V. CIRCULATION ELEMENT

INTRODUCTION

Princeton's resident population is 28,572 (2010 Cc~~e~~nsus). Combined with an estimated 21,000 in-commuters to local institutions and businesses, approximately 6.250 out-commuters from Princeton, and some 125,000 vehicles traveling through, our small and mostly unchanged network of streets will continue to be impacted

As the community approaches build-out of its available land, steps must be taken to ensure long-term sustainability of the community's social diversity, neighborhood quality of life and vibrancy of its town center. A concerted effort should be made to support reduced dependency upon the automobile. Instead the community should support efforts to provide increased walking, biking, and transit.

The Municipality of Princeton, Mercer County and the New Jersey Department of Transportation have all adopted Complete Streets policies, requiring all roadway projects to safely accommodate travel by pedestrians, bicyclists, public transit, and motorized vehicles. These policies shift the focus from a transportation system centered on the car, to creating a multi-modal network with better access and safety for all travel modes, including pedestrians and bicyclists

Princeton's ~~A~~ "Complete Streets" ~~initiative~~ program will extend a complete sidewalk and bicycle route network throughout the community's core in order to encourage more residents to walk or bike, rather than use their cars. Implementing this complete street policy will guide Princeton towards realizing its vision of a town where users of all ages can safely and comfortably ride, walk or bicycle regardless of their abilities, the purpose of their trip, or their destination. Replacing vehicle trips with bicycle and/or pedestrian trips would alleviate the strain on the downtown's limited parking supply, reduce the proportion of traffic that is simply trying to find parking and decrease congestion on local roads. All of which would, in part, mobility and make Princeton a more accessible place.

Major initiatives will need to be undertaken to manage and reduce the flow of motor vehicle traffic into and through the community. All future developments of significant impact will be required to include a plan for traffic management. In cooperation with neighboring municipalities, the community will need to seek approval and financing for traffic flow and control measures on U.S. 206 to discourage through truck traffic, and enhance local traffic flow and safety. It will need to press for below or above-grade crossings of U.S. 1 at Washington Road and Harrison Street. Physical or traffic management alternatives will be identified to alleviate traffic at the points of most severe congestion in the community.

To enhance accessibility and vibrancy of the community's downtown, plans will need to be implemented for additional municipal parking structures as well as remote parking lots to facilitate convenient access to downtown and its stores, restaurants, theaters and other facilities, reduce traffic on downtown streets and costs to merchants of providing their own on-site parking.

Princeton's gateway tree-lined, two-way streets are jammed beyond capacity with inter-regional and local traffic. Mobility planning is a major priority if we are to safeguard our community's quality of life and the character of our roadways. More and better transit opportunities will be needed to entice additional residents, commuters, and visitors to lessen their reliance on motor vehicles.

The community's policy updated in this Master Plan calls for:

a) reducing local automobile road trips "in town,"
b) providing more and better bikeways and sidewalks,
c) redesigning and constructing an internal road system that will implement the elements of a Complete Streets Policy to provide more infrastructure to encourage walking and biking,
d) improving mass transit options;
e) upgrading the existing area road system to improve local traffic circulation; and
f) not facilitating through traffic and long-haul large truck traffic.

GOALS

It is the policy of this Master Plan to entice people out of their cars and to promote using mass transit, bicycles or walking as their primary means of travel.

1. Regulate traffic flow in the downtown, business districts and protect historic and residential neighborhoods

(a) Reduce the number of single-occupancy vehicles by providing viable alternatives ~~-~~ for people to get to work, shop or recreate.

(b) Provide both in-town and fringe parking served by transit.

(c) Encourage large local businesses and institutions to develop Transportation Demand Management plans.

2. Promote and encourage pedestrian mobility

~~(a) Implement a walkable design within guidelines as the municipality updates its existing infrastructure and initiates new infrastructure construction.~~

~~(b) Introduce a safer mobility network designed for all bicyclists, public transportation riders, and pedestrians of all ages and abilities.~~

(a) Provide a well-connected walkway system with an emphasis on providing access to the downtown as well as public and private schools, Princeton Shopping Center and other business and medical buildings in town. ~~Establish a complete sidewalk network throughout the Princeton Community, per the Sidewalk & Path System Plan (Map D), with an emphasis on providing varied access to the downtown and public schools~~,

~~thereby eliminating the need to provide busing on hazardous routes and encouraging interconnection of the Princeton neighborhoods.~~

(b) Promote education about and enforcement of pedestrian, automobile and bicycle safety.

(c) Provide safe streets and crosswalks for all pedestrians.

(d) Create a culture of walking by providing a safe and secure environment for al pedestrians.

(e) Promote a well maintained pedestrian system.

3. Promote bicycling for cyclist of all ages and abilities to safely, comfortably and conveniently access major destinations throughout Princeton.

(a) Develop a bicycle network that is safe continuous, connected, convenient, complete and comfortable.

(b) Improve safety for all roadway users and prioritize bicycle safety for those with limited transportation options, including school-age children and other vulnerable roadway users.

(c) Create a low-stress bicycle network that is accessible to cyclists of all ages and ability levels.

(d) Encourage bicycle use for local trips to mitigate roadway congestion and parking demand issues in the downtown core.

(e) Promote safe cycling practices and a mutual respect and better understanding of the rules of the road among all roadway users through education, enforcement, and encouragement programs.

~~3~~4. Carefully review future development and new land uses.

(a) Review proposed zoning ordinances to ensure that use and development potential are appropriately supported by either existing or planned transportation systems.

(b) Discourage development at the concept stage when it conflicts with planned transportation goals.

~~4~~5. Encourage regional transportation collaboration with other agencies.

(a) Provide leadership in promoting regional traffic coordination in State, County, and municipal road projects.

(b) Develop strategies to address interstate/interregional truck and automobile traffic throughout the community.

(c) Utilizing all resources available collect and analyze traffic data on employment and commuting patterns to evaluate circulation impacts from existing and new development.

~~5~~6. Improve coordination with public and specialized transportation providers.

(a) Promote the further development, extension, and use of both public and private mass transit.

(b) Encourage New Jersey Transit Corporation to:
(1) continue and improve the "Dinky" rail service along the NJ Transit ROW from Princeton to the southbound station platforms of the Northeast Corridor trains at Princeton Junction;
(2) support "Dinky" service to meet all peak commuter hour trains, provide adequate Princeton Station facilities that are open during "Dinky" operating hours; and,
(3) schedule buses to arrive and leave the Princeton "Dinky" Station to enhance the ability for rail commuters to access it by bus; and
(4) seek and support grants from the federal government and other sources for improvements of the "Dinky" rail service.

(c) Continue and expand the municipally operated jitney service to accommodate the needs of local residents.

(d) Assist in the expansion and public use of bus and jitney systems operated by Princeton University, Princeton Theological Seminary, the Institute for Advanced Study, and Westminster Choir College of Rider University.

(e) Encourage the development of various transit services for the elderly, disabled, and other transportation dependent persons.

(f) Explore the integration of public and private schools' transportation services with other transportation services to better serve the transportation needs of the entire community.

(g) Encourage the expansion or development of private transportation services such as taxis, shuttles, car pools and other services.

(h) Make information available to the public on transit services using print and electronic media.

~~6~~7. Promote Sustainability

(a) Encourage the use of low emissions and clean technologies in transportation and facilities.

(b) Protect and improve the visual, historic, and human-scale qualities of Princeton's roadways, bridges, culverts, and other transportation facilities.

(c) Protect and enhance access to employment, education, businesses and services for our community's resident population.

(d) Encourage the use of alternative fuel vehicles by the municipality.

~~7~~8. Enhance Local Circulation

(a) Encourage the development of remote parking facilities.

(b) Encourage municipal officials to develop an alternative strategy(ies) in providing access to medical facilities when floods or blockage of standard routes creates a situation which prevents the use of standard routes.

STRATEGIES TO ADDRESS CIRCULATION GOALS

Environmental

- Protect the health of citizens, especially pedestrians and cyclists, by advocating the use of low-emission vehicles and educating the public about the short- and long-term environmental damage caused by vehicle pollution.

- Protect scenic and natural settings by promoting the preservation of existing trees and the planting of new trees along existing and proposed roadways.

- Maintain and create scenic gateways identifying entrances into Princeton.

- Protect the visual and aesthetic values of the community by coordinating improvements to roadways and parking areas using the Urban Design Element. Develop holistic design standards for roadways and parking lots that integrate landscaping, signage, and hardscape as well as safety features.

- Monitor physical and program development plans and expansion plans for the Princeton Airport and take appropriate action(s) to limit noise impacts and flight patterns over the Princeton Community.

- Encouraging walking and bicycling which reduce the need to widen or build new roadways and reduces congestion.

Pedestrian/Bicycle Mobility

- Provide for safe crossings of pedestrians and bicyclists at roadway intersections or intermediary points where appropriate, especially on routes to schools.

- Develop, in conjunction with major local corporations and institutions, an overall pedestrian, bicycle and vehicular circulation and parking plan.

- Develop a continuous pedestrian and bicycle circulation system throughout the community and encourage neighboring communities and corporations to become a part of this network.

- Indicate which roads are part of the share-the-road programs through signage and road surface "sharrows" markers.

- Implement wayfinding signage in the Princeton Community to help all ~~find~~users find their way to specific destinations. Wayfinding is a process of using visual information to navigate through a complex environment; such signage should ideally be easy to interpret and allow the user to proceed to a specific destination.

- Develop a core bicycle network with seamless and convenient connections throughout the municipality.

- Establish a clear framework for implementation of bicycle improvements that reflects local context, recognizes the spectrum of travel needs and facility types, and acknowledges the need for balance and trade-offs in the design of specific improvements.

- Establish sidewalks as standard infrastructure.

- Eliminate gaps in the sidewalk network that prevent pedestrians from having a continuous route to major destinations and schools.

- Educate pedestrians, bicyclists and motorists about the rights and responsibilities of those using our roads.

- Provide street furniture appropriate to pedestrian and bicyclist needs.

- Develop appropriate zoning standards for bicycle parking.

- Develop a downtown bicycle parking plan.

Local and Regional Public Transit

- Encourage convenient peripheral parking and/or shuttle service for commuters and Central Business District (CBD) employees.

- Reduce auto dependency by improving public bus and rail transportation as well as minibus, shuttle bus, van services.

- Vigorously support rail between Princeton and Princeton Junction. Encourage alternative transit systems to provide service to the Princeton Community.

- Support regional transit initiatives such as bus rapid transit in the Route 1 corridor.

- Provide bus shelters at high bus user transit stops.

Specialized Transit Service

- Promote and coordinate local bus service and specialized bus service for the elderly, handicapped, school-aged children and other auto-dependent people.

- Review school bus transportation policies.

Transit Information Availability

- Provide better information on transit routes and schedules through the use of municipal websites, newspapers, cable television and other communication media. Such information should be posted prominently along the routes and at hubs such as the railway station, the public library and the Princeton Shopping Center. Promote signage and branding on transit vehicles. Electronic notification of arrival and departure times at stops is desirable as is personal access to this data through web-enabled devices.

Land Use and Transportation

- Work with the State, surrounding communities, Mercer, Somerset and Middlesex counties to balance land use bearing in mind the capacity of the existing circulation system.

Interstate/Interregional Traffic

- Eliminate interstate truck traffic from local streets by imposing a four-ton gross weight restriction on all local streets except where state and county regulations apply.

- Incorporate “traffic calming” physical variations in the roadways (primarily 206, if possible) to discourage large trucks and speeding motorists.

- Encourage and enforce reduced weight limits on state and county roads to protect historic bridges.

Regional Traffic Distribution

- Work with NJDOT develop a comprehensive strategy for Route 206 through Princeton that addresses noise, vibration, speed, safety, and size and weight of trucks.

Local Circulation

- Plan new road connections only in those areas where the Land Use Element of the Master Plan projects increases in automobile traffic owing to the land-use designation.

- Implement pedestrian and bicycle improvements recommended in the Circulation Element of the Master Plan in three ways:

- as roads are due for resurfacing or other routine maintenance;
- as grants or other funding is available;
- as programs and policies that support a bicycle friendly community and encourage more people to bicycle as a means of daily transportation are developed. **(pg 2)**

- Limit roadway improvements to a scale that is compatible with surrounding neighborhoods. Roads through and around Princeton should be two-lane and tree-lined with sidewalks included.

- Review the status of and criticality of private roadways, ROWs, and paths to overall service, mobility and connectivity of the multi-modal circulation system.

- Protect attractive and historic bridges to promote their rehabilitation and restoration.

- Limit curb cuts on heavily traveled streets to reduce vehicular conflicts.

- Review impact on circulation system of any addition of turning lanes at intersections.

- Designate a hierarchy of roads by ordinance.

- Investigate and implement traffic calming techniques in neighborhoods impacted by through traffic.

- Review the impact of new traffic lights on existing neighborhoods.

- Consider priority signal preemption for emergency vehicles and for buses at Harrison Street, Washington Road, and other U.S. 1 intersections where congestion threatens delays.

Information

- Collect data and maintain a data base of existing traffic counts.

- Develop a greater understanding of existing traffic patterns.

- Develop a traffic management plan for the Princeton area.

CURRENT STATE OF THE CIRCULATION SYSTEM

Travel Demand Patterns

More could be learned about regional circulation from the major employers in the area. General residential locations of the employees of the major companies, educational institutions and government agencies would provide valuable quantitative information about the geographic

distribution of peak-hour demand. Interregional traffic is the most difficult and expensive to quantify. NJDOT should continue to survey truckers using Routes 206 and 31.

U.S. 1 currently functions as a barrier splitting the Greater Princeton economic area in two. Not only is it an impediment to efficient commutation, it also is a threat to public safety. Access to the University Medical Center of Princeton at Plainsboro for those living in Princeton and elsewhere west of U.S. 1 is seriously compromised by the lack of above- or below-grade interchanges at Harrison St. and Washington Rd. A 2010 NJDOT Route 1 Regional Growth Strategy stressed that the Princeton/Plainsboro/West Windsor area "has the strongest overall private sector market" in the southern U.S.1 corridor in New Jersey and is "a major economic driver, based upon the stature of the University and related research institutions, which link the area to the global marketplace."

Every day, 80,000 commuters are coming to work in Princeton, West Windsor, and Plainsboro. By factoring in portions of nearby Lawrence and South Brunswick Townships, as well as those who come from Pennsylvania, New York City area, as well as other areas in New Jersey, it totals well over 100,000 that travel every day to sites along the "Greater Princeton" section of the U.S. 1 Corridor. Although the "Greater Princeton" economy employs over 100,000 workers, only about 55,000 of those workers also live in a "Greater Princeton" municipality.

Historic Structures, Roads and Bridges

Historic roads and bridges are often the gateways into the community and are the principal view that both residents and visitors have of our community. Care should be taken to maintain their repair and to protect their historic character through the sensitive selection of materials and a design that provides a width, scale and appearance in keeping with the surrounding neighborhood. It is the policy of this Master Plan to urge the State and County to develop alternative design standards in keeping with the original design of the structure that preserve and protect the historic elements of these roadways and bridges.

The State Historic Preservation Office has asked the Historic Preservation Commission to work with neighboring municipalities on the development of design guidelines for the Kings Highway Historic District. Design guidelines for this and other historic roads should provide the tools that local, county, and state officials need for repairing replacing or preserving historic landscapes, roadscapes, and structures.

Emergency Access

It is the policy of this Master Plan to recommend a secondary means of site access for any new development creating 25 or more residential lots. New developments creating over 15 lots should provide a secondary means of access for emergency vehicles.

Recent flooding events have raised a new concern about emergency access to the Princeton Hospital at Plainsboro. A plan must be developed to provide access for Princeton residents to the hospital when the Millstone River floods. Safe routes to other regional hospitals should be mapped and chosen for use when Princeton Hospital in Plainsboro is not accessible during emergencies.

Roadway Design Standards

Princeton's right-of-ways should be safe and inviting public spaces. In accordance with Complete Streets, roadways should be designed to accommodate all users when possible while incorporating existing healthy trees and complementing historic features and surrounding neighborhoods. ~~Trees are a critical component to all of Princeton's roadways. Where they exist, every effort should be made to preserve them. Where they are absent, new plantings should be provided in appropriate size, spacing, and species.~~ Roadway design must be compatible with the surrounding neighborhood in terms of width, scale, appearance and selection of construction material.

Renewed attention should be given to sidewalk design standards, especially in areas where road widths are constrained and bicyclists and pedestrians both use adjacent sidewalks. On dual-use sidewalks, it is very hard for a cyclist to pass a pedestrian, let alone a wheelchair or child stroller; a wider sidewalk construction, should be recommended where practicable. The roadway geometric design standards in Princeton are shown in Table 1, Appendix B. As construction or improvements are required, street design will be based on the established standards for that particular street classification. However, the standards are intended as a general guide since flexibility should be retained in the road design of new developments. The actual paving width, for example, should be kept narrow although it may vary between the minimum and maximum shown depending on the road location and the need for curbs, walks, parking or shoulders, and bike paths.

The Board should consider exceptions to the standard for road width when environmental considerations warrant such consideration. Whenever a narrower width is permitted, a grass stabilized shoulder should be provided to ensure safe emergency vehicle access and operation. Alternate standards are recommended for secondary arterials and major collectors which recognize the sensitive historic, residential, and environmental areas they traverse. In those constrained locations, narrower shoulder widths and parking restrictions should be proposed.

Roadway Classification Standards

Existing and proposed streets are classified according to their traffic-carrying function and are identified on the Roadway Inventory Map (Map A). Six street classifications are listed on the map: primary arterials, secondary arterials, major collectors, minor collectors, local streets, and cul-de-sacs. It is recommended that these roadway classifications be ordinanced.

Primary Arterials - are under State jurisdiction and provide for major local and inter-municipal movements. These roads will be expected to handle substantial volumes of local and through traffic. Primary arterial roadways will generally handle most of the interstate/inter-regional and regional traffic that traverses Princeton. In order to preserve their traffic-carrying capacity, the number of intersections, driveways, and frontage activities should be minimized along these streets.

Secondary Arterials - are under County and local jurisdiction and also provide for intermunicipal movements but at lower capacity levels than primary arterial streets. Although these streets may

handle significant traffic volumes, adjoining land use is often residential in character. Secondary arterial roadways will generally handle most of the regional traffic that traverses Princeton. In order to preserve their traffic-carrying capacity, the number of intersections, driveways, and frontage activity should be minimized along these streets.

Major Collectors - are under County and local jurisdiction and provide access and circulation between various points within the community for moderate volumes of traffic. Because their function is to promote free traffic flow, major collectors should minimize parking and access driveways since these activities interrupt the flow of traffic. Collector roadways will generally be utilized by persons making regional and local trips.

Minor Collectors - provide access to properties and also collect traffic from developments and carry it to major collectors or arterials. The traffic on these streets should be limited to vehicles collected from intersecting local streets and the small amount generated on the street itself. Minor collectors are not intended to service interstate/inter-regional, regional, or cross-town traffic. They should be designed to discourage short-cutting by through traffic from outside the neighborhood.

Local Streets - ideally they serve to provide access to land activities that front upon them (primarily residential) and serve no network function in terms of long distance or intra- regional linkages. They are designed to carry only the traffic generated from the neighborhood. Private substandard streets are discouraged since they do not permit sufficient emergency access, and other public services.

Cul-de-sacs - are useful in some instances to provide local access to residential lots. Their use should be discouraged in cases where they cause circuitous traffic patterns or difficult access for emergency vehicles. Private or substandard cul-de-sacs should not be allowed.

Additional and/or different roadway classifications may be required in the future to address how a roadway functions and impacts the Princeton community. Examples include Faculty Road which is Princeton University's access road as well as a distributor of traffic among Harrison Street, Washington Road and Alexander Street.

Roadway Inventory

The following roadways have been classified as Primary Arterials:

Route 27 (Nassau St.)
Route 206 (Stockton St., Bayard Lane, State Rd.)

The following roadways have been classified as Secondary Arterials:

Cherry Valley Road	Bunn Drive
River Road	Province Line Road
Mercer Street	Faculty Road
Washington Road	Alexander Street
Harrison Street	The Great Road – Elm Road

The following roadways have been classified as Major Collectors:

Rosedale Road	Hodge Road

University Place
Paul Robeson Place
Quaker Road
Wiggins Street-Hamilton Avenue
Witherspoon Street
Cherry Hill Road

The following roadways have been classified as Minor Collectors:

Snowden Lane
Mountain Avenue
Poor Farm Road
Jefferson Road
Ewing Street
Hutchinson Drive
Valley Road
Herrontown Road
Terhune Road/Van Dyke Road
Pretty Brook Road
Moore Street
Lovers Lane
Prospect Avenue
Stuart Road from The Great Road to Cherry Hill Road
Mount Lucas Road north of Ewing Street

COMPLETE STREETS

Complete Streets are designed and operated to enable safe access for all users. Pedestrians, bicyclists, motorists and transit riders of all ages and abilities must be secure in the knowledge that they are able to safely move along and access the Princeton community. Princeton's Complete Streets policy calls for the town to create a comprehensive, integrated and connected multi-modal network which provides access for all modes of transportation to employment centers, educational facilities, retail areas and residential neighborhoods.

The benefits of Complete Streets are many and include the following:

a. Provide improved safety for all users as well as those that cannot afford a car or choose to live car-free.

b. Reduce barriers and provide opportunities for potentially vulnerable populations such as low–income individuals, older adults and children.

c. Provide connections to bicycling and walking trip generators such as employment, education, residential, recreation, retail centers and public facilities.

d. Improve physical and mental health either directly or indirectly by providing more opportunities for social connectivity and active transportation on safer facilities.

e. Create more livable communities.

f. Reduce traffic congestion and reliance on carbon fuels thereby reducing greenhouse gas emissions.

COMPLETE STREET POLICY

Princeton should implement Complete Streets policy improvements though the planning, design, construction, maintenance and operation of new and retrofit transportation facilities, in an effort to improve safe access, mobility and health of all users. This includes all projects funded through the Community's Capital Programs as well as other funding mechanisms. Flexibility must be exercised in implementing these policies as each street is different and user needs must be balanced and fit in to the context of the community.

a. Create a comprehensive, integrated, connected multi-modal network by providing connections to bicycling and walking trip generators such as employment, education, bicycle and transit facilities.

b. Incorporate sidewalks, bike lanes, safe crossings and transit amenities into the initial design of a project, sparing the expense of retrofits later.

c. The following pedestrian, bicycle and transit accommodations should be considered: accessible sidewalks; curb ramps; crosswalks; countdown pedestrian signals; signs; median refuges; curb extensions; pedestrian scale lighting; bike lanes; shoulders and bus shelters should be completed for each publicly funded transportation project (except sidewalk and ADA curb ramp maintenance, signage, and striping contracts, and bike rack and street furniture installation) unless supporting documentation against inclusion is provided and found to be justifiable by the governing body.

d. Additionally, in rural areas, paved shoulders or a multi-use path should be included in all new construction and reconstruction projects on roadways used by more than 1,000 vehicles per day. Paved shoulders provide safety and operational advantages for all road users. Shoulder rumble strips are not recommended when used by bicyclists, unless there is a minimum clear path of four feet in which a bicycle may safely operate. If there is evidence of heavy pedestrian usage then sidewalks shall be considered in the project.

e. Establish a procedure to evaluate resurfacing projects for complete streets inclusion according to length of project, local support, environmental constraints, right-of-way limitations, funding resources and bicycle and/or pedestrian compatibility.

f. Transportation facilities are long-term investments that should anticipate likely future demand for bicycling and walking facilities and not preclude the provision of future improvements.

g. Address the need for bicyclists and pedestrians to cross corridors as well as travel along them. Even where bicyclists and pedestrians may not commonly use a particular travel corridor that is being improved or constructed, they will likely need to be able to cross that corridor safely and conveniently. Therefore, the design of intersections, interchanges and bridges should accommodate bicyclists and pedestrians in a manner that is safe, accessible and convenient.

h. Design bicycle and pedestrian facilities to the best currently available standards and practices.

i. Research, develop and support new technologies in improving safety and mobility.

j. Consider opportunities in planning and design of complete streets infrastructure to improve pubic health.

k. Make provisions for pedestrians and bicyclists when closing roads, bridges or sidewalks for construction projects.

l. Improvements should also be considered connections for Safe Routes to Schools, trail crossings and areas or population groups with limited transportation options.

m. Improvements should comply with Title VI/Environmental Justice, Americans with Disabilities Act (ADA) and should complement the context of the surrounding community.

n. Implement training for engineering and planning professional staff and volunteers on bicycle/pedestrian/transit policies and integration of non-motorized travel operations into transportation systems.

o. Establish Performance Measures to gauge success.

II. EXEMPTIONS

Exemptions to the Complete Streets policy should be presented for final decision to the governing body in writing by the appropriate staff and documented with supporting data that indicates the reason for the decision and are limited to the following.

a. Pedestrian and bicycle facilities shall not be required where they are prohibited by law.

b. Public transit facilities shall not be required on streets not serving as transit routes.

c. Scarcity of population, travel and attractors, both existing and future, indicate an absence of need for such accommodations.

d. In any project, should the cost of pedestrian, public transit, and/or bicycle facilities cause an increase in project costs in excess of 15%, as determined by engineering estimates, that would have to be funded with local tax dollars then and in that event, approval by the municipal governing body must be obtained prior to bidding of the project;

e. Detrimental environmental or social impacts outweigh the need for these accommodations; and

f. Historic streetscapes and highways may need special treatment or consideration rather than exemption.

A complete street checklist which can be used to evaluate each transportation capital improvement should be adopted by Mayor and Council.

BICYCLE & PEDESTRIAN IMPROVEMENTS

Among the goals of this bicycle and pedestrian plan is to develop a network in Princeton that is accessible and attractive to cyclists and walkers of all ages and abilities. The guiding principle used to achieve this vision is to follow the "Five C's." That bike and pedestrian networks must be "C"ontinuous, "C"onnected, "C"onvenient, "C"omplete, and "C"omfortable. Investing in bicycle & pedestrian infrastructure and its programs will attract more people to bicycling and walking. Encouraging residents to walk and ride provides many positive impacts on the quality of life in Princeton.

Princeton welcomes walking & cycling as an essential, comfortable, convenient, and safe form of transportation for residents and visitors of all ages and abilities. Cycling and walking will play a critical role in Princeton's future, not only as a recreational activity, but as an everyday means of transportation – an easy way to get to school, run errands, commute to work, and see friends

Bicyclists and pedestrians in Princeton are diverse in age and abilities. To meet the needs of this wide-ranging group a variety of facilities are needed. Pedestrians need to safely and conveniently travel on foot or with a mobility devices, safely cross streets and have walkways adequately maintained, free of snow and ice, and be in good repair. Cyclist need to respect pedestrians when sharing common paths. Advanced bicyclists are best served by streets and highways which have been designed for cars and bicycles to share the road. Casual riders may prefer a separate path or marked bike lane which encourages bicycle usage. Young children need separate paths or to share sidewalks due to their limited riding skills.

A separate Bicycle Plan developed by the municipality with the assistance of Parsons Brinkerhoff and funded by the NJDOT has been endorsed (to be scheduled) by the Planning Board. The complete Princeton Bicycle Plan, 2016~~6~~7 is available for reference.

The Master Plan does not identify the type of bicycle facility as each improvement must take into account the context of each link in the bicycle network. Factors such as the surrounding land use and density, traffic volume and speed, frequency of driveways, on-street parking demand, proximity of off-street parking options, historical context, constraints such as street trees and utilities, and existing roadway widths should be used to evaluate the appropriate bicycle facility. Implementation of the bicycle network will inevitably involve trade-offs as Princeton strives to implement its complete streets policy and create a more balanced, multi-modal transportation network and preserve the character of the town and specific neighborhoods.

The existing bicycle network in Princeton includes off-road paths, shared lane markings, bicycle lanes and shared use paths. Princeton's network provides, to a varying degree, benefits to cyclists. Currently there are 24.5 miles of off-street paths and 10.8 miles of on-street shared lane markings (sharrows). There are over 80 miles of sidewalk in Princeton.

Bicycle and Pedestrian Network - Recommendations

~~The Princeton Community Master Plan recommends that a community-wide bicycle system that addresses all levels of bicycle riding ability be developed. Special attention should be given to developing routes which allow school-aged children to safely ride bicycles to and from school, parks, the Library and other areas in the community.~~

Map ?? depicts the existing and proposed bicycle network and Map ?? depicts the existing and proposed sidewalk network.

Bike Path Extensions - A bike path extending from the Institute for Advanced Study on Olden Lane through the Institute lands and over the Stony Brook and D & R Canal linking the Mercer County Park, Seminary Apartments and Market Fair Shopping Center should be considered. ~~The Guyot Avenue bike path should be extended from Witherspoon Street to Community Park~~

Sidewalks, bikeways, and paths - This Master Plan encourages development of a continuous network of sidewalks, bikeways and paths to create linkages between neighborhoods, open spaces, recreational areas, and schools as well as providing an alternative to motorized vehicular traffic. Sidewalks, bicycle paths or pedestrian paths should be provided along all major roadways. Sidewalks networks should be completed as road work is done on all roads within a half mile of public and private schools and priority should be given to completing paths or sidewalks that would provide access to public parks and recreation and open space areas. Joggers should be encouraged to use sidewalks, bikeways and other paths rather than public streets. A list of current popular jogging routes that lack sidewalks or paths should be created as a tool for planning future sidewalk and path extensions.

Since 1989 many of the sidewalks, bikeways and paths recommended in the Master Plan have been constructed. The remaining sidewalks, bikeways and paths indicated in the 1989 plan remain valid and should be constructed when feasible. The sidewalk plan indicates the existing as well as proposed sidewalks, bikeways, and paths. The design and type of bicycle and pedestrian facility has been evolving over the past ten years. As these standards and facility type changed some of our existing facilities may not meet current standards. The Master Plan recommends that as roadways are reconstructed, as part of the complete street requirements, these facilities be brought up to current standards.

Pedestrian Enhancement - Areas of high pedestrian activity should be studied to determine what actions are appropriate to better protect and encourage pedestrian activity. Pedestrian crossing markings and signage should be enhanced where appropriate. Stricter enforcement of pedestrian safety rules should be encouraged. A community-wide pedestrian safety program should be developed.

SUGGESTED ROADWAY IMPROVEMENTS

Most of the roadway improvements suggested in the Master Plan are minor improvements to the existing system or involve overlays of existing roadways. A few major highway improvements will be needed to maintain a reasonable level of service on the Princeton Community's streets, while retaining roadway size at a level that is within the scale and character of Princeton. It is recognized that some improvements can be accomplished more easily than others. The suggested improvements are grouped as State and Regional proposals and local proposals.

Existing and proposed sidewalks and multi-use paths are shown on the Sidewalk & Path Plan. Sidewalks are typically four feet wide and are constructed of concrete. Multiuse paths are six to eight feet wide and constructed of bituminous concrete, stone dust or other natural surfaces.

Suggested road and highway improvements are shown on the map titled Suggested Road Improvements (Map B).

STATE AND REGIONAL IMPROVEMENTS

Routes 27 and 206 - These roadways should be maintained as two-lane roadways and additional curb cuts discouraged wherever practical. Any plans to widen either of these roads in adjoining communities must be carefully reviewed for their impact on Princeton. Routes 27 and 206 cannot be widened in Princeton and should not be allowed to empty four lanes of traffic onto a two- lane road. Continued effort should be made to install ~~roundabouts~~ improvements at key intersections along 206, as recommended in the *Route 206 Vision Study*.

Route 1 Improvements - Improvements to Route 1 such as widening and construction of grade separated interchanges at Alexander Street, Washington Road, and Harrison Street, are necessary to meet traffic demand. Pedestrian and bicycle access over these interchanges should be provided. The size and scale of roadway connections to the overpasses and any new roads serving them should be consistent with this Master Plan's policy of two-lane tree-lined roadways. Any road design which negatively impacts Carnegie Lake, the D & R Canal, Alexander Street, Washington Road, Harrison Street, or Faculty Road should be discouraged.

Alexander Street Bridge over the Stony Brook - This bridge should be replaced by Mercer County and constructed with an increased cartway width and a pedestrian walkway to improve safety and traffic flow

Route One Bus Rapid Transit (BRT) System - In order to establish an alternative to U.S. Route 1 which is heavily congested with automobile traffic during peak hours, a study by N.J. Transit has recommended a Bus Rapid Transit (BRT) System as a fast and reliable transit service.
An alignment was proposed that would directly connect to the major activity centers and only allow access to BRT and supporting feeder route buses, separating the vehicles from the automobile congestion on U.S. Route 1. Two primary BRT guideways were developed, one on the east side and one on the west side of U.S. Route 1.

Historic Bridges and Culverts - The community's historic bridges and culverts should be rehabilitated and preserved rather than replaced with new structures. New structures should be compatible with the historic area in which they are located. The replacement of the Bridge over the Stony Brook on Rosedale Road is a good example of recent bridge replacement.

LOCAL ROAD IMPROVEMENTS

Cherry Valley Road System

Cherry Valley Road Improvement – In addition to recent improvements to Cherry Valley Road additional safety improvements such as adequate shoulder on each side, straightening of several sharp curves, regrading of a few sharp vertical curves, improved sight distance on some of the curves, and drainage improvements to eliminate dangerous ditches and sheet ice in winter are needed. Intersections should be reviewed and re-aligned as needed. This road should remain as a two-lane roadway.

Cherry Valley Road and Route 206 - Circulation improvements will be needed in this area to service Griggs Farm, several new office buildings, and development in Montgomery Township. The relationship of Hillside Avenue, Cherry Valley Road, Route 206 and Duffy Place should be evaluated. Pedestrian walkways should be provided along Route 206.

Province Line Road System

Province Line Road Extension - Province Line Road should be improved and extended from Rosedale Road to Cherry Valley Road, with two lanes and shoulders. The bridge over the Stony Brook should be replaced or repaired. The proposed extension of Province Line Road must maintain the scenic and rural character of this roadway.

Province Line Road/Cherry Valley Road Intersection - This intersection will require improvement after the restoration of the Province Line Road bridge and at that time may require signalization. A cooperative effort will be needed with Montgomery Township to align both legs of Province Line Road.

Province Line Road Bridge - It is proposed that the bridge over Stony Brook which is currently out of service, be restored to a two-lane bridge to provide a traffic corridor along Princeton's western border in order to reduce the volume of traffic passing through the center of Princeton.

Province Line Road Improvement - This road is proposed to be reconstructed and extended from Rosedale Road to Cherry Valley Road, with two lanes and shoulders. It is a key component of an evolving peripheral circulation system.

Route 206 System

Lovers Lane/Route 206 Intersection - A traffic signal is proposed which would be coordinated with signals at Lovers Lane/Mercer Street and Elm Road/Route 206.

Mercer Street/Route 206/Bayard Lane/Nassau Street Intersection - This intersection needs some improvement in realignment, where possible, and in coordinating signal timing with other intersections on Nassau Street. This is the busiest intersection in Princeton. Over 20,000 vehicles pass through it each day. Given this volume, the unusual confluence of these roads creates dangerous bottlenecks during the busiest times of the day and poses continual threats to public safety. Proposed redevelopment along Alexander Street necessitates careful study to determine the most effective strategies to manage traffic and protect public safety in this historic and iconic part of the community.

Mercer Street/Alexander Street Intersection – A ~~light~~ traffic signal synchronized with the ~~light~~ signal at Nassau and Bayard/University warrants consideration. These are two of the most used entrance and egress thoroughfares in the community. During busy times of the day, left turns onto Mercer Street from Alexander Street are extremely difficult and hazardous.

Mountain Avenue/Route 206 - Some minor geometric improvements will be needed to allow more freedom of traffic movement. A roundabout was recommended as part of the Route 206 Vision Plan and should be considered.

Route 206/Ewing Street – This intersection is the number 1 accident site in ~~the Township~~Princeton and needs improvement. A signalized intersection or roundabout is recommended.

Route 206/Elm – A ~~right~~ turn lane from eastbound Elm to ~~southbound~~ 206 and new signal timing should be considered.

Route 206 Signals - The timing of traffic signals at Rosedale Road and Mountain Avenue should be coordinated to improve traffic flow.
~~Rosedale Road/Elm - A left-turn lane from eastbound Rosedale to southbound Elm should be implemented.~~

Route 206/ Cherry Valley Road - Circulation improvements will be needed in this area to service Griggs Farm, several new office buildings, and development in Montgomery Township. Pedestrian walkways should be provided along Route 206.

Nassau Street/Route 27

Witherspoon Street & Nassau Street, University Place & Nassau Street and Harrison Street & Nassau Street - Signal improvements should be considered to improve pedestrian safety and traffic flow.

Elm Road/Great Road System

Rosedale Road/Elm Road Intersection - Some minor geometric improvements will be needed to allow more freedom of traffic movement.

~~Mountain Avenue/Great Road Intersection - Minor geometric improvements have been completed. The need for a traffic signal should be investigated and installed if warranted.~~

Pretty Brook Road/Great Road Intersection - Pretty Brook Road should be improved on its approach to Great Road with minor geometric improvements and Great Road requires a left turning lane.

~~Great Road West - Road and drainage improvements are needed along this roadway.~~
Great Road- Pedestrian, road and drainage improvements should be considered from Stuart Road to Cherry Valley Road.

Ewing Street/Harrison Road System

Ewing Street/Route 206 Intersection - This intersection requires a traffic signal with geometry improvements on Ewing Street and a left turning lane on Route 206 or a round a bout.

~~Ewing Street/Harrison Street Intersection - This intersection requires geometry improvements to provide safer traffic flow.~~

Snowden Lane System

Snowden Lane/Route 27 - This signalized intersection will require geometric improvements to provide better movement of traffic.

Snowden Lane Roadway Improvement - Safety improvements are required on the northern end between Overbrook and Herrontown Roads. The culvert on Snowden Lane south of Hamilton Avenue should be evaluated and retrofitted as needed.

Other Road Improvements

Herrontown Road - Drainage and road improvements from ~~Bertrand~~ Bunn Drive to River Road should be made to eliminate existing drainage ditches and improve safety and traffic flow.

Mount Lucas Road - Drainage and road improvements from Stuart Road East to the ~~Poor Farm Road~~ Princeton/Montgomery Township Line should be made to eliminate existing drainage ditches and to improve safety and traffic flow.

~~Washington Road and Nassau Street - Signal improvements should be considered to improve pedestrian safety and traffic flow.~~

Riverside Drive- Culvert south of Vernon Circle should be evaluated and retrofitted as needed.

Grover Avenue – Culvert south of Randall Road should be evaluated and retrofitted as needed.

Rosedale Road/General Johnson Drive Intersection - Minor geometric and safety improvements will be needed. The need for a signalization should be investigated and installed if warranted.

John Street/Lytle Street Intersection - Minor geometric improvements should be considered to improve pedestrian safety.

Alexander Street/College Road Intersection - Minor geometric improvements should be considered to improve pedestrian safety and traffic flow.

Hamilton Avenue/Walnut Lane Intersection - Minor geometric improvements should be considered to improve pedestrian safety.

Proposed Extensions

Farrand Drive Extension – The Farrand Drive right-of-way connecting Russell Estates to Rosedale Road should be retained for emergency vehicular purposes as well as pedestrian and bicycle access. The alignment within Russell Estates indicated on the 1996 Circulation Plan Maps has been corrected to reflect the actual right-of-way dedication shown on the Municipal tax map.

West Drive - Consideration should be given to connecting West Drive to Springdale Road in order to provide an alternate route other than Alexander Street to access the west side of the community.

Traffic Flow Improvements

Nassau Street Improvement – The entire length of Nassau Street should be examined and improved to allow safe and efficient traffic flow as well as to better accommodate bicyclist.

Traffic Signal Coordination - Signals should be coordinated one to the other in their timing where appropriate. In addition individual lights should be adjusted to the traffic characteristics according to the time of day. All impacts from new traffic lights should be evaluated including impact on adjacent residential neighborhoods.

Traffic Flow Improvements - A systematic review of intersections should be undertaken to determine whether traffic flow could be improved by permitting “right turn on red” where currently prohibited, prohibiting left turns on certain roads during peak hours, and providing minor widening or stripping to facilitate turning movements.

Complete Street Study- Traffic-calming techniques should be evaluated to determine if they are appropriate to relieve traffic impacts on residential streets. Suggested roads to be analyzed include Wiggins-Hamilton-Paul Robeson Place, Witherspoon Street, Edgehill, Library Place, Lovers Lane and the intersection of Route 206-Nassau Street-Mercer Street and Alexander Street and Route 27 from Bayard to Harrison Street.

Traffic Focus Studies- Roads should be examined and improved to allow safe and efficient traffic flow as well as to better accommodate bicyclist and pedestrians. Suggested roads to be studied include Paul Robeson Place, Wiggins Street-Hamilton Avenue, Harrison Street from Bunn Drive to Nassau Street and Nassau Street.

Princeton University Circulation

University Circulation - The University should provide an internal traffic circulation plan to handle traffic that will result from new buildings and modifications to existing facilities. Faculty Road is crucial to the community's circulation system and we ask that the University keep it open in perpetuity. Future buildings, parking lots and garages should use Faculty Road for egress and ingress.

Other Improvements

Gateways - The entrances to Princeton should be visually recognizable as marking a transition to an area with a distinctive character.

Parking - Any plans for new parking garages should be accompanied with a street capacity analysis. Adequate parking should be provided by all new developments, especially downtown. Shared parking and cross access agreements should be considered to reduce private off-street parking lots. New Princeton University garages should be oriented to use Faculty Road as an access street rather than Nassau Street.

TRANSIT IMPROVEMENTS

A “Free B” Jitney Service -- both during morning and evening commuter-hours to the “Dinky” Station as well as mid-day services connecting senior housing, affordable housing, and shopping center sites – has been established through the cooperation of the municipal government, Princeton University, and N.J. Transit. Careful study of its utilization and cost-effectiveness should continue.

Bus Service

Through the cooperation of the Delaware Valley Regional Planning Commission, the N.J. Department of Transportation, NJ Transit, and the Mercer County Planning Office, a Future Bus Plan has been advanced for Mercer County. It includes the following elements that apply to the Princeton area:

Route 1 BRT System

As currently envisioned by New Jersey Department of Transportation, New Jersey Transit and Mercer County, the Route 1 BRT is a “feeder and trunk” system servicing a multitude of origins and destinations traveling along a dedicated “trunk” of the network parallel to Route 1. Greater reliability can be achieved with Transit Signal Priority granting vehicles extended green signal phases (or shortened red phases) at signalized intersections. Also included would be improved

passenger information, real time "next bus" arrival information at stops, as well as enhanced shelters and sidewalks.

As originally envisioned, the network would provide at either end for transfers to the Princeton's "Dinky" rail line. Some buses in the network may connect into downtown Princeton on Alexander Street.

EXISTING BUS ROUTE IMPROVEMENTS

Route 606 (Princeton to Trenton via US 206)

This direct connection from Princeton to Lawrenceville and downtown Trenton should have enhanced service levels. Frequency should be increased to every 20 minutes at peak periods and 30 minutes at midday and evening.

Route 605 (Montgomery Township to Quaker Bridge Mall via Princeton)

This direct connection from Montgomery Township via downtown Princeton and the "Dinky" Station to Quaker Bridge and the other Route 1 malls should have enhanced service levels. Frequency should be increased to every 20 minutes at peak periods and 30 minutes at midday and evening. Service might be extended to Belle Meade if and when the West Trenton Rail Line is reactivated and connected to the Raritan Valley Line to Newark.

~~**Route 655 (Princeton to Plainsboro via Princeton Medical Center)**~~

~~This loop from/to the Harrison St. Shopping Center, downtown Princeton, and the "Dinky" Station to the new University Medical Center of Princeton at Plainsboro and the center of Plainsboro should have enhanced service levels. Frequency should be increased to every 20 minutes at peak periods and 30 minutes at midday and evening.~~

NEW ROUTE IMPROVEMENTS

Route 651 (Burlington to Princeton via I-295)

This new bus route from park-and-ride lots in Burlington County would connect to the Junction Station. Frequency would increase over time to 20 minutes at peak periods and 30 minutes at midday and evening.

Princeton Pike at I-295 via Princeton and the Great Road to Montgomery Township (CR518) and Belle Meade

This combination of two local routes would connect major employers along the Princeton Pike corridor in Lawrence Township with downtown Princeton and also via The Great Road with the Belle Meade Station if and when the West Trenton Rail Line is reactivated and connected to the Raritan Valley Line to Newark.

TRANSPORTATION DEMAND MANAGEMENT STRATEGIES

Consideration should be given to van pooling in the high density office areas, providing bus shelters where appropriate, encouraging additional peripheral parking outside the CBD with shuttle services, extensions of bus service to accommodate higher density commercial and residential zones, and providing a shuttle system between the "Dinky" rail station, the CBD, along with other areas of the community.

Reduce peak hour traffic volumes by encouraging/requiring ride sharing, flex time, parking limitations, as well as mixed-use developments which would reduce peak demands on the roadway system and minimize the roadway capacity needed to service the peak demand.

Parking requirements should be modified to allow businesses and private schools to develop Transportation Demand Management programs to take credit for vanpooling, ride sharing or other documented transit strategies.

TRUCK MOVEMENTS

Limiting large truck deliveries to off-peak traffic periods if feasible could reduce traffic congestion. It is recommended that the Council study the possibility of an ordinance that would limit deliveries to the downtown area by large trucks to off-peak traffic periods.

Interstate truck traffic should be routed around Princeton. A coordinated strategy with surrounding communities should be developed to keep interstate traffic on interstate highways or four-lane highways and away from residential streets.

INFORMATION IMPROVEMENTS

Data collection regarding supply and demand for roads and transportation services/availability should be improved by beginning to systematically collect traffic volume data on major roadways throughout the community. Princeton's new consolidated government should set up an in-house continuously maintained and updated traffic database of its own.

CONCLUSION

The Circulation Element recognizes that Princeton's commitment to Complete Streets will set the standard of livability and historic appearance for the Princeton Community. The Master Plan has begun to identify various recommendations to meet the anticipated increase in the community's growth, development and its accompanying increase in multi-modal transportation demands. The findings have resulted in the proposed Circulation Plan and a Roadway Improvement Program list for inclusion into Princeton's Master Plan Traffic Circulation Element.

The details of roadway and intersection improvements need to be established as the Complete Street program is implemented. This Circulation Element is intended to provide a recommendation

of future street, highway, transit, pedestrian, and bicycle needs, and to provide a frame-work for identifying the priorities, magnitude, and responsibility for improvement projects.~~The Circulation Element recognizes that the design and scale of roadways set the standard of livability and historic appearance (or lack thereof) for the Princeton Community. To this end the report has identified various improvements to meet the anticipated increase in both development and its accompanying increase in traffic demands. The findings have resulted in the proposed Circulation Plan and a Roadway Improvement Program list for inclusion into Princeton's Master Plan Traffic Circulation Element.~~

~~The details of roadway and intersection improvements need to be established as improvement plans are developed, since the precise sequencing and timing of projects cannot be defined at this time. This Circulation Element is intended to provide an identification of future street, highway, transit, pedestrian, and bicycle needs, and to provide a frame-work for identifying the priorities, magnitude, and responsibility for improvement projects.~~

Appendix B
Table 1

ROADWAY DESIGN STANDARDS

Classification	Travel Lane Width[1,2]	Shoulder Width [3,5]	Parking Lane Width[4]	Total Right of Way Width
Primary Arterial	10' - 12'	0 - 6'	8'	66'
Secondary Arterial	10' - 12'	0 - 6'	8'	50' - 60'
Major Collector	10' - 12'	0 - 3'	7 - 8'	50'
Minor Collector	10' - 12'	0 - 3'	7' - 8'	50'
Local Street	9' - 12'	0 - 4'	7'	50'

Notes:

(1) Travel lanes shall typically be a minimum of 10 feet wide, except 9-foot travel lanes may be permitted for local streets.

(2) Additional lanes or shoulders may be needed at intersections to facilitate turning movements.

(3) Streets shall be curbed when the gradient exceeds 3½%, where there is an existing / proposed sidewalk / shared use path, or where needed for drainage or safety purposes.

(4) Parking lanes should be considered on one side of the street on all local residential streets. Consideration should be given to providing bike lanes in lieu of parking where recommended in the Circulation Element of the Master Plan. Parking lanes shall be a minimum of 7 feet in width. Where the ADT exceeds 1,500, parking lanes shall be 8 feet wide.

(5) On-street one-way bike lanes shall be a minimum of 4 feet where there is no curbing, and 5 feet where curbing exists.

(6) Sidewalks networks within a 1/2 mile of public and private schools should be completed as road work is done and priority should be given to completing paths or sidewalks that would provide access to public parks and recreation and open space areas. Sidewalks shall typically be 5 feet wide with a minimum 2-foot separation from the road edge; where the right of way or existing conditions are constrained, the sidewalk may be 4 feet wide directly abutting the curb.

(7) Shared use pathways to accommodate bi-directional bicycle and pedestrian

travel may be installed within right-of-way on any road. Shared use pathways shall typically be 10 feet wide; where the right of way or existing conditions constrain the width, the shared use pathway may narrow to 8 feet wide.

(8) Shoulder width shall be minimized and shall reflect the historic character and environmental sensitivity of surrounding lands. Gravel or reinforced grass is encouraged instead of pavement in rural areas or roads with low volume.

(9) All new local streets shall be curbed with Belgian block curbing.