Aldermen docketed this item in order to assist with immediate and long term needs to provide pedestrian and vehicular safety and to preserve the quality of life for the neighborhood.

Mr. Koses provided Committee members with a PowerPoint presentation and a 'draft' Neighborhood Parking Plan map. Both are attached to this report.

Mr. Koses said that it would cost approximately $30,000 to relocate the pedestrian beacon with a Hawk Signal to Tiger Drive. The annual cost for police detail at this location is $53,280.

Mr. Koses reviewed current parking restrictions, goals of neighborhood parking plan and the Newton North neighborhood permit program. He described two approaches on how street restrictions could conform to the plan: 1) Approach all restrictions at once. The Public Safety & Transportation Committee would approve all parking restrictions within the Newton North area permit zone. 2) Approach street restrictions on a case-by case basis. Traffic Council would approve new parking restrictions in smaller areas as docketed.
Mr. Koses then described how residents become eligible for a permit, how residents would receive permits or visitor passes and locations permits would allow parking.

Committee members and Aldermen present expressed their concerns, questions, requests and suggestions.

Concerns:
Committee members said that if parking is eliminated it cause unfairness, burdens and negative impacts to homeowners. Students park all day taking away homeowners benefits. Homeowners, guests and contractors should be allowed to park in front of residents. The Police Department will have to program each street and each restriction into the license plate recognition system, a difficult task. Suggestions were made to simplify parking restrictions making this task easier.
Questions
Would this parking plan divide and impose the abutting Newtonville Village, what is the criteria for an even flow, has the Police Department reviewed the plan, could residents apply for the parking permit on-line, why the permit cost is $25.00, when the plan could be implemented and how do you prevent students from obtaining visitor permits?
Requests/Suggestions
Committee members suggested exploring the possibility of applying for the permit on-line. They suggested holding a community meeting, public hearing and that the Board of Aldermen approve all parking restrictions within the Newton North area permit zone before implementing the program. They suggested changing the name of the program from Neighborhood Parking Plan to Resident Parking Permit Plan. They then suggested limit the number of permits per household or vehicle.

Mr. Koses answered that Captain Mintz and Sgt. Babcock feel the plan would work well and residents may prefer to apply in-person for their permit to obtain it immediately. Perhaps two options could be available to residents for obtaining permits. Chair Ciccone stated that the current Resident Parking Only Permit cost is now $25.00.

Chair Ciccone opened the discussion to members of the public. Approximately four residents were present for this discussion. Residents stressed their concerns, suggestions and questions.
Concerns
Residents expressed their concern regarding the $25.00 permit fee to override parking restrictions. They feel they should not be responsible to pay for a parking permit since they will be inconvenienced when parking is restricted. They agree it is an unfair burden to them because they should be allowed to park in front of their homes.
Suggestions/Questions
Residents suggested advertising the program, reducing the $25.00 permit fee if they apply on-line. They asked how the Police Department could supervise parking restrictions. They suggested implementing a revolving fund to benefit the neighborhood with safe routes, sidewalk repairs and street repairs. What does the school think of the parking plan? They all agreed education would be necessary on where people can park. A resident asked if the one-hour parking restriction on Gay Street that Traffic Council approved on June 14, 2012 could be appealed. He then said he feels residents of Atwood Avenue, Frederick and Bonwood Streets desire a parking restriction. Mr. Koses answered yes the item could be appealed through the close of business July 5, 2012. Ald. Danberg asked if residents of these streets knew they had the option of purchasing the $25.00 parking permit. Ald. Johnson and Mr. Koses answered no. Ald. Albright said that if safety is a concern the Police Department could implement a parking restriction at any time. Ald. Fuller and Johnson said that they support the appeal. Ald. Johnson asked what the Police Department could do in the interim before school starts.

Mr. Koses said that the automatic plate readers could identify times parking restrictions. Chair Ciccone said that issues would arise. Mr. Koses said that the program could be reviewed in six months addressing concerns.

Ald. Johnson said that residents were informed once construction was complete that Tiger permits would cease and student education is necessary where parking is allowed. She said that Washington Street remains an option because it has free parking to the west of Lowell Avenue.

Ald. Johnson made the motion to hold this item in order to hold a community meeting, public hearing and that the Board of Aldermen approve all parking restrictions within the Newton North area permit zone before implementing the program. Committee members agreed 6-0, Ald. Harney and Swiston not voting.

Chair Ciccone, Aldermen and Committee members thanked Mr. Koses for his presentation and commended him for his diligent work.

At approximately 10:50 pm, Ald. Fuller moved to adjourn. Committee members agreed 6-0.

Respectfully submitted,

Allan Ciccone, Jr. Chairman

Discussion Item
06-12-12
Stephanie Pollack

Moving Forward with the Recommendations of the Newton Transportation Advisory Committee

Briefing for the Public Safety and Transportation Committee

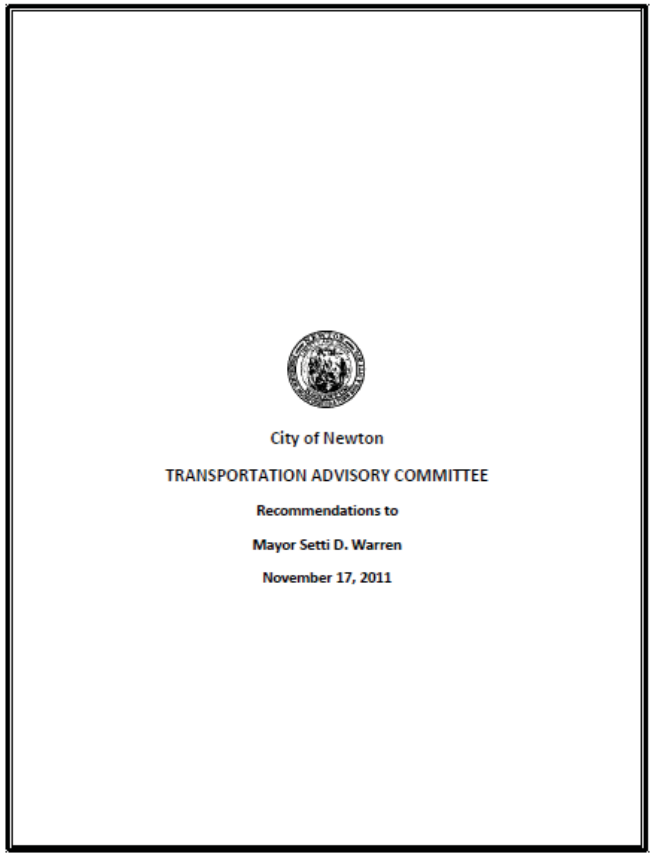
June 20, 2012

Stephanie Pollack
Chair,
Transportation Advisory Committee

Discussion Item
06-12-12
Stephanie Pollack

Newton Transportation Advisory Committee

- Appointed by Mayor Setti D. Warren in July in order to undertake a wide-ranging review of transportation issues in Newton
- Diverse group of residents, including some already active on transportation issues and others who were not
  - With strong support from staff of key City departments
- Charged to "examine all transportation decisionmaking, policy, planning and investments and craft recommendations for making changes both small and large"


City of Newton

TRANSPORTATION ADVISORY COMMITTEE

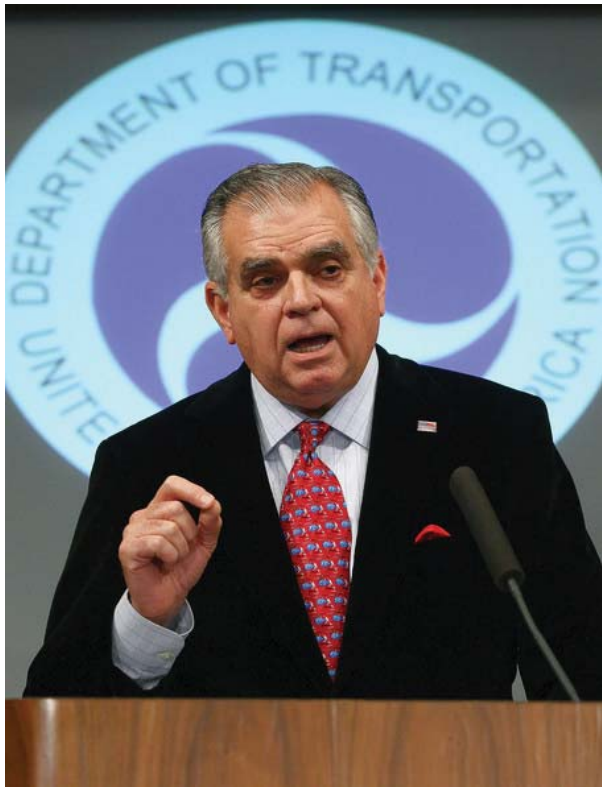
Recommendations to

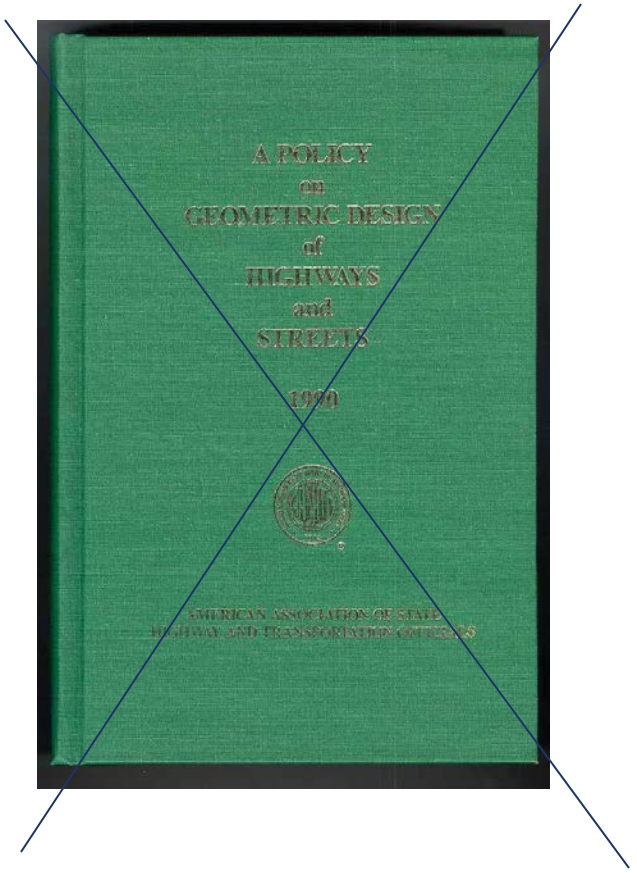
Mayor Setti D. Warren

November 17, 2011

Discussion Item
06-12-12
Stephanie Pollack

Context for TAC





Discussion Item
06-12-12
Stephanie Pollack

Context for the TAC

- Comprehensive Plan
  - And other planning efforts
- Many types of residents, many different needs
  - *Not* different types of users or "modes"
  - 22% of residents under 18, 15% over 65
- Newton as both city and suburb
  - Density of 4,700+ persons/square mile
  - But "walk score" of 60

Walk Score®
Drive less. Live more.™

Arlington	67
Boston	79
Brookline	83
Cambridge	89
Marblehead	54
Needham	46
Newton	**60**
Quincy	62
Somerville	84
Worcester	60

Discussion Item
06-12-12
Stephanie Pollack

Four kinds of recommendations

An overarching set of citywide transportation **goals** to guide the decision-making of all city departments and staff whenever they are making transportation, planning, land use or other decisions that may affect the City's transportation system;

Creation of a **new system of coordinating and implementing transportation decisionmaking** including a permanent Transportation Advisory Group, bicycle and pedestrian coordinators and the eventual evolution of the new interdepartmental Transportation Team and Transportation Division in the Department of Public Works into a true Transportation Department;

A series of executive orders and planning efforts, issued according to specific timetables, to create a new **transportation policy and planning framework** for Newton, including a Complete Streets policy, bicycle master plan, urban fabric master plan and parking management plan; and

A host of **specific recommendations**, large and small, on issues ranging from safety to urban fabric and address the needs of youth, seniors and everyone in between – everyone who travels in Newton whether they drive, use transit, walk or bike.

Discussion Item
06-12-12
Stephanie Pollack

Citywide Transportation Goals

1. Real Options: Newton's transportation system will provide Newton residents and visitors with a variety of options for getting to work, school, shopping, recreation and other destinations. Newton's transportation system will provide real options for everyone, including those too young or too old to drive, those having disabilities that preclude or limit driving and those who choose not to drive for budgetary, health or environmental reasons.

2. Quality of Life: Newton's transportation system and policies will support and advance a broader vision for the Newton that we all want to live in, maintaining the quality of life in our neighborhoods and village centers and reducing the negative impacts of traffic and congestion on those neighborhoods and village centers.

3. Reducing Driving and Strengthening Alternatives: Transportation policies, investments and decision-making will focus on reducing motor vehicle travel, particularly cut-through traffic and solo driving. While driving will remain an important option for many trips, the City will work to strengthen alternatives including walking, biking, and public transportation and to capture more of the costs of motor vehicle travel from those who drive.

Discussion Item
06-12-12
Stephanie Pollack

Citywide Transportation Goals

4. Safety: Safe travel will be a top priority and transportation policies, investments and enforcement strategies will be based on the principle of "safety first" so that everyone (from children to seniors and including pedestrians, bicyclists and scooter riders) feels safe and so that motorists, bicyclists and pedestrians alike practice safe travel behavior.

5. Balance: Transportation policies, investments and decision-making will be designed to address and improve performance across all modes of travel and balance the needs of all users of the transportation system (including drivers, pedestrians and bicyclists) rather than focusing solely on a single transportation mode or element of the problem (for example, traffic congestion).

6. Smart Growth: Creating real transportation choices and reducing driving will require changes to Newton's development patterns and therefore all transportation, planning and land use decisions will support walkable, mixed-use and higher density development (particularly where transit is orwill be available) in order to enable more walking, biking and use of public transportation.

7. Consistency: Transportation policies, investments and decision-making will also be consistent with and support the City of Newton's goals and policies with respect to reducing greenhouse gas emissions and promoting healthy lifestyles for all residents.

Discussion Item
06-12-12
Stephanie Pollack

Governance and policy-setting

"Many transportation and land use decisions in Newton are made on a case-by-case basis rather than pursuant to overarching policies designed to guide decisions with respect to specific projects. Even when policies have been put in place, many are informal, without public input into their development and sometimes not even reduced to writing. In order to implement the Transportation Goals recommended by the TAC and achieve more consistent and progressive transportation policies and projects, the City of Newton should seek to develop a set of written policies to guide decision making on specific projects by the Planning and Development, Public Works and School departments as well as by the Traffic Council."

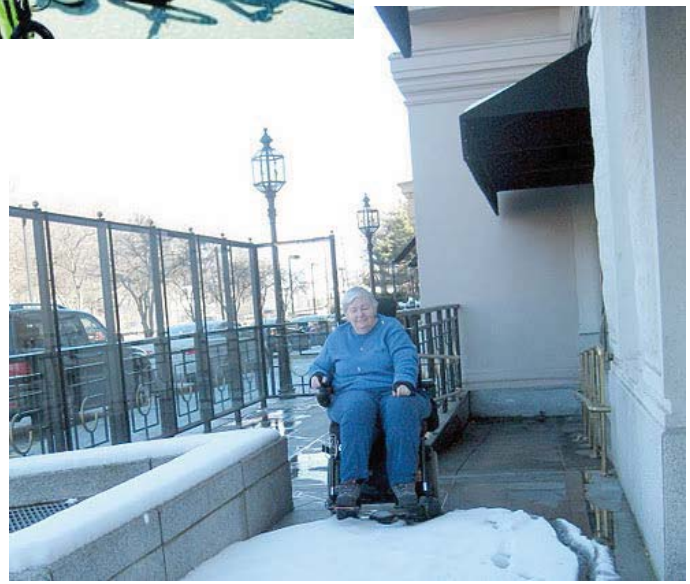
Discussion Item
06-12-12
Stephanie Pollack

Recommendations crafted by subcommittees

- Safety
- Transportation Planning and Complete Streets
  - Bicycle Accomodations
  - Transit
- Parking
- Urban Fabric
- Youth and Senior Travel
- Outreach and Engagement

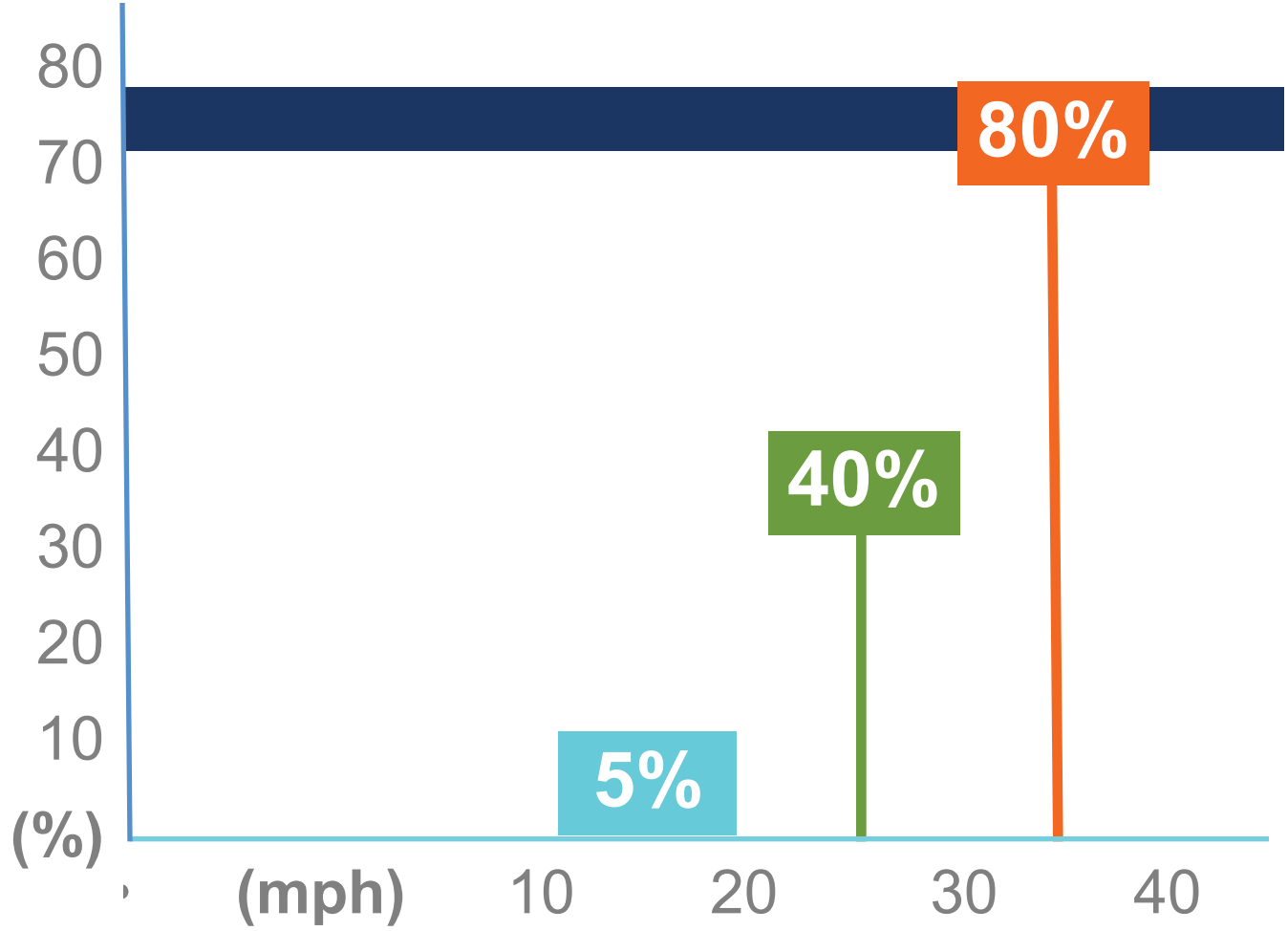
Discussion Item
06-12-12
Stephanie Pollack

What are complete streets?



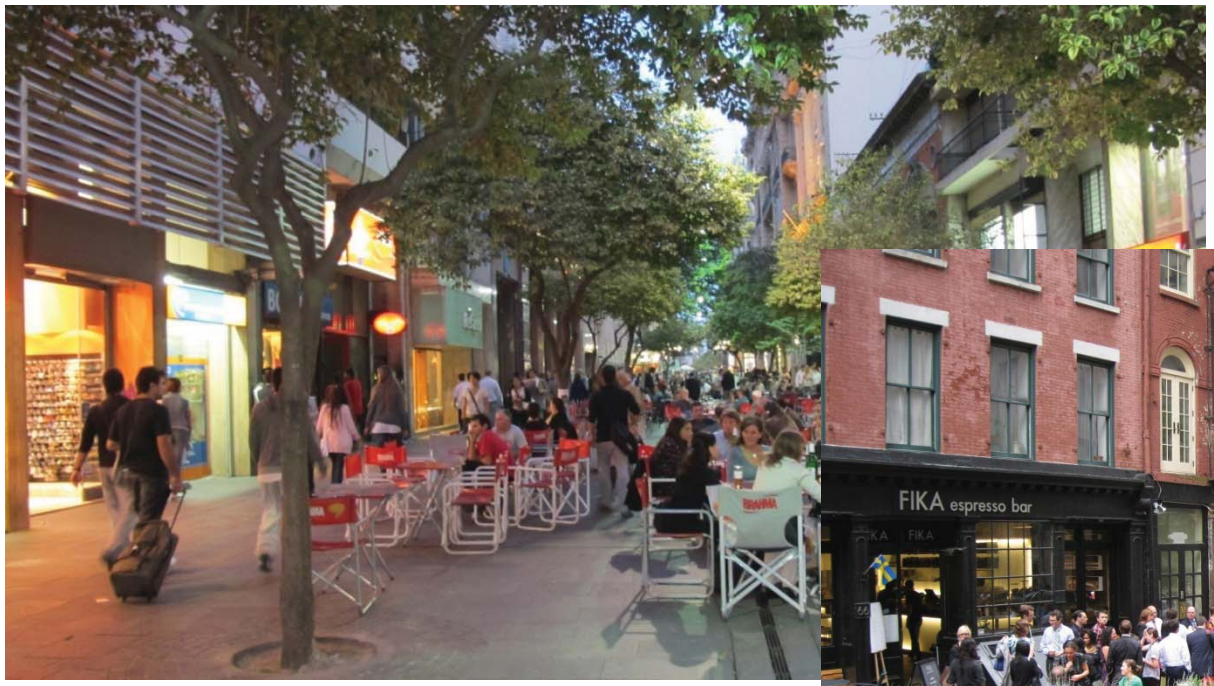
Discussion Item
06-12-12
Stephanie Pollack

Complete streets are about safety



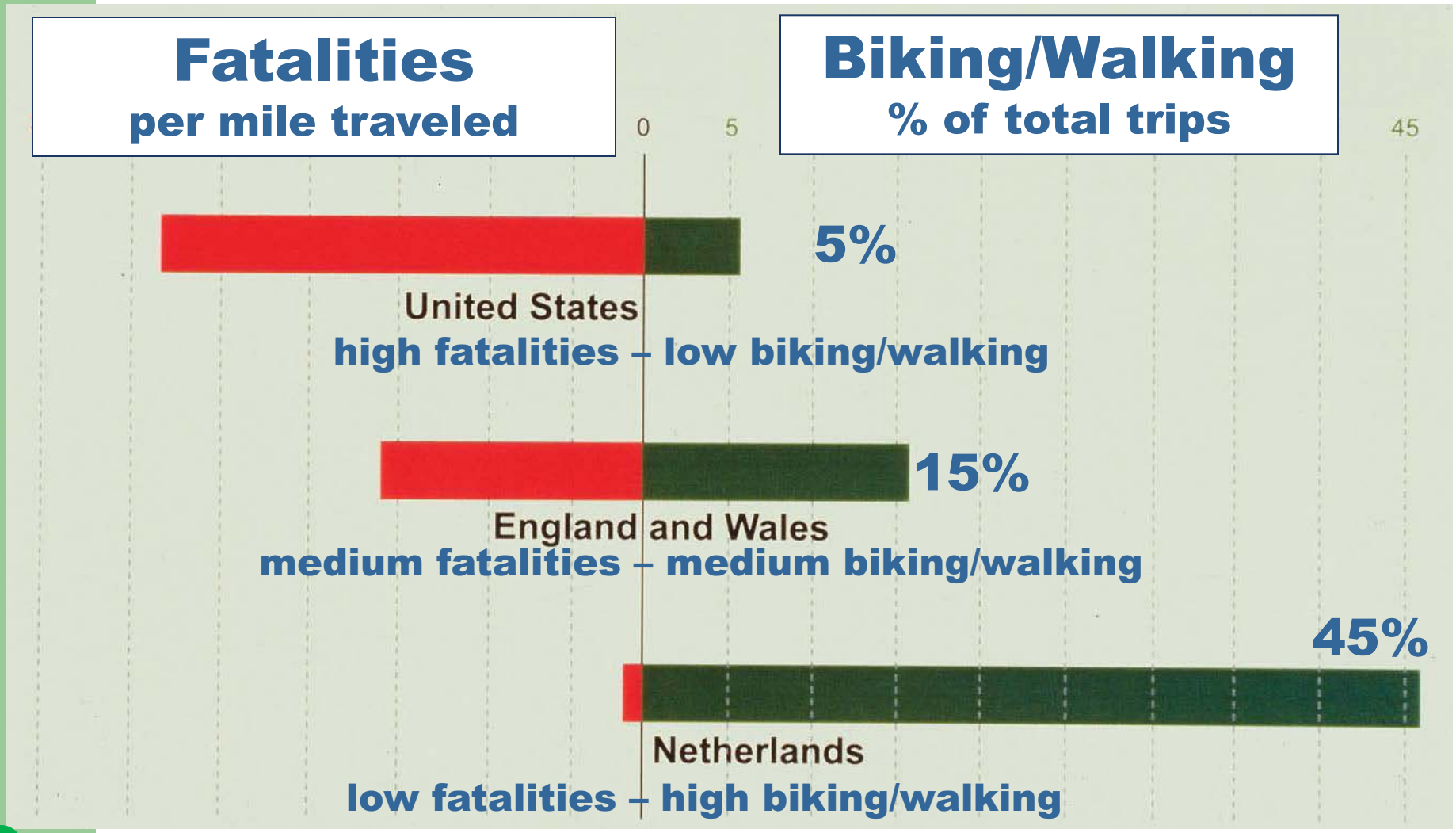
Source: Pasanen (1992) http://tinyurl.com/yuohsg

Complete Streets are about economic vitality for commercial centers



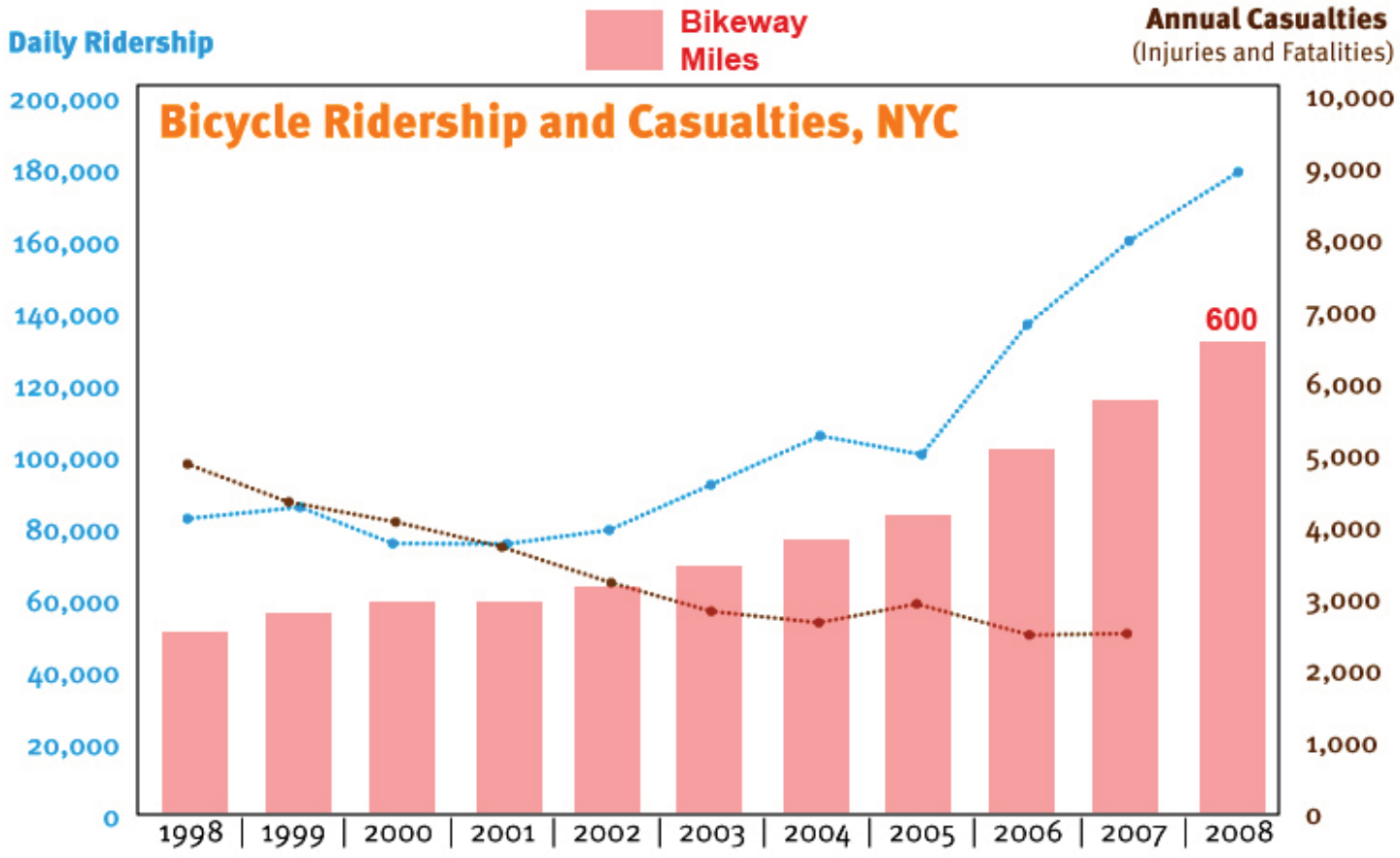
Complete streets are about community

Safety in numbers



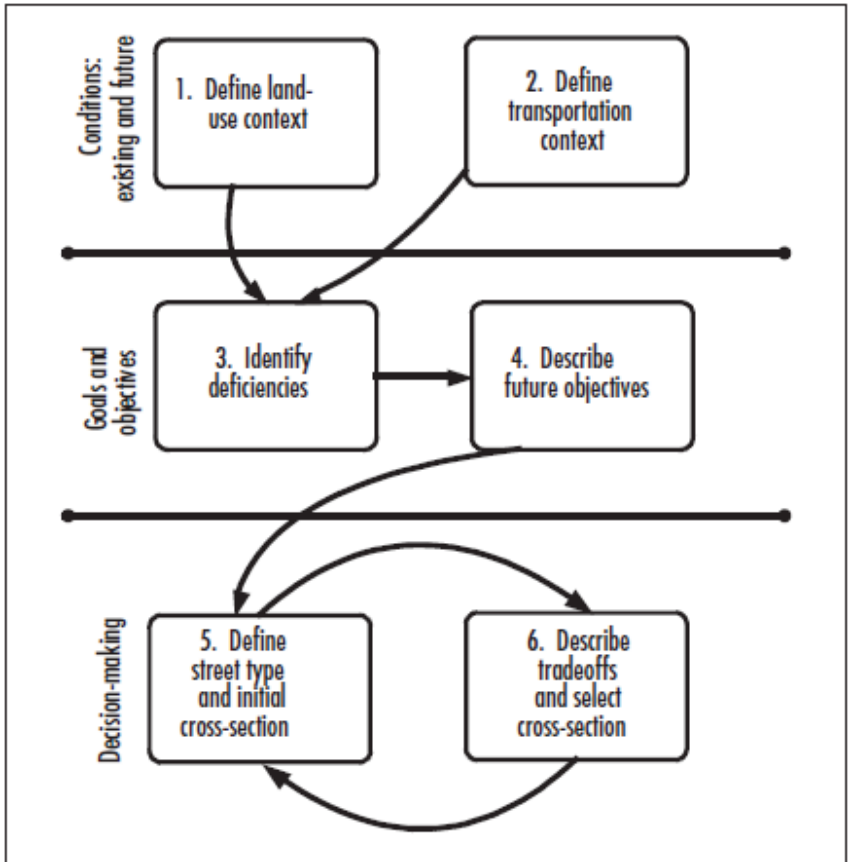
Discussion Item
06-12-12
Stephanie Pollack

Safety in numbers

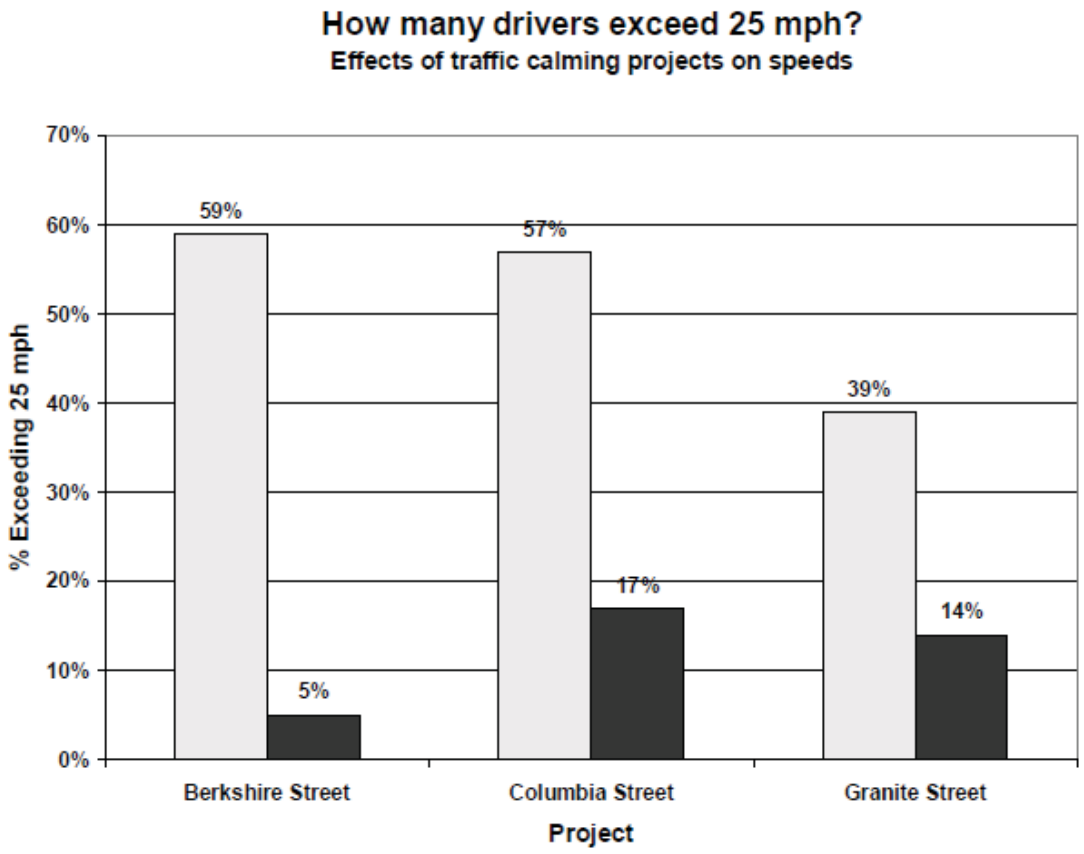


Discussion Item
06-12-12
Stephanie Pollack

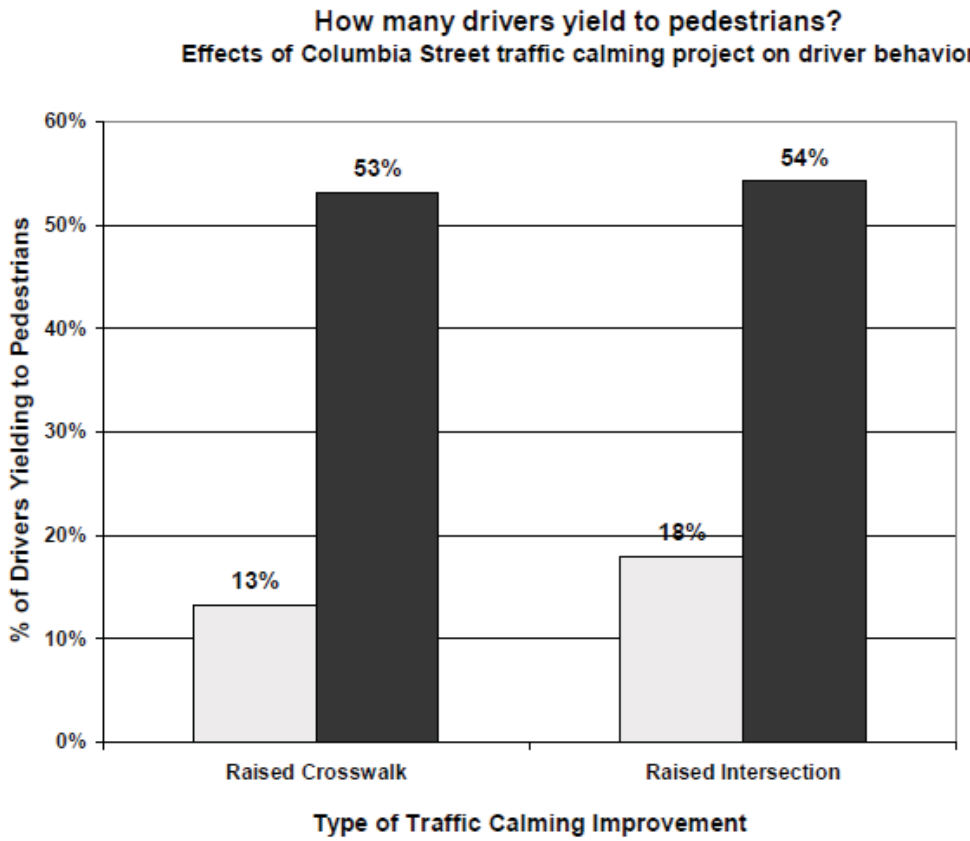
Complete Streets is a process, not just a result



Traffic calming works

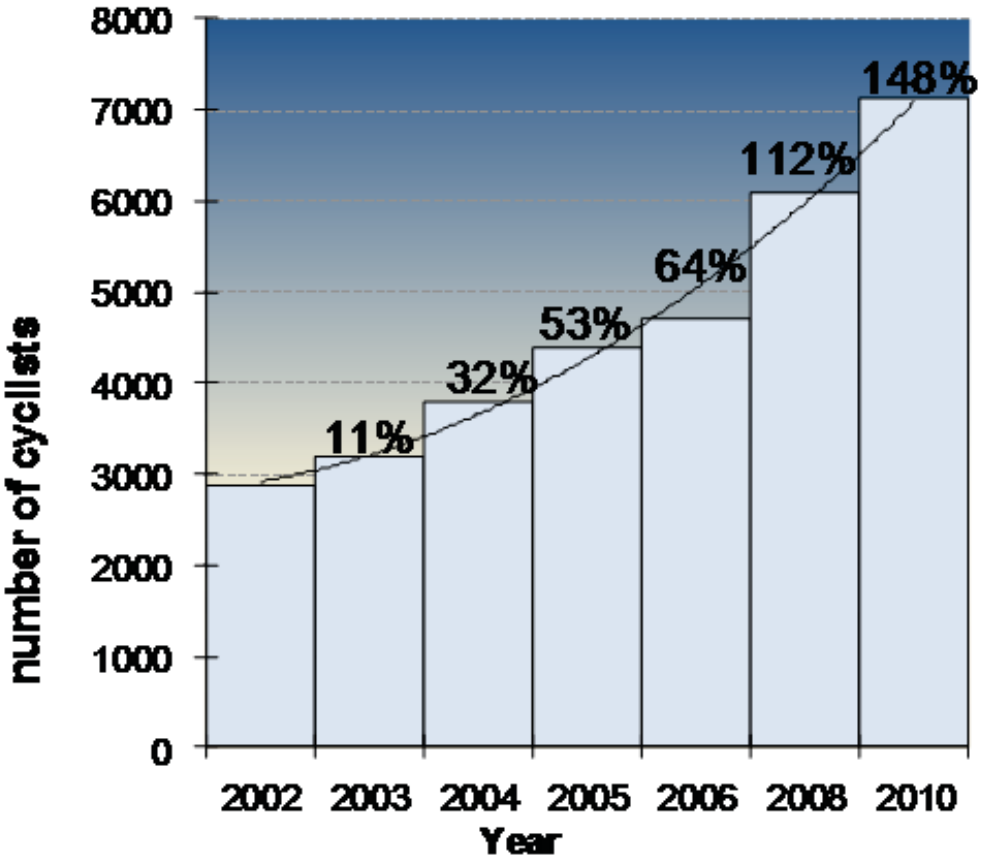


Traffic calming works



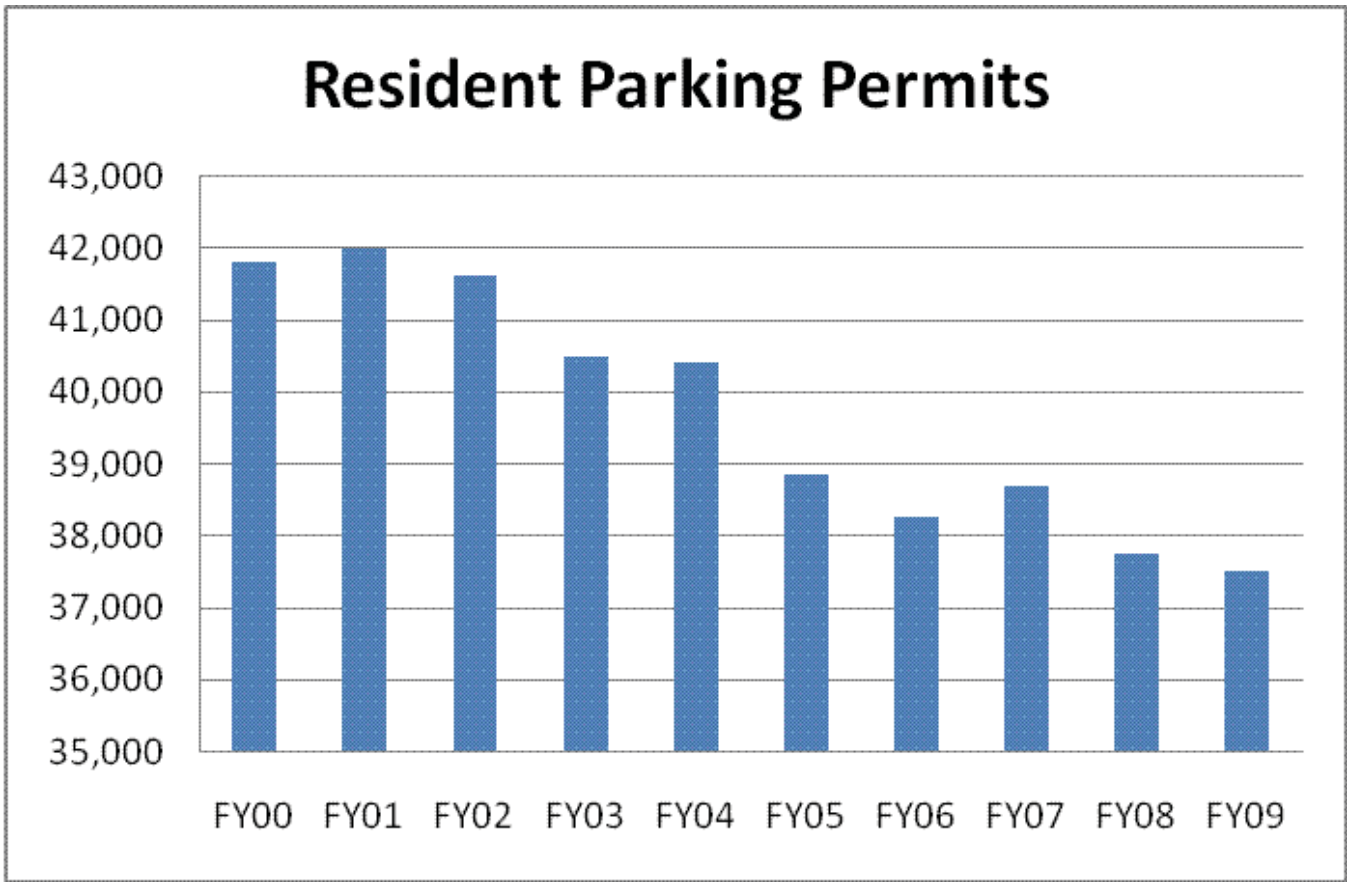
Discussion Item
06-12-12
Stephanie Pollack

Policy change works: Cambridge bicycle trips more than doubled



Discussion Item
06-12-12
Stephanie Pollack

Policy works: Driving is declining in Cambridge



Complete Streets
06-20-12
Andreae Downs

What are "Complete Streets" and Complete Streets policies?

Complete Streets are streets for everyone. They are designed and operated to enable safe access for all users. Pedestrians, bicyclists, motorists and transit riders of all ages and abilities must be able to safely move along and across a complete street. Complete Streets make it easy to cross the street, walk to shops, and bicycle to work. They make it safe for people to walk to and from train stations.

By adopting a Complete Streets policy, Newton directs transportation planners and engineers to **routinely design and operate the entire right of way to enable safe access for all users**, regardless of age, ability, or mode of transportation. This means that every transportation project will make the street network better and safer for drivers, transit users, pedestrians, and bicyclists – making your city a better place to live.

What does a "complete street" look like?

There is no singular design prescription for Complete Streets; each one is unique and responds to its community context. A complete street may include: sidewalks, bike lanes (or wide paved shoulders), special bus lanes, comfortable and accessible public transportation stops, frequent and safe crossing opportunities, median islands, accessible pedestrian signals, curb extensions, narrower travel lanes, roundabouts, and more.

Complete main street in a Boston suburb

Why has Newton adopted Complete Streets policies?

Incomplete streets – those designed with only cars in mind – limit transportation choices by making walking, bicycling, and taking public transportation dangerous, inconvenient and unattractive. Newton's Complete Streets policies mean that walking, riding bikes, and riding buses and trains will be safer and easier. People of all ages and abilities will have more travel options.

Complete Streets are particularly prudent when more communities are tightening their budgets and looking to ensure long-term benefits from investments. An existing transportation budget can incorporate Complete Streets projects with little to no additional funding, accomplished through re-prioritizing projects and allocating funds to projects that improve overall mobility. Many of the ways to create more complete roadways are low cost, fast to implement, and high impact.

Complete Streets
06-20-12
Andreae Downs

Where are complete streets being built?

MassDOT has adopted Complete Streets as the guiding principal behind its award-winning Design Guidelines, which are regularly cited as a national model. Communities such as Northhampton, Cambridge and Boston have also adopted Complete Streets policies. Among the other places with some form of complete streets policy are the states of Oregon, California, Illinois, North Carolina, Minnesota, Connecticut, and Florida.

What are some of the benefits of Complete Streets?

Complete streets can offer many benefits:

1. *Improved safety.* A Federal Highways Administration safety review found that streets designed with sidewalks, raised medians, better bus stop placement, traffic-calming measures, and treatments for disabled travelers improve pedestrian safety. Some features, such as medians, improve safety for all users: they enable pedestrians to cross busy roads in two stages, reduce left-turning motorist crashes to zero, and improve bicycle safety.
2. *More walking and bicycling for health*. The Centers for Disease Control and Prevention recently named adoption of Complete Streets policies as a recommended strategy to prevent obesity. One study found that 43% of people with safe places to walk within 10 minutes of home met recommended activity levels; among individuals without safe place to walk, just 27% were active enough.
3. *Lower transportation costs.* Americans spent an average of 18 cents of every dollar on transportation, with the poorest fifth of families spending more than double that figure
4. *Strengthen communities.* Complete Streets play an important role in livable communities, where all people – regardless of age, ability or mode of transportation – feel safe and welcome on the roadways.

Commonwealth Avenue, Boston, Before & After Complete Streets

Complete Streets: We Can Get There from Here

THIS FEATURE EXPLAINS THE COMPLETE STREETS MOVEMENT AND EXPLORES WAYS TO MAKE URBAN THOROUGHFARES MORE PEDESTRIAN AND BICYCLE FRIENDLY AND RESPECTFUL OF THE SURROUNDING COMMUNITY WHILE NOT UNDULY COMPROMISING MOTOR VEHICLE TRAVEL. TECHNIQUES FOR DESIGNING AN ARTERIAL STREET THAT CAN CONTROL TRAFFIC SPEEDS AND PERMIT MORE COMFORTABLE AND SAFE PEDESTRIAN AND BICYCLE ACCESS ARE DESCRIBED.

BY JOHN LAPLANTE, P.E., PTOE AND BARBARA McCANN

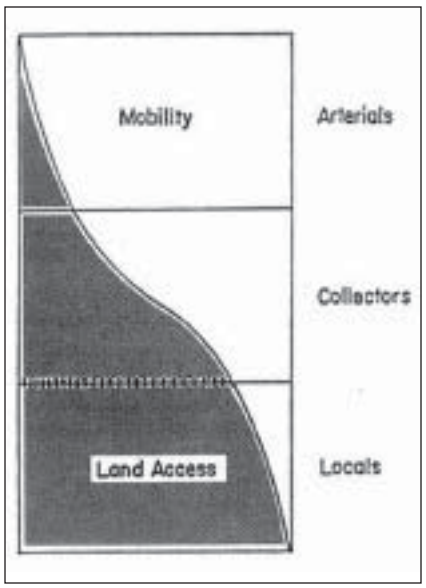
A COMPLETE STREET IS A ROAD that is designed to be safe for drivers; bicyclists; transit vehicles and users; and pedestrians of all ages and abilities. The complete streets concept focuses not just on individual roads but on changing the decision-making and design process so that all users are routinely considered during the planning, designing, building and operating of all roadways. It is about policy and institutional change.

This may seem simple enough. Over the last 30 years, a lot of planning and engineering energy have gone into learning to create beautiful streets that work well for everyone. Standards from *A Policy on Geometric Design of Highways and Streets* have been changed to reflect a multimodal approach, but many roads continue to be built as if private motor vehicles and freight are the only users.[1] Too many urban arterials feature a well engineered place for cars to travel next to a homemade pedestrian facility—a "goat track" tramped in the grass—with a bus stop that is no more than a pole in the ground uncomfortably close to high-speed traffic.

This stems in large part from entrenched planning and design practices. Transportation projects typically begin with an automobile-oriented problem—increasing average daily traffic or deteriorating level of service (LOS). The performance of the right of way for bicyclists, pedestrians and transit riders or transit vehicles often is not measured. Roadway classification is similarly oriented toward auto mobility.

THE FUNCTIONAL CLASSIFICATION TRAP

Using the standard functional classification system, streets designated as arterials are, by definition, intended primarily to provide mobility, with emphasis placed on operating speed and traffic-carrying capacity (see Figure 1). This leads to other design requirements that stress access management, wider lane widths, increased turning radii and minimum interference with traffic movements. This, in turn, often leads to urban roadways dividing neighborhoods, destroying local businesses in established communities and creating sterile, inhospitable streetscapes in developing suburbs.



Source: *A Policy on Geometric Design of Highways and Streets*. Washington, DC, USA: American Association of State Highway and Transportation Officials, 2001, pp, 1–7.

Figure 1. Proportion of service.

CONTEXT-SENSITIVE SOLUTIONS (CSS)

As a reaction to this unhealthy trend, context-sensitive design concepts and techniques have developed. Within ITE, a new arterial street design paradigm for urban areas is being adopted in the Recommended Practice entitled *Context Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities*. The document is being developed in conjunction with the Congress for New Urbanism and the Federal Highway Administration.[2]

How do complete streets initiatives relate to CSS? CSS is a project-oriented and location-specific process and is aimed at making sure a road project fits into its context. Early projects tended to be large roadway improvements and featured extensive public meetings, stakeholder out-

reach and plenty of extra work. More recently, CSS practitioners have recognized that this process can be applied to every project and that early public involvement does not necessarily lead to expensive and time-consuming outreach efforts.

Complete streets focuses more on road users and is about making multimodal accommodation routine so that multimodal roads do not require extra funds or extra time to achieve. The intent is to change the everyday practice of transportation agencies so that every mode should be part of every stage of the design process in just about every road project—whether a minor traffic signal rehabilitation or a major road widening. The ultimate aim is to create a complete and safe transportation network for all modes. CSS and complete streets can be seen as complementary, not competitive movements.

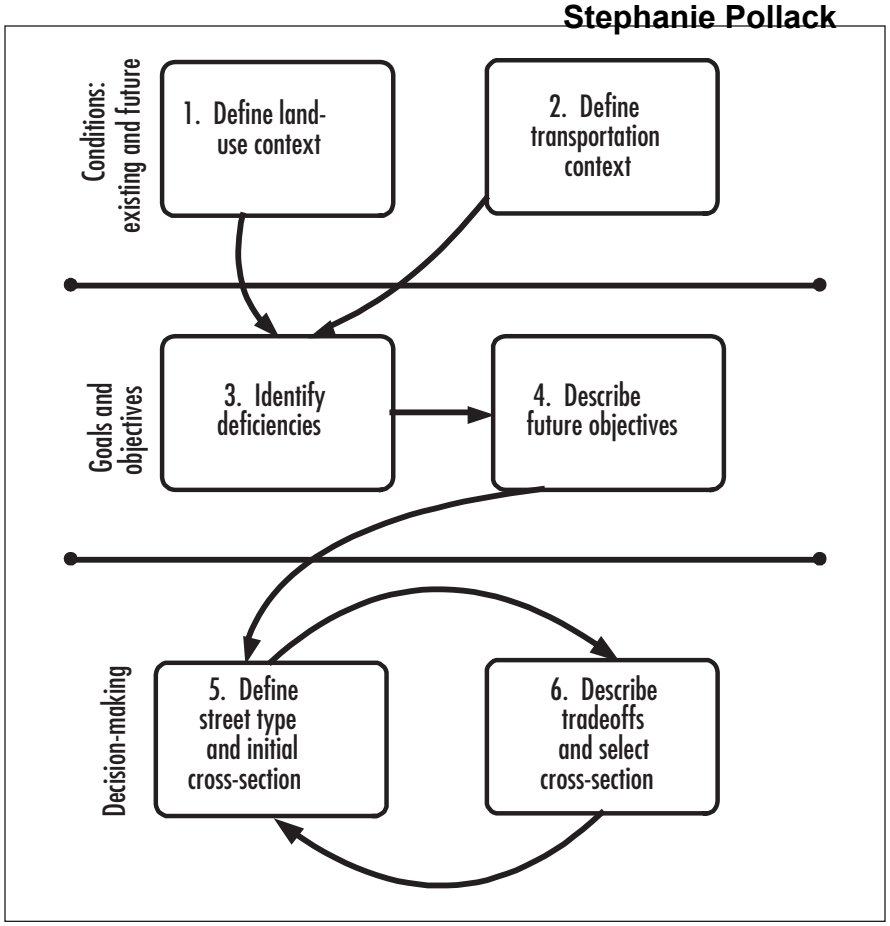
NATIONAL COMPLETE STREETS COALITION

The National Complete Streets Coalition has been working for three years to promote policy and procedural changes at the federal, state and local levels. In addition to ITE, the coalition includes the American Public Transportation Association, the American Planning Association, AARP and many others.[3]

The coalition has succeeded in gaining national media attention and policy adoption across the country. More than 50 jurisdictions, from states to small towns, have adopted some type of complete streets policy, most over the last few years. In 2007, several cities adopted notable policies, including Salt Lake City, UT, USA, through a simple executive order; Seattle, WA, USA, through a comprehensive ordinance; and Charlotte, NC, USA, through adoption of its *Urban Street Design Guidelines*.

At the state level, a new law in Illinois requires the state department of transportation to accommodate bicycle and pedestrian travel on all its roads in urbanized areas. It is effective immediately for project planning and required in construction beginning in August 2008. Other places have been building complete streets for a while, including Oregon; Florida; Arlington, VA, USA; and Boulder, CO, USA.

A new complete streets policy adopted by a legislature or city council is likely to make any engineer nervous. If well written, the impact should be gradual and reasonable. These policies are not prescriptive. Complete streets will look different in different places. They must be appropriate to their context and to the modes expected on that corridor.



Source: *Urban Street Design Guidelines*. Charlotte, NC, USA: Charlotte Department of Transportation, October 2007. Accessible via www.charmeck.org/departments/transportation/urban+street+design+guidelines.htm.

Figure 2. Charlotte, NC, USA, street design standards: A six-step process for considering and balancing the needs of all users.

A bustling street in an urban area may include features for buses, bicycles and pedestrians as well as private cars; in a more rural area with some walkers, a paved shoulder may suffice. Low-traffic streets need few treatments. Places with existing complete streets policies are successfully building a variety of roads that meet the varied needs of children, commuters and other users while creating an overall network that serves all modes.

IMPLEMENTATION CHALLENGES

In order for complete streets to be truly effective, the following implementation measures should be considered:

- Rewrite and/or refocus agency policies and procedures to serve all modes.
- Rewrite and/or adapt design guidelines.
- Train and develop staff skills in serving all modes.
- Collect data on all users and modes for performance improvements.

The policy change should result in an institutionalization of the complete streets approach in all aspects of the transportation agency and beyond and often means a restructuring of everyday procedures, beginning with scoping. For example, in Charlotte, transportation planners are using a new six-step complete streets planning process that systematically evaluates the needs of all modes (see Figure 2).[4] The National Complete Streets Coalition is offering a Local Implementation Assistance Program to help jurisdictions with this task.

An effective policy should lead to the rewriting of design manuals. The best example of this in the United States is Massachusetts. A complete streets policy statement became one of three guiding principles for the new award-winning design guide—context-sensitivity is another. The new manual has no chapters for bicycling, walking, transit,

or disabled users. Every mode is integrated into every chapter, with new tools to help engineers make decisions about balancing the modes.[5]

The third of the four implementation steps is the need for additional training for planners and engineers. Balancing the needs of all users is a challenge, and doing so with every project requires new tools and skills. For example, South Carolina has used its policy to launch a comprehensive training program.

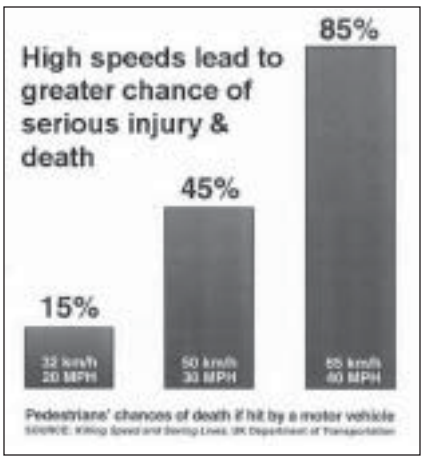
Complete streets policies also should result in new ways to track the success of the road network in serving all users. Florida; Ft. Collins, CO; and other jurisdictions have adopted multimodal level of service standards to do that.

SPEED MATTERS

Complete streets is about more than simple allocation of street space. One of the major components of this new design paradigm is selecting a design speed that is appropriate to the actual street typology and location and that allows safe movement by all road users, including more vulnerable pedestrians and bicyclists. From a safety and community livability standpoint, speed does matter.

Everyone should be familiar with the chart that shows that a pedestrian hit by a car traveling at 20 miles per hour (mph) (32 kilometers per hour [km/hr.]) has an 85-percent survivability rate. That same collision with a car going twice as fast, 40 mph (65 km/hr.), will lower the survivability likelihood to 15 percent (see Figure 3).

Current practice is to use a design speed based on a somewhat arbitrary functional classification and then post a speed limit based on the 85th-percentile of speeds engendered by this artificial street designation. This practice is based on the conventional wisdom that to maintain mobility to and through communities, some arterial streets have to be designated as major traffic carriers or the entire regional economy will grind to a halt. Travel speed has always been equated as a necessary component of this mobility.



Source: *Guide to Recommended Pedestrian Safety Planning*. Washington, DC, USA: Federal Highway Administration, 1989.

Figure 3. Vehicle speed versus injury and death.

REDEFINING MOBILITY

Given that speeds much over 30 mph (50 km/hr.) in urban areas are incompatible with pedestrians (including transit passengers) and bicyclists, if not downright dangerous, is the only choice to sacrifice mobility for community livability? The answer to this question depends on how mobility is defined. One aspect of mobility is travel speed or, more accurately, total travel time.

For a 5-mile (8 km) trip along an arterial corridor with a 45 mph (70 km/hr.) travel speed, the added travel time for a reduced speed of 30 mph (50 km/hr.) would be 2.5 minutes. In the overall scheme of things, how important is this potential delay compared to the proven safety benefits and the city livability advantages that come with the slower traffic speeds?

Some will quote the standard benefit-cost travel-time delay litany that multiplies these 2.5 minutes times an average daily traffic of 30,000 vehicles times 365 days per year times $20 per hour in time costs, equaling $600,000 in lost wages to the economy. However, in reality, the loss is still under 3 minutes per individual for this one trip, for which he or she is probably not being paid and which is less than the time he or she willingly will spend in line for morning coffee.

Take this scenario one step further, to the all-too-common suburban arterial traffic experience of driving 45 mph (70 km/hr.), stopping for up to 2 minutes at a traffic signal, accelerating back up to 45 mph (70 km/hr.), only to stop and wait again one-half-mile (0.8 km) down the road. This uncoordinated signal system wastes time and fuel, and the many stops increase crash rates. If these signals can be coordinated to permit two-way progression at a constant speed of 25 or 30 mph (40 or 50 km/hr.), the total travel time ends up being roughly the same.

The other part of the mobility equation is capacity, with the number of lanes acting as the primary surrogate measurement. It should be recognized by now that LOS D is a reasonable peak period LOS in an urban area, provided the above-mentioned signal progression can be maintained. However, some state departments of transportation or regional planning organizations still recommend LOS C (or even B) in an urban setting whenever possible.

Not only is this a waste of tax dollars constructing unneeded pavement, it also increases pedestrian crossing distances (and thus pedestrian crossing times, which impact negatively on signal timing for vehicular traffic) and encourages faster vehicular speeds during the other 22 hours of the day in each direction.

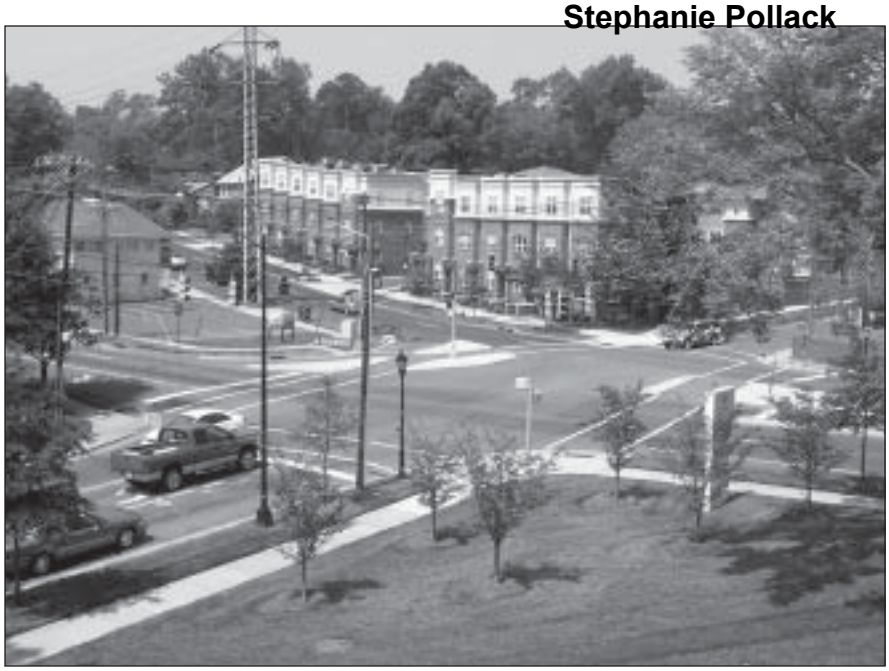
ARTERIAL TRAFFIC CALMING MEASURES

The remainder of this feature deals with specific design measures that may be used to retrofit urban arterials into complete streets. These roads present one of the biggest challenges to engineers in that they tend to be the most hostile to bicyclists, pedestrians and transit riders, but all of these modes are usually present in significant numbers.

Arterial traffic calming first must deal with controlling vehicular speeds. In addition to timing the traffic signals for a 25 or 30 mph (40 or 50 km/hr.) operating speed, other possible speed control measures include:

- Narrower travel lanes: Based on the results of a recent National Cooperative Highway Research Program study, 11-foot (3.3-meter [m]) or 10-foot (3.0-m) lanes in urban areas are just as safe as 12-foot (3.6-m) lanes for posted speeds of 45 mph (70 km/hr.) or less.[6]
- Road diets: A four-lane to three-lane road diet can work for average daily traffic volumes as high as 20,000. This makes the more prudent driver the "pace" car for that roadway and greatly improves left turning safety.
- Tightening corner curb radii: Selecting the appropriate design vehicle and using the minimum needed to provide the "effective" turning radius from the closest approach lane into

any lane in the departure roadway will slow down turning vehicle speeds.
- Elimination of any free-flow right-turn lanes: This specifically includes freeway entry and exit ramp connections. Encouraging freeway speeds onto or off arterial streets is particularly dangerous for both pedestrians and bicyclists.
- Raised medians: Raised medians visually narrow the roadway and provide a median refuge for mid-block crossings.
- Median and parkway landscaping: Appropriate low-maintenance landscaping further visually narrows the roadway and provides a calming effect.
- Curb parking: Retaining curb parking provides for community access while creating a significant traffic calming effect.
- Curb bulb-outs: Where on-street parking exists, curb bulb-outs shorten pedestrian crossing distances, improve sight lines and help control parking.



Source: Ben Miller, Charlotte Department of Transportation.

Figure 4. Redesigned intersection of Kenilworth and Romany in Charlotte, NC, USA.

PEDESTRIAN CROSSINGS

The other important element in creating a pedestrian-friendly arterial street is making pedestrian crossing locations safe, comfortable and more frequent. On any road where there is transit service, a pedestrian will cross wherever there is a transit stop, whether it is provided for or not. In a dense downtown case with signals spaced every 300 to 600 feet (90 to 180 m), crossing at a traffic signal is a reasonable expectation. However, along most urban and suburban arterials, these signals usually are spaced no closer than every one-quarter mile.

Requiring travel just 1,200 feet (360 m) or more out of the way to cross a street will add 5 minutes to the travel time of a pedestrian walking at the average 4.0 feet per second (1.2 m per second) walking speed. If a 5-minute detour for all automobile traffic were suggested, this would be the equivalent of adding a distance of 2.5 miles (4 km) for a car traveling at 30 mph (50 km/hr.). The outrage would be loud and instantaneous.

Many of the suggested pedestrian crossing improvements flow directly out of the traffic speed control measures noted above. They include:

- Narrower travel lanes: Shorten the pedestrian crossing distance and roadway exposure time.
- Road diets: Reduce the number of lanes to be crossed.
- Tighter corner curb radii: Shorten pedestrian crossing distances and provide space for perpendicular curb ramps.
- Adding corner "pork chop" islands where design vehicle turning radii do not permit a small corner radius: Also shorten pedestrian crossing distances.
- Raised medians: Provide pedestrian refuge and allow pedestrians to cross half the street at a time.
- Curb bulb-outs: Shorten pedestrian crossing distances, improve sight lines and provide space for curb ramps.
- Continental-style crosswalks and pedestrian crossing warning signs: Effective for lightly-traveled arterials posted for urban speed limits.
- Pedestrian-actuated crosswalk warning signs: For heavier traffic flows.
- Pedestrian-actuated HAWK-style signals: Will be in the new *Manual on Uniform Traffic Control Devices* (MUTCD).
- Full signalization: All pedestrian signals should now be timed using the new MUTCD pedestrian walking speed of 3.5 feet per second (1.05 m per second) to set the Flashing Don't Walk pedestrian clearance time and 3.0 feet per second (0.9 m per second) to determine the total Walk/Flashing Don't Walk time.
- Countdown clocks: The new MUTCD will not only require countdown clocks at all new pedestrian signal installations, but there will be a 10-year compliance date for retrofitting all existing pedestrian signal locations, finally correcting the longstanding confusion surrounding the traditional but counter-intuitive Flashing Don't Walk.

TRAFFIC "TAMING"

In conclusion, instead of the concept of traffic calming used in discussing the design of residential streets, the term "traffic taming" should describe the concept of making arterial streets more pedestrian, bicycle and community friendly. This compilation of suggestions for retrofitting arterial streets into complete streets is not meant to be all-inclusive. Many more solutions are available once the task of designing arterial roadways for community livability while retaining a reasonable level of mobility along the most important travel corridors is taken seriously.

Complete streets is both evolutionary and revolutionary. A growing awareness of other transportation modes has led to a trend toward accommodating a wider

variety of users. Complete streets is simply the latest evolutionary step in this process. At the same time, stepping beyond how design typically is done today by greatly increasing travel options, flexibility and usability, a revolutionary new network of travel can be created for all modes.

Largely through the work of the transportation industry, the United States has succeeded brilliantly over the last century in building better roads for farmers, national security and economic growth. It is now time to achieve the same success in the challenge of completing U.S. streets for everyone. ■

References

1. *A Policy on Geometric Design of Highways and Streets.* Washington, DC, USA: American Association of State Highway and Transportation Officials, 2001, pp, 1–7.

2. *Context Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities, A Draft Recommended Practice.* Washington, DC: ITE, 2006.

3. To see a complete list of coalition members, visit www.completestreets.org/whoweare.html.

4. *Urban Street Design Guidelines.* Charlotte, NC, USA: Charlotte Department of Transportation, October 2007. Accessible via www.charmeck.org/departments/transportation/urban+street+design+guidelines.htm.

5. *Massachusetts Highway Department Project Development & Design Guide*. Accessible via www.vhb.com/mhdGuide/mhd_GuideBook.asp.

6. National Cooperative Highway Research Program Project 3-27: *Preliminary Report, Urban and Suburban Lane Widths.* Kansas City, MO, USA: Midwest Research Institute, 2007.

JOHN N. LAPLANTE, *P.E., PTOE, is chief transportation planning engineer for T.Y. Lin International Inc., working out of the Chicago, IL, USA, office. Prior to joining the firm in 1992, he was with the City of Chicago for 30 years in various transportation engineering positions, including chief city traffic engineer, first deputy commissioner of public works and acting commissioner of the new department of transportation. His education includes a B.S.C.E. from the Illinois Institute of Technology and an M.S.C.E. from Northwestern University. He is a fellow of ITE.*

BARBARA McCANN, *of McCann Consulting, serves as coordinator of the National Complete Streets Coalition. In addition, she researches the effectiveness of complete streets policies around the country. She is an author and former journalist who has written and co-authored numerous reports and articles on the intersection of transportation and land use and how the transportation system affects issues ranging from climate change to personal health and economic growth. She also served as director of research at Smart Growth America and directed the Quality of Life Campaign at the Surface Transportation Policy Project.*

Discussion
06-20-12
Stephanie Pollack

Complete Streets:

Best Policy and Implementation Practices

Barbara McCann and Suzanne Rynne, Editors

American Planning Association

Planning Advisory Service
Report Number 559

Discussion
06-20-12
Stephanie Pollack

COMPLETE STREETS:

BEST POLICY AND IMPLEMENTATION PRACTICES

Barbara McCann and Suzanne Rynne, AICP, Editors

TABLE OF CONTENTS

Discussion
06-20-12
Stephanie Pollack

CHAPTER 5

Making the Transition: Planning for Change and Addressing Problems

It should be clear that complete streets policies can and should lead to changes in transportation planning, design, and construction processes. But how do communities make the transition from traditional, automobile-based transportation planning to a more inclusive and multimodal process? What are the biggest issues they must resolve? And how do they measure the success of their new way of doing business?

SAFETY AND COMFORT FOR ALL STREET USERS: NEW HAVEN, CONNECTICUT

In the city of New Haven, Connecticut, a variety of local factors mobilized members of the community to encourage the adoption of a complete streets policy in the fall of 2008. These factors included (1) a very high proportion of workers commuting on foot or by bike, carpool, or public transit; (2) two high-profile pedestrian fatalities; (3) data indicating a disproportionate rate of pediatric injury; and (4) the elevation of local streets as public places that define quality of life and the overall image of the city. Activists in the area made it a priority to rally public support for a comprehensive policy to make the streets of New Haven safer and more comfortable for all users.

Activists, city officials, and aldermen worked together to draft and adopt a set of goals and develop an implementation program. The resulting policy explicitly outlines comprehensive steps to make sure that complete streets implementation will be a community effort. A steering committee has been tasked with developing a design manual, ensuring that engineers—key players in implementation—are not left out of the process. Further, the committee must develop a process to involve the general public in the planning and design of complete streets in their neighborhoods.

Although the city does not have the public funds available to support projects solely dedicated to completing the streets, a tremendous amount of private investment is available to the city despite the challenging economic times. Thus, the city has been using funds from private investors to develop its bikeway system and enhance bicycle and pedestrian access to transit hubs.

Ethan Hutchings, City of New Haven

Figure 5.1. *Concerns for pedestrian safety have helped fuel New Haven's complete streets movement.*

Bureaucratic procedures have stood in the way of complete streets implementation in New Haven; however, the policy addresses this issue. According to Mike Piscitelli, AICP, city transportation director, "This policy was more about how to organize ourselves for the longer term. How do we create a lasting system?" City officials have found that the policy has created a more comprehensive and systematic approach as it coordinates the efforts of staff, who previously had worked in unrelated silos, to promote similar goals. The policy focuses on changing the way the administration does business so as to provide a sustainable, reliable transportation system for all roadway users well into the future.

Finally, the policy emphasizes the importance of public education campaigns to promote complete streets principles. One campaign that stands out is the award-winning "Street Smarts," in which drivers take a pledge to be cognizant and respectful of other roadway users. In New Haven, citizens can receive training to become a "Smart Driver"; all city and school bus drivers go through this program. The city has emphasized the relation of the Street Smarts campaign to the complete streets legislation.

According to Piscitelli, "Instead of focusing solely on regulations, we are addressing human behavior as the central focus of the safety campaign and then complementing education with physical improvements." This is one unique and, according to Piscitelli, successful aspect of the systematic change taking place in New Haven.

The New Haven Street Smarts program website can be found at www.cityofnewhaven.com/streetsmarts/index.asp. Read about the New Haven Safe Streets Coalition's local advocacy at www.newhavensafestreets.org.

This chapter addresses these issues. It explores implementation planning, training, performance measures, and exception procedures. It also examines how some jurisdictions have shifted their transportation priorities and what that has meant for their relationships with other agencies that control roads in their community.

IMPLEMENTATION PLANNING

It is too easy to adopt a strongly worded complete streets resolution or even a law—and then let it sit, unimplemented. Many communities have taken years to move their policies from paper into practice, with fits and starts along the way. For example, Oregon's 1971 bike bill was ignored by many local governments until a 1992 lawsuit led to a court decision confirming that the law must be applied to all road projects. (See sidebar, p. 28.)

In Massachusetts, the 1996 bicycle and pedestrian accommodation law calls for "reasonable provisions" for bicyclists and pedestrians, but the Massachusetts Highway Department struggled to understand what that meant substantively, and transportation modes other than automobiles remained an afterthought. A full complete streets implementation process was not born in the state until the state highway design manual was rewritten in 2006.

One way to get things moving is to create an implementation plan—or to charge a committee with doing so. An implementation plan can identify documents and processes that need to be changed, assign responsibility for who will be making such changes, and name specific documents or processes that should be created as part of complete streets implementation. This was the case in New Haven, Connecticut. In order to back

Discussion
06-20-12
Stephanie Pollack

up its complete streets policy with action, the city established a steering committee to focus on policy development, establish a complete streets design manual, encourage community involvement, spearhead an educational campaign, and work with city police officers to ensure that traffic enforcement is in alignment with the policy goals.

Seattle and Chicago have focused on a systematic review of all documents that need to be updated to implement the policy. Seattle also established an internal complete streets steering committee to help clarify and define the daily operational practices that the Department of Transportation would take to implement the policy.

The California DOT, Caltrans, adopted a limited policy in 2001 and expanded it in 2008 to include transit and apply to seniors and people with disabilities. Following the update, Caltrans decided to create an implementation plan, overseen by a high-level steering committee, that engaged all 12 of the department's districts and created specific next steps. Among other items, the plan called for a review of all relevant transportation documents and for reports on specific topics such as work-zone issues and how to incorporate changes into repaving and maintenance projects.

Such formal implementation plans are the exception rather than the rule. The places that have moved beyond the initial policy statement have usually done so by creating a more detailed transportation plan, design manual, or design standards, often while working to apply complete streets principles to specific projects. Other places have been content to take a more ad hoc approach, learning from the experience of pilot projects, with the intent to codify new standards and procedures later.

CHANGING EVERYDAY TRANSPORTATION PLANNING PROCESSES

Traditionally, engineers and planners in transportation agencies and public works departments have made their day-to-day decisions on the basis of the demands for roadway capacity expansion and repair. One of the biggest challenges for complete streets advocates is changing business as usual. New planning processes can help guide planners and engineers through new procedures and ways of thinking.

One of the most systematic changes to date has occurred in Charlotte, North Carolina. Prior

COMPLETE STREETS TRAINING AND IMPLEMENTATION IN CHICAGO

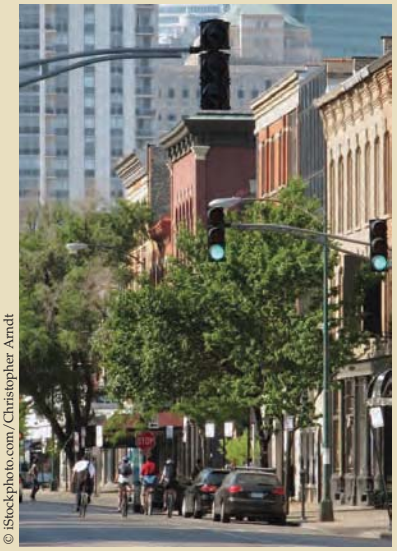


Figure 5.2. *Cars share the streets with bicyclists in downtown Chicago.*

The City of Chicago adopted a complete streets policy in October 2006. The policy states, "The safety and convenience of all users of the transportation system including pedestrians, bicyclists, transit users, freight, and motor vehicle drivers shall be accommodated and balanced in all types of transportation and development projects and through all phases of a project so that even the most vulnerable—children, elderly, and persons with disabilities—can operate safely within the public right of way."

In order to help staff understand and implement the policy, the Chicago Department of Transportation worked with the Chicago Metropolitan Agency for Planning to sponsor a series of training sessions for city planners, engineers, and project managers. Several hundred people participated in four two-day workshops. The workshops resulted in a greater awareness of complete streets issues and helped to increase understanding of potential design considerations.

While the city has taken steps over the last few years to implement the policy, it is now comprehensively assessing the status of complete streets implementation and how it can be improved. According to Kiersten Grove, pedestrian program coordinator, the project "aims to identify opportunities and challenges in existing city policies and practices and to create a series of recommendations to address these." Grove anticipates that in addition to the recommendations, a project checklist will be developed to assess the degree to which complete streets are realized in project development.

The city hopes to operationalize complete streets in all phases of a project including planning, design, construction, and maintenance. The implementation project is engaging a diverse set of stakeholders—including multiple city departments, state agencies, and representatives from the local advocacy community—in order to include a broad range of disciplines in creating solutions and building awareness.

Information about Chicago's complete streets policy and its broader Safe Streets for Chicago initiative is available at www.cityofchicago.org/webportal/COCWebPortal/COC_EDITORIAL/SafeStreetsforChicago_programsheets.pdf.

Discussion
06-20-12
Stephanie Pollack

PLANNING AND DESIGNING FOR COMPLETE STREETS: CHARLOTTE, NORTH CAROLINA

After decades of rapid growth, Charlotte, North Carolina, was becoming dependent on thoroughfares and cul-de-sacs; the city had no bicycling routes and an incomplete sidewalk network. In the early 2000s, however, planners and engineers at the Charlotte Department of Transportation (CDOT) began to create a street network designed and operated for people, whether in cars or buses, on bikes, or on foot. Today, armed with new guidelines and a new approach to street design, Charlotte is completing its streets.

The 2006 Transportation Action Plan (TAP), the city's first comprehensive transportation plan, has played a major role in achieving Charlotte's goal to integrate land-use and transportation choices. The TAP describes policies, projects, and programs that support continued growth while making the best use of existing infrastructure and transportation resources and preserving a high quality of life. Among its goals is the promotion of a "balanced, multi-modal transportation system that serves the mobility needs of all segments of the population, accommodates all travel modes, and promotes community economic development needs." It also aims for context-based street design, expanded public transportation service, improved safety for all users, and improved connectivity of the transportation network.

City of Charlotte

Figure 5.3. *New urban street-design guidelines are improving local streetscapes in Charlotte.*

Many of these goals are being implemented through Charlotte's Urban Street Design Guidelines (USDG), adopted in October 2007. To create the USDG, developers, interest groups, city staff, and residents were interviewed to ensure their concerns were addressed. While consultants were hired for some tasks, staff remained at the forefront, ensuring true ownership of the results.

The USDG focuses on providing the best possible streets to accommodate growth, create transportation choices, and maintain Charlotte's livability. Transportation choices are created both through providing more connections across the network and by building complete streets that make other modes viable. By providing a better street network, Charlotte hopes to increase its overall transportation capacity and improve air quality, while supporting the land-use decisions needed for Charlotte's future growth, including more compact development. Streets identified as favorites by residents in surveys tend to be found in older neighborhoods, are closer to the city's core, and feature street-tree canopies and pedestrian amenities. The city aims to build more streets that have these characteristics.

To meet these goals, a new street classification system was developed as an overlay to standard federal classifications. Staff believed that the best way to balance modal needs was to develop a process for designing streets wherein the varying interests and needs of all users—and various land uses—were considered and the design trade-offs were examined. Five new street types emerged, falling along a continuum ranging from most pedestrian friendly to most auto oriented. There is an explicit understanding that all street types along this range will be designed with all potential users in mind. Once a street or portion of a street is classified, both street design and future land-use decisions will reflect that classification.

The emerging street network is also context based. Preferred and maximum block lengths based on land use are specified for new public or private development projects, encouraging a dense, well-connected network of streets. "Intentionally and inherently, street design is tied to intensity and density of development," says Norm Steinman, planning and design division manager. "We made it very clear that where there will be more density, we expect more streets and more blocks."

Typical cross sections for each street type were developed to encourage planners and engineers to think about each project and fully consider its context and use—both now and in the future. There is no one-size-fits-all approach; Charlotte deliberately chose not to include dimensions on many cross sections, which would be too prescriptive. The exception is for local streets, where a stricter approach is preferred. Even there, however, several options are provided to ensure a good match between each street and the adjacent land uses. For nonprescriptive (thoroughfare) street types, the cross-section design is intended to be the final step of a more comprehensive sequence of fact-finding and decision making.

As part of the USDG, CDOT created new methodologies for determining multimodal levels-of-service (LOS). The new methods look similar to automotive LOS, allowing a comparison for evaluating trade-offs and helping to convince engineers that complete streets design can be based on analysis. LOS measures for pedestrians and cyclists are applied in conjunction with traditional vehicular LOS. The new measures identify and evaluate roadway features that influence the safety and comfort of pedestrians and bicyclists, such as crossing distance, crosswalks, bike lanes, corner radii, and traffic-signal timing and placement.

(continued on page 49)

Discussion
06-20-12
Stephanie Pollack

(continued from page 48)

CDOT added to this innovation by using a two-hour peak congestion analysis, rather than the traditional one-hour look. When using the standard 60-minute interval, engineers might be more likely to add additional turn lanes at intersections. "This is logical for 30 or 45 minutes," says Transportation Planner Tracy Newsome, "but what about the rest of the day?" Pedestrians would face longer crossing distances all day to accommodate a potentially brief period of vehicular congestion. The duration of congestion is crucial in determining the need for roadway changes.

All of this does not mean that CDOT is unconcerned about congestion and travel delays. On road diet projects, for example, CDOT undertakes careful analyses to ensure that vehicular flow has not been worsened. A range of measures are used, including crashes, speeds, and volumes at peak periods, both before and after the conversion.

The extra analysis now used throughout CDOT is credited by Newsome and Steinman as a key reason the USDG works and is supported by staff. "We're not eliminating analysis but instead doing more of it," says Steinman. The results, once thought counterintuitive, are proven through logic and methodology. As a result, engineers are more likely to be on board.

At first, some design engineers wondered how the new analytical processes would work, says Newsome, because they did not seem like traditional traffic analyses. However, after working through the new method and using a six-step process, former skeptics have become advocates for the changes. They appreciate the additional technical analysis, which is blended with meaningful public participation to identify logical options and to create better streets.

Engineers were not the only ones with doubts—the public had to see the process work as well. CDOT has been incremental in its approach, applying the new designs on their own projects. This has created real-world examples of how the process and street designs look and function. CDOT uses these projects to demonstrate how all the elements work together. This makes communicating the many benefits of complete streets to the community far easier.

Charlotte is now working to integrate the USDG into zoning and subdivision codes, which would require developers to follow the guidelines. Because private developers construct the vast majority of new streets in the city, the updated codes will assure an integrated, connected system of complete streets necessary for mobility and growth. Over the past few years, CDOT has been informally applying the USDG process when reviewing conditional rezoning applications. During these reviews, CDOT has asked for conditions or modifications that reflect their street design goals, like planting strips and bike lanes. Several recent large-scale developments have agreed to follow the USDG, including the planned redevelopment of the 90-acre site of the old Charlotte Coliseum. Eight recent area plans have applied USDG guidance as well.

Charlotte, unlike many jurisdictions in North Carolina, is responsible for maintaining most of its local roads and many of its thoroughfares. However, the North Carolina Department of Transportation controls several major thoroughfares and the city's extraterritorial jurisdiction (ETJ), unincorporated areas within Charlotte's growth boundary. All roads in the ETJ are constructed to the standards of NCDOT, which are quite different from, and sometimes contradictory to, the USDG used within the city. According to Steinman and Newsome, this has sometimes been an issue. Many of their negotiations have been over lane width; where Charlotte would allow, 11- or 10-foot lanes, NCDOT requires 12-foot lanes. Other elements—turn lanes, curb radii, bike lanes, on-street parking—have also been contentious. However, a complete streets policy adopted by the NCDOT in mid-2009, which drew on the experience in Charlotte, is expected to help the two agencies align their visions.

Charlotte's TAP also addresses the costs of maintaining a good quality of life and mobility. Some costs have increased, as CDOT is installing more sidewalks, planting strips, and bike lanes; sometimes this can mean increased costs in acquiring right-of-way. However, after going through the six-step process, the city has concluded that the costs in widening the right-of-way for sidewalks and bike lanes will pay off in future mobility. With some intersection projects, CDOT saves by not adding as many lanes as they would have under a different process.

Other changes to the streets to make them more functional for all users have little to do with construction and cost very little. For example, Charlotte has changed its operations approach, especially in prioritization and style of crossings. They have added countdown pedestrian signals, increased the visibility crosswalk markings, and reduced most traffic signal cycles to no more than two minutes to minimize the time pedestrians spend waiting to cross.

Overall, Charlotte is on a steady path to implementing its policy. As of the end of 2009, the city had completed 16 projects to create complete streets, and 18 more are in the works. Eleven intersections have been modified, with 10 more projects planned. Fifteen projects have added new sidewalks, and 40 more are planned. The city now has more than 50 miles of bikes lanes, up from almost zero 10 years ago.

In some ways, Charlotte's guiding vision is not really new. As Steinman puts it, "We're going back to what has worked in the past, and trying to create the type of community that has sustained itself for decades." The six-step process is simply a good planning process that is well defined, and "new" street designs reflect those built in the early 20th century that have stood the test of time. "We're only innovative in that we are forcing ourselves to think," says Newsome. "Is the additional left-turn lane really needed to relieve congestion that exists for just 45 minutes at the expense of pedestrians and bicyclists using that street all day?" Armed with strong policies, good design standards, and a context-sensitive outlook, CDOT planners and engineers fully own their vision and take pride in their work, allowing them to create better streets not just for motorists but for pedestrians, bicyclists, and others working and living in Charlotte.

Charlotte's Urban Street Design Guidelines, along with policy summary and implementation process documents, can be accessed at www.charmeck.org/Departments/Transportation/Urban+Street+Design+Guidelines.htm.

MOVING TOWARD COMPLETE STREETS: PENNSYLVANIA DEPARTMENT OF TRANSPORTATION

PennDOT is working to change its traditional automobile-oriented approach. It has emphasized context-sensitive solutions since 2001, and the agency's compliance with federal ADA requirements has been key in revising design guidelines for accommodating pedestrian access. The 2008 Smart Transportation Guide, developed in partnership with the New Jersey DOT, has further enabled PennDOT to consider the needs of all users and integrate all modes of transportation. Finally, the state's secretary of transportation, Allen Biehler, has been a leader in thinking about a complete transportation system encompassing multiple roads, rather than just focusing on highways.

One of the most helpful tools PennDOT uses to take a proactive approach to complete streets is its Bicycle and Pedestrian Checklist. The checklist is used throughout PennDOT's project planning and programming, scoping, and final design processes, and it ensures that bike and pedestrian accommodations are considered from the very beginning of a project. According to Danielle Spila, director of PennDOT's Policy Office, the checklist is just one of various complete streets–type policies in place throughout PennDOT under the umbrella of its Smart Transportation policy.

PennDOT

Figures 5.4–5.5. *(Above) Annville Township's Main Street before and (below) after traffic-calming streetscape improvements, leveraged with PennDOT assistance*

In 2007, PennDOT policy was revised to mandate that highway and bridge projects must evaluate access and mobility needs of pedestrians and bicyclists. As a result, the checklist, which had been in existence for several years, was officially made part of PennDOT's project development process. In the initial planning and programming phase of that process, the checklist is used to ensure consistency with existing bicycle and pedestrian planning documents; evaluate current and future usage by bicyclists and pedestrians; consider safety needs; and take into account community development and land-use patterns as well as the availability of transit. In the second phase, scoping, the checklist provides design specifications to determine what pedestrian and bicycle features will be necessary based on Phase 1 findings and guides field-checking to note any site constraints. In the final design phase, the checklist provides a "cookbook-style" matrix of various bicycle and pedestrian design elements to assist in creating project plans.

(continued on page 51)

decision making had focused on meeting automobile level-of-service standards, but the development of the new Urban Street Design Guidelines has led to a transportation planning process that is flexible, inclusive, well-documented, and clear. The Charlotte Department of Transportation's six-step process focuses on project context and has fostered creative solutions to transportation questions.

1. Define the existing and future land use and urban design context.
2. Define the existing and future transportation context.
3. Identify deficiencies.
4. Describe future objectives.
5. Recommend street classification and test initial cross-section.
6. Describe trade-offs and select cross-section.

The process ensures that planners understand the project and the area that surrounds it, and is applied to all plans, programs, and projects that could affect existing streets or result in new streets. This includes area plans, streetscape plans, neighborhood improvement plans, development proposal reviews, and preparation of capital improvement plans. Area planning, in particular, benefits from the process, as it provides the framework necessary for integration of land use and transportation on a larger scale.

Other places are using checklists as a way to ensure early consideration of the needs of all users. PennDOT uses a bicycle and pedestrian checklist throughout its project planning and programming, scoping, and final design processes to ensure that bicycle and pedestrian accommodations are considered from the very beginning of a project. On a regional scale, the Metropolitan Transportation Commission (MTC), the San Francisco Bay Area's MPO, adopted a routine

accommodation checklist in 2008 for those projects applying for funding through the American Recovery and Reinvestment Act (see MTC sidebar, p. 53).

FROM THE PENNDOT BICYCLE AND PEDESTRIAN CHECKLIST

1. Consistency with Bicycle/Pedestrian Planning Documents
   - Is the transportation facility included in or related to bicycle and pedestrian facilities identified in a master plan?
     - MPO/LDD bike/ped plan
     - Local planning documents
     - BicyclePA Routes
     - Statewide Bicycle and Pedestrian Master Plan
2. Existing and Future Usage
   - Do bicycle/pedestrian groups regularly use the transportation facility?
     - Bike clubs
     - Bicycle commuters
     - Hiking, walking, or running clubs
     - Skateboarding or rollerblading groups
     - Bicycle touring groups
     - General tourism/sightseeing
   - Does the existing transportation facility provide the only convenient transportation connection/linkage between land uses in the local area or region?
3. Safety
   - Would the transportation facility (and all users) benefit from widened or improved shoulders or improved markings (shoulders, crosswalks)?
4. Community and Land Use
   - Are sidewalks needed in the area?
     - Presence of worn paths along the facility
     - Adjacent land uses generate pedestrian traffic
     - Possible linkages/continuity with other pedestrian facilities
   - Is the transportation facility in close proximity to hospitals, elderly care facilities, or the residences or businesses of persons with disabilities?
5. Transit
   - Is the transportation facility on a transit route?
6. Traffic Calming
   - Is the community considering traffic calming as a possible solution to speeding and cut-through traffic?

Since 2004, the Virginia Department of Transportation has been working to counter its traditional transportation mind-set with a routine accommodation policy. In 2006, VDOT added a new section to its scoping forms for new construction and maintenance activities to ensure that multimodal accommodation is considered for each project. To supplement the forms, VDOT also created a simple decision tree that helps determine whether or not a project is exempted for any of the reasons outlined in the policy statement. These have been important tools for working to change the status quo. (See Figure 5.6, p. 52)

(continued from page 50)

The checklist is important because it acts as a data-gathering piece, pulling together all of the necessary information early in the planning process so that proper funding can be applied to ensure the inclusion of bicycle and pedestrian facilities. According to Ben DeVore, a civil engineer and PennDOT bike/ped coordinator, mandatory use of the checklist has had a positive impact on provision of accommodation. Most accommodation needs are now identified early in the process, and design solutions can be engineered in from the start. The checklist also enables PennDOT to include local communities and transportation users; relationships are established through having one-on-one conversations with these stakeholders to determine their needs. However, DeVore's experience has shown him that the effectiveness of the checklist to a large extent depends on who uses it. Project managers are officially responsible for completing checklists, but DeVore completes the checklists for all projects in his district to ensure that adequate attention is paid to this step.

Other challenges to successful implementation remain. Patrick Roberts, a former PennDOT planner who now works as principal transportation planner for the City of Pittsburgh, asserts that local planners must work with PennDOT to ensure that accommodation needs are met on projects in their communities. While PennDOT's jurisdiction in urban areas is minor—Roberts estimates that PennDOT is involved with about 5 percent of the roads within Pittsburgh—the roads it does work on are vital for connectivity throughout the city.

Cost is always an issue, according to DeVore. ADA accommodation is absolutely required, so sometimes a project must be scaled back to incorporate all the required improvements. When multimodal needs are considered very early in the process, the costs are incorporated into PennDOT's project budget from the beginning and are not as much of an obstacle. If bike/ped improvements are added to an active project, however, the local municipality may be asked to come up with the additional funds, and that can be a problem.

Sidewalks can be another sticking point. In Pennsylvania, responsibility for sidewalk maintenance has been delegated to municipalities, so while PennDOT will build sidewalks if they are incorporated into the project design early in the process, the municipality must still sign a maintenance agreement. Local politics can play a role as well. In more rural areas where the car is king, politicians don't see a need for complete streets and are often against reducing lane capacity to accommodate other modes of transportation.

Through its Smart Transportation policy, the driving force of which is consideration of all modes, PennDOT is moving toward a complete streets perspective. The bicycle and pedestrian checklist is an important tool to make sure that accommodation issues are considered very early in the process, so that these facilities can be planned and designed into a project from the start.

For more information on PennDOT's Smart Transportation initiative, see www.smart-transportation.com. The Smart Transportation Guidebook can be downloaded at www.smart-transportation.com/guidebook.html. The Bicycle and Pedestrian Checklist, Appendix J in PennDOT's Design Manual 1A, can be found at ftp.dot.state.pa.us/public/Bureaus/design/PUB10A/Appendix/Append-J.pdf.

Discussion
06-20-12
Stephanie Pollack

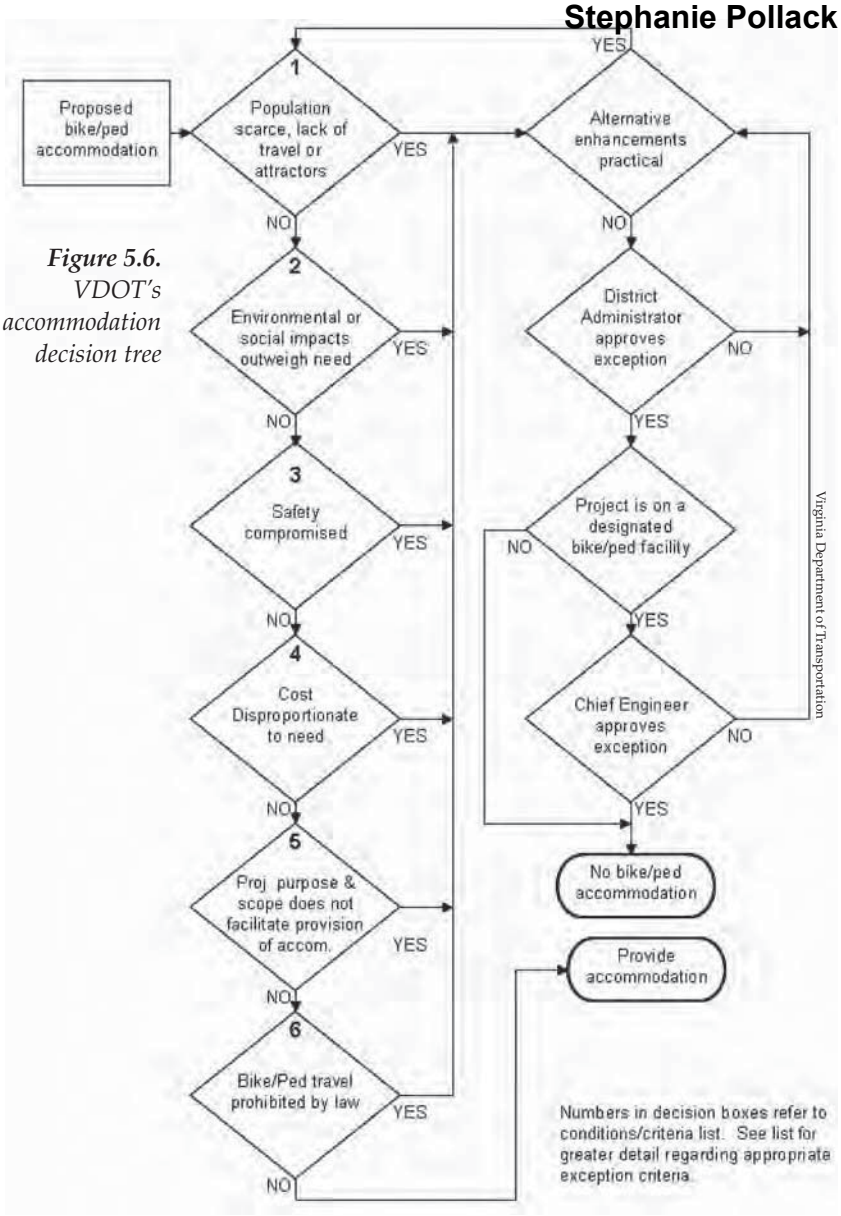


Figure 5.6. *VDOT's accommodation decision tree*

Another common innovation is the use of planning teams and early project meetings. In Roanoke, Virginia; Columbus, Ohio; and Seattle, project development starts with broad team meetings that bring all relevant departments together to coordinate everything from utilities to transit stops along a corridor.

TRAINING

A common complaint is that transportation planners and engineers have not received the technical training needed to effectively serve all transportation system users. Many learned very little in their formal education about planning and designing facilities for bicyclists, pedestrians, or transit and were taught even less about how to balance the needs of different modes. Some places with complete streets policies have conducted extensive design training on pedestrian and bicyclist facilities or ADA requirement compliance. This training is sometimes provided through traditional continuing-education forums or at state conferences, and such courses are widely available. But some planners and engineers involved in complete streets are cautious about the value of an

Discussion
06-20-12
Stephanie Pollack

emphasis on technical training. They believe this may create the impression that the design of such facilities requires specialized knowledge when this should be part of routine planning and design.

Some communities have instead emphasized procedural training. This approach focuses on the meaning of a complete streets policy and the avenues to its implementation. The intent of any procedural training program is to ensure that agency staff charged with implementation of the policy are aware of the new procedures that apply to their field of work. In Columbus, Ohio, the Mobility Division conducted a training session for zoning staff to help them consider the complete streets policy in site plan review. In addition, the implementation team has offered training to public utilities to help them understand the city's expectations when they dig up roads. The division has also held training sessions for contractors, consultants, and developers to ensure that the private development community understands complete streets provisions within the land-use regulations.

Both Charlotte and the Commonwealth of Massachusetts upended their former project development processes when they moved to a complete streets approach. In Charlotte, when the Urban Street Design Guidelines (USDG) document was first adopted, staff participated in extensive discussion, review, and training sessions on applying the new six-step planning process. Eventually, the USDG methodologies will be incorporated into all land development review processes. As Charlotte moves ahead with updating its land development standards to further integrate the complete streets approach, more trainings and reviews are planned.

SUPPORTING COMPLETE STREETS AT THE REGIONAL LEVEL: METROPOLITAN TRANSPORTATION COMMISSION, CALIFORNIA

During the summer of 2006, the Metropolitan Transportation Commission (MTC), the metropolitan planning organization for the San Francisco Bay Area, adopted Resolution 3765. This document requires local jurisdictions to consider the needs of bicyclists, pedestrians, and transit riders when applying for federal or regional transportation funds, which MTC controls, for any new road project or road renovation project. The policy supports the agency's commitment to bicycle and pedestrian safety and travel, and provides a routine accommodation implementation policy for the region.

Following the adoption of Resolution 3765, MTC adopted a routine accommodation checklist in 2008 to help ensure that local jurisdictions were indeed considering complete streets principles. Though not required to include routine accommodation as part of every project, each jurisdiction applying for project funding through MTC is required to fill out the checklist for every project.

Dan Burden, the Livable and Walkable Communities Institute, Inc.

Figure 5.7. *MTC's new project checklist will encourage pedestrian and bicycle accommodation throughout the San Francisco region, including along the Embarcadero.*

The checklist asks whether bicycle and pedestrian infrastructure is included as part of the proposed project. If such provisions are not part of the project, the checklist asks for information regarding the nearest bicycle and pedestrian infrastructure that provides all users with right-of-way access. Local jurisdictions are required to complete these checklists and make them available to the public through county congestion management agency websites. They are also required to furnish their county's bicycle and pedestrian advocacy committee with copies of these checklists.

The checklist requirement is designed to encourage multimodal considerations by requiring transparency. Project sponsors may have to deal with complaints by advocates if bicycle and pedestrian provisions are not included in the project design, so inclusion of bicycle, pedestrian, and transit infrastructure in new projects is one way to help prevent potential political uproar.

In promoting complete streets principles throughout the region, MTC purposefully chose the checklist approach to help avoid conflict with county-level governments. According to Sean Co, a transportation planner with MTC, many of the region's counties typically see requirements imposed by MTC as barriers standing in the way of funding. From the county government perspective, a checklist that is just one more piece of the funding application process is preferable to a mandate that requires the inclusion of bicycle and pedestrian infrastructure in order to receive funds. This makes the resolution more politically palatable.

The routine accommodation checklist was first used for projects applying for funding through the American Recovery and Reinvestment Act. Since the implementation of the requirement, all applicants have filled out the checklist, with few complaints. This suggests that local jurisdictions are taking complete streets principles seriously, though not all of them are adopting local policies of their own.

Links to the checklists provided by the counties' congestion management agencies can be found at www.mtc.ca.gov/planning/bicyclespedestrians/routine_accommodations.htm. A copy of the checklist as it appears to those applying for funding can be found at: www.mtc.ca.gov/planning/bicyclespedestrians/Routine_Accommodation_checklist.pdf.

CREATING NEW COMPLETE STREET STANDARDS AND INDICATORS: REDMOND, WASHINGTON

In September 2007, Redmond became the third community in the Puget Sound region to adopt a complete streets ordinance. The city had taken note of its neighbors' actions, and when approached by local advocates in the Cascade Bicycle Club and Transportation Choices Coalition, it saw adoption of an ordinance as a natural progression. The ordinance codified the steps Redmond had already taken in its comprehensive plan and transportation master plan (TMP) to create a balanced, multimodal transportation network.

www.pedbikeimages.org / Dan Burden

Figure 5.8. *A supportive pedestrian environment in Redmond*

This traditional suburban-style community has undergone a number of incremental changes in its outlook and approach to planning and design. "It's another piece of the puzzle that reaffirms our commitment to moving in a different direction than Redmond was in the last 30 years," says Principal Planner Joel Pfundt. The idea of complete streets, especially its potential application in placemaking, helped build support among constituents and elected officials. While city staff felt they were already moving in this direction, the process of passing the ordinance was helpful. The city council affirmed their belief in creating streets that work for all users, which granted them ownership of the concept.

The city has a unique approach to Washington State's Growth Management Act (GMA), which requires concurrency between development and transportation. Under the GMA, local governments set a level-of-service (LOS) standard; any proposed development that causes the transportation system to drop below this threshold must be denied until transportation improvements are made to accommodate that development. Communities, including Redmond, have typically used vehicle-based LOS standards to monitor concurrency at the intersection or corridor level. This can lead to an emphasis on building wider streets to maximize vehicular throughput and causing projects to become auto-dependent even when this is inconsistent with GMA and local comprehensive plan policy.

(continued on page 55)

Massachusetts has also taken a learn-by-doing approach. When the new Project Development and Design Guide was adopted in 2006, training was offered to MassHighway (now part of MassDOT) staff as well as superintendents, town staff, and consultants working in the state. Since then, training opportunities have not been widespread; instead, staff are expected to become familiar with the guide's principles through implementation. Advocates and agency staff are supportive of more training, especially to help move away from the one-size-fits-all engineering that dominated in the past. Helping staff understand the range of acceptable approaches and partake in a more iterative approach has been a challenge, according to some.

PERFORMANCE MEASUREMENT

Performance measurement is an important tool in the implementation of complete streets policies, yet it remains a challenging area. Performance measures provide a quantitative (and sometimes qualitative) indicator of actual or potential performance of a specific street, a section of the street network, or of the street system as a whole. Communities must consider both how to use performance measures and how to measure performance.

Using Performance Measures

Performance measures may be used in several different ways to facilitate the implementation of complete streets policies (Table 5.1, p. 56).

First, performance measures can be used for needs assessment: to identify problems in the system and to assess their relative severity. In this case, performance measures are applied systemwide (e.g., to all arterial streets), usually as part of the planning process. In Roanoke, planners have developed a scoring system for major streets that takes into account safety, connectivity, and design, as well as the presence of street trees, stormwater and drainage issues, and the availability of sufficient right-of-way to accommodate all modes.

A related approach is to classify all streets in the system as to their appropriateness for complete streets treatments, in effect evaluating them for their potential performance as complete streets. Decatur, Georgia, modified the traditional street typology to account for the relationship of the street to land use, so that each new street type caters to different levels of need for various travelers, by foot, bike, or car.

Redmond, Washington, laid out a comprehensive monitoring system in its transportation master plan. The Mobility Report Card measures over 15 indicators for multimodal transportation each year; results are posted on the Internet. The report cards show the baseline value, the current year's observed value, and the target (objective) value for each indicator. This allows the city to spot trends and track progress toward goals (see sidebar).

Second, performance measures can be used to rank projects for funding in the programming process, as described in chapter 4. The methods used here may be similar to those used for needs assessment.

Third, performance measures can be used in impact assessments. In this application, the probable impact of a proposed development project on the performance of the street system is projected, and the result is used as the basis for impact fees or other exactions, such as requirements to provide bicycle and pedestrian facilities. For example, in Sacramento, traditional level-of-service (LOS) standards for the impact of development on vehicle traffic have been relaxed to accommodate development that may improve conditions for other modes. In Redmond, where the state requires concurrency for developments, the city is developing a new plan-based system that will let them measure impact on a network basis rather than through corridor LOS measures.

Fourth, performance measures can be used to evaluate the effects of a policy or project on the performance of the system and to assess whether it achieved its goal. These before-and-after studies are important for building a base of evidence for the effectiveness of the complete streets approach and can be instrumental in justifying further investments in complete streets projects. Although it has been common to measure changes in vehicle traffic before and after implementation of traffic-calming programs, impacts on other modes are rarely measured. When operating under a complete streets framework, jurisdictions can measure traffic volume of all modes, note any modal shifts, and track the number of crashes and injuries incurred by all roadway users. (See Table 5.1, p. 56.)

Measuring Performance

These uses of performance measures are standard, but for complete streets some of the metrics being used are new. In all four applications, it is standard practice to use vehicular LOS, which focuses on the automobile alone. In using performance measures to implement complete streets policies, communities are expanding the range of measures used to account for multiple modes and to achieve a broader range of objectives.

In developing appropriate methods of performance measurement, communities must consider three interrelated concepts. First, performance can be measured as inputs, outputs, or outcomes. Inputs are the initial actions taken by the community to achieve the desired goal. For complete streets, inputs could include adoption of complete streets policies or dollars spent on complete streets projects. Outputs are the direct result of these actions and could include the number of projects completed, the extent of the bicycle or pedestrian network, or the characteristics of that network. For example, Seattle has set goals with respect to numbers of sidewalks, crosswalks, and street trees. Charlotte measures crossing distances, bike lanes, and corner radii. Outcomes, in contrast, reflect the impacts on the users of the system, and include counts of users, mode shares, and crashes, as well as subjective assessments such as perceived safety and user satisfaction. Most before-and-after studies focus on outcomes; however, because outcomes tend to be harder to measure, they are less often used in needs assessments and other applications.

Discussion
06-20-12
Stephanie Pollack

(continued from page 54)

Redmond is replacing its vehicle-based intersection LOS standard with plan-based concurrency, which allows for a transportation system that can accommodate the network of complete streets envisioned by the community. In this way, the implementation of the transportation plan will explicitly support achievement of the comprehensive plan's visions and policies.

The plan-based approach is also intended to be simple and predictable. The city used its transportation model to calculate "mobility units," or person-miles of travel, provided by existing streets and public transportation service to offer a quantifiable moving capacity. Each development proposal is analyzed to estimate the number of mobility units it will generate. This is compared to the available mobility units within the city's Six-Year Transportation Improvement Program/Capital Improvement Program. The city's land-use growth target and 2022 transportation facility plan (TFP) set the total allowed amount of person-miles traveled. As long as the land-use growth target and the development of the transportation system remain proportionate, the LOS standard, and therefore the concurrency requirement, is met.

In the TMP, Redmond created a mobility report card measuring a variety of indicators: concurrency; completion of the 2022 TFP; a.m. mode share; school bus ridership; public transportation travel time and service frequency; average weekday boardings on public transportation; service hour targets for local public transportation; p.m. peak-hour VMT; changes in traffic volume across key screenlines; average traffic growth by transportation management district; roadway volume-to-capacity ratios along selected screenlines; percentage of pedestrian environment designed to "supportive" standards; completion of the bicycle network; number of vehicle, pedestrian, and bicyclist collisions; and status of the Three-Year Priority Action Plan. This information supplements the concurrency management system and is used to evaluate the performance of each mode.

Annual mobility report cards are available to download from http://redmond.gov/connectingredmond/policiesplans/tmpprojectdocs.asp.

TABLE 5.1. PERFORMANCE MEASURE ROLES AND EXAMPLES

	Description	Examples
Needs Assessment	Systemwide assessment of multimodal conditions and identification of problem spots in planning process	Roanoke: Scoring system for major streets that takes into account safety, connectivity, and design, plus right-of-way availability, street trees, stormwater and drainage issues Louisville: Bike-friendly index calculated for collectors and arterials, for use in bicycle master plan Decatur: Modified typology of street types to take into account relationship to land use Redmond: Annual mobility report card
Project Prioritization	Comparison of proposed projects with respect to severity of problem and potential impacts	Seattle: Prioritization of projects that have the most impact on network completion.
Impact Assessment	Forecast of potential impacts of proposed project, often as basis for impact fees or exactions	Sacramento: Relaxation of traditional vehicle LOS standard from C to D or E near transit in assessing development impacts Charlotte: New LOS for bicyclists and pedestrians at intersections Redmond: new plan-based concurrency system
Project Evaluation	Measurement of multimodal conditions before and after implementation of project	Seattle: Before and after evaluations of mode shift, volumes, crashes Charlotte: Before and after evaluations of volumes, speeds, crashes New York: Sustainable Streets goals and measures

Second, to be effective, performance measures must be closely tied to planning goals: each must measure a relevant aspect of system performance. If the goal is to increase walking and bicycling or to improve safety for these modes, then performance measures should measure these outcomes. In developing performance measures, communities should thus take the goals of their complete streets policy as their starting points. Note that inputs and outputs tend to be less directly related to goals than are outcomes.

There are two important corollaries to this concept: (1) If performance measures do not match goals, they will bring confusion to planning and programming processes. Decisions based on those performance measures are likely to lead the community in unrelated directions. (2) Goals should have performance measures. Goals without performance measures are likely to get less attention in the planning process because it is harder to document problems and evaluate solutions.

New York City has developed an extensive process for matching goals and measures. The Sustainable Streets strategic plan sets a number of goals for the transportation department. Each is accompanied by a number of benchmarks for measuring success—including improved safety and mobility, good maintenance of infrastructure, well-developed placemaking policies, and the incorporation of sustainability objectives into projects, among others—that are to be measured annually. As the agency works through the plan, it will update and add new goals on a continual basis. The department expects to

Discussion
06-20-12
Stephanie Pollack

hold staff retreats every year or two, where employees will discuss what has been achieved and what new goals they should set.

One challenge is measuring a complete streets network's outcomes related to long-term community goals that reach far beyond the immediate transportation realm, such as goals to increase the physical activity of residents or decrease the emission of greenhouse gases. In the first instance, the public health community has been exploring ways to measure the effectiveness of transportation investments in altering behavior, mainly through the development of health impact assessment tools.

Third, all four uses of performance measures may require the establishment of standards by which performance can be judged. These standards should, of course, be tied to the goals of the community and can be viewed as the quantification of those goals. However, standards may be constrained by practical limitations. For example, while it might be the goal of the community to eliminate all crashes, physical and financial constraints may make this standard unachievable. Still, standards can be used to judge the severity of an existing problem (how far below the standard an existing situation is) or the effectiveness of a proposed or implemented solution (whether or not the solution achieves the standard). Redmond's mobility report card is a good example of the use of standards, or targets, to evaluate progress toward goals.

Level of Service

The traditional performance measure for street design is level of service as calculated based on the current version of the Highway Capacity Manual (HCM) published by the Transportation Research Board. This measure, in all its forms, is a function of the ratio of the number of cars on a road to the road's carrying capacity, and it is expressed by assumed delay for each vehicle. Historically, it has been used to calculate how much road capacity is needed to serve a given volume of vehicles, and it is directly tied to the goal of reducing congestion and delay; in most common use, LOS A represents free-flowing automobile traffic, and E or F represent complete congestion. Although it has the advantage of being highly standardized and widely used, traditional vehicular LOS is not a relevant measure for the complete street goal of providing a safe and convenient environment for all users.

Efforts to develop bicycle and pedestrian LOS measures go back at least to the early 1990s, following passage of the federal Intermodal Surface Transportation Efficiency Act (ISTEA) in 1991. A forthcoming revised version of the Highway Capacity Manual should include methods for measuring the quality of travel for bicyclists and pedestrians, including comfort and sense of safety. (A preliminary description of this methodology is in TRB NCHRP 2008.)

In the meantime, communities have been developing their own methods for measuring bicycle, pedestrian, and transit LOS. For example, Louisville developed a metric that factors in speed limits and traffic volumes to create a rating that captures bike friendliness. Seattle is developing a new LOS approach, while Decatur is using the preliminary new HCM approach.

Although there are many benefits to standardization of measures across communities, appropriate measures may also vary, depending on a community's goals. In general, bicycle, pedestrian, and transit LOS measures tend to be more complex than vehicle LOS; they attempt to measure the quality of the travel experience rather than just throughput. Some communities are not pursuing new LOS measures, instead choosing more qualitative measures of success.

In practice, communities have been using these new measures in addition to the traditional vehicle LOS measure, not in place of it. They have both expanded their measures of vehicle standards (e.g., to include crashes), and they have added measures of LOS for other modes. In Massachusetts, vehicle LOS is one of many "measures of effectiveness," and designers are directed to calculate and provide a "reasonable LOS for all users." The state's new Project Development and Design Guide offers tools to do so, including guidance on balancing LOS measures for different users at intersections, where automobiles and nonmotorized users so often come into conflict.

It may be important to continue to measure traditional vehicle LOS in order to provide a balanced assessment across all modes and to alleviate potential concerns about negative impacts on vehicles. Modifying rather than rejecting the traditional performance-measurement approach seems to have smoothed the way for many complete streets projects. For example, the added analysis now used by the Charlotte DOT is credited by lead planners as a key reason their complete streets policy works and is supported by staff. "We're not changing our analysis but instead doing more of it," says Norm Steinman, planning and design division manager. Staff engineers in particular appreciate the use of logic and analysis to justify complete streets design.

SETTING UP AN EXCEPTIONS PROCESS

Creating a clear exceptions process has been a central issue in many jurisdictions transitioning to the complete streets approach. During the policy adoption process, exceptions are often hotly debated and can make or break political support for the policy.

Once a complete streets policy is in place, a clear and fair exception process can enhance credibility, ease fears of both opponents and proponents of change, and provide a guide for planners. Redmond's ordinance is short and to the point, outlining three exceptions to its policy: where accommodating all users would be contrary to public safety; where there is no identified long-term need; and where the public works director allows a documented exception in specific situations. The exceptions process forces staff to be systematic and to consider all options.

In Massachusetts, eliminating discrepancies in the existing exceptions process was a top priority for the new project guide. Now, any exceptions to the guide's standards are handled each month by a review committee of senior-level engineers from across the state, according to a standard, documented procedure. (See sidebar, p. 83.)

As noted, the Virginia DOT has created a new project scoping form, decision tree, and guidance document to assist in determining exceptions to its policy. In Seattle, a checklist process is used, but the approval of an exception is not the end of the story. If complete streets improvements were identified in the process but were unable to be included in the final scope, one of the city's transportation divisions is required to include that need in its list of projects, regardless of funding. In this way, user needs are not lost or written off.

Cost Exceptions

The worry that complete streets policies will break the bank is very common and has spurred many communities to provide for cost exceptions. While worries about cost are sometimes overstated (see Chapter 6), many places have accepted the FHWA's 2000 guidance defining "excessively disproportionate" as costs above 20 percent of total project costs. But the guidance also uses this phrase from the Oregon law: "if the cost of establishing such paths and trails would be excessively disproportionate to the need or probable use." In Oregon, accordingly, a project in a high-use area for bicycling and walking has no ceiling.

BRIDGING THE GAP: SEATTLE

Seattle has been swift and methodical in its implementation of complete streets. With the adoption of its nine-year "Bridging the Gap" transportation funding levy, Seattle pledged not only to reduce its backlog of transportation maintenance, make seismic upgrades to bridges, and increase public transportation speed and reliability but also to allocate funds to creating complete streets. Six months later, the city council adopted an ordinance so that all transportation projects, not just those funded through Bridging the Gap, would improve travel for all users. Barbara Gray, transportation system design and planning manager in the Policy and Planning Division at the Seattle Department of Transportation (SDOT), credits both policies for providing SDOT with "a consistent and formal approach to improving the right-of-way for all users."

Gray indicated that SDOT had been moving toward a more integrated approach to delivering complete streets under the leadership of Director Grace Crunican, but the ordinance provided the legislative authority to ensure that decisions about project design did not happen unless the needs of all modes were considered. The first big step to break down silos within the transportation department had been to allow the SDOT bicycle and pedestrian program team to review repaving and channelization projects for opportunities to improve rights-of-way for bicycle and pedestrians. Upon adoption of the ordinance, this process expanded significantly.

Today, SDOT policy requires all capital major-maintenance projects (such as repaving) to have a thorough complete streets review, and staff are directed to look for ways to make each project consistent with the complete streets ordinance. An internal complete streets steering committee was formed to help clarify and define the daily operational practices that SDOT would take to implement complete streets. This group also provides design oversight to the team of project managers and planners responsible for project design. A citizen oversight committee meets quarterly to review project completion and ensure consistency with the goals of the Bridging the Gap levy, including the complete streets mandate.

An energized SDOT soon began to roll out projects. Seattle has added sidewalks, crosswalks, and curb extensions; installed shared-lane pavement markings (sharrows); painted green bike lanes; established bioswales; planted trees; improved signage; and added new curb extensions at bus stops (bus bulbs). Bicycle parking has replaced auto parking in some parallel parking spaces (bike corrals). Many streets have been rechannelized (i.e., road diets have been implemented), converting four-lane streets into three-lane streets (two travel lanes and a center turn lane) with bike lanes. These projects have given pedestrians a leg up as well, as the city is more inclined to install unsignalized crosswalks across three lanes but not four.

On Rainier Avenue South, bus bulbs help buses save time by allowing them to pick up passengers without moving in and out of the parking lane. Buses also have priority signals so green lights stay green longer and red lights switch faster when buses approach. On Second Avenue and Fourth Avenue downtown, new street designs include bus bulbs, green bike lanes at potential vehicle/bicycle conflict points, advanced stop bars, sharrows, and bus-priority signals. A pilot project along Aurora Avenue (Highway 99) will include closing one of the entry points from a residential street that feeds onto Aurora, creating a "street end plaza" and expanded waiting area at this heavily used bus stop location. If successful, this project is very likely to be replicated in another location where sidewalks are narrow and bus ridership is high. This new plaza will convert car space to pedestrian space in order to give more room for bus shelters and waiting passengers without significant impacts on local businesses or residents.

Part of SDOT's success lies in infusing complete streets principles into all guiding documents—the transportation strategic plan, the transit plan, and the pedestrian and bicycle master plans, among others—as defined in the ordinance. Such integration helps expand complete streets policies into daily operations, making it standard for all staff. It will also eventually influence the capital improvement program (CIP) planning process, when all CIP projects (with the exception of very small projects or those that are considered to be routine maintenance) will be subject to the internal complete streets checklist.

(continued on page 60)

Seattle Department of Transportation

Figures 5.9–5.10. *Before-and-after shots of pedestrian improvements on Sixth Avenue in Seattle*

Discussion
06-20-12
Stephanie Pollack

(continued from page 59)

Seattle's CIP involves a wide range of projects, from bridge repair and construction to trail extensions and roadway repaving. Although the CIP is a six-year plan, SDOT has a nine-year paving plan. This look ahead at paving projects has been instrumental in complete streets implementation, and SDOT has leveraged these projects to implement complete streets in every case since 2007, when the Bridging the Gap levy was passed. As the city updates its planning documents with the complete streets outlook and looks at new data, priority projects will emerge and be slated for implementation, either through the CIP or through one of SDOT's annual funding programs. The 2009 update to Seattle's pedestrian master plan used a variety of GIS indicators, such as income, pedestrian generators, and density, to locate priority areas for pedestrian improvement. From this, planners look for what's missing in the system, prioritizing projects that will have the most impact and help create a complete network for pedestrians, especially those who are most dependent on walking and transit.

Three to four years out, those priority projects found through the planning process will be put through a complete streets checklist. This allows SDOT time to work with different divisions to link needed improvements and to secure funding. After this, the project goes to design. At the design reviews conducted 30, 60, and 90 percent of the way through the process, all involved city stakeholders will ensure that the designs follow the input communicated through the checklist. When complete, the checklist is signed by each key member of the SDOT project team, then by the SDOT director. If complete streets improvements are identified in the process but not included in the final scope, one of SDOT's divisions is required to include that need in its list of projects, to ensure that user needs are not lost simply because current funding is not available.

In 2005, Seattle made major revisions to its Right-of-Way Improvements Manual, a design standards manual that is used primarily by private developers. While the document has routine accommodation language, SDOT felt it did not fully express the complete streets policies set forth in 2007 and 2008. Seattle depends on private developers' work for smaller sections of corridors and encourages all projects in the right-of-way to be consistent with complete streets policies. The ordinance officially applies only to SDOT-funded projects, so private developers are not required to comply. However, many see the benefit of improving pedestrian, bicycle, and public transportation quality and have made commitments to such improvements as key pieces of their projects—another demonstration that complete streets can also be good for business.

The Right-of-Way Improvements Manual and related roadway design standards are scheduled to be updated in 2010 through 2011 and will contain a stronger focus and message about complete streets. Until that time, SDOT will continue to use state-of-the-practice designs and encourage others to do the same. "Our new designs just create new internal standards," says Strategic Advisor Darby Watson. "Our design has not changed a whole lot; it's more our willingness to look at streets in a new way." Innovative designs for road diets, longer street tree pits, bike boulevards, pervious sidewalks, bio-swales, and green bike lanes have been integrated into internal design standards so they become regular practice. If a pilot program shows results, it is added to the list as well. "The more we can add to the standards, the fewer prolonged debates often resulting from 'new' or 'nonstandard' design details are needed. The constant debate about the details can really slow a project down," says Gray, so standardizing innovative approaches improves efficiency and makes a difference on the ground quickly.

Seattle has been measuring its success as well. The Bridging the Gap initiative sets clear goals for SDOT, such as building 117 blocks of new sidewalks, restriping 5,000 crosswalks, planting 8,000 new street trees, and developing a pedestrian master plan. SDOT has also begun to examine how best to use LOS indicators for different modes; a new LOS measure for Seattle is being considered for the near future, Gray says. On a case-by-case basis, SDOT conducts before-and-after evaluations to measure mode shift, volumes, and crash data. For every road diet project, an "after" study is done one year after installation. In the broader sense, though, Gray feels that it will be harder to measure performance as time goes on because complete streets will be "just standard practice." Seattle is investigating a way to overcome that barrier but has yet to find the answer.

Seattle has not been blocked by the costs in developing complete streets. While some complete streets work is funded by the Bridging the Gap tax levy, many are funded through traditional means. Here, making good plans steeped in complete streets principles helps tremendously. "With good planning and information shared across departments several years out, we can leverage the dollars much more effectively," notes Gray. "Planning in advance makes complete streets much easier to accomplish." Projects can also be done incrementally to help manage costs and expectations.

Seattle employs a number of low-cost methods to improve its transportation system. When repaving a street, staff will consider a new configuration in the existing right-of-way that creates space for bicyclists or improves traffic flow for automobiles. They may flag the location as needing further study later on, when more funding can be attached. Painting and signing stop bars greatly improves the pedestrian environment and can be done for the low cost of paint when repaving or intersection redesign work is occurring. When moving signal detectors, SDOT will install bike loop detectors so cyclists can activate the signal without needing to wait for a vehicle. Installing bike corrals is another low-cost technique that signals bicyclists are welcome in the area.

Many times, it is best for SDOT to do all the improvements at once, benefiting from the economies of scale and lessening inconveniences on travelers by closing portions of the street only once. Furthermore, priorities among the divisions can be aligned so that all modes can benefit from a project. If a road is due for sidewalk improvements and will already be rechannelized after a repaving, SDOT will try to pair up the projects. On bridge projects, where adding a nonmotorized trail is far too costly, SDOT takes a "do no harm" approach. So long as the design does not preclude inclusion of that trail in the future, SDOT can plan to do it when funding can be secured.

Gray strongly believes complete streets policies have been valuable "from elected officials on down, at every level of the city" and in engaging with the public. "It's just our system now." Each project brings debate, but SDOT has good support and policies to reinforce its efforts. For Seattle, it is not about convincing people; it is about getting the systems in place to ensure complete streets is standard operating procedure. The policies have caused them to consider each project as a part of the whole city. "I'm hopeful that the work we are doing lays the groundwork for other cities—that would be an incredible measure of success," concludes Gray.

Seattle's complete streets ordinance (ordinance no. 122386) can be accessed at http://clerk.ci.seattle.wa.us/~public/CBOR1.htm. Read more about the Bridging the Gap initiative at www.seattle.gov/Transportation/BridgingtheGap.htm.

Discussion
06-20-12
Stephanie Pollack

Other communities have also rejected specific ceilings. Seattle initially capped complete streets elements when they added 20 percent or more to total project cost, but city planners later decided that every project should be evaluated individually. If the costs add 21 percent but the benefits outweigh the costs, the project is just as valid as one where the complete streets elements add 19 percent to the cost.

When creating guidance for the TransNet tax extension, San Diego's regional agency, the San Diego Association of Governments (SANDAG), decided not to set a percentage threshold over which costs would be deemed excessive, instead allowing policy makers to make these decisions on a case-by-case basis. If an agency decides that costs would be excessively disproportionate to the need or probable use, the agency must provide documentation and justification for its decision, go through a public hearing, and have the exemption approved by SANDAG.

Some communities are placing less emphasis on an exceptions process aimed at individual streets and more emphasis on creating a variety of street cross-sections, new street typologies, or network plans that clarify what facilities will be placed in what contexts. Smaller communities, such as Boulder, Colorado, and Decatur, Georgia, are thus able to identify future improvements across the entire street network, if not on every street.

THE BALANCING ACT: MEETING THE NEEDS OF VARIOUS USERS

To successfully balance user needs, planners must first change the way in which automobile traffic congestion is viewed. But the dominance of the automobile paradigm is not easy to displace. Patrick Roberts, a former PennDOT planner who now works as principal transportation planner for the City of Pittsburgh, laments the lack of state or national policies mandating equity for the needs of all transportation modes. AASHTO and other standards are still focused on planning for cars, and ensuring capacity for automobiles puts pedestrian and bicycle facilities at a disadvantage when funding or right-of-way is limited. He would like to see policies that allow for a reduction in automobile capacity in order to provide accommodation for other modes.

Such a change is an especially tall order for state DOTs, with their primary missions of supporting long-distance travel. But at the municipal level, some of the most successful policies have directly addressed the way that complete streets affect automobile traffic. Santa Barbara, California, and Seattle have embraced complete streets as a way to increase the capacity of the transportation network, but communication and education are essential for acceptance. For example, Seattle has launched a public awareness campaign and "Commuter Toolkit" with information about the city's efforts to be more walkable, bikeable, and transit-friendly, tips on reducing automobile dependence, and a poster illustrating the space 200 people take up if they are in cars, on light rail, on a bus, or riding bicycles.

Once the rights of other modes to share the streets are recognized, the balancing act has just begun. Many projects need creative solutions so improvements for one mode do not overly burden others. The recently completed project on Stone Way North in Seattle is a poster child for this kind of balance. Stone Way is a low-traffic freight corridor with strong pedestrian and bicycle usage: the perfect candidate for a road diet. "In the design phase, there was a lot of fear," says Darby Watson, the strategic advisor in SDOT's policy and planning division. Local bicyclists wanted bike lanes on both sides of the roadway, but freight users worried about reduced access to light industrial areas. SDOT brokered a compromise, installing bike lanes along the street's uphill side, where cyclists would be moving more slowly, and shared lane pavement markings, or "sharrows," along the other, where the grade would allow them to move close to the

SIDEWALKS

It is very common across the United States for sidewalk construction and maintenance to be considered a separate responsibility from road building. In many cases, adjacent landowners are responsible for construction, maintenance, and snow removal. The practice stems from English common law and has proved a significant barrier to complete streets implementation in some places. At the local level, aside from residents who want to maintain a "rural feel," other residents are resistant to sidewalks because they do not want to have to repair them or shovel snow off them.

The New Jersey DOT and the Alan M. Voorhees Center issued a report on sidewalk construction and maintenance in New Jersey (VTC and Carmalt 2006), which includes a national assessment and overview. It states, "As a result of the complicated and multi-layered responsibility for sidewalk siting, construction and maintenance, varied municipal ordinances, and varied perceptions among decision makers about the need for sidewalks, the current sidewalk network in New Jersey is fragmentary and incomplete. This network has less utility than a complete network because potential pedestrians may forgo walking trips if they cannot rely on the presence of a safe facility all the way to their destinations." The report recommends that laws should be changed so jurisdictions responsible for the road should also be responsible for the sidewalk.

Some communities with complete streets policies, such as Colorado Springs, Colorado, are addressing this issue by taking back responsibility for sidewalk construction and maintenance. Several communities have launched sidewalk retrofit programs, including Charlotte, in which the city installs new sidewalks based on where they are most needed, as well as residents' requests (see www.charmeck.org/Departments/Transportation/About+Us/Sidewalk+Program+FAQ.htm).

speed of traffic. The sharrows allow bicyclists to blend with traffic, easing the freight users' concerns. The route has seen an increase in bicycle traffic with no lessening of freight use, and Watson notes that the project actually improved accessibility for freight users. Here, being creative and listening to all parties was essential for successful implementation.

While bicyclists and pedestrians tend to get the most attention, a true complete streets policy is more inclusive. ADA requirements have pushed a few policies toward implementation. The origins of the complete streets movement in Sacramento can be traced back to a 2002 court decision requiring ADA-compliant sidewalks and curb ramps along all public streets. (See sidebar, p. 41.) In Pennsylvania, PennDOT compliance with federal ADA requirements has been key in revising agency design guidelines for accommodating pedestrian access.

The needs of older Americans have driven policy adoption in some places, most notably in Hawaii. But a recent AARP study found that a majority of policies do not adequately address the needs of older adults. In response, AARP issued the report *Planning Complete Streets for an Aging America*, which includes three design principles that make streets safer for older drivers, pedestrians, bicyclists, or transit users: (1) reduce vehicle speeds for safety and improved reaction time; (2) make the physical layout easy to navigate; and (3) simplify the visual environment to make it easier to interpret visual cues.

Transit is also an important component of complete streets. Pedestrians and bicyclists need access to transit vehicles, and finding ways to speed transit vehicles can improve transit performance and attract ridership. In Boulder, accommodating and encouraging public transportation use has been a major tool in achieving transportation master plan goals. The city's Community Transit Network features bus routes with well-designed and conveniently sited stops on several major corridors.

Oftentimes, simply bringing transit agencies to the table is an important first step for complete streets implementation. "Transit agencies don't know what to ask for, and engineers don't know what to design for," says Ron Kilcoyne, general manager of the Greater Bridgeport Transit Authority in Connecticut and a longtime proponent of transit agency involvement in street planning. In Roanoke and Seattle, the transit agency is involved in street design review from the very first meetings. Louisville's transit agency participated actively in the rewrite of the city's street manual. The transit agency in Colorado Springs is part of the city government and works closely with the planning and engineering departments to ensure that project designs support transit. Once transit agencies are part of the process, they can advocate for better bus-stop placement, space in the streetscape for shelters, and consistent provision of crossings.

Another important complete streets constituency is lower-income residents who rely more heavily on transit, bicycling, and walking for transportation yet often don't have the time or resources to fight for better facilities on a project-by-project basis. According to Mike Piscitelli, transportation director for New Haven, Connecticut, the city's complete streets policy has "been a way to create an identity around something that's been around the city for a while as an important priority. Creating a system for it has allowed us to move beyond the advocacy groups in higher-income neighborhoods. We spend a lot of time on the social justice side of it."

RELATIONSHIPS WITH OTHER JURISDICTIONS

A survey of planners and engineers conducted by the Institute of Transportation Engineers found that the most commonly cited barriers to multimodal planning are the conflicts that arise between jurisdictions: between local governments and state DOTs, between MPOs and local governments, and between MPOs and states. Most jurisdictions do not control all of the roads

Discussion
06-20-12
Stephanie Pollack

within their boundaries; roads can be built and maintained by states, counties, cities, townships, or private developers. Conflicting goals and design standards can result in an abrupt character change along a roadway or a stalled project that never gets off the ground at all. These issues were reported widely during our case study interviews. (See the Decatur case study, p. 25, and the Charlotte case study, p. 48.)

For example, Louisville Metro's complete streets policies have helped the municipality communicate its complete streets vision to Kentucky's DOT, which controls many roadways in the rural part of the metro area. And while the policy in Rochester, Minnesota, is quite new, it has already been used in negotiations with the state. When the Minnesota DOT recently sent the city its plans to refurbish a highway through the city, the city council noted the new complete streets policy and requested that inclusion of bike lanes be considered.

On the other side of the equation, state DOTs with complete streets policies report challenges in working with local communities and developers that do not necessarily share their vision. In Massachusetts, land-use and subsequent transportation decisions are entirely within the jurisdiction of municipalities, which are exempted from following the state's Project Development and Design Guide. According to Rosalie Anders, a member of the state's bicycle and pedestrian advisory board, "there needs to be a lot of education on the local level." A former planner at PennDOT struck the same note on the need for local planners to educate the public and build support. PennDOT focuses on designing projects and maintaining facilities, not planning, so the agency is heavily reliant on the efforts of local planners and municipal staff as well as existing bicycle or pedestrian plans that document facility needs.

Smaller communities lament their inability to provide a more complete network beyond their borders. The relationship with its MPO—and meeting funding criteria—has been a challenge for Boulder, Colorado, as detailed in Chapter 6. University Place, Washington, controls all the roads within its borders, which has allowed this community to make dramatic on-the-ground changes. However, no adjacent jurisdictions have extended any of the town's bike lanes—though a new countywide complete streets policy may change that. In contrast, the Sacramento region enjoys an interlocking web of jurisdictions with complete streets policies. Policies are in existence at the state, MPO, county, and city levels.

CONCLUSION

The transition from traditional automobile-centered transportation planning to complete streets is almost always a long one. Staff must learn not only new design techniques but new procedures and new ways of thinking through problems. A clear commitment to a complete streets approach, with the support of the community's leadership, is the best compass to guide planners and engineers through the transition.

FY 2012 #186-12

City of Newton, Massachusetts
Office of the Mayor

SETTI D. WARREN
MAYOR

Telephone
(617) 796-1100

Facsimile
(617) 796-1113

TDD/TTY
(617) 796-1089

E-mail
swarren@newtonma.gov

June 11, 2012

Honorable Board of Aldermen
Newton City Hall
1000 Commonwealth Avenue
Newton, MA 02459

Ladies and Gentlemen:

I write to request that your Honorable Board docket for consideration a request to transfer the sum of $25,000 from Acct# 0120102-5197 Wage Reserve to Acct # 0120108-5480 Gasoline to cover the department's needs through June 30th.

Thank you for your consideration of this matter.

Very truly yours,

Setti D. Warren
Mayor

RECEIVED
Newton City Clerk
2012 JUN 11 PM 5:51
David A. Olson, CMC
Newton, MA 02459

FROM: POLICE SALARIES
0120102-5197 25,000

TO: POLICE EXPENSES
0120108-5480 25,000

06/12/2012

#186-12

SETTI D. WARREN
MAYOR

City of Newton, Massachusetts
Office of the Mayor

Telephone
(617) 796-1100

Facsimile
(617) 796-1113

TDD/TTY
(617) 796-1089

E-mail
swarren@newtonma.gov

RECEIVED
Newton City Clerk
2012 JUN 13 PM 2:24
David A. Olson, CMC
Newton, MA 02459

June 13, 2012

Honorable Board of Aldermen
Newton City Hall
1000 Commonwealth Avenue
Newton, MA 02459

Ladies and Gentlemen:

I write to request that your Honorable Board amend my request dated June 11, 2012 for the transfer of the sum of $25,000 from Acct# 0120102-5197 Wage Reserve to Acct # 0120108-5480 Gasoline to cover the Police Department's needs through June 30th.

Upon further review of the Police Department forecasted expenditures I would like to replace that request with the following:

- Transfer the sum of $10,000 from Executive Department Unexpended Salaries 0110301-511001 to 0120108-5480 Gasoline
- Transfer the sum of $50,000 from Executive Department Unexpended Salaries 0110301-511001 to 0120102-513001 Police Overtime

Thank you for your consideration of this matter. 06/13/2012

Very truly yours,

Setti D. Warren
Mayor

Taxi/Public Auto List **Docket # 167-12**

(semi-annual taxi license/public auto inspections)
prepared by Officer Rocco Marini 06/13/12

Docket #	Company	Contact	Medallion	Pass/Fail
#	**Veterans Taxi of Newton, LLC.** 224 Calvary Street Waltham, MA 02453	Michael Antonelis 617-527-0300	Medallions 1-29,66-85(Total 49) PA 2,3,11,12 (Total 4)	# 124 FRONT END DAMAGE # 52 BEING REPLACED
#	**Newton Yellow Cab, Inc.** 25 Border St Newton, MA 02465	Richard Johnston 617-332-7700 617-527-5555 617-244-2464	Medallions 30-49 (Total 20)	PASS
#	**Holden's Taxi, Inc.** 50 Union St Newton, MA 02459	George Marry 617-969-4168	Medallions 59, 60, 61	PASS
#	**Newtonville Cab Co., Inc.** 50 Union St Newton, MA 02459	George Marry 617-969-4168	Medallions 54, 55	PASS
#	**Newton Taxi Co.** 50 Union St Newton, MA 02459	George Marry 617-969-4168	Medallions 56,57,58	PASS
#	**Newton Cab** 72 Beaver St Waltham ,MA 02453	Medhi Houlani 617-332-1322 508-275-6198	Medallions 62,63,64	# 1 (62) CRACKED TAIL LIGHT P.SIDE/ FRONT MED. NOT AFFIXED/ CAB LIGHT INOP
#	**Newton Luxury Cab** 77 Cedar St Boston, MA 02119	Mohamed Saidi 617-293-4300	Medallion 65	PASS
#	**Newton Town Taxi** 4 Cedar St #405 Wellesley, MA 02481	Anis Lahiani 617-244-7444	Medallion 53	PASS
#	**Newton Metro Cab** 31 Irving St Apt A-8 Watertown, MA 02472	Ahcene Touri 617-947-2191 857-244-4959 617-332-8294	Medallion 52	PASS
#	**Beantown Carriage LLC**	Mark Belenkii Igor Portnoy 617-	PA 7	PASS

	PO BOX 42 90 Oak St. 4th floor Newton, MA 02464	594-5995		
#	**Bills Nice Ride, Inc.** 25 Curve St Newton ,MA 02465	William Turner 617-312-3602	PA 13	PASS
#	**Crystal Lake Express** 15 Moreland Ave Newton, MA 02459	Dorothy Dundas 617-244-5833 617-510-0336	PA 6	PASS
#	**Weldon Executive Coach** 253 Riverview Ave Newton MA 02466	Jerald Robbins 617-828-4990 617-928-1888 978-535-0222	PA 4,5,9,10	
#	**Boston City Limousine** 9 Hazelwood Street Malden, MA 02148	Zakaria Atrousse 1-866-581-0347	PA 15 PA17	
#	**Charter Rides, Inc.** 266 Nevada Street Newton, MA 02460	Robert Keefe	PA 1	PASS
#	**Don's Car Service** 395 Lexington Street Auburndale, MA 02466	Donald LaPlante 617-962-4446	PA 14	PASS
#	**Newton Car Service** 155 Lexington Street Unit 22 Auburndale, MA 02466	Hamdi Tlilli 781-690-1477 617-244-9044	PA 8 PA 16	

Taxi/Public Auto List **Docket # 167-12**

(semi-annual taxi license/public auto inspections)
prepared by Officer Rocco Marini 06/13/12

UPDATED 06/20/12

Docket #	Company	Contact	Medallion	Pass/Fail
#	**Veterans Taxi of Newton, LLC.** 224 Calvary Street Waltham, MA 02453	Michael Antonelis 617-527-0300	Medallions 1-29,66-85(Total 49) PA 2,3,11,12 (Total 4)	# 124 FRONT END DAMAGE # 52 BEING REPLACED
#	**Newton Yellow Cab, Inc.** 25 Border St Newton, MA 02465	Richard Johnston 617-332-7700 617-527-5555 617-244-2464	Medallions 30-49 (Total 20)	PASS
#	**Holden's Taxi, Inc.** 50 Union St Newton, MA 02459	George Marry 617-969-4168	Medallions 59, 60, 61	PASS
#	**Newtonville Cab Co., Inc.** 50 Union St Newton, MA 02459	George Marry 617-969-4168	Medallions 54, 55	PASS
#	**Newton Taxi Co.** 50 Union St Newton, MA 02459	George Marry 617-969-4168	Medallions 56,57,58	PASS
#	**Newton Cab** 72 Beaver St Waltham ,MA 02453	Medhi Houlani 617-332-1322 508-275-6198	Medallions 62,63,64	# 1 (62) CRACKED TAIL LIGHT P.SIDE/ FRONT MED. NOT AFFIXED/ CAB LIGHT INOP
#	**Newton Luxury Cab** 77 Cedar St Boston, MA 02119	Mohamed Saidi 617-293-4300	Medallion 65	PASS
#	**Newton Town Taxi** 4 Cedar St #405 Wellesley, MA 02481	Anis Lahiani 617-244-7444	Medallion 53	PASS
#	**Newton Metro Cab** 31 Irving St Apt A-8 Watertown, MA 02472	Ahcene Touri 617-947-2191 857-244-4959 617-332-8294	Medallion 52	PASS

#	**Beantown Carriage LLC** PO BOX 42 90 Oak St. 4th floor Newton, MA 02464	Mark Belenkii Igor Portnoy 617-594-5995	PA 7	PASS
#	**Bills Nice Ride, Inc.** 25 Curve St Newton ,MA 02465	William Turner 617-312-3602	PA 13	PASS
#	**Crystal Lake Express** 15 Moreland Ave Newton, MA 02459	Dorothy Dundas 617-244-5833 617-510-0336	PA 6	PASS
#	**Weldon Executive Coach** 253 Riverview Ave Newton MA 02466	Jerald Robbins 617-828-4990 617-928-1888 978-535-0222	PA 4,5,9,10	*PASS*
#	**Boston City Limousine** 9 Hazelwood Street Malden, MA 02148	Zakaria Atrousse 1-866-581-0347	PA 15 PA17	*PASS*
#	**Charter Rides, Inc.** 266 Nevada Street Newton, MA 02460	Robert Keefe	PA 1	PASS
#	**Don's Car Service** 395 Lexington Street Auburndale, MA 02466	Donald LaPlante 617-962-4446	PA 14	PASS
#	**Newton Car Service** 155 Lexington Street Unit 22 Auburndale, MA 02466	Hamdi Tlilli 781-690-1477 617-244-9044	PA 8 PA 16	*PASS*

K&L|GATES

K&L Gates LLP
State Street Financial Center
One Lincoln Street
Boston, MA 02111-2950
T 617.261.3100 www.klgates.com

#166-12

email

May 21, 2011

Franklin G. Stearns
D 617.951.9275
F 617.261.3175
franklin.stearns@klgates.com

Alderman Allan Ciccone, Jr.
Chairman
Public Safety and Transportation Committee
Board of Aldermen
22 West Street
Newton, MA 02458

Re: Boston College Bus Licenses - July 1, 2012 to June 30, 2013

Dear Alderman Ciccone:

This is the annual request from Boston College for the renewal of the Boston College Bus Licenses. There are no changes to the substance of Licenses as approved last year.

Sincerely,

Franklin G. Stearns

FGS:kw

cc: Members, Public Safety & Transportation Committee
Alderman Scott Lennan, President, Board of Aldermen
Alderman Lisle Baker
Alderman Marc Lorado
Alderman Ruthanne Fuller
Linda Finucane, Assistant City Clerk
Danielle Delaney, Committee Clerk
Joseph Herlihy, Esq., General Counsel

K&L|GATES

#166-12

Howard A. Levine, Esq.
Thomas Keady
Jeanne Levesque
P.J. Cappadona
Linda Riley

K&L|GATES

K&L Gates LLP
State Street Financial Center
One Lincoln Street
Boston, MA 02111-2950

T 617.261.3100 www.klgates.com

#166-12

Original

May 22, 2011

Franklin G. Stearns
D 617.951.9275
F 617.261.3175
franklin.stearns@klgates.com

Alderman Allan Ciccone, Jr.
Chairman
Public Safety and Transportation Committee
Board of Aldermen
22 West Street
Newton, MA 02458

Re: Boston College Bus Licenses - July 1, 2012 to June 30, 2013

Dear Alderman Ciccone:

This is the annual request from Boston College for the renewal of the Boston College Bus Licenses. There are no changes to the substance of Licenses as approved last year.

Sincerely,

Franklin G. Stearns

FGS:kw

cc: Members, Public Safety & Transportation Committee
Alderman Scott Lennan, President, Board of Aldermen
Alderman Lisle Baker
Alderman Marc Lorado
Alderman Ruthanne Fuller
Linda Finucane, Assistant City Clerk
Danielle Delaney, Committee Clerk
Joseph Herlihy, Esq., General Counsel

K&L|GATES

#166-12

Howard A. Levine, Esq.
Thomas Keady
Jeanne Levesque
P.J. Cappadona
Linda Riley

#170-11(A)

CITY OF NEWTON

IN BOARD OF ALDERMEN

June 20, 2011

TO BE ISSUED JULY 1, 2011 (TO JUNE 30, 2012)

The Board of Aldermen, pursuant to the provisions of Section 19-361 et. Seq. of the Revised Ordinances, as amended, hereby grants a license to

BOSTON COACH CORPORATION
1 Airforce Road
Everett, MA 02149

to operate motor vehicles for the carriage of passengers for hire over the following described ways in the City of Newton as further specified herein.

Designated Route:

1. Boston College Chestnut Hill Campus to Boston College Law School (the "Law School Route").

A. Specific Conditions for Each Route:

1. Boston College Law School Routes (A & B). Note that for the Law School Route only, the routes and vehicles used changes according to the day and time as stated below.

Description of Routes: (From BC Chestnut Hill Campus)

A. Direct Newton Route:

Proceed west on Commonwealth Avenue to Centre Street, turn right onto Centre Street heading north to Law School campus. Turn left into main entrance and proceed to Stuart Hall parking lot. Proceed from Stuart Hall parking lot to main entrance. Turn right onto Centre St. and proceed south to Commonwealth Avenue. Turn left onto Commonwealth Avenue heading east to the Commonwealth Avenue Main Gate curb cut at Chestnut Hill Campus. Turn right into Lower Campus by St. Ignatius Church and proceed to Robstrom Bus Stop. Return to Stuart Hall via Commonwealth Avenue.

1. Early Morning Service:

a. Type of Vehicle(s): Gillig Phantom

b. Seating Capacity:

1. 34 Seats plus 32 standees (66 total)

1. Propulsion system: Diesel

2.

c. Days and hours of Operation: **(Fall and Spring Semesters, August 19, 2011 through May 31, 2012)**

1. Monday – Friday: 7:00 a.m. – 2:00 a.m.

d. Limitation on Total Number of Vehicles and Frequency of Service:

1. The number of vehicles in service and round trips per hour shall not exceed the limits stated below.

a. Monday – Friday

7:00 a.m. – 10:00 a.m.
8 vehicles
16 round trips

B. Newton Loop Route
Proceed west on Commonwealth Avenue to Centre St.. Turn right onto Centre Street heading north to Law School campus. Turn left into main entrance and proceed to Stuart Hall parking lot. Proceed from Stuart Hall parking lot to main entrance. Turn right onto Centre St. and proceed south to Commonwealth Avenue. Turn left onto Commonwealth Avenue heading east to the Commonwealth Avenue Main Gate curb cut at Chestnut Hill Campus. Eastbound Route terminates at Newton City line. Route reenters Newton at the Boston/Newton line on Beacon Street Heading west. Turn right onto College Road. Turn left onto Commonwealth Avenue heading west to Centre Street.

a. Type of Vehicle(s): Gillig Phantom

1. Seating Capacity:

a. 34 seats plus 32 standees (66 total)

2. Propulsion system: Diesel

b. Days and Hours of Operation: **(Fall and Spring Semesters, August 19, 2011 through May 31, 2012**

c. 1. Monday – Friday: 7:00 a.m. – 2:00 a.m.

2. Saturday/Sunday/Holidays: 8:00 a.m. – 2:00 a.m.

3. Summer Schedule **(June 1, 2011 – September 4, 2011)**: 8:00 a.m. – 2:00 a.m.

c. Limitation on Total Number of Vehicles and Frequency of Service:

1. The number of vehicles in service and round trips per hour shall not exceed the limits stated below.

a. Daily Service:

1. Monday – Friday:

*7:00 a.m. – 10:00 a.m.

*No more than 8 vehicles; no more than 16 round trips

2. 10:00 a.m. – 3:00 p.m.

No more than 4 vehicles

No more than 8 round trips

3:00 p.m. – 8:00 p.m.
No more than 5 vehicles
No more than 10 round trips

b. Evening and Weekend Service

1. Monday – Friday:

8:00 p.m. – 2:00 a.m.
No more than 4 vehicles
No more than 8 round trips

2. Sat./Sun./Holidays:

8:00 a.m. – 2:00 a.m.
No more than 4 vehicles
No more than 8 round trips

3. Summer Schedule **(July 1, 2011 – August 18, 2011)** 8:00 a.m. – 2:00 p.m.

C. Stops and Other Conditions Applicable to Law School Routes:

1. Stops recommended as follows, subject to approval of Police Chief:

a. Within Law School Campus:
1. Stuart Hall Parking Lot
2. Main Gate
3. Hardly/Cushing
4. Duchesne Hall
5. Keyes South

b. On public ways:
1. McElroy @Beacon Street (Newton Loop Only)

2. Donaldson @College Road (Newton Loop Only)
3. Commonwealth Avenue @Main Gate curb cut

2. Points of campus entry and exit:

a. Chestnut Hill: St. Ignatius Gate & Edmonds Gate
b. Law School: Main entrance and Colby Road

3. Other Operating Conditions:

a. Idling time when stopped on public ways shall not exceed 3 minutes, exclusive of time needed to pick up and discharge passengers.

b. The License term for this route shall commence on **July 1, 2011 and shall terminate on June 30, 2012** unless renewed by the Board of Aldermen, subject to the right of the Board of Aldermen to make changes during the license term as conditions may require.

c. General Conditions Applicable to All Routes:

1. The Licensee shall not operate buses or other vehicles on any routes or public ways in Newton other than those designated herein.

2. No changes shall be made in any of the Conditions of this License, and, in particular, in the routes, termini, running schedules, stops or vehicles without the prior written consent of the Board of Aldermen of the City of Newton. Licensee shall forward all requests for changes to the Clerk of the Board of Aldermen in writing. The Board of Aldermen shall approve or deny all such requests, except as otherwise provided herein. In the event of a maintenance issue with a bus, a Boston Coach Nova RTS will be used as a substitute until the bus is repaired. These temporary buses seat 33 and stand 15.

3. This License is valid only for the Licensee stated herein and shall not be transferred or otherwise assigned without the prior written approval of the Board of Aldermen. In addition, this License shall remain in effect solely for the period that the Licensee continues to operate under contract with Boston College, and shall automatically terminate upon expiration or termination of contract.

4. All diesel powered vehicles operated by Licensee pursuant to this Licensee shall meet the inspection standards of the Registry of Motor Vehicles.

5. Adjustments to Service during the License Term:

Aldermanic Approval: This License is valid for the purpose of inter-campus transportation for Boston College students, employees, and faculty over the routes designated herein. Other than adjustments to regular service as provided in paragraph A, and transportation for special events and athletic or entertainment events as hereinafter provided in paragraph B and C, respectively, of this provision, the Licensee shall not operate vehicles over these routes for any other purpose without first obtaining permission from the Board of Aldermen. Except as otherwise provided below, all changes to the regular service shall require the approval of the Board of Aldermen, including but not limited to, an increase in the number of vehicles to be used or an increase in the number of round trips per hour of vehicles over and above the numbers

previously set forth in this license; a change in an approved route other than a temporary change approved as part of transportation to and from a special event as hereinafter provided in paragraph B; and the use of a new route, other than the temporary use of a new route pursuant to a special event as hereinafter provided in paragraph B.

A. Regular Service:

1. Subsequent to the annual approval of the License, the Licensee shall be authorized to make adjustments to the regular bus service, Monday through Friday, from 7:00 p.m. to 10:00 p.m., provided that any increases in the number of bus round trips shall not exceed the "baseline" as specified in paragraph 2 of this provision and provided that the maximum number of bus round trips per hour shall not exceed 15 round trips per hour. The Licensee shall notify the Director of Planning and Development (hereinafter the "Director") and the Chief of Police (hereinafter the "Chief") within five (5) business days of any adjustment in the number of bus round trips per hour and per week, Monday through Friday, from 7:00 to 10:00 p.m. The Director shall maintain a file of all such requests in order to verify the total changes to the service at the end of each License term. And other changes to the regular services shall require the approval of the Board of Aldermen.

2. Baseline: For the purposes of this provision, Baseline shall be defined as the total number of vehicle round trips per week, Monday through Friday, from 7:00 a.m. to 10:00 p.m. The Baseline shall not include round trips added after the commencement of the License term which commences **July 1, 2011**. The Baseline number of round trips per week shall be determined annually by the Board of Aldermen to be effective as of the date of the commencement of the License term. The Baseline for the **2011-2012** License Term shall be as follows:

Newton Route

a maximum of 770 round trips per week Monday through Friday, from 7:00 a.m. to 10:00p.m.

B. Special Events Scheduled After Commencement of License Term:

1. Notice Required: The requirement for advance Aldermanic approval shall not apply to transportation to or from a special event, not including athletic or entertainment events as hereinafter provided in paragraph C, which event is not scheduled as of the beginning of the License term and which requires the use of not more than two (2) vehicles over a particular route subject to the provisions of this License and which requires no more than three (3) trips per hour on such route. Special events requiring the use of more than 2 vehicles over such route or more than three (3) trips per hour, or the use of more than one route subject to the provisions of this License, or the use of new route shall require the approval of the Director. In addition, for special events requiring the use of ten (10) or more buses, the Licensee shall route all such buses onto the internal roadways or within the boundaries of the Boston College Chestnut Hill and/or Law School Campus and require all such buses to remain within the campus boundaries whenever such buses are idling. Licensee shall also require that all such buses pick up and discharge passengers within the Boston College Chestnut Hill and/or Law School Campus and not on Newton streets.

2. Monthly Approval of Special Events(s) Permit: On or before the 15th of the preceding month, but in any event no less than three weeks prior to any such event, Boston College, on behalf of Licensee, shall provide the Director with a list of temporary or one-time event(s) to be held during the next month which will require the use of more than two (2) vehicles, or more than three (3) round trips per hour or more than one route licensed herein or a route not currently licensed pursuant to this License. Such list shall include the number and type of vehicle(s), frequency of service, bus stop locations and route(s) to be used. Such list shall constitute a request for a monthly event permit, which shall be deemed approved unless denied in writing within 15 days of receipt of said list. Such monthly event permit shall constitute a one-time approval for each event as stated in the permit.

3. Director Approval: In a situation in which the Licensee cannot obtain approval through the monthly approval process as provided in paragraph 2 of this section, the Licensee, or Boston College on behalf of Licensee, may apply to the Director for approval of transportation to and from a special event. The Director shall be authorized to approve transportation to and from a special event upon no less than one week's prior written notice from Boston College on behalf of Licensee, provided, however, that the Director may authorize transportation for no more than two such special events each semester. For the purposes of this provision, a request for approval of transportation to and from a post season hockey or basketball tournament shall not be included in said two request limit. The request for approval of transportation shall contain the number and type of vehicle(s), frequency of service, bus stop locations and route(s) to be used. No later than one week following receipt of such request, the Director shall notify the applicant and the Chief of Police in writing of such approval along with any conditions that may apply including the valid dates of the approval.

C. Transportation for Athletic or Entertainment Events: Transportation for athletic or entertainment events held at Boston College facilities for which tickets are sold may be provided for ticket holders, students, faculty and staff, provided that on or about June 30 of each year of this License, Boston College, on behalf of the Licensee, shall provide the Board of Aldermen with a schedule of such events, and shall also provide for each such event, in a format to be determined by the Board, the proposed routes, proposed number and type of vehicles, proposed frequency of service, and the proposed time and duration of operation, each of which must then be approved by the Board as a special addendum to this License, which addendum shall specify the terms of such events license. Once adopted, modifications to the terms of such addendum must be made in accordance with the applicable provisions of section 5.B of this License.

The approved transportation schedule for **Fall 2011** Varsity Football Games and currently scheduled special events are stated in Appendix A, attached hereto and incorporated herein in fulfillment of the above condition for the period ending June 30, 2006 with the College using school buses with a preference for non-diesel vehicles.

6. A copy of this License shall be issued to the driver of each vehicle and presented upon request to any City of Newton police officer and such other enforcement officials as may be designated by the Board of Aldermen, provided that the Licensee shall be notified in writing prior to the designation of such other enforcement officials.

7. TERM: This License renewal is valid beginning **July 1, 2011** and shall expire on **June 30, 2012.** Subsequent one-year license renewals shall be granted in the discretion of the Board of Aldermen pending satisfactory completion of the provisions of section 8 below.

8. Periodic Review:

(1) No later than **November 15, 2011** and **March 15, 2012** of the License Term, the Licensee shall meet with the Board of Aldermen to review any concerns related to the service and shall make such adjustments as deemed necessary by the Board of Aldermen. The review shall include the following items:

(a) Nothing in this License shall prevent the College from altering allowed service on Newton Streets around the Chestnut Hill Campus in favor of use of internal roads within the Chestnut Hill Campus during the License term, provided that any proposed left turns across traffic shall first be noticed to the Chief of Police.

(2) Consolidation of Routes: The Licensee shall cooperate with the appropriate committee(s) of the Board of Aldermen in determining the appropriateness of consolidating routes and schedules in an effort to reduce and to eliminate excessive service. Consolidation of routes and reduced schedules shall be based on the level of ridership and such other factors as deemed relevant by the appropriate committee(s) of the Board of Aldermen and College. If routes are to be consolidated or if the College and the appropriate committee of the Board of Aldermen determine that there is a reasonable basis to request schedule reductions, Boston College, on behalf of the Licensee shall provide ridership data in the manner set forth in paragraph 8 (2) of this License.

(3) The Licensee shall equip vehicles with two-way radios and shall maintain contact between a dispatcher and all vehicles while in operation on the routes described herein.

9. Violation of any of the above Specific or General Conditions shall be cause for revocation of this license in accordance with procedures to be established by the Board of Aldermen.

10. Boston Coach Corporation, Boston College and the officials, trustees, agents, servants and employees of each shall hold harmless and defend the City of Newton from and against all claims, damages, demands and actions of every kind arising out of the exercise of this License.

11. The provisions of this License are severable. If any of the provisions of this License are held invalid by a court of competent jurisdiction, the remaining provisions of this License shall not be affected by such invalidity and shall remain in full force and effect, provided that upon such a finding or invalidity the City shall have the right to initiate proceedings to revise the remaining provisions of the License in a manner not inconsistent with any such fining of invalidity.

12. The Chief of Police shall be charged with the enforcement of the Provisions of this License.

Under Suspension of Rules
Readings Waived and License Approved
18 yeas 0 nays 6 absent (Aldermen Baker, Ciccone, Danberg, Sangiolo, Schnipper, Swiston)

(SGD) DAVID A. OLSON
City Clerk

SGD) SETTI D. WARREN
Mayor
Date: 7/18/10

#170-11(B)

CITY OF NEWTON

IN BOARD OF ALDERMEN

June 20, 2011

TO BE ISSUED JULY 1, 2011 (TO JUNE 30, 2012)

The Board of Aldermen, pursuant to the provisions of Section 19-361 et. seq. of the Revised Ordinances, as amended, hereby grants a license to

BOSTON COACH CORPORATION
1 Airforce Road
Everett, MA 02149

to operate motor vehicles for the carriage of passengers for hire over the following described ways in the City of Newton as further specified herein.

Designated Route:

1. Boston Route:

Description of Route: (From BC Chestnut Hill Campus) Route begins at the Boston/Newton line on Beacon Street heading west. Turn right onto College Road. Turn right onto Commonwealth Avenue heading east to Boston line.

a. Type of Vehicle(s): Gillig Phantom

1. Seating Capacity:

a. 34 Seats plus 32 standees (66 total)

2. Propulsion system: Diesel

b. Days and hours of Operation: **(Fall and Spring Semesters, August 19, 2011 through May 31, 2012)**

1. Monday – Friday: 7:00 a.m. – 2:00 a.m.

2. Saturday/Sunday/Holidays: 8:00 a.m. – 2:00 a.m.

c. Limitation on Total Number of Vehicles and Frequency of Service:

The number of vehicles in service and round trips per hour shall not exceed the limits stated below.

B. General Conditions:

1. The Licensee shall not operate buses or other vehicles on any routes or public ways in Newton other than those designated herein.

2. a) No changes shall be made in any of the Conditions of this License, and, in particular, in the routes, termini, running schedules, stops or vehicles without the prior written consent of the Board of Aldermen of the City of Newton. Licensee shall forward all requests for changes to the Clerk of the Board of Aldermen in writing. The Board of Aldermen shall approve or deny all such requests, except as otherwise provided herein. In the event of a maintenance issue with a bus, a Boston Coach Nova RTS will be used as a substitute until the bus is repaired. These temporary buses seat 33 and stand 15.

3. This License is valid only for the Licensee stated herein and shall not be transferred or otherwise assigned without the prior written approval of the Board of Aldermen. In addition, this License shall remain in effect solely for the period that the Licensee continues to operate under contract with Boston College, and shall automatically terminate upon expiration or termination of contract.

4. All diesel powered vehicles operated by Licensee pursuant to this Licensee shall meet the inspection standards of the Registry of Motor Vehicles.

5. Adjustments to Service during the License Term:

Aldermanic Approval: This License is valid for the purpose of inter-campus transportation for Boston College students, employees, and faculty over the routes designated herein. Other than adjustments to regular service as provided in paragraph A, and transportation for special events and athletic or entertainment events as hereinafter provided in paragraph B and C, respectively, of this provision, the Licensee shall not operate vehicles over these routes for any other purpose without first obtaining permission from the Board of Aldermen. Except as otherwise provided below, all changes to the regular service shall require the approval of the Board of Aldermen, including but not limited to, an increase in the number of vehicles to be used or an increase in the number of round trips per hour of vehicles over and above the numbers previously set forth in this license; a change in an approved route other than a temporary change approved as part of transportation to and from a special event as hereinafter provided in paragraph B; and the use of a new route, other than the temporary use of a new route pursuant to a special event as hereinafter provided in paragraph B.

A. Regular Service:

1. Subsequent to the annual approval of the License, the Licensee shall be authorized to make adjustments to the regular bus service, Monday through Friday, from 7:00 p.m. to 10:00 p.m., provided that any increases in the number of bus round trips shall not exceed the "baseline" as specified in paragraph 2 of this provision and provided that the maximum number of bus round trips per hour shall not exceed 15 round trips per hour. The Licensee shall notify the Director of Planning and Development (hereinafter the "Director") and the Chief of Police (hereinafter the "Chief") within five (5) business days of any adjustment in the number of bus round trips per hour and per week, Monday

through Friday, from 7:00 to 10:00 p.m. The Director shall maintain a file of all such requests in order to verify the total changes to the service at the end of each License term. And other changes to the regular services shall require the approval of the Board of Aldermen.

2. Baseline: For the purposes of this provision, Baseline shall be defined as the total number of vehicle round trips per week, Monday through Friday, from 7:00 a.m. to 10:00 p.m. The Baseline shall not include round trips added after the commencement of the License term which commences **July 1, 2011**. The Baseline number of round trips per week shall be determined annually by the Board of Aldermen to be effective as of the date of the commencement of the License term. The Baseline for the **2011-2012** License Term shall be as follows:

Boston Route
a maximum of 601 round trips per week Monday through Friday, from 7:00 a.m. to 10:00 p.m.

B. Special Events Scheduled After Commencement of License Term:

1. Notice Required: The requirement for advance Aldermanic approval shall not apply to transportation to or from a special event, not including athletic or entertainment events as hereinafter provided in paragraph C, which event is not scheduled as of the beginning of the License term and which requires the use of not more than two (2) vehicles over a particular route subject to the provisions of this License and which requires no more than three (3) trips per hour on such route. Special events requiring the use of more than two (2) vehicles over such route or more than three (3) trips per hour, or the use of more than one route subject to the provisions of this License, or the use of new route shall require the approval of the Director. In addition, for special events requiring the use of ten (10) or more buses, the Licensee shall route all such buses onto the internal roadways or within the boundaries of the Boston College Chestnut Hill and/or Law School Campus and require all such buses to remain within the campus boundaries whenever such buses are idling. Licensee shall also require that all such buses pick-up and discharge passengers within the Boston College Chestnut Hill and/or Law School Campus and not on Newton streets.

2. Monthly Approval of Special Events(s) Permit: On or before the 15th of the preceding month, but in any event no less than three weeks prior to any such event, Boston College, on behalf of Licensee, shall provide the Director with a list of temporary or one-time event(s) to be held during the next month which will require the use of more than two (2) vehicles, or more than three (3) round trips per hour or more than one route licensed herein or a route not currently licensed pursuant to this License. Such list shall include the number and type of vehicle(s), frequency of service, bus stop locations and route(s) to be used. Such list shall constitute a request for a monthly event permit, which shall be deemed approved unless denied in writing within 15 days of receipt of said list. Such monthly event permit shall constitute a one-time approval for each event as stated in the permit.

3. Director Approval: In a situation in which the Licensee cannot obtain approval through the monthly approval process as provided in paragraph 2 of this section, the Licensee, or Boston College on behalf of Licensee, may apply to the Director for approval of transportation to and from a special event. The Director shall be authorized to approve transportation to and from a special event upon no less than one week's prior written notice from Boston College on behalf of Licensee, provided, however, that the Director may authorize transportation for no more than two such special events each semester. For the purposes of this provision, a request for approval of transportation to and from a post season hockey or basketball tournament shall not be included in said two request limit. The request for approval of transportation shall contain the number and type of vehicle(s), frequency of service, bus stop locations and route(s) to be used. No later than one week following receipt of such request, the Director shall notify the applicant and the Chief of Police in writing of such approval along with any conditions that may apply including the valid dates of the approval.

C. Transportation for Athletic or Entertainment Events: Transportation for athletic or entertainment events held at Boston College facilities for which tickets are sold may be provided for ticket holders, students, faculty and staff, provided that on or about June 30 of each year of this License, Boston College, on behalf of the Licensee, shall provide the Board of Aldermen with a schedule of such events, and shall also provide for each such event, in a format to be determined by the Board, the proposed routes, proposed number and type of vehicles, proposed frequency of service, and the proposed time and duration of operation, each of which must then be approved by the Board as a special addendum to this License, which addendum shall specify the terms of such events license. Once adopted, modifications to the terms of such addendum must be made in accordance with the applicable provisions of section 5.B of this License.

The approved transportation schedule for **Fall 2011** Varsity Football Games and currently scheduled special events are stated in Appendix A, attached hereto and incorporated herein in fulfillment of the above condition for the period ending **June 30, 2012** with the College using school buses with a preference for non-diesel vehicles.

6. A copy of this License shall be issued to the driver of each vehicle and presented upon request to any City of Newton police officer and such other enforcement officials as may be designated by the Board of Aldermen, provided that the Licensee shall be notified in writing prior to the designation of such other enforcement officials.

7. TERM: This License renewal is valid beginning **July 1, 2011** and shall expire on **June 30, 2012**. Subsequent one-year license renewals shall be granted in the discretion of the Board of Aldermen pending satisfactory completion of the provisions of section 8 below.

8. Periodic Review:

(1) No later than **November 15, 2011 and March 15, 2012** of the License Term, the Licensee shall meet with the Board of Aldermen to review any concerns related to the service and shall make such adjustments as deemed necessary by the Board of Aldermen. The review shall include the following items:

(a) Nothing in this License shall prevent the College from altering allowed service on Newton Streets around the Chestnut Hill Campus in favor of use of internal roads within the Chestnut Hill Campus during the License term, provided that any proposed left turns across traffic shall first be noticed to the Chief of Police.

(2) Consolidation of Routes: The Licensee shall cooperate with the appropriate committee(s) of the Board of Aldermen in determining the appropriateness of consolidating routes and schedules in an effort to reduce and to eliminate excessive service. Consolidation of routes and reduced schedules shall be based on the level of ridership and such other factors as deemed relevant by the appropriate committee(s) of the Board of Aldermen and College. If routes are to be consolidated or if the College and the appropriate committee(s) of the Board of Aldermen determine that there is a reasonable basis to request schedule reductions, Boston College, on behalf of the Licensee shall provide ridership data in the manner set forth in paragraph 8 (2) of this License.

(3) The Licensee shall equip vehicles with two-way radios and shall maintain contact between a dispatcher and all vehicles while in operation on the routes described herein.

9. Violation of any of the above Specific or General Conditions shall be cause for revocation of this license in accordance with procedures to be established by the Board of Aldermen.

10. Mini Coach Corporation, Boston College and the officials, trustees, agents, servants and employees of each shall hold harmless and defend the City of Newton from and against all claims, damages, demands and actions of every kind arising out of the exercise of this License.

11. The provisions of this License are severable. If any of the provisions of this License are held invalid by a court of competent jurisdiction, the remaining provisions of this License shall not be affected by such invalidity and shall remain in full force and effect, provided that upon such a finding or invalidity the City shall have the right to initiate proceedings to revise the remaining provisions of the License in a manner not inconsistent with any such fining of invalidity.

12. The Chief of Police shall be charged with the enforcement of the Provisions of this License.

Under Suspension of Rules
Readings Waived and License Approved
18 yeas 0 nays 6 absent (Aldermen Baker, Ciccone, Danberg, Sangiolo, Schnipper, Swiston)

(SGD) DAVID A. OLSON
City Clerk

SGD) SETTI D. WARREN
Mayor
Date: 9/18/11

Free Parking at the Holidays:
Nonantum Pilot Program December 2012

PUBLIC SAFETY & TRANSPORTATION COMMITTEE

JUNE 20, 2012

Background and Purpose

- BOA interest in free parking trial at holidays
- DPW Commissioner can waive meter fees for public safety
- Must recoup the lost revenue for free parking at holidays

Proposed Nonantum Pilot Program
December 2012

- "Free" parking at 62 on-street meters in Nonantum during specified period
- 2-hour time limits in effect
- Enforcement needed to assure turnover
  - Traffic Control could issue "warnings"

Scenario 1 (4 Saturdays)	Scenario 2 (2 weeks)
Saturday, December 1 Saturday, December 8 Saturday, December 15 Saturday, December 22	Sunday, December 9 – Tuesday, December 25
4 metered days	14 metered days

Costs

1) Meter Revenue
   - One meter, one day = $7.50 x 62 meters = $465/day

Scenario 1 (4 Saturdays)	Scenario 2 (2 weeks/12 days)
$1,860	$5,580

2) DPW Overtime
   - Bagging must be done by DPW staff working overtime

Scenario 1 (4 Saturdays)	Scenario 2 (2 weeks/12 days)
$1,040 (8 shifts)	$390 (3 shifts)

3) Decorative Bags
   - Promotion and communication are essential
   - $300 - $500

Nonantum Pilot Program December 2012

- Total Cost Estimates

	Scenario 1	Scenario 2
Meter Revenue	$1,860	$5,580
DPW Overtime	$1,040	$ 390
Decorative Bags	$400	$400
Total	**$3,300**	**$6,370**

Nonantum Neighborhood Association

- Nonantum Neighborhood Association interested in enlivening commerce in the village
- First Nonantum Village Day on June 3rd
- Plan to fundraise for “free parking during the holidays”

Possible Next Steps

- Summer: Nonantum Neighborhood Association fundraising
- September: determine scenario based on funds raised
- Fall: order bags and promote program
- December: Nonantum Pilot Program
- January 2013: roundtable discussion with businesses to gauge success of the project
  - Was there lack of turnover?
  - Enforcement issues?
  - Documented revenue gains?
- Related efforts happening now
  - EDC and Chamber of Commerce working on “Shop Local” efforts
  - Mayor and staff rolling out marketing campaign for the City

#417-11

Massachusetts Department of Transportation Type I and Type II Noise Abatement Policies and Procedures

Massachusetts Department of Transportation
Boston, Massachusetts

Effective July 13, 2011

massDOT
Massachusetts Department of Transportation
Highway Division

This Page Intentionally Left Blank

Table of Contents

List of Tables

This Page Intentionally Left Blank

Massachusetts Department of Transportation
Type I and Type II Noise Abatement
Policy and Procedures

Glossary of Terms

Activity Categories – Categories of land use and human activities, established by the Federal Highway Administration, that are sensitive to noise in different ways. Each Activity Category has specific Noise Abatement Criterion. A discussion of the Activity Categories used in a highway traffic noise analysis is included in this policy and procedures document.

Approach the Criteria – For purposes of this document, approaching the criteria will mean noise levels that are 1 dB(A) less than the Noise Abatement Criteria for Activity Categories A to E listed in Table 3.

Benefited Receptor – A noise-sensitive receptor in the study zone that attains at least a 5 dB(A) insertion loss or greater from a noise abatement measure. A benefited receptor does not have to be an impacted receptor.

Cost Effectiveness Index (CEI) – An index that is based on cost, average insertion loss, and the number of benefited receptors and, if applicable, average time per visit. The CEI is one of the criteria used to determine the reasonableness of noise abatement in the study zone.

dB(A) – An A-weighted decibel unit that is used to measure noise. It best corresponds to the frequency response of the human ear.

Design Year – The future year used to estimate the probable traffic volume for which a highway is designed. It is typically 10 to 20 years from the start of construction.

Date of Public Knowledge – The date that the public is officially notified of the adoption of the location of a proposed highway project. The Date of Public Knowledge is defined as the date of approval of the Categorical Exclusion (CE), the Finding of No Significant Impact (FONSI), or the Record of Decision (ROD) on a proposed project. The definitions of CE, FONSI, and ROD are in Title 23, Code of Federal Regulations, Part 771 (23 CFR 771), *Environmental Impact and Related Procedures*.

Existing Noise Levels – The loudest hour noise levels from the combination of natural and mechanical sources and human activity that currently exist in a particular area. Existing noise levels generally should not include infrequent noise sources (*e.g.*, lawn mowers).

Feasibility – The combination of acoustical and engineering factors considered in the evaluation of a noise abatement measure. Feasibility generally deals with considering whether it is possible to provide noise abatement given the site constraints and whether the noise abatement provides a minimum reduction in noise levels.

Future Noise Level – The highest hourly traffic noise level predicted using the Federal Highway Administration's Traffic Noise Model.

Impacted Receptor – Any receptor that experiences a traffic noise impact.

Insertion Loss – Insertion loss is the amount of noise reduction provided by a noise abatement measure. For Type I projects, the insertion loss is the difference between design year build noise levels with the noise abatement measure and design year build noise levels without the noise abatement measure. For Type II noise projects, the insertion loss is the difference between current noise levels with the noise abatement to current noise levels without the noise abatement. Insertion loss is a function of a noise barrier's height, length, and location and is independent of the magnitude of existing or future noise levels.

Leq – An equivalent steady-state noise level that accounts for the moment-to-moment fluctuations in noise levels from all sources during the time period under consideration. For highway noise analyses, one hour is the typical time period used.

Loudest Traffic Hour (LTH) – The one-hour period when the traffic characteristics regularly yield the highest traffic noise levels.

Noise Abatement – Any measure implemented to reduce highway traffic noise levels.

Noise Abatement Criteria (NAC) – The upper limit of acceptable highway traffic noise for different Activity Categories. The NAC varies according to Activity Category.

Noise Barrier – A physical obstruction constructed between the highway noise source and noise-sensitive receptors to reduce the traffic noise levels at noise-sensitive receptors. Noise barriers may be stand alone noise walls, noise berms (made of earth or other material), or combination berm/wall systems.

Noise Level – The noise level obtained through the use of A-weighting characteristics. The unit of measure is the decibel (dB) commonly referred to as dB(A) when A-weighting is used.

Noise Reduction Design Goal – The desired insertion loss. For residential areas and Activity Category C land uses, the noise reduction design goal is considered to be achieved when at least one first row benefited receptor attains a minimum of 10 dB(A) of insertion loss. The noise reduction design goal is also considered to be achieved when proposed noise abatement provides a minimum of 10 dB(A) of noise reduction for all receptors using Activity Category D facilities.

Noise-Sensitive Receptor – A discrete or representative location of a noise-sensitive area for any of the land uses listed in Table 3 where a lowered noise level would be of benefit. In cases where a representative location is used, the entire noise-sensitive area does not have to experience noise levels that approach or exceed the Noise Abatement Criteria.

Permitted – A definite commitment to develop land with an approved specific design of land use activities as evidenced by the existence of a currently valid building permit.

Reasonableness – The combination of social, economic, and acoustical factors considered in the evaluation of proposed noise abatement measures. Reasonableness implies that good judgment and common sense has been applied in arriving at a decision on the construction or installation of proposed noise abatement measures.

Statement of Likelihood – A statement of MassDOT's intent to provide noise abatement measures at certain locations. The statement of likelihood is provided in the environmental clearance document based on the feasibility and reasonableness analysis completed at the time the environmental document is being approved.

Study Zone – The study limits within which the design year traffic noise impacts from the proposed project occur. A highway traffic noise model is typically used to determine the extent of impacts from a proposed project.

Substantial Noise Increase – An increase in the design year noise level that is greater than 10 dB(A) over the existing noise level. A substantial noise increase is independent of the absolute existing noise level and is a noise impact even if future noise levels do not approach or exceed the NAC.

Traffic Noise Impacts – Impacts that occur when the existing noise levels or the predicted future build Loudest Traffic Hour (LTH) traffic noise levels approach (within 1 dB(A)) or exceed the Noise Abatement Criteria (NAC) listed in Table 3, or when the predicted future build LTH traffic noise levels create a substantial noise increase over existing noise levels.

Type I Noise Abatement Program – The Type I Noise Abatement Program is a Federal-aid highway program for Type I projects.

Type I Project – A Type I project is a project that involves:

(1) The construction of a highway on new location;
(2) The physical alteration of an existing highway where there is either a substantial horizontal alteration or a substantial vertical alteration;
(3) The addition of a through traffic lane(s);
(4) The addition of an auxiliary lane, except for when the auxiliary lane is a turn lane;
(5) The addition or relocation of interchange lanes or ramps added to a quadrant to complete an existing partial interchange;
(6) Restriping existing pavement for the purpose of adding a through traffic lane or an auxiliary lane; or,
(7) The addition of a new or substantial alteration of a weigh station, rest stop, ride-share lot or toll plaza.

A fuller discussion of Type I projects is included in Section 3.0, *Type I Projects*, in this policy and procedures document.

Type II Noise Abatement Program – The Type II Noise Abatement Program is a voluntary Federal-aid highway program for Type II projects (*i.e.*, projects that involve the construction of noise barriers on existing highways). Type II projects are often referred to as retrofit projects. The development and implementation of a Type II Noise Abatement Program is not required by Federal law or regulation and is strictly an optional decision by a State. MassDOT has a Type II Noise Abatement Program that is limited to noise impacts from Interstate Highways under its jurisdiction.

Type III Project – A Type III project is a project that does not meet the classification of a Type I or Type II project. Type III projects do not involve added capacity, construction of new through lanes or auxiliary lanes, changes in the horizontal or vertical alignment of the roadway, or exposure of noise sensitive land uses to a new or existing highway noise source. Type III projects do not require a noise analysis or consideration of noise abatement measures.

1.0 Background

The Federal Highway Administration (FHWA) is the Federal agency responsible for administering the Federal-aid highway program. Under this program, Federal funds are allotted by Congress to the individual states. Compliance with FHWA regulations is a prerequisite for the granting of Federal-aid highway funds for construction or reconstruction projects.

Studies have shown that some of the most pervasive sources of noise in our environment are those associated with transportation. Traffic noise can adversely affect human activities. Noise is considered problematic when it interferes with speech communication on the land use associated with the property.

Traffic noise tends to be a major source of noise to residences and businesses adjacent to highways, although it is not usually a serious problem for properties more than 500 feet from heavily traveled freeways. Vehicle noise is primarily a combination of the noises produced by the engine, exhaust, and tires.

In response to the highway traffic noise problem, in 1972, Congress required FHWA to develop a noise standard for new Federal-aid highway projects. This noise standard provided national criteria and requirements for all state transportation agencies and gave flexibility to states on how to approach the problem of highway traffic and construction noise in the planning and design of Federally aided highways. FHWA issued regulations for mitigation of highway traffic noise and construction noise, titled *Procedures for Abatement of Highway Traffic and Construction Noise*. The regulations are found in Part 772 of Title 23 of the Code of Federal Regulations (CFR), known more simply as 23 CFR 772.

FHWA's noise regulations define two types of highway noise projects, Type I Projects and Type II Projects. Type I projects involve construction of new highways or improvements to existing highways. Type II projects are 'stand alone' projects that involve construction of noise barriers to reduce noise levels at residential areas (and other sensitive land uses) adjacent to existing highways. Type II projects are not constructed as mitigation for new or expanded highway construction. The development and implementation of Type II projects are not mandatory requirements of Federal law or regulation. A program to provide noise abatement along existing highways is strictly an optional decision by a State. The Massachusetts Department of Transportation (MassDOT) has established a program for both Type I and Type II projects.

2.0 Applicability

To enact its noise abatement program, MassDOT has developed these Type I and Type II Noise Abatement Policy and Procedures to comply with and to implement the noise regulations in 23 CFR 772, as well as to be in accordance with the FHWA's Highway Traffic Noise Analysis and Abatement Guidance, dated June 2010 (revised January 2011). This document establishes consistent criteria and procedures for providing noise abatement for all Type I and Type II projects. It describes how highway traffic noise impacts are defined, how noise abatement is evaluated, and how

noise abatement decisions are made on all Type I and Type II projects in Massachusetts. Careful adherence to these procedures is vital to obtaining federal funding for construction or installation of proposed noise abatement and for the fair and equitable administration of the Type I and Type II Noise Abatement Program. FHWA has reviewed and has concurred with this policy and procedures document.

The effective date of this document is July 13, 2011. Beginning on and after that date, the requirements in this Type I and Type II Noise Abatement Policy and Procedures document apply uniformly and consistently to all Type I and Type II highway projects under MassDOT's jurisdiction. The Type I and Type II Noise Abatement Policy and Procedures also apply to multimodal projects under MassDOT's jurisdiction that receive Federal-aid highway funds or are otherwise subject to FHWA approval and that begin on or after July 13, 2011. MassDOT will consult with FHWA to determine if any additional analysis and documentation is needed for Type I and Type II highway projects begun before July 13, 2011, but requiring FHWA approvals on or after that date.

The Type I and Type II Noise Abatement Policy and Procedures are subject to change at the discretion of MassDOT and FHWA. MassHighway's Type I Noise Barrier Guidelines, dated April 1, 1996, are superseded.

Federal-aid funds can only be used to reduce traffic noise impacts and provide highway traffic noise abatement benefits. These funds cannot be used as payment or compensation for a highway traffic noise impact through the purchase of a noise easement from a property owner. In addition, Federal-aid funds cannot be used to purchase homes or developed property to create a noise buffer zone.

MassDOT's Type II Noise Abatement Program applies only to Interstate Highways with receptor locations that have been included in the Type II Noise Barrier Lists, as described in Section 4.0, *Type II Projects*.

If an area does not meet the feasibility and reasonableness criteria during the consideration of noise abatement on a Type I project, it will not be eligible for noise abatement under MassDOT's Type II Noise Abatement Program.

MassDOT has posted this Type I and Type II Noise Abatement Policy and Procedures document on its Environmental Website. If there are any questions about whether a project is subject to the Type I and Type II Noise Abatement Policy and Procedures, please contact the MassDOT Environmental Services Section at 617-973-7484.

3.0 Type I Projects

A Type I project is a project that involves:

(1) The construction of a highway on new location;

(2) The physical alteration of an existing highway where there is either a substantial horizontal alteration or a substantial vertical alteration;
(3) The addition of a through traffic lane(s);
(4) The addition of an auxiliary lane, except for when the auxiliary lane is a turn lane;
(5) The addition or relocation of interchange lanes or ramps added to a quadrant to complete an existing partial interchange;
(6) Restriping existing pavement for the purpose of adding a through-traffic lane or an auxiliary lane; or,
(7) The addition of a new or substantial alteration of a weigh station, rest stop, ride-share lot or toll plaza.

If any segment or component of a project (or a project alternative) is determined to be a Type I project under this definition, then the entire project, as defined in the environmental clearance document, is a Type I project and a highway traffic noise analysis is required for the entire project. A noise analysis is required for all Type I projects regardless of whether they occur on a controlled access highway or on an uncontrolled access highway. Furthermore, highway traffic noise analyses are required for all Type I projects, even when there is no change in the surrounding noise environment.

3.1 Highway on New Location

The construction of a highway on new location, as a Type I project, is self-explanatory. There was no highway before the construction, and there will be one afterwards.

The following actions are also highways on new location and are classified as Type I projects:

- The addition of new interchanges to an existing highway;
- The addition of lanes to existing interchange ramps that are carried to the mainline highway;
- The relocation of existing interchange ramps, and
- The addition of ramps to an existing partial interchange.

3.2 Physical Alteration of an Existing Highway

3.2.1 Substantial Horizontal or Vertical Alteration

Projects that involve a substantial horizontal alteration of the alignment of a highway are Type I projects. A substantial horizontal alteration is defined as the halving of the distance between the traffic noise source and the closest noise-sensitive receptor when comparing the existing condition to the future build condition.

Projects that involve a substantial vertical alteration of a highway are also Type I projects. A substantial vertical alteration occurs when a project removes the shielding between a noise-sensitive receptor and the highway, thereby exposing the line-of-sight of the previously shielded noise-sensitive receptor to the highway. This can occur by either altering the vertical alignment of the highway or by altering the topography between the highway traffic noise

source and the noise-sensitive receptor, such as by cutting back side slopes or other terrain features.

For example, a project that changes an at-grade intersection or an at-grade railroad crossing to a grade separation (*i.e.*, an overpass) is a Type I project, because the project results in either a highway on new alignment or because the grade separation project substantially alters the vertical alignment of the existing highway. In some cases, for example railroad crossings, the grade separation project results in an overall benefit to the noise environment because of reduced requirements to sound train horns at grade-separated crossings.

Bridge replacement projects may be Type I projects if the bridge is realigned or is substantially different from the existing bridge.

3.2.2 Increase in the Number of Through Travel Lanes or Addition of Auxiliary Lanes

The addition of through travel lanes to the mainline of an existing highway requires consideration of the through traveled way (*i.e.*, that portion of the highway constructed for the through movement of vehicles, exclusive of the shoulders and turn lanes). The lane addition must be a full lane width (*i.e.*, 12 feet), and must increase the capacity of the highway. Since new through lanes result in added capacity, more traffic, and usually more traffic noise, the addition of a full lane to the mainline of a highway is a Type I project whether this lane is added in the median or on the outside of the existing highway. The addition of new through lanes requires a noise analysis on both sides of the highway whether the new lanes are all in one direction of travel or in both directions.

The addition of through travel lanes that function as high-occupancy vehicle (HOV) lanes, high-occupancy toll (HOT) lanes, bus lanes, or truck climbing lanes are classified as Type I projects. Frequently, HOV or HOT projects cause little or no change in the existing or future noise environment. However, highway traffic noise impacts may occur since existing noise levels may already approach or exceed the NAC. In these cases, noise abatement will be considered and implemented, if feasible and reasonable.

The addition of an auxiliary lane (*i.e.*, a parking, weaving, or climbing lane) to an existing highway, except when the auxiliary lane is a turn lane, would be a Type I project.

New through lanes may be created through restriping projects. In this case, the pavement width of the existing highway would remain the same, but the project restripes the existing pavement to increase the number of through travel lanes or auxiliary lanes. Creation of through lanes through restriping would be a Type I project.

Allowance of the use of the shoulder (breakdown lane) during peak periods would be a Type I project since the shoulder would function as a through travel lane.

3.2.3 Changes to Highway Ancillary Facilities

The following projects involving highway ancillary facilities are considered Type I projects:

- Construction of a new truck weigh station or rest area;
- Improvements to an existing truck weigh station or rest area that involve increased capacity for overnight parking or involve relocation of parking facilities closer to noise-sensitive land uses;
- Construction or expansion of an existing ride-share lot and access roads to a ride-share lot; and
- Construction of a new toll plaza or substantial alteration of an existing toll plaza.

Since these land uses involve a mix of stationary and mobile sources, they require special attention and consideration for determining existing and future noise levels. Noise analysts should develop a methodology, in coordination with MassDOT, to determine existing and future noise levels at these locations.

4.0 Type II Projects

Because there are many residential areas in Massachusetts adjacent to highways that are exposed to high noise levels (*i.e.*, noise levels that exceed FHWA's NAC described in the Section 5.1, *Noise Abatement Criteria*), the then-Massachusetts Highway Department (MassHighway) decided to implement a Type II Noise Abatement Program. Because of the high cost of design and construction (approximately $3 million to $5 million per mile in 2010), noise barrier projects could not be constructed along all highways under MassHighway's jurisdiction. MassHighway, therefore, chose to limit its Type II Noise Abatement Program to noise impacts from Interstate Highways under its jurisdiction at the time. In addition, in Massachusetts, traffic volumes and speeds are highest on the Interstate Highways. To target the locations most affected by noise, only Interstate Highways were considered in the in the Type II Noise Attenuation Study conducted in 1988.

In March 1988, MassHighway completed a statewide noise study to determine the areas most adversely affected by noise from Interstate Highways. In determining and abating traffic noise impacts, MassHighway primarily considered exterior areas where frequent human use occurs. The statewide noise study allowed MassHighway to develop an equitable approach to mitigating highway noise. The study, named the Massachusetts Type II Noise Attenuation Study (the Type II Study), established a Final Priority List to rank the 53 locations along Interstate Highways under MassHighway's jurisdiction most seriously affected by noise from the highways. Locations along the Massachusetts Turnpike were not included as part of the Type II Study because the Massachusetts Turnpike was under the authority of the Massachusetts Turnpike Authority at the time and not MassHighway. MassHighway's Type II Priority List is presented in Table 1.

In an effort to improve the quality of life along the Massachusetts Turnpike and in response to the concerns of its neighbors, in 1992, the then-Massachusetts Turnpike Authority established a priority listing of areas where noise barriers were determined to be cost effective. The Massachusetts Turnpike Authority's Noise Barrier Priority List is presented in Table 2.

The Massachusetts Transportation Reform Act was signed into law in June 2009 and consolidated all Massachusetts' transportation agencies into one newly-established Massachusetts Department of Transportation (MassDOT). Under the law, the Massachusetts Turnpike Authority and MassHighway

were merged into the Highway Division of MassDOT. Because there is one MassDOT, there is no need to have two separate Type II Noise Barrier Priority Lists. MassDOT will create a new combined Type II Noise Barrier Priority List by merging locations from the two separate Type II noise barrier priority lists that have not yet had Type II noise barriers designed or constructed. Development that occurred between May 14, 1976 and November 28, 1995 at these locations would be considered and the priority points would be recalculated. Moving forward, MassDOT will then systematically examine these locations listed in the combined list, in the order of their ranking, to determine the feasibility and reasonableness of future Type II noise barriers. MassDOT will reanalyze the methodology used to create its Type II Noise Abatement Program at least every five years.

Table 1 MassHighway's Type II Priority List

Barrier Priority Number	Location		Status
	City/Town	Roadway	
1	Milton/Quincy	I-93	Constructed
2	Milton	I-93	Constructed
3	Milton/Quincy	I-93	Constructed
4	Boston	I-93	Studied, Not Feasible
5	Boston	I-93	Constructed
6	Lynnfield	I-95	Constructed
7	Woburn	I-93	Under Design
8	Wellesley/Newton	I-95	Constructed
9	Lynnfield	I-95	Constructed
10	Wakefield	I-95	Constructed
11	Fall River	I-195	Under Design
12	Wellesley/Newton	I-95	Under Design
13	Medford	I-93	Under Design
14	Stoneham	I-93	To Be Studied
15	Boston	I-93	To Be Studied
16	Lowell	I-495	To Be Studied
17	Boston	I-93	To Be Studied
18	Wakefield	I-95	To Be Studied
19	Lynnfield	I-95	To Be Studied
20	Boston	I-93	To Be Studied
21	Wakefield	I-95	To Be Studied
22	Boston	I-93	To Be Studied
23	Lynnfield	I-95	To Be Studied
24	Lynnfield	I-95	To Be Studied
25	Newton	I-95	To Be Studied
26	Woburn/Reading	I-93	To Be Studied
27	Wakefield	I-95	To Be Studied
28	Lynnfield/Wakefield	I-95	To Be Studied
29	Reading	I-95	To Be Studied
30	Chelmsford	I-495	To Be Studied
31	Wakefield	I-95	To Be Studied
32	Wakefield	I-95	To Be Studied
33	Lynnfield/Wakefield	I-95	To Be Studied
34	Chelmsford	I-495	To Be Studied
35	Medford	I-93	To Be Studied
36	Lowell	I-495	To Be Studied
37	Wilmington	I-93	To Be Studied
38	Wilmington	I-93	To Be Studied
39	Wilmington	I-93	To Be Studied
40	Chelmsford	I-495	To Be Studied
41	Reading/Wakefield	I-93	To Be Studied
42	Methuen	I-93	Studied Under Type I Program. Feasible and Reasonable.
43	Chelmsford/Westford	I-495	To Be Studied
44	Randolph/Quincy	I-93	To Be Studied
45	Chelmsford	I-495	To Be Studied
46	Chelmsford	I-495	Studied Under Type I Program. Not Reasonable.
47	Methuen	I-93	To Be Studied
48	Chelmsford	I-495	To Be Studied
49	Wilmington	I-93	To Be Studied
50	Chelmsford	I-495	To Be Studied
51	Medford	I-93	To Be Studied
52	Medford	I-93	To Be Studied
53	Braintree	I-93	To Be Studied

Table 2 Massachusetts Turnpike Authority's Noise Barrier Priority List

Rank	Location	Status
1	Newton, Barnes Road/Hunnewell Avenue	Constructed
2	Newton, Bowers Street	Constructed
3	Newton, Curve/Crescent Street	Constructed
4	Newton, Charlesbank Road	To Be Studied
5	Newton, Charles Street	To Be Studied
6	Newton, Austin Street	To Be Studied
7	Ludlow, Cady Street	Constructed*
8	Brighton, Riverview Road	To Be Studied
9	Allston, Lincoln/Franklin Street	To Be Studied
10	Natick, Hammond Road	Constructed
11	Brighton, Lincoln/S. Waverly Street	To Be Studied
12	Newton. Auburn/Central Street	To Be Studied
13	Ludlow, West Avenue	To Be Studied
14	Newton, Washington/Brookside Avenue	To Be Studied
15	Framingham, Westgate Road	Constructed
16	Ludlow, Davis/Fuller Street	Constructed
17	Chicopee, Whitin Street	To Be Studied

*Constructed berm with landscaping per community wishes

5.0 Analysis of Highway Traffic Noise Impacts

Federal regulations require the following actions during the planning and design of a Type I or Type II highway project: (1) identification of highway traffic noise impacts; (2) examination of potential noise abatement measures; (3) incorporation of feasible and reasonable highway traffic noise abatement measures into the highway project; (4) coordination with local officials to provide helpful information on compatible land use planning and control and, in the case of a Type II project, to provide information on eligibility requirements for Federal-aid participation; and (5) identification and incorporation of necessary measures to abate construction noise.

A three-part procedure is used for determining if the construction or installation of Type I or Type II noise abatement is appropriate. These three procedures are as follows:

- Analysis of highway traffic noise impacts;
- Determination of the feasibility of noise abatement; and
- Determination of the reasonableness of noise abatement.

MassDOT will only consider locations on the Type II Noise Barrier Priority Lists for protection under its Type II Noise Abatement Program. If any locations on the Type II Noise Barrier Priority Lists are within the study areas of future Type I projects, MassDOT will consider noise abatement at those locations as part of the Type I projects.

5.1 Noise Abatement Criteria

FHWA has established Noise Abatement Criteria (NAC) to help protect public health, welfare, and livability from excessive vehicle traffic noise. FHWA considered numerous approaches in establishing the NAC. The use of NAC for hearing impairment or for annoyance, sleep, or task interference or disturbance was determined to be impracticable. NAC for interference with speech communication was well researched and was determined to be usefully applied to the problem of highway noise. This was a compromise between noise levels that are desirable and those that are achievable. The NAC are described in Table 3.

Table 3 Noise Abatement Criteria (NAC)
One-Hour, A-Weighted Noise Levels in Decibels (dB(A))

Activity Category	$L_{eq}(h)$*	Description of Activity Category
A	57 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purposes.
B**	67 (Exterior)	Residential.
C**	67 (Exterior)	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, daycare centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
D	52 (Interior)	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.
E**	72 (Exterior)	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in Categories A-D or F.
F	--	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing.
G	--	Undeveloped lands that are not permitted.

* Leq (h) is an energy averaged, one-hour, A-weighted noise level in decibels (dB(A)). The Leq(h) Activity Criteria values are for impact determination only, and are not design standards for noise abatement measures.

** Includes undeveloped lands permitted for this Activity Category.

Source: 23 CFR Part 772, *Procedures for Abatement of Highway Traffic Noise and Construction Noise*.

Type I and Type II noise analyses must evaluate noise levels in each Activity Category in the study zone (except Activity Category F).

Activity Category A includes lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose. While it is appropriate for the determination of Activity Category A receptors to occur early in the process and through an interagency consultation process; the final determination for this designation remains with FHWA. Before MassDOT initiates any noise analysis, it will submit justification to FHWA for approval of any designations of land use as Activity Category A, if necessary. Activity Category A land uses are analyzed using the lower Activity Category A NAC even if the land use is within an Activity Category with a higher NAC.

Activity Category B includes the exterior impact criterion for single family (including mobile home parks) and multifamily residences. MassDOT will also treat hotels and motels that serve as long-term residential units as Activity Category B, rather than Activity Category E.

Activity Category C includes the exterior areas of a variety of nonresidential land uses not specifically covered in Activity Category A or B. This category may include public or private facilities. The procedures discussed in the document titled *Massachusetts Department of Transportation Methodology for the Determination of Cost Effectiveness of Proposed Noise Abatement for Activity Category C Land Uses and Activity Category D Facilities* should be used to determine the number of impacted receptors, the number of benefited receptors, and cost effectiveness of construction of proposed noise barriers for the land uses listed in Activity Category C.

Activity Category D includes the interior impact criterion for the facilities listed in Activity Category C that may have interior uses. For Activity Category D land uses, MassDOT will consider an indoor noise analysis only after it has fully completed an analysis of any outdoor activity areas and has determined that noise barriers are not feasible and reasonable for those exterior areas. In situations where no exterior activities are to be affected by the traffic noise (a typical example would be a public meeting room with no outdoor common grounds activity areas), or where the exterior activities are far from or physically shielded from the roadway in a manner that prevents an impact on exterior activities, MassDOT will use Activity Category D as the basis for determining noise impacts. The procedures discussed in the document titled *Massachusetts Department of Transportation Methodology for the Determination of Cost Effectiveness of Proposed Noise Abatement for Activity Category C Land Uses and Activity Category D Facilities* should be used to determine the number of impacted receptors, the number of benefited receptors, and cost effectiveness of proposed noise abatement for the facilities listed in Activity Category D.

Activity Category E is the exterior impact criterion for developed lands that are less sensitive to highway traffic noise. Activity Category E includes motels, hotels, offices, and other developed lands not included in Activity Category A through D or in Activity Category F. In the rare case where an Activity Category E land use has one or more exterior areas of frequent human use that are subject to noise impacts (*i.e.*, has noise levels that approach or exceed 72 dB(A), MassDOT would use the approach used for Activity Category C land uses to determine the reasonableness of noise abatement measures.

Activity Category F includes developed lands that are not sensitive to highway traffic noise and/or do not have exterior areas of frequent human use and therefore no activity criteria is appropriate to apply. There is no impact criterion for the land use facilities in this Activity Category and no noise analysis or consideration of noise abatement measures is required for these locations.

Activity Category G includes undeveloped lands. Undeveloped land is not sensitive to highway traffic noise and does not have exterior areas of frequent human use. For undeveloped lands, no NAC is established and consideration of mitigation is not required.

In some cases, lands that are undeveloped at the time of the project may be known to be permitted for development in the future. MassDOT considers the existence of a currently valid building permit issued by the local jurisdiction or by the appropriate governing entity as defining undeveloped lands for which development is permitted. If undeveloped land is determined to be permitted (*i.e.,* a building permit has been issued on or before the Date of Public Knowledge), then the land will be assigned to the appropriate Activity Category and be analyzed in the same manner as developed lands in that Activity Category.

If undeveloped land is not permitted for development by the Date of Public Knowledge, MassDOT will determine the distance from the roadway to the exterior NAC for each Activity Category in Table 3 and provide this information to local officials through the project's environmental clearance documents and noise analysis documents. Federal and State funding of noise abatement measures will not be considered for lands that are not permitted by the Date of Public Knowledge. If the local government allows development to occur on undeveloped lands where highway noise impacts were predicted to occur, then mitigation will be the responsibility of the local government and/or property owner.

5.2 Highway Traffic Noise Impact Determination

For Type I projects, MassDOT recognizes and considers absolute noise levels as well as substantial increases in noise levels when identifying highway traffic noise impacts. MassDOT considers noise impacts to occur in an area when existing or future computed noise levels approach (within 1 dB(A)) or exceed the FHWA NAC for Activity Categories A through E; or when the computed future (design year) build noise levels exceed the loudest existing noise levels by 10 dB(A) or more in Activity Categories A through E.

For Type II projects, MassDOT determines traffic noise impacts based on current year conditions and considers noise impacts to occur in an area when existing computed noise levels approach (within 1 dB(A)) or exceed the FHWA NAC for Activity Categories A through E. Noise abatement measures are to be evaluated at Type II locations to determine if noise abatement measures are reasonable and feasible.

In accordance with FHWA's noise regulations, all noise analyses must be conducted using the FHWA Traffic Noise Model (TNM) Version 2.5 (or the latest version) or by using any other model FHWA determines to be consistent with the methodology of the FHWA TNM. The use of

TNM Lookup Tables on Type I or Type II projects is no longer acceptable. Furthermore, while noise contour lines are useful for project alternative screening and for providing information to local officials, they shall not be used for determining highway traffic noise impacts.

In determining and abating traffic noise impacts, MassDOT primarily considers exterior areas where frequent human use occurs. A one-hour Leq is used for assessing highway noise impacts on different land uses. Interior noise levels for Activity Category D land uses can be derived by subtracting the building noise reduction factors in Table 4 from the predicted exterior noise levels for the building in question.

Table 4 Building Noise Reduction Factors

Building Type	Window Condition *	Noise Reduction Caused By Exterior of the Structure
All	Open	10 dB
Light Frame	Ordinary Sash (closed)	20 dB
	Storm Windows	25 dB
Masonry	Single Glazed	25 dB
	Double Glazed	35 dB

*The windows shall be considered open unless there is firm knowledge that the windows are kept closed almost every day of the year.

Source: *Highway Traffic Noise Analysis and Abatement Guidance*. (Effective July 13, 2011)

5.3 Data Collection and Determination of Existing Noise Levels

Collection of data in the project area, such as identification of existing activities, developed land, and undeveloped land; traffic data; and noise measurements are needed to determine the existing noise levels used in the noise analysis.

5.3.1 Identification of Existing Activities, Developed Land, and Undeveloped Land

Geographic Information Systems (GIS), zoning maps, coordination with local officials, other data sources, and field verification are typically used in the data collection effort to identify existing activities, developed land, and undeveloped land. In some cases, lands that are undeveloped at the time of the project may be known to be under consideration for development in the future. The FHWA regulations refer to these lands as “undeveloped lands for which development is permitted" and the highway noise impact on these lands should also be assessed. MassDOT considers the existence of a currently valid building permit as defining undeveloped lands for which development is permitted. If the local government allows development to occur on undeveloped lands where highway noise impacts were predicted to occur, then mitigation will be the responsibility of the local government and/or property owner.

Residences may be owner-occupied, rented, or leased. All residences in a multifamily facility that are predicted to experience highway traffic noise impacts are counted as impacted receptors. This may include units above the ground level.

Multifamily residential units often have associated common outdoor areas for recreational or other use (*e.g.*, a pool). These common areas are typically available for use by all residents of the multifamily facility. MassDOT will coordinate with the owner or manager of the multifamily residence to obtain information on the actual use, potential use, and capacity limits of the impacted common areas. This information will then be used to determine the number of receptors to be used in the noise analysis for these impacted common areas.

For Activity Category C land uses, receptors should be placed at the closest location to the highway right-of-way line where frequent human activity normally occurs to determine if the NAC is approached or exceeded. If the NAC is approached or exceeded at the right-of-way line, receptors should also be placed at locations away from the right-of-way line to determine the extent of impact. Parking lots are not to be considered as valid receptor locations. A fuller discussion of determining noise-sensitive receptors in Activity Category C land uses is included in the document titled *Massachusetts Department of Transportation Methodology for the Determination of Cost Effectiveness of Proposed Noise Abatement for Activity Category C Land Uses and Activity Category D Facilities*.

All users of Activity Category D facilities would be considered receptors because they would each experience the same interior noise levels when they use the facility. If the interior noise levels approach or exceed the noise abatement criterion of 52 dB(A), then each user would be an impacted receptor.

MassDOT will determine the number of receptors for outdoor activity areas in Activity Category E land uses in the same manner as the number or receptors determined for common outdoor areas for multifamily residences.

5.3.2 Traffic Data

Noise levels from highway traffic are affected by three factors: (1) the number of vehicles; (2) the speed of the traffic; and (3) the vehicle mix in the flow of traffic. For purposes of the highway traffic noise analysis, motor vehicles fall into one of five categories: (l) automobiles (vehicles with two axles and four tires); (2) medium trucks (cargo vehicles with two axles and six tires); (3) heavy trucks (cargo vehicles with three or more axles); (4) buses (vehicles designed to carry more than nine passengers); and (5) motorcycles (vehicles with two or three tires and an open-air driver/passenger compartment). The percentage of automobiles, medium trucks, heavy trucks, buses, and motorcycles and the directional distribution factor should be collected for the existing year and analyzed for the design year.

Traffic data can be used to narrow the time period that could potentially be the Loudest Traffic Hour (LTH). Generally, the loudness of highway traffic noise is increased by heavier traffic volumes, higher vehicle speeds, and greater numbers of heavy trucks. Contrary to popular belief, in heavily congested urban areas, the LTH typically does not occur during the peak traffic hour because, while the peak traffic hour will have the highest traffic volumes, these traffic volumes may not represent the worst noise conditions (*i.e.*, they operate low speeds and heavy truck volumes drop as truckers try to avoid severe congestion). In this case, highway traffic noise levels would be lower. Usually, the LTH along a highway occurs just before or after the peak traffic

hours when the vehicle volume, speeds, and the truck-to-auto ratio are in a combined optimum condition to yield the highest hourly noise level. The noise analysis should use the LTH when modeling potential noise impacts.

5.3.3 Noise Measurements

The purpose of field noise measurements is twofold: (1) to help establish the existing noise levels in the LTH for projects on existing highway alignment as well as for projects on new highway alignment and (2) to validate or calibrate the computer noise model (FHWA's Traffic Noise Model (TNM)).

Field noise measurements should be conducted along existing or proposed roadway segments or links that are near existing and permitted noise-sensitive receptors that may be affected by the proposed project. All field monitoring should be conducted in accordance with FHWA's guidance document titled *Measurement of Highway-Related Noise*, dated May 1996. Field noise measurements should not be taken under wet or snowy conditions. ANSI Type I or Type II integrating sound level meters should be used to measure noise in the field. The noise monitor should be calibrated at least at the beginning and end of each measurement session. Additional calibrations are recommended if the measurement session lasts more than three hours, or if there are monitoring site changes with more than one hour of down time in between noise measurements. If the final calibration differs from initial calibration by greater than 1 dB(A), all measurements should be discarded and repeated. All acoustic instrumentation should be calibrated annually by its manufacturer, or other certified laboratory to verify accuracy.

Generally, a one-hour highway noise measurement can be statistically accurate if a minimum of approximately 15 minutes of measurements is conducted. This assumes that motor vehicles are the dominate noise source and hourly sound levels are reasonably constant.

There are a number of factors to be considered in determining the LTH. Time of day is one factor. Both a peak traffic period and non-peak period noise measurement may be required to verify LTH noise levels. An example of a situation where this would be required is on highly congested facilities where trucks avoid peak automobile travel periods. The day of week (weekend versus workday) is another consideration. Finally, the week of year (for example, tourist season versus off-season) may need to be taken into account. Using time periods during different seasons are only appropriate if initial investigations did not identify an existing noise impact.

There are three options that may be used for determining the LTH:

- Option #1: Evaluation of the weekday hourly traffic volumes and speeds to identify a time period, such as mid- to late afternoon or mid- to late morning, to conduct hourly noise measurements to identify the LTH. This approach assumes that the traffic data can reasonably eliminate other time periods, such as evening and peak traffic hours.
- Option #2: Monitoring of noise for 24-hour weekday period to identify the LTH.

- Option #3: Requesting MassDOT's approval of other methods to establish the LTH. Some projects may have unique impacts on traffic volumes, speeds, and/or truck percentages that require a different approach for establishing the LTH.

Where more than one receptor is clustered together, noise measurements at a single site can be taken as representative of a group of receptors. A representative location is one that has a common noise environment for all the receptors in a group. For proposed highways on new alignments where no highway currently exists, measurements should be taken at representative receptor locations.

The entire project area should be reviewed to determine if there are other highway noise sources in the area (for example, the presence of local cross streets) or any unusual noise sources (such as barking dogs) that may influence the ambient noise readings. When non-highway transportation noise sources affect the noise environment next to a highway, the magnitude of this impact should be assessed. If the highway project is near a rail line, rail noise levels should be calculated using the procedure in the FHWA document titled *Advanced Prediction and Abatement of Highway Traffic Noise*, dated June 1982. Transit noise should be calculated by using the procedures in the Federal Transit Administration's *Transit Noise and Vibration Impact Assessment Guidance*, dated May 2006.

Measuring noise in exterior areas of frequent human use is the primary consideration for the noise analysis. Exterior areas of frequent human use are normally at ground level. Measurements should usually be taken in an area between the right-of-way line and the building where frequent human activity occurs, such as a patio or the yard of a home.

When analyzing areas with multifamily dwelling units (*e.g.*, apartments, condominiums, etc.), measurements should be taken at an exterior area, such as a patio, playground, or picnic area between the highway and the actual building, if one exists. If there are no ground level exterior areas at multifamily facilities, a balcony/deck location may be chosen for analysis. If there are no exterior areas of frequent human use at all, such as at churches, hospitals, or libraries (*i.e.*, Activity Category D land uses), interior measurements can be made and the analysis should be completed using the interior NAC

Another purpose of field noise measurement is validation or calibration of the accuracy of the noise model runs used to predict existing or future noise levels for the project. The noise model runs should be validated or calibrated using the data collected in the measurement phase. All existing and future noise level predictions should be made for the LTH of the day. If the noise level measurements and the predicted noise levels from the noise model runs for the existing condition are within reasonable limits (±3 dB(A)), then it can be assumed that the noise model runs have been properly validated and are then reliable for computing the loudest noise levels in the study zone. If the noise model runs are not within ±3 dB(A) for all the measurements at all the sites, then the noise model runs are not considered valid until additional measurements are made or until the reason for the discrepancy is identified and a correction is made within the model.

Calibration of noise model runs, where the user adjusts the noise level at a specific receiver to account for differences between measured and modeled noise levels, is not routinely advisable. Problems with validating most noise model runs usually are due to input errors rather than problems

with the noise model runs and users are encouraged to exhaust input options before making receiver adjustments. Typically, calibration involves situations where the noise model runs are consistently over-predicting or under-predicting by an amount greater than 3 dB(A). A possible solution is to adjust the noise model runs by the difference between the measured and predicted values. The reasons or causes for the difference between measured and predicted highway traffic noise levels, as well as the actual level of the adjustment, must be determined and documented in the analysis. Generally, differences in measured and predicted noise levels greater than ±3 dB(A) occur because of a site condition not accounted for in the noise model runs, such as ground type, meteorological effects, or contributions from non-transportation-related noise sources.

5.4 Prediction of Future Noise Levels (Type I Projects Only)

After determination of the existing noise levels, the next step in the noise analysis for Type I projects is prediction of future noise levels. If noise abatement is proposed, only FHWA's TNM may be employed to determine the future noise levels in the study zone and to determine any proposed noise barrier's dimensions.

Input parameters necessary to run the TNM include:

- Distance from the center of each roadway to each receptor;
- Width of roadway and lanes;
- Height of the receptor;
- Barrier/buffer information, such as trees, berms, and structures;
- Type of propagation path (hard versus soft);
- Variations in terrain between the receptor and the source; and
- Grade, if any.

Noise level predictions are required for all alternatives under detailed study in the environmental clearance document. The following conditions should be included in the noise analysis.

Alternative	Year
No Build	Existing and Design Year
All Build	Design Year Only

High speed lane(s) with no trucks are typically modeled as a single roadway in the TNM. The remaining lanes would then be grouped and modeled as a single roadway also. In both cases, the shoulder width is included in the model.

Noise-sensitive receptors should generally be modeled individually. For long corridors or for project alternative screening, receptors can be grouped and modeled.

5.5 Noise Abatement Measures

Noise abatement measures may be considered in the following priority when analyses indicate the need for their consideration.

(1) Traffic management measures, such as traffic control devices and signing for prohibition of certain vehicle types, time-use restrictions for certain vehicle types, reduced speed limits, and exclusive lane designations.

(2) Alteration of horizontal or vertical alignment.

(3) Construction of noise barriers including acquisition of property rights, either within or outside the highway right-of-way.

(4) Acquisition of predominately unimproved property to serve as a buffer zone to preempt development that would be adversely affected by traffic noise. (Type I projects only).

(5) Noise insulation of Activity Category D land use facilities listed in Table 3.

Measures such as traffic management, alteration of alignment, or purchase of land for use as a buffer zone usually do not provide substantial noise reduction, or are found to be not feasible and reasonable because of cost, right-of-way requirements, or project purpose. Noise insulation is less likely to be used also. Thus, the most-used noise abatement measure is the noise barrier.
Noise barriers are most effective along limited-access highways. Noise barriers are ineffective in situations where there are numerous intersecting streets or driveway openings because of the gaps that are required.

Planting of vegetation or landscaping is not an effective or acceptable noise abatement measure because only dense stands of evergreen vegetation at least 100 feet deep will reduce noise levels.

6.0 Determination of Feasibility of Constructing or Installing Noise Abatement

MassDOT considers engineering and acoustical factors in evaluating when noise abatement is feasible. Feasibility involves determining whether it is possible to build a noise barrier given the site constraints and determining whether the noise abatement provides a minimum reduction in noise levels.

6.1 Engineering Feasibility

For a noise barrier to be engineeringly feasible, it must be able to be constructed given the existing topography and taking into consideration the presence of local cross streets; bridge structures over or along the highway; access requirements for driveways or ramps;

drainage, safety, or maintenance requirements; utilities; environmental impacts; and other predominating noise sources in the area (*e.g.,* aircraft overflights).

Safety factors that should be considered in determining the feasibility of a proposed noise barrier include maintaining a clear recovery zone, redirection of crash vehicles, adequate sight distance, fire access, and emergency vehicle needs. Motorist sight distance requirements are included in the American Association of State Highway and Transportation Officials' (AASHTO) fifth edition of *A Policy on Geometric Design of Highways and Streets*.

In determining the feasibility of a proposed noise barrier, maintenance of the noise barrier must be considered. The proposed noise barrier should not be in a location that makes maintenance of the noise barrier difficult. It should also be located so that there is sufficient distance (typically, 10 feet) for snow storage between the roadway and the noise barrier. The proposed noise barrier should not be made of material that is hard to maintain. Access rights or easements required for maintenance will normally be by donation, since the construction of the noise barrier is for the benefit of the property owners.

The impact of proposed noise barriers on utilities and the converse must be assessed. Large overhead power lines, underground water, sewer, gas, fiber optic, and oil lines can have a major impact on costs and design options.

Environmental impacts are also important factors in determining whether a noise barrier is feasible. It is unlikely that MassDOT would find a Type I or Type II noise barrier feasible if the construction of the barrier, by itself, would result in substantial impacts to environmental resources. For example, a noise barrier should not require filling an amount of wetlands that requires a Variance from the Massachusetts Wetlands Protection Act (WPA).

A ground-mounted noise barrier should not have a height that exceeds 25 feet. This is because, in addition to the visual considerations, a noise barrier with a height exceeding 25 feet would be subject to excessive wind loads.

6.2 Acoustic Feasibility

Acoustic feasibility indicates that the noise abatement can, at a minimum, achieve a discernible reduction in noise levels. MassDOT considers a noise barrier to be acoustically feasible when it reduces traffic noise by at least 5 dB(A) at the majority of impacted receptors in the front row. Majority is defined as more than 50 percent of the impacted receptors. Blocking the line of sight between the noise source and a receptor usually provides a 5 dB(A) noise reduction.

MassDOT considers noise insulation for Activity Category D facilities to be acoustically feasible when it reduces traffic noise by at least 5 dB(A) for all the impacted receptors using the facility.

7.0 Determination of Reasonableness of Constructing or Installing Noise Abatement

If potential noise abatement is found to be feasible, then the reasonableness of the noise abatement is considered. Reasonableness implies that good judgment and common sense has been applied in arriving at a decision on the construction or installation of the proposed noise abatement.

There are three mandatory reasonableness criteria that must be met for MassDOT to consider noise abatement to be reasonable:

- The noise abatement must meet MassDOT's noise reduction design goal.
- The noise abatement must be cost effective.
- The property owners and residents of the benefited receptors must be in favor of the noise abatement.

If the noise abatement does not meet the three mandatory reasonableness criteria, noise abatement will not be constructed or installed.

To comply with Environmental Justice requirements, third party funding is not allowed (if offered) on a Type I project if the noise abatement would require additional funding from the third party to be considered feasible and/or reasonable. Third party funding is acceptable, however, on a Type I project, to make functional enhancements, such as absorptive treatment, access doors, landscaping, or aesthetic enhancements to noise barrier(s) already determined feasible and reasonable. Third parties are any entity other than the MassDOT.

When noise abatement, such as noise insulation, is provided for an Activity Category D facility, an agreement must be entered into with the property owner which specifies that MassDOT is not responsible for any future costs of operating and/or maintaining the noise abatement measure(s).

7.1 Noise Reduction Design Goal

The noise reduction design goal is the desired amount of noise reduction provided by noise abatement. The noise reduction design goal is not the same as acoustic feasibility, which is the minimum level of effectiveness of a noise abatement measure.

For residential areas and Activity Category C land uses, MassDOT considers the noise reduction design goal to be achieved when at least one first row benefited receptor attains a minimum of 10 dB(A) of noise reduction (*i.e.,* insertion loss). The 10 dB(A) noise reduction design goal is a rational and achievable goal based on the rules-of-thumb that, if a noise barrier breaks the line-of-sight between the noise source and the noise-sensitive receptor, the insertion loss is typically 5 dB(A) and that, for each 3 feet of barrier height beyond the line-of-sight blockage, an increase in insertion loss of 1.5 dB(A) is typical. Noise barriers should be designed to have a height as low as possible and still attain the noise reduction design goal.

MassDOT also considers the noise reduction design goal to be achieved when proposed noise abatement provides a minimum of 10 dB(A) of noise reduction for all receptors using Activity Category D facilities.

7.2 Cost Effectiveness

Because MassDOT must balance its available funds and statewide highway safety responsibilities, a mathematical formula, called the Cost Effectiveness Index (CEI), is used when considering the cost effectiveness of proposed noise abatement measures.

7.2.1 Cost Effectiveness Index (CEI) for Activity Category B (Residences)

The CEI for residential areas is calculated by dividing the noise barrier cost by the average insertion loss (the average of individual insertion losses at each benefited receptor) and by the number of benefited receptors in the study zone. Receptors receiving less than 5 dB(A) of insertion loss are not considered benefited receptors and are, therefore, not counted in the CEI calculation. The individual insertion loss values come from the TNM output files.

The CEI is equal to $$/dBIL/unit, where:

$$ = Total barrier cost, based upon a $50 per square foot cost.
dBIL = Average insertion loss of benefited receptors, in dB(A)
Unit = Number of benefited receptors protected in the study zone

The noise barrier cost is determined by multiplying the square footage of the proposed noise barrier (as modeled by the FHWA TNM) by $50 per square foot. These square foot costs are to be used purely for developing CEI. Actual costs will vary. MassDOT considers a noise barrier to be cost effective if, based on the CEI, it costs $8,400 or less per decibel reduction per benefited receptor. Both the CEI of $8,400 and the barrier costs of $50 per square foot were developed for the same year (2010) and are based on historical construction bid data.

To help provide a better understanding of the process used to determine cost effectiveness of noise barriers in residential areas, two examples of CEI calculations are provided.

Example #1

For this hypothetical example, the TNM determined that, to meet the noise reduction design goal, a proposed noise barrier would have to be 18 feet high and 2,600 feet long. The square footage of this proposed noise barrier would be 46,800 square feet, derived by multiplying the barrier's height (18 feet) by its length (2,600 feet). The cost for the proposed noise barrier would, therefore, be $2,340,000 (46,800 square feet multiplied by the average cost of $50 per square foot for a noise barrier).

With this proposed noise barrier in place, a neighborhood would have 30 benefited receptors, involving 24 homes with a 10 dB(A) insertion loss and 6 homes with a 7 dB(A) insertion loss. In this example, the average insertion loss is 9.4 dB(A). This is calculated by multiplying 24 (homes) by 10 (insertion loss) which equals 240; plus 6 (homes) times 7 (insertion loss) which equals 42. 240 plus 42 equals 282; divided by the total number of homes (30) equals 9.4.

Barrier Cost = $2,340,000
dBIL = 9.4
Units = 30

Using the formula to calculate CEI, the result of the CEI calculation is $8,298/dBIL/unit. In this example, the noise barrier proposed for this neighborhood is cost effective because, at $8,298, the CEI is below the $8,400 threshold.

Example #2

In this hypothetical example, we will be using the same noise barrier as proposed in Example #1 (18 feet high and 2,600 feet long) but, in this case, the noise barrier would be less effective acoustically. In this case, with the proposed noise barrier in place, the neighborhood would have 20 benefited receptors, involving 12 homes with a 10 dB(A) insertion loss and 8 homes with a 7 dB(A) insertion loss. In this example, the average insertion loss would be 8.8 dB(A). This is calculated by multiplying 12 (homes) by 10 (insertion loss) which equals 120; plus 8 (homes) by 7 (insertion loss); which equals 56. 120 plus 56 equals 176; divided by the total number of homes (20) equals 8.8.

Barrier Cost = $2,340,000
dBIL = 8.8
Units = 20

Using the formula to calculate CEI, the result of the CEI calculation is $13,295/dBIL/unit. In this example, the noise barrier proposed for this neighborhood is not cost effective and, therefore, not reasonable because, at $13,295, the CEI is above the $8,400 threshold.

As required by the FHWA noise regulations, MassDOT will reanalyze the CEI every five years. This reevaluation will focus on the effect that construction costs of noise barriers have on the CEI. For example, if construction costs of noise barriers increase by 10 percent between evaluations of the CEI, the CEI threshold should increase by the same amount. In this way, a noise barrier determined cost effective at one time would not fail to meet the CEI later.

7.2.2 Cost Effectiveness Index (CEI) for Activity Category C Land Uses and Activity Category D Facilities

MassDOT will use the methodology in *Massachusetts Department of Transportation Methodology for the Determination of Cost Effectiveness of Proposed Noise Abatement for Activity Category C Land Uses and Activity Category D Facilities* to determine cost effectiveness of noise abatement for Activity Category C land uses and Activity Category D facilities. The unit measure that the CEI uses for Activity Category C land uses and Activity Category D facilities is Cost per dB(A) insertion loss per person per hour ($$/dBIL/person/hour) where:

$$ = Total noise abatement cost
dBIL = Average insertion loss of benefited receptors, in dB(A)
Person = Number of benefited receptors per day
Hour = Average time per visit

As described in *Massachusetts Department of Transportation Methodology for the Determination of Cost Effectiveness of Proposed Noise Abatement for Activity Category C Land Uses and*

Activity Category D Facilities, MassDOT uses a statewide CEI of $138 per dB(A) insertion loss per person per hour to determine cost effectiveness of noise abatement for Activity Category C land uses and Activity Category D facilities. MassDOT considers noise abatement to be cost effective for Activity Category C land uses and Activity Category D facilities when it costs $138 or less per decibel reduction per benefited receptor.

Two hypothetical examples help provide an understanding of how the statewide CEI of $138 is used to determine cost effectiveness of noise abatement for an Activity Category C land use and an Activity Category D facility. In Example #3, the Activity Category C land use is a school with a noise barrier as the proposed noise abatement. Example #4 involves an Activity Category D facility, in this case, a light frame public meeting room with no exterior areas of activity.

Example #3

The following data are known for the school property:

1. Average time per person using playground = 1 hour
2. Proposed height of noise barrier = 13 feet
3. Proposed length of noise barrier = 1,000 feet
4. Average insertion loss from the proposed noise barrier = 8 dB(A)
5. Number of benefited receptors per week = 300 people

The unit measure that the CEI is expressed in is $$ per dBIL per person per hour. In the case of the school property,

$$ = Total noise abatement cost = 13 feet x 1,000 feet x $50 per square foot = $650,000
dBIL = Average insertion loss of benefited receptors = 8 dB(A)
Person= Number of benefited receptors per day = 300 persons per week divided by 7 days per week = 40 persons
Hour = 1 hour

The site-specific CEI is calculated to be $1,890 (650,000 divided by 8 divided by 40 divided by 1). Since the site-specific CEI of $1,890 is greater than the statewide CEI of $138 for Activity Category C land uses, the proposed noise barrier for the school would not be considered cost effective.

Example #4

In this example, the noise analysis indicates that the public meeting room has interior noise levels higher than the NAC of 52 dB(A). The public meeting room would, therefore, experience a noise impact. Noise insulation in the form of new storm windows and central air conditioning is proposed as noise abatement. The insertion loss from the proposed noise insulation was determined to be 20 dB(A). The cost of the noise insulation was determined to be $200,000.

From previous consultation with the municipality, (*i.e.*, the property owners of public meeting room), it was found that the meeting room is used twice a week by approximately 100 attendees each time for 3 hours. The daily number of benefited receptors would therefore be 29. This

number is derived by multiplying the number of attendees (100) by the number of times the facility is used per week (2) and by dividing by the number of days in a week (7).

For the public meeting room,

$$ = 200,000
dBIL = 20 dB(A)
Person = 30
Hour = 3

The site-specific CEI would be $115 ($200,000 divided by 20 divided by 30 divided by 3). Since the site-specific CEI of $115 is less than the statewide CEI of $138, noise insulation of the public meeting room would be considered cost effective.

As required by the FHWA noise regulations, MassDOT will reanalyze the CEI for Activity Category C land uses and Activity Category D facilities every five years.

7.3 Viewpoints of Property Owners and Residents

A major factor in determining the reasonableness of proposed noise barriers in noise-affected residential areas is the viewpoints of the property owners and of the residents of the benefited receptors. MassDOT will provide noise barriers if at least two-thirds (67 percent) of the weighted total number of residential votes are in favor of it. In the case of rental properties, FHWA requires MassDOT to consider both the views of the owners of the benefited receptors and the views of the renters.

A public informational meeting is held in the municipality(s) of the proposed noise barrier to present and discuss the noise impacts from the project and to provide an opportunity for local input in the development of the noise barrier project. This meeting occurs during the project development phase as part of the public involvement or public hearing process. MassDOT will notify the property owners in each Activity Category in Table 3 of the public informational meeting and of its intent to install a noise barrier in the noise-affected area.

After presenting the project information to the noise-affected area, a survey of the desires of the property owners and of the residents of the benefited receptors is conducted by mail. Owners of undeveloped lands for which residential development is permitted are also invited to participate in the voting process. While MassDOT will consider commercial and industrial establishments' desire to maintain visibility of their property from the highway, the property owners and renters of these types of land uses are not allocated any votes and, therefore, do not participate in the voting process. Table 4 presents the number of votes allocated to each type of residential benefited receptor in the study zone.

At least 67 percent of the weighted total number of votes in the study zone must be in favor of the proposed noise barrier for the noise barrier to be considered for construction; otherwise a noise barrier will not be built. If this requirement is met, continued community coordination will take place during the final design phase of the project. A second public meeting is held, after the

noise barrier design further progresses, to present more specific project information to the affected area.

If noise abatement is proposed for Activity Category C land uses or Activity Category D facilities, then each individual property owner (that is, each owner of the Activity Category C land use or Activity Category D facility) must be in favor of it, otherwise, noise abatement would not be considered as a reasonable noise abatement measure.

Table 5 Number of Votes Allocated to Benefited Receptors Surveyed

Land Use	Occupancy	Row	Number of Votes
Existing Residential	Owner	First	5
Existing Residential	Owner	Second, Third, etc.	3
Existing Residential	Renter	First, Second, Third, etc.	1
Existing Activity Category C or D	Owner	Not Applicable	1
Undeveloped Land Permitted for Development (Residential)	Owner	First	5
Undeveloped Land Permitted for Development (Residential)	Owner	Second, Third, etc.	3

Although not a requirement for construction of a proposed noise barrier, MassDOT will also solicit a written letter from appropriate city/town officials stating their support of the desires of the property owners and of the residents of the benefited receptors for the noise barrier to be constructed.

When the municipality is opposed to noise abatement that is determined to be feasible and reasonable, MassDOT will coordinate with the city/town officials. The purpose of this coordination is to determine if the local government's reasons for the opposition are justified, such as for safety reasons. Municipalities cannot arbitrarily veto and/or restrict the length or height of the mitigation measure that was determined to be feasible and reasonable based on visual quality concerns or any other unjustified reasons. MassDOT's primary responsibility is to provide abatement for impacted noise-sensitive land uses so as not to jeopardize federal funding for its projects.

8.0 Technical Considerations

The structural design of a noise barrier should be in accordance with the current edition of the *Guide Specifications for Structural Design of Sound Barriers* by AASHTO (published in 1989 and amended in 1992 and 2002), and with MassDOT's *Standardized Foundations for Sound Barrier Walls (September 2004).*

Where space and other environmental constraints allow, noise berm (earth or other material) or combination berm/wall systems are preferred. Using the existing topography to begin or end a noise barrier in an earth berm or mound should be considered.

Noise barriers should be constructed to be visually pleasing and to blend in with their surroundings. Generally, it is desirable to provide landscaping near the noise barrier to avoid visual dominance.

9.0 Coordination with Local Government Officials

MassDOT coordinates with local officials whose jurisdictions are affected by noise from proposed projects. The primary purpose of this coordination is to promote noise compatible land use planning and control on undeveloped land adjacent to highways. Local governments may use their authority to regulate land development to prohibit noise-sensitive land uses adjacent to highways, or to require developers to plan, design, and construct projects that minimize highway traffic noise impacts on adjacent developments. Local governments may not use this type of legislation, however, to override construction of noise abatement deemed feasible and reasonable. Only residents and property owners of benefited receptors determine the desirability of whether proposed noise abatement should be implemented. Furthermore, local zoning and design requirements, such as height limits on fencing and walls, are not acceptable limitations on the configuration or design of proposed noise barriers.

Local government officials need to know what highway traffic noise levels to expect from a Type I or Type II project and what techniques they can use to prevent future impacts. The following information is, therefore, furnished to allow the public and local officials to understand where local communities should protect future land development from becoming incompatible with anticipated highway noise levels.

- A link on MassDOT's Environmental Website to the *MassDOT Type I and Type II Noise Programs Guidebook*.
- Links on the MassDOT Environmental Website to *The Audible Landscape: A Manual for Highway and Land Use*, a manual that assists local government officials to deal with the problem of noise-sensitive land uses adjacent to highways and to *Entering the Quiet Zone*, a brochure that provide information to elected officials, planners, developers, and the general public about the problem of traffic noise and effective responses to it.
- Estimated future noise levels from the highway traffic noise analysis for properties in the immediate vicinity of a proposed project (Type I projects only).
- The distances from the edge of the nearest travel lane of the proposed highway project where the future noise levels on the undeveloped land within the project limits approach the exterior NAC for each Activity Category in Table 3 (Type I projects only).
- Information on how noise abatement for undeveloped land not permitted for development by the Date of Public Knowledge is not eligible for MassDOT's Type II Noise Abatement Program.

Local officials are encouraged to make this information available for disclosure in real estate transactions.

For Type I projects, MassDOT informs the local officials by means of the environmental documentation process (that is, the Environmental Impact Statement (EIS) or Environmental Assessment (EA)), public hearings, public information meetings, and direct contact. In cases of Type I projects that are Categorical Exclusions (CEs), MassDOT will send a letter to the local officials with a summary of the above information. The CE Checklist and the noise analysis themselves would not be sent.

Because MassDOT has a Type II noise program, FHWA's noise regulations require it to have a statewide outreach program. For its Type II statewide outreach program, MassDOT will use existing forms of information dissemination to periodically announce to the cities and towns the availability of information about its Type II Noise Abatement Program.

10.0 Highway Traffic-Induced Vibration

Studies to assess the impact of operational traffic-induced vibrations have shown that both measured and predicted vibration levels are less than any known criteria for structural damage to buildings. Normal living activities within a building (for example, closing doors, walking across floors, or operating appliances) have been shown to create greater levels of vibration than highway traffic. Vibration concerns are not addressed in this policy.

11.0 Documentation of Highway Traffic Noise Analyses

A traffic noise analysis should include the following information for each alternative under detailed study:

(1) Determination of Activity Categories and applicable NAC for adjacent land uses;

(2) Identification of existing receptors;

(3) Determination of existing highway traffic noise levels;

(4) Prediction of future highway traffic noise levels for study alternatives (Type I projects only);

(5) Verification of noise model run validation or calibration;

(6) Determination of highway traffic noise impacts for study alternatives;

(7) Examination and evaluation of alternative noise abatement measures for reducing or eliminating the noise impacts; and

(8) Consideration of construction noise.

The following information related to methodology and assumptions shall be included in the Noise Appendix:

(1) Model(s) and methodology used;

(2) Alternatives and years considered;

(3) Existing and design year vehicle volumes, speeds, and mix data;

(4) Receptor locations and descriptions, including Activity Category;

(5) Basis for determination of existing and future noise levels; and

(6) Noise descriptor used.

A reviewer should be able to replicate the results using the TNM with the input data reported in the Noise Appendix.

Reporting noise levels to the tenth of a decibel may imply a false sense of accuracy and precision. All noise levels (measurements and calculations) should, therefore, be reported to the nearest decibel.

12.0 Documentation of Noise Abatement in Environmental Clearance Documents

A noise analysis is typically included as part of an environmental clearance document (CE Checklist, EA, or EIS) for a Type I project. In the CE Checklist, Finding of No Significant Impact, or Record of Decision for a Type I project, MassDOT will identify the locations where noise abatement measures are feasible and reasonable, and are likely to be incorporated into the project; and the locations where there are noise impacts for which no noise abatement measures appears to be feasible and reasonable. Use of a table to compare the predicted future levels with the project, the predicted future levels without the project, the existing levels, and the NAC in 23 CFR 772 is typically included for clarity.

Normally, a Type II project will qualify as a CE, under the National Environmental Policy Act, unless other environmental impacts are identified that require additional investigation. Nonetheless, a Type II project requires the same level of analyses and documentation as required for a Type I project.

For projects at locations on the Type II Noise Barrier Priority Lists that qualify as CEs, MassDOT will include the following information in the CE Checklist:

- The location(s) where noise abatement measures are feasible and reasonable, and are likely to be constructed;
- The location(s) where there are noise impacts for which no noise abatement measures appears to be feasible and reasonable; and

- The distances from the edge of the nearest travel lane where the existing noise levels on the undeveloped land within the project limits approach the exterior NAC for each Activity Category in Table 3.

MassDOT will send a letter to the local officials with a summary of the above information from the Type II noise analysis. The CE Checklist and the noise analysis themselves would not be sent.

Feasibility and reasonableness determinations for proposed noise barriers may change because of changes in project design after approval of the environmental clearance document. In addition, while the final environmental clearance document contains the preliminary layout and height information for proposed noise barriers, it is unlikely that the exact layout or material type would be determined. For noise-impacted areas on Type I projects or for locations on the Type II Noise Barrier Priority Lists requiring noise barrier consideration, the final environmental clearance document should, therefore, contain a statement of likelihood similar to the following:

> Based on the studies conducted to date, the Massachusetts Department of Transportation (MassDOT) intends to install highway traffic noise abatement measures in the form of noise barrier(s) at the noise-impacted locations identified in (section, table, or figure) provided that the following feasibility and reasonableness conditions remain:
>
> - Safety and engineering aspects relating to the roadway user and adjacent property owners do not preclude construction of the noise barrier.
> - Environmental impacts are not of a magnitude to make construction of the noise barrier infeasible.
> - The noise abatement is acoustically feasible and meets MassDOT's noise reduction design goal.
> - The noise abatement is cost effective.
> - There is community acceptance of the noise abatement by the property owners and residents.
>
> The preliminary heights and lengths of the noise barriers are as follows:
>
> [Insert table of preliminary heights and lengths of the noise barrier(s) and insertion losses at each location]
>
> If it subsequently develops during final design that these conditions have substantially changed, the noise barrier(s) might not be provided. A final decision of the construction of the noise barrier(s) will be made upon completion of the project's final design and the public involvement processes.

The following paragraph will appear in the CE Checklists for Type III Projects:

> The [Project Name] meets the criteria for a Type III project established in 23 CFR 772. Therefore, the project requires no analysis for highway traffic noise impacts. Type III projects do not involve added capacity, construction of new through lanes or auxiliary lanes, changes in the horizontal or vertical alignment of the roadway, or exposure of noise

sensitive land uses to a new or existing highway noise source. MassDOT acknowledges that a noise analysis is required if changes to the proposed project result in reclassification to a Type I project.

13.0 Construction Noise

A discussion of construction noise and construction noise mitigation measures deemed appropriate should be included in an EIS, EA, or CE Checklist whether the NAC are exceeded or not. The impact of construction noise does not appear to be serious in most instances and calculation of construction noise levels is usually not necessary for traffic noise analyses. Potential impacts of highway construction noise should be addressed generally and the temporary nature of the impacts should be noted. An indication of the types of construction activities that can be anticipated and the noise levels typically associated with these activities can be obtained from existing literature and presented in the noise analysis.

Using a common-sense approach, traffic noise analyses should identify measures to mitigate potential highway construction noise impacts. Low-cost, easy-to-implement measures, such as work hour limits, equipment muffler requirements, location of haul roads, elimination of "tailgate banging," ambient-sensitive backup alarms, community rapport, and complaint mechanisms should be incorporated into the special provisions to the project's construction specifications, as appropriate. These options can then be applied during the construction of the project by the contractor. Because of their cost, any unique noise control efforts should be thoroughly discussed and justified and coordinated with MassDOT before inclusion into the EIS, EA, or CE Checklist discussion.

14.0 Noise Abatement Measure Reporting

MassDOT has voluntarily maintained and completed an inventory of all completed Type I and Type II noise abatement measures every three years since the 1990s and has provided information from this inventory to FHWA. The next inventory collection will be for noise abatement measures constructed in 2008, 2009, and 2010. For noise abatement measures constructed in 2011 and thereafter, the inventory will include the following information:

- Type of Noise Abatement;
- Cost (overall cost, unit cost per square foot);
- Average Height;
- Length;
- Area;
- Location (state, county, city, route);
- Year of Construction;
- Average Insertion Loss (as reported in the noise analysis);
- Activity Categories Protected;
- Material(s) Used (precast concrete, berm, block, cast in place concrete, brick, metal, wood, fiberglass, combination, plastic (transparent, opaque, other));
- Features (absorptive, reflective, surface texture);

- Foundation (ground mounted, structure mounted); and
- Project Type (Type I, Type II, and optional project types, such as State funded, county funded, turnpike funded, and others).

MassDOT will obtain this information from traffic noise analyses; plans, specifications, and estimates; and construction bid documents.

Appendix to the Massachusetts Department of Transportation Type I and Type II Noise Abatement Policy and Procedures

This Appendix provides links to general highway traffic noise guidance and guidance on noise impact assessment, measurement, and design.

Noise Regulation and Policy

- 23 CFR 772 *Procedures for Abatement of Highway Traffic and Construction Noise* (July 13, 2010). This regulation updates the noise abatement standards to clarify applicability, certain noise analysis requirements, and use of federal funds for noise abatement measures.
- *Highway Traffic Noise Analysis and Abatement Guidance* (June 2010 (revised January 2011)). This guidance document, effective July 13, 2011, supplements the requirements contained in 23 CFR 772.
- *MassDOT Type I and Type II Noise Programs Guidebook* (January 2007).

Noise Measurement

- *Measurement of Highway-Related Noise* (May 1996). This report provides a set of standardized procedures for measuring and assessing highway-related noise.

Noise Impact Assessment

- *Massachusetts Department of Transportation Methodology for the Determination of Cost Effectiveness of Proposed Noise Abatement for Activity Category C Land Uses and Activity Category D Facilities* This report outlines a procedure that employs a systematic approach to the determination of cost effectiveness of noise abatement for Activity Category C land uses and Activity Category D facilities.
- *Transit Noise and Vibration Impact Assessment Guidance* (May 2006). This report contains procedures that should be used to calculate transit noise.
- *Advanced Prediction and Abatement of Highway Traffic Noise* (June 1982). If a highway project is near a rail line, rail noise levels should be calculated using the procedure in this document.

Noise Mitigation

- *Guide Specifications for Structural Design of Sound Barriers* (published by the American Association of State Highway and Transportation Officials in 1989 and amended in 1992 and 2002)
- *Standardized Foundations for Sound Barrier Walls* (MassDOT, September 2004))

- *FHWA Highway Noise Barrier Design Handbook* (August 2000). This design manual provides guidance on how to design a highway noise barrier which fits its surroundings and performs its intended acoustical and structural functions, with a reasonable cost.

Noise Compatible Planning

- *Entering the Quiet Zone: Noise Compatible Land Use Planning* (September 26, 2002). This brochure provides information to elected officials, planners, developers, and the general public about the problem of traffic noise and effective responses to it.
- *The Audible Landscape: A Manual for Highway Noise and Land Use* (October 1995). This manual assists local government officials in dealing with the problem of noise-sensitive land uses adjacent to highways

#279-10
06-20-12

NEWTON NORTH AREA PARKING CHANGES AND PERMIT PROGRAM

Public Safety & Transportation Committee
June 20, 2012

Original Docketed Item (Last held: 4/18/12)

#279-10: ALD. JOHNSON, ALBRIGHT & LINSKY, requesting the development of a comprehensive traffic and parking plan for the Newton North High School neighborhood with the following streets as its borders: Commonwealth Avenue, Washington, Harvard and Valentine Streets. This plan to be completed by November 30, 2010 will include a fix to short term (immediate needs) and longer term needs to:

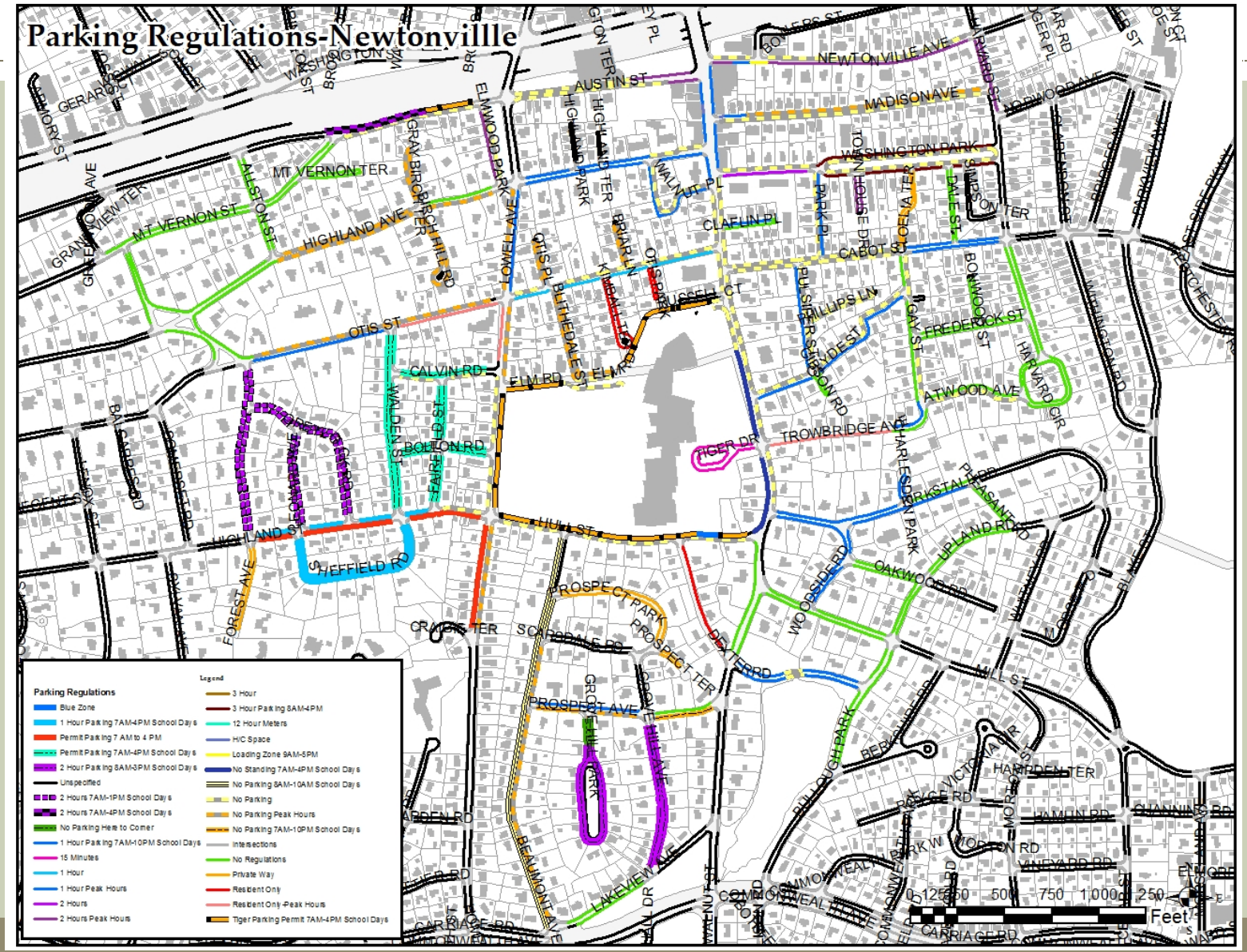
- *effectively manage the traffic circulation within the neighborhood,*
- *provide pedestrian and vehicular safety,*
- *preserve quality of life for the neighborhood, school staff and faculty.*

Walnut Street Signal (Question from Last Meeting)

- Cost to relocate Pedestrian Beacon: $30,000 (one time)
  - Hawk Signal
  - Move to Walnut Street at Tiger Drive
  - Retains right in/right out only

- Annual Cost for Police Detail $53,280 (185 days)
  - Due to staffing limitations and contract issues, would require
    - Four hour shift in AM & four hour shift in PM
    - $144/shift twice a day = $288/day

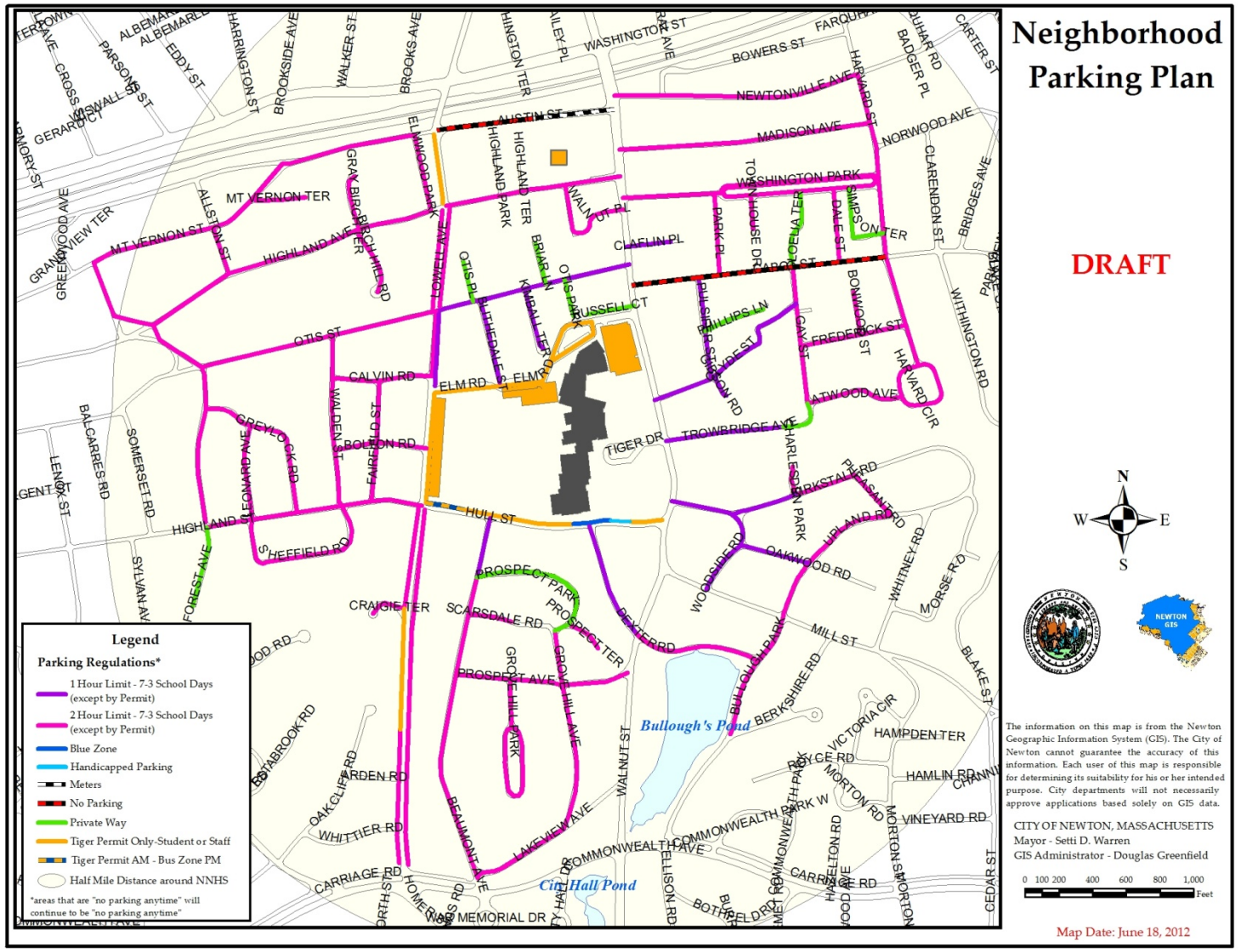
Current Parking Restrictions



Goals of Neighborhood Parking Plan

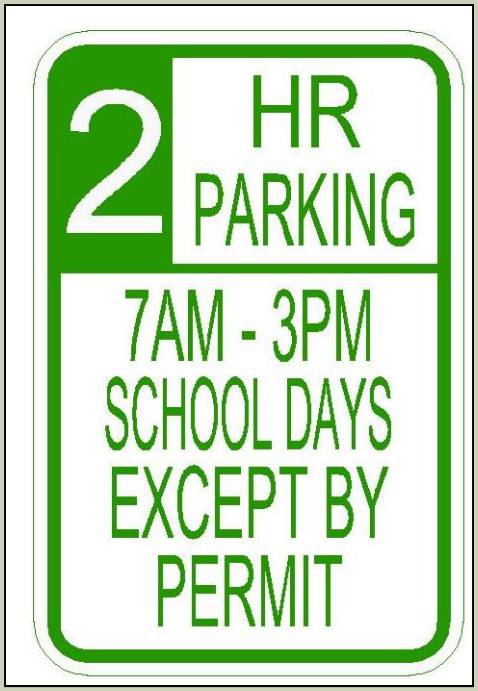
- Goals
  - Improve residents' ability to park on their local streets
  - Reduce student parking in the neighborhoods
  - Provide more consistent parking restrictions in the neighborhood
- Methodology
  - Create rings around school
    - One-hour limit (closest to school, most restrictive)
    - Two-hour limit (a little farther away)
    - Streets can petition to move up or down one level

Map of Neighborhood Parking Plan



"Newton North Neighborhood Permit" Program

- Allow *residents* with permits to park longer than posted limit
- Requires Board action
  - Set program parameters
  - Define "Newton North Neighborhood" zone
  - Determine resources needed to enforce/administer
    - Set fee to support management
    - Current rate for resident permit is $25



How Can Street Restrictions Conform With Plan?

- Approach A: all at once
  - Public Safety & Transportation approve all parking restrictions within entire "Newton North Area Permit" Zone
- Approach B: case-by-case
  - Traffic Council to approve new parking restrictions in smaller areas as docketed

How Can Residents Become Eligible For a Permit?

- Address falls within the *Newton North Area Permit Zone*

AND

- Street restrictions conform with the *Neighborhood Parking Plan*

How Would Residents Get Permit & Visitor Passes?

- Provide required documentation
  - Must be done in person at Police Annex
- Vehicle must be registered in name of applicant
- Vehicle must be principally garaged at address
- Documentation to include
  - Drivers License and Vehicle Registration
  - Proof of Residency
    - Vehicle registration
    - Current address
    - Copy of recent utility, telephone or cable bill

Where Would a Permit Allow You to Park?

- On your street
  - Exceptions
    - Streets with “No Parking” restriction (e.g., Walnut, Mill, Cabot) could park on a nearby streets
    - Hull Street and Elm Road (all residences eligible for Tiger Permits)
    - Lowell (residences across from school can get Tiger Permit)
- TIGER Parking Zones remain as is
  - Newton North Area Permit not allowed within TIGER zone
    - Hull Street
    - Elm Road
    - Lowell Avenue (3 sections)

Financial Impact

- Zone Population
  - 1,445 households; 3,448 residents; 2,227 vehicles
- Annual Cost
  - PT clerk @ 15 hrs./wk. @ $15/hr. = $11,700/year w/o benefits
  - Over 19 hrs./wk. requires additional pay and benefits
  - Permits design and printing
- Funding sources
  - $25/permit + free visitor passes
    - $14,000 (if 25% of vehicles)
    - $28,000 (if 50% of vehicles)
    - $42,000 (if 75% of vehicles)

Recommended Approach – How to Enact?

- PS&T to approve final map of new parking restrictions within neighborhood
  - Avoids individual requests at Traffic Council
  - Provides for comprehensive, consistent parking policy in neighborhood
  - Sets stage for successful permit program
    - Many residents immediately eligible to obtain permits
    - Easier enforcement
    - Option B ("case-by-case") would take years

Recommended Approach – Phase 1

- Assume $25/permit + 2 free visitor passes/household
  - Same as existing Resident Permit program
  - Provides adequate funding for management and materials
- Program managed by Traffic Bureau w/ new part-time staff
  - 15 hours/week
  - Funded through fees or other means
- Permits valid only on your street (some exceptions)
- Allows residents w/o on-street parking to park nearby

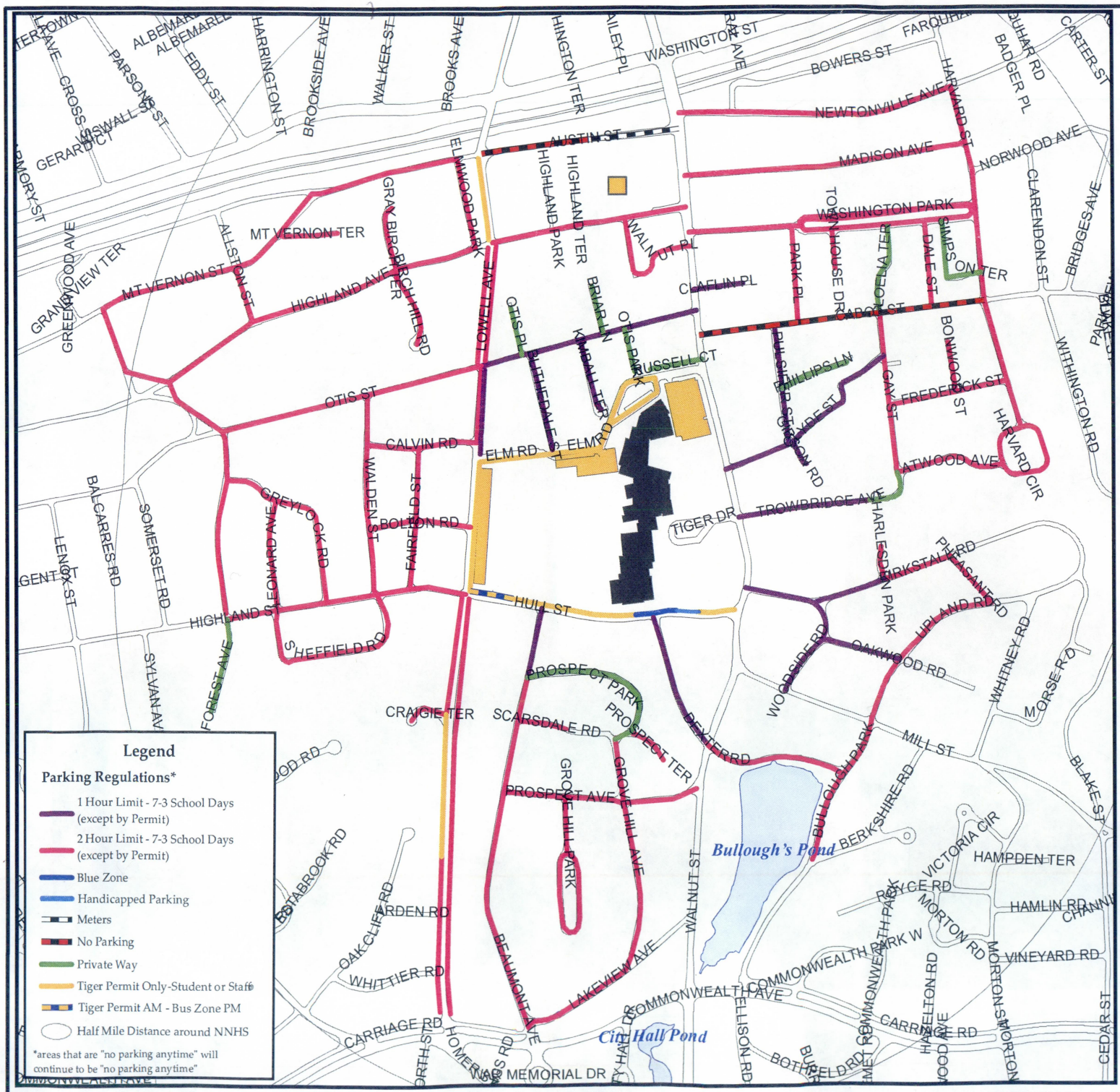
Recommended Approach – Phase 2

- Police Chief to review after 6 months
  - Staff hours needed
  - Program details
- Future changes to Parking Plan to be handled by Traffic Council
- Consider Parking Manager as programs grow

DISCUSSION

Neighborhood Parking Plan

DRAFT



Legend

Parking Regulations*

- 1 Hour Limit - 7-3 School Days (except by Permit)
- 2 Hour Limit - 7-3 School Days (except by Permit)
- Blue Zone
- Handicapped Parking
- Meters
- No Parking
- Private Way
- Tiger Permit Only-Student or Staff
- Tiger Permit AM - Bus Zone PM
- Half Mile Distance around NNHS

*areas that are "no parking anytime" will continue to be "no parking anytime"

CITY OF NEWTON, MASSACHUSETTS
Mayor - Setti D. Warren
GIS Administrator - Douglas Greenfield

0 100 200 400 600 800 1,000 Feet

Map Date: June 18, 2012

06-20-12 #279-10 Koses 06-20-12