

Township of
NORTH BRUNSWICK



May 2006

Prepared by
Heyer, Gruel & Associates
Urban Engineers, Inc.

Credits

Township of **NORTH BRUNSWICK**

Francis “ Mac” Womack, *Mayor*
Rob Lombard, *Business Administrator*

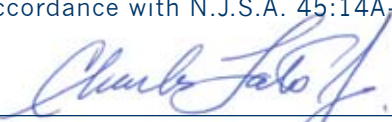
TOWNSHIP PLANNING BOARD

Daniel DiStefano, *Chairman*
Richard Zangara, *Vice Chairman*
Ralph Andrews, *Council Representative*
Janice Larkin, *Board Secretary*
Thomas Vigna, *Municipal Official*
Richard Rebeck, *Member*
Patrick Melanson, *Member*
Edward Southgate, *Member*
Peter Lisi, *Member*
William Krause, *Mayor’s Designee*

HEYER, GRUEL & ASSOCIATES

Susan Gruel, *P.P., Principal*
Fred Heyer, *P.P., AICP, Principal*
Charles Latini Jr., *P.P., AICP, Project Manager*
Dilip Chittajallu, *BARCH Urban Designer*
Kyra Quinn, *Associate Planner*
Cynthia Hu, *Graphic Designer*
Aditi Mantrawadi, *Associate Planner*
Jonathan Burch, *Associate Planner*

The Original of this report was signed and sealed
in accordance with N.J.S.A. 45:14A-12.



Charles Latini Jr. P.P., AICP #5721

Table of Contents

01	Goals and Objectives Element
10	Community Profile Element
42	Land Use Element
72	Circulation Element
101	Housing Element
122	Community Facilities Element
147	Recreation and Open Space Element
173	Conservation Plan Element
183	Utility Plan Element
198	Relationship of the Master Plan to State of New Jersey Planning Efforts
205	Appendix A Appendix B Appendix C





Goals and Objectives Element

INTRODUCTION

The Goals and Objectives Element details the overall vision contained in this Master Plan and provides the foundation for the other components of the Plan. This Element provides specific targets for the realization of North Brunswick's planning recommendations. This vision, and its associated planning goals, are based upon a compilation and assessment of the comments and ideas of public meetings that have occurred throughout the Master Plan process.

These goals and objectives are not presented in priority order. Nevertheless, they will be drawn upon while developing recommendations in each Element of this Master Plan.

Master Plan Process – Identification of Issues

The first step in the master planning process was the identification of key planning issues facing the Township. The identification of these issues provides the planning basis for the development of a comprehensive Master Plan. The issues identified as part of this Master

Plan were derived through meetings with the Planning Board and other Boards and agencies, stakeholders, and public meetings where the general public was invited to speak. Meetings included:

- Meetings and workshops with the Planning Board to identify and discuss planning issues within the Township. This included several initial public input sessions that directly solicited input from the public at the start of the process.
- Meetings with relevant Boards of the Township including; the Community Development Department, the Traffic Safety Advisory Committee, the Recreation Committee, the Environmental Commission, the Open Space Committee, the Municipal Engineer, and the Township Administration.

The issues identified by all stakeholders are discussed throughout the Master Plan and are as follows;



Community Vision

1. Analyze the efficiency of the existing land-use patterns and whether or not the current zoning standards can be improved.
2. Analyze how the Master Plan can work toward unifying the township physically and socially through land use and circulation policies.
3. Analyze the Township's development application requirements to determine whether regional analysis, or other conditions within the application process, should be considered in order to address the impacts of site design on surrounding property and infrastructure.

Land Use

4. Analyze current land use patterns to determine where it is appropriate to establish new approaches to land use and circulation such as; center-based planning and/or activity nodes that are "Smart Growth" driven.
5. Coordinate circulation and land use planning.
6. Coordinate planning efforts with regional entities such as; Rutgers University (Cook College), County of Middlesex, the North Jersey Transportation Planning Authority and Delaware Valley Regional Planning Commission (Central Jersey Transportation Forum).
7. Review commercial zoning standards along highways to ensure better

coordination with circulation patterns.

8. Review the potential for sites to capitalize on the *Einstein Alley* Science and Technology Initiative and NJ EDA's Innovation Zone (I-Zone) at the Technology Center.
9. Review the appropriateness of the existing residential zoning along the Rt. 27 corridor, specifically between Evelyn Avenue and Amber Way, and between Broadway Road and Ruth Road.
10. Review the appropriateness of the existing residential zoning along the Rt. 130 corridor, specifically between Halsey Road and Adams Lane on the southbound side, and between Georges Road and Adams Road on the northbound side.
11. Evaluate redevelopment opportunities associated with four potential sites on Rt. 1 & Rt. 130, including the J&J site, the Treumann Storage site, the abandoned General Automotive site, and the old Okonite Cable site.
12. Review the appropriateness of the existing industrial and office zoning of the Wachovia site, the Permacel site and the DKM site adjacent to Devry University.
13. Review the potential for the creation of a high technology zone to complement the EDA's efforts at the Technology Center.
14. Review the appropriateness of allowing for the construction of age-restricted housing on vacant sites ranging from 3-10 acres in size throughout the



- Township.
15. Review the appropriateness of rezoning properties located along Jersey Avenue in the vicinity of Ottawa Street for mid-rise senior housing.
 16. Review the appropriateness of the existing industrial zoning of approximately 7 acres of land located in close proximity to the Renaissance PUD on southbound Rt. 130.
 17. Review the appropriateness of the existing commercial zoning of the lands located between Joyce Kilmer Avenue, the railroad, 12th Street and 15th Street.
 18. Review the redevelopment potential of the Livingston Avenue and Georges Road business districts.
 19. Review the appropriateness of the existing industrial zoning on a 25 acre tract of land located in proximity to the Manor Apartments at the end of Birchwood Court.
 20. Review the appropriateness of creating a new commercial zoning designation that is more compatible with residential uses.
 21. Review the appropriateness of creating a new commercial zoning designation that would facilitate a "Main Street" development scenario.
 22. Review the appropriateness of the permitted land use types and development density for non-residential portions of the Renaissance PUD.
 23. Evaluate the need for additional age-restricted housing in various price

ranges throughout the Township.

24. Evaluate the appropriateness of retaining the TMU zoning for smaller tracts located in the vacant TMU zone.
25. Analyzes alternatives for a pedestrian crossing between How Lane and 12th Street to provide pedestrian access between the Jersey Avenue Train Station and the Berdines Corner section of the Township.

Housing Issues

26. Analyze Township demographics to determine the need to provide additional age restricted housing.
27. Analyze the adopted Housing Element and Fair Share Plan of the Master Plan to determine how the new Third Round Council on Affordable Housing rules apply.
28. Analyze the zoning standards as it applies to "tear-down and rebuild" housing to ensure consistency in character with homes in the existing neighborhoods.

Traffic & Circulation Issues

29. Examine truck circulation patterns.
30. Analyze the need to create additional east-west roadway connections throughout North Brunswick including the possible connection of Finnegan's Lane between Route 1 and Route 130.
31. Examine the possible connection of Black Horse Lane from Rt1 to Rt130.
32. Analyze the ability to improve overall circulation patterns, including pedestrian movements, within North



- Brunswick.
33. Analyze the appropriateness of widening Cozzens Lane from Rt. 27 to Sabella Park or Rt. 1.
 34. Analyze the possibility of creating a grade-separated intersection at the intersection of Rt. 1 and Adams Lane/Cozzens Lane.
 35. Evaluate the possibility of widening the railroad crossings at How Lane and Adams Lane.
 36. Anticipate the potential traffic impact of extending Finnegan's Lane across Rt. 1 and over the railroad to connect it to Rt. 130.
 37. Determine the appropriateness of the turning movement restrictions that presently exist at the intersection of Aaron Road and Hartland Commons.
 38. Determine the appropriateness of adding a second left turn lane from Commercial Boulevard onto Rt. 1 northbound.
 39. Determine the appropriateness of extending Sutter Avenue to Rt. 27.
 40. Examine the "T" intersection of Cozzens Lane and Route 27 as well as the widening of Route 27 from Bennett's Lane to Finnegan's Lane.
 41. Explore possible alternatives to address the traffic congestion at the intersections of How Lane and Jersey Avenue, and How Lane and Livingston Avenue.
 42. Explore possibilities for improving traffic flow in the vicinity of the S-turn in Adams Lane.
 43. Analyze the proposed DOT improvements to the intersection of Adams Lane and Rt. 130, including the elimination of turning movements at Wood Avenue and the redesign of the Hadleigh Woods entrance and exit drives.
 44. Analyze the potential impacts of painting medium strips or constructing median islands to create turning lanes along Livingston Avenue.
 45. Analyze the potential impacts of the proposed DOT Rt. 1 Sec. 6V Project in the proximity to Bristol Meyers Squibb and Silverline.
 46. Identify traffic and pedestrian improvements that can help unify portions of the Township that are currently bisected by state highways.
 47. Evaluate the feasibility of the developing of a train station and/or Transit Village at the J&J site.
 48. Identify roadway improvements other than Finnegan's Lane that would enhance movement in the Township in an east-west direction.
 49. Analyze of the location of existing parks, public buildings, and population centers to determine the need for additional pedestrian and bikeway connections.
 50. Review roadways and right-of-ways in order to enhance pedestrian and bicycle circulation in the Township.

**Community Facilities**

51. Determine how the community facilities currently and prospectively are suited given population projection increases.
52. Analyze access to existing community facilities and determine whether improvements need to be made.
53. Identify appropriate sites for a new library and a community center, if funding for such buildings becomes available.

Environmental, Open Space & Recreation

54. Determine the benefits of preparing a Natural Resources Inventory.
55. Look into possible incentives to encourage the use of renewable energy resources in developments.
56. Assess existing Township regulations to determine if additional measures are warranted to protect stream and lakeside areas from the negative effects of development.
57. Review zoning standards and circulation patterns near parks and recreational areas to ensure compatibility and appropriate access.
58. Analyze whether the current development regulations appropriately address environmental concerns.
59. Consider the environmental characteristics of sites in evaluating possible public acquisition for open

space/recreation.

60. Evaluate most appropriate standard for assessing the Township's need for additional active and passive recreational/open space.
61. Evaluate whether the Township needs to acquire additional recreational space for active or passive uses.
62. Analyze remaining vacant tracts of land and make recommendations for sites to be added to the Township's open space inventory.



GOALS & OBJECTIVES

The Municipal Land Use Law (MLUL) requires that all Master Plans contain a statement of principles, assumptions, policies and standards upon which the physical, economic and social development of the municipality are based. The Goals and Objectives Element of the Master Plan satisfies this requirement and provides the foundation for the other components of the Plan.

Goal

- Promote land use policy designed to create a “sense of place” in designated centers of activity.

Objectives

- Determine areas appropriate to be targeted as centers of activity.
- Develop design regulations that allow for the proper mix of land uses and require appropriate pedestrian amenities.

Goal

- Preserve existing residential neighborhoods.

Objectives

- Support the upgrading of substandard properties through continuation and/or expansion of the Township’s housing preservation program as additional funding becomes available.
- Evaluate residential zoning standards to determine if adjustments are

necessary to ensure that “in-fill” housing development does not result in development that is out of character and scale with the existing neighborhood.

Goal

- Maximize the potential for expansion of the economic base, while assuring that development projects address roadway and utility infrastructure needs.

Objectives

- Provide opportunities to expand upon the NJ Economic Development Authority’s “Innovation Zone” on lands in close proximity to the Technology Center.
- Encourage redevelopment of older, underutilized properties, while requiring the developer to study and construct necessary infrastructure upgrades.

Goal

- Provide a balance of land uses in appropriate locations to address the needs of Township residents and businesses.

Objectives

- Review the zoning regulations and design standards governing the non-residential portion of the Renaissance PUD in order to ensure that future development of vacant land is compatible with the



character of the Township.

- Examine the Route 27, Route 130, Finnegan's Lane, Livingston Avenue and Georges Road corridors to determine the appropriate mix of residential and nonresidential uses in these corridors.
- Review existing land use throughout the Township to determine if there are areas where transitional uses or enhanced buffering techniques may be warranted.

Goal

- Examine possibilities to improve the Township's circulation system.

Objectives

- Determine existing levels of service at key intersections, and make recommendations for improvement as warranted.
- Examine alternatives for improving east-west traffic flow in the Township, specifically indicating the possibilities of widening existing crossings and constructing additional crossings of the Northeast Corridor Rail Line.
- Where appropriate, make recommendations for improving the "connectivity" of the roadway system by extending dead-end streets and opening cul-de-sacs.

Goal

- Pursue all avenues to expedite the completion of all studies necessary

for NJ Transit to determine if the construction of a rail station is both feasible and a "high priority" location within the northeast corridor.

Goal

- Promote the development of a comprehensive, Township-wide system of greenways, bikeways, and other pedestrian connections.

Objectives

- Identify Township facilities where enhanced pedestrian access could maximize the public's use of the site.
- Identify and map possible pedestrian corridors and connections throughout the Township.
- Aggressively look to improve access to Farrington Lake.

Goal

- Determine the Township's obligation to provide for affordable housing in accordance with the Council on Affordable Housing's Third Round methodology.

Objectives

- Analyze data on all projects occupied from January 1, 2004, to the present time, as well as all projects projected to be occupied by December 31, 2014 in order to determine the Township's obligation to provide additional affordable housing.
- Examine the Township's approved



Housing Element in order to determine whether credits accumulated from prior affordable housing development are sufficient to meet the Township's future needs.

Goal

- Analyze the need for additional public facilities and services to address the existing and future needs of the Township.

Objectives

- Meet with appropriate officials from all Township departments and agencies whose areas of programming or service deliveries are affected by future growth and development.
- Highlight potential needs for additional capital improvements, equipment, manpower and services.
- Consider alternative locations for a new or ancillary post office to better serve the Township's residents and businesses.

Goal

- Provide an appropriate amount of active recreational spaces and passive open spaces to address the Township's

current and future needs.

Objectives

- Determine the amount of active recreational and passive open spaces necessary to meet current and future needs.
- Identify locations for possible acquisition and/or development in order to address identified needs.
- Improve utilization of existing facilities by enhancing public access to the facilities.

Goal

- Analyze sanitary sewerage, public water and public stormwater facilities to determine the need for future studies and possible improvements.

Objectives

- Determine whether the above utilities impose any known constraints to developing vacant sites or redeveloping underutilized sites.
- Highlight areas where future study is warranted.





Community Profile Element

INTRODUCTION

The Township of North Brunswick, located in the eastern central portion of Middlesex County, is approximately 12 square miles in size with a 2000 population density of 3,019 people per square mile. With a 2000 population of 36,287, North Brunswick is the tenth most populous municipality out of the 25 municipalities in Middlesex County.

Additional highlights of the population include:

- North Brunswick's population grew by 5,000 persons between 1990 and 2000 (16%). This rate of growth was greater than the population growth experienced by Middlesex County (11.7%) and New Jersey (8.9%) during the same time period.
- Just over one quarter (25.1%) of the Township's population is 19 years of age and younger. 56.6% of the Township's population is between 20 and 54 years of age, and 18.3% of the Township's population is 55 years and older.
- African Americans comprise the largest ethnic population in the Township (15.3%), followed closely by Asians (14.2%). The Township's white population decreased from 80.0% in 1990 to 62.7% in 2000.
- The Township's median household income (\$61,325) is slightly less than the County (\$61,446) and greater than that of the State (\$55,146).

DEMOGRAPHIC CHARACTERISTICS

Population

In 2000, the Township of North Brunswick had a total population of 36,287. This number represented a notable increase (5,000 individuals or 16%) from 1990 when the total population was 31,287 individuals. The Township has seen steady and substantial population increases over the past several decades, with the largest increases in the 1960s and 1970s. While the Township's 16% population increase between 1990 and 2000 was significant, it was the smallest increase over the last seven decades, as seen in Table 1.

The Township's total population growth over the past seventy years has been more significant and steady than Middlesex County's growth. The population of North Brunswick has accounted for a small but steadily increasing portion of the County's population over the last several decades, starting with 2.3% in 1960, 2.9% in 1970, 3.7% in 1980, 4.6% in 1990 and 4.8% in 2000. Population growth for both North Brunswick and Middlesex County are detailed below in Table 1.



Table 1
Decennial Population Trends, Township of North Brunswick and Middlesex County, 1930-2000

Year	North Brunswick	Number	% Change	Middlesex County	Number	% Change
1930	3,622	-	-	212,208	-	-
1940	4,562	940	26.0%	217,077	4,869	2.3%
1950	6,450	1,888	41.4%	264,872	47,795	22.0%
1960	10,099	3,649	56.6%	433,856	168,984	63.8%
1970	16,691	6,592	65.3%	583,813	149,957	34.6%
1980	22,220	5,529	33.1%	595,893	12,080	2.1%
1990	31,287	9,067	40.8%	671,780	75,887	12.7%
2000	36,287	5,000	16.0%	750,162	78,382	11.7%

Source: US Census, NJ Dept. of Labor and Workforce Development

Population Composition by Age

Table 2 compares the median age of North Brunswick, Middlesex County and New Jersey in 2000.

Table 2
Median Age, North Brunswick, Middlesex County and New Jersey 2000

Year	North Brunswick	Middlesex County	New Jersey
2000	35.4	35.7	36.7

Source: New Jersey Department of Labor



Table 3 provides a more detailed analysis of the Township and County's 2000 population by further breaking down the total population according to individual age cohorts. This analysis reveals that.

- 25.1% of the Township's population is 19 years and younger compared with 26.5% of the County.
- 56.5% of the Township's population

is between 20 and 54 years of age compared with 52.9% of the County.

- 18.3% of the Township's population is 55 years and older compared with 20.6% of the County.

This analysis reveals a significant amount of families with school-age children present in the Township.

Table 3 2000 Age Profile, North Brunswick and Middlesex County				
Age Cohort	North Brunswick		Middlesex County	
	Number	Percent	Number	Percent
Total Population	36,287	100%	750,162	100%
Under 5	2,437	6.7%	49,390	6.6%
5 to 9	2,378	6.6%	50,933	6.8%
10 to 14	2,232	6.2%	49,207	6.6%
15 to 19	2,071	5.7%	48,429	6.5%
20 to 24	2,145	5.9%	50,963	6.8%
25 to 34	6,601	18.2%	117,105	15.6%
35 to 44	6,627	18.3%	128,839	17.2%
45 to 54	5,150	14.2%	100,323	13.4%
55 to 59	1,709	4.7%	35,040	4.7%
60 to 64	1,322	3.6%	27,343	3.6%
65 to 74	2,019	5.6%	48,779	6.5%
75 to 84	1,268	3.5%	34,387	4.6%
85 years and older	328	10.9%	9,424	1.3%

Source: United States Census



Table 5
Change in Age Composition, North Brunswick 1990 - 2000

	1990		2000		Percent Change
	Number	Percent	Number	Percent	
Total	31,287	100%	36,287	100%	16.0%
Under 5 years	2,084	6.5%	2,437	6.6%	16.9%
5 to 9	1,664	5.3%	2,378	6.8%	42.9%
10 to 14	1,611	5.1%	2,232	6.6%	38.5%
15 to 19	2,193	7.0%	2,071	6.5%	-5.6%
20 to 24	2,639	8.4%	2,145	6.8%	-18.7%
25 to 34	7,076	22.6%	6,601	15.6%	-6.7%
35 to 44	5,246	16.8%	6,627	17.2%	26.3%
45 to 54	3,364	10.7%	5,150	13.4%	53.1%
55 to 59	1,313	4.2%	1,709	4.7%	30.1%
60 to 64	1,205	3.8%	1,322	3.6%	9.7%
65 to 74	1,819	5.8%	2,019	6.5%	11.0%
75 to 84	885	2.8%	1,268	4.6%	43.3%
85 years and older	188	0.6%	328	1.3%	74.5%

Source: 1990 & 2000 United States Census.



Table 5 compares the change in age composition in North Brunswick from 1990 to 2000. The largest population increases were within the 85 years and older, 45 to 54, and 75 to 84 year cohorts. The 85 and older category is fairly insignificant because the age cohort makes up only 1.3% of the North Brunswick community. The only population losses were seen within the 20 to 24 and 15 to 19 year cohorts, which is significant in that the Township is losing a notable portion of its younger post High School population. The 55 and older population increased from 5,410 in 1990 to 6,646 in 2000, a 23% increase. The 0-14 year cohort particularly the 10 – 14 year range also showed significant growth, increasing from 5,359 in 1990 to 7,047 in 2000, a 31.4% increase. Lastly, the 35-54 age population also increased considerably, from 8,610 in 1990 to 11,777 in 2000, an increase of 37%.

As the Township continues to grow and develop, the types of housing units provided will further shape these age cohorts. For example, if the Township provides additional age-restricted housing, those cohorts will inevitably rise. Development of J&J as a mixed-use transit village could also influence the 55 and older age cohorts, but may also affect the 20-34 age cohorts as certain amenities may be provided to attract these cohorts. Age demographics by themselves only present a portion of the Township's profile. This data should also be viewed against household demographics to gain a clearer picture of the demographic direction of the Township. Additional discussion is provided in the Demographic Trends Analysis section of this document.





Population By Race

The 2000 Census reveals that the majority of the Township's population is comprised of White Americans (62.7%) with the balance comprised of African Americans (15.3%), and Asian American and 'other' ethnicities (22.0%). Of that 22%, over 14% are Asian while under 8% is comprised of populations which are more difficult to define, such as those of two or more races, or some other race not listed on the 2000 Census form. The Township also contains a population of Hispanic origin of 10.4%. The 2000 Census did not define Hispanic origin as a separate race and instead includes members from all races. The following tables summarize the Township's 2000 racial composition.

Table 6 General Summary Racial Composition North Brunswick 2000		
	Number	Percentage
Population	36,287	100%
African American	5,542	15.3%
White	22,763	62.7%
Asian	5,152	14.2%
American Indian and Alaska Native	63	0.2%
Native Hawaiian and Other Pacific Islander	10	0.0%
Some Other Race	1,707	4.7%
Two or more races	1,050	2.9%

Source: 2000 United States Census.

Of Hispanic Origin	Number	Percentage
Hispanic Origin (1)	3,775	10.4%

- (1) Hispanic origin includes members of all races and not classified as a separate race.



Table 7 Change in Racial Composition, North Brunswick 1990 - 2000					
	1990		2000		Percent Change
	Number	Percent	Number	Percent	
Total	31,287	100%	36,287	100%	+16.0%
African American	3,465	11.1%	5,542	15.3%	+60.0%
White	25,044	80.0%	22,763	62.7%	-9.1%
Asian or Pacific Islander	2,132	6.8%	5,162	14.2%	+142.1%
American Indian and Alaska Native	75	0.2%	63	0.2	-16.0%
Some other race/two or more races	571	1.8	2,758	7.6	+383.0%

Source: 1990 & 2000 United States Census.

Table 8 Detailed Summary Hispanic or Latino Population, North Brunswick 2000			
	Total Amount	Percentage of Township Population	Percentage of Hispanic/Latino Population
Total reporting Hispanic or Latino	3,775	10.4%	100%
Puerto Rican	1,316	3.6%	34.9%
Mexican	522	1.4%	13.8%
Cuban	161	0.4%	4.3%
Other Hispanic or Latino	1,776	4.9%	47.0%

Source: 2000 United States Census.

Table 9
Detailed Summary Asian/Other Population, North Brunswick 2000

	Number	Percentage of Township Population	Percentage of Asian Other Population
Total reporting Asian/Other	5,152	14.2%	100%
Asian Indian	3,012	8.3%	58.5%
Chinese	872	2.4%	16.9%
Filipino	383	1.1%	7.4%
Japanese	42	0.1%	0.8%
Korean	449	1.2%	8.7%
Vietnamese	28	0.1%	0.5
Other Asian (1)	366	1.0%	7.1%

Source: 2000 United States Census.

(1) Other Asian alone or two or more Asian categories.

The Township's racial composition has shifted significantly since 1990. White Americans, who accounted for 80% of the population in 1990, comprised under 63% of the 2000 population, a decrease of over 9%. Aside from the 'some other race/two or more races' category, the most significant population increases were seen in the Asian and African American populations. The Asian population increased from 2,132 in 1990 to 5,162 in 2000, an increase of over 140%. It is worth noting that of those reporting their race as Asian, more than half identified themselves as Asian Indians (58.5%), with Chinese and Korean the next two largest Asian subgroups. The African American population comprised 11.1% of North Brunswick's population in 1990 (3,465 persons) and grew to account for over 15%

of the 2000 population (5,542 persons), an increase of 60%. The Township also experienced an increase in those reporting as Hispanic/Latino, from 5.8% of the Township's population in 1990 to 10.4% in 2000.

It should be noted that part of the decrease in the Township's White population and increase in individuals reporting as Asian/Other and/or Hispanic/Latino can be attributed to changes in the census itself. The 2000 census allowed more options for individuals to indicate a race other than White or African American than the 1990 census. As a result, many individuals who previously responded as 'White' in 1990 instead may have responded as a different race in 2000.



North Brunswick has become more racially diverse since 1990, as have Middlesex County and New Jersey. According to the 2000 Census, North Brunswick is significantly more racially diverse than either Middlesex County or the State as a whole. The Township's percentage of African Americans (15.3%) is much higher than the County (9.1%) and the State (13.6%). Correspondingly, the percentage of white residents in the Township was less (62.7%) than the County (68.4%) or the State (72.6%).

The Township's percentage of those reporting as Asian/Other (22.0%) was slightly less than that of the County (22.2%), but higher than the State percentage (13.8%).

The Township had a lower percentage of individuals of Hispanic/Latino origin (10.4%) compared with Middlesex County (13.6%) and the State (13.3%).

Table 10
Ethnic Composition 2000 North Brunswick, Middlesex County and New Jersey

	North Brunswick		Middlesex County		New Jersey	
	Number	Percentage	Number	Percentage	Number	Percentage
Population	36,287	100%	750,162	100%	8,414,350	100%
White	22,763	62.7%	513,298	68.4%	6,104,705	72.6%
African American	5,542	15.3%	68,467	9.1%	1,141,821	13.6%
Asian/other	7,982	22.0%	166,876	22.2%	1,167,824	13.8%
Hispanic Origin	3,775	10.4%	101,940	13.6%	1,117,191	13.3%

Source: 2000 United States Census.



Table 11
Ethnic Composition 1990 North Brunswick, Middlesex County and New Jersey

	North Brunswick		Middlesex County		New Jersey	
	Number	Percentage	Number	Percentage	Number	Percentage
Population	31,287	100%	671,780	100%	7,730,188	100%
White	25,044	80.0%	550,006	81.9%	6,130,465	79.3%
African American	3,465	11.1%	53,629	8.0%	1,036,825	13.4%
Asian/ other	2,778	8.9%	68,145	10.1%	562,898	7.3%
Hispanic Origin (of any race)	1,817	5.8%	59,776	8.9%	739,861	9.6%

Source: 1990 Census. Note. Total = White + African American + Asian Other. Hispanic origin included in total.



HOUSEHOLD CHARACTERISTICS

Household Size

A household is defined as one or more persons, whether related or not, living together in a dwelling unit. The Census classifies households as “family households” and “non-family households”.

A “family household” consists of a householder and one or more people living together in the same household who are related to the householder by birth, marriage, or adoption. Family households may also include people unrelated to the householder. If the householder is married and living with his/her spouse, then the household is designated a “married-couple

household.” The remaining types of family households not maintained by a married couple are designated by the sex of the householder. A “nonfamily household” consists of a person living alone or a householder who shares the home with nonrelatives only; for example, with roommates or an unmarried partner.

In 2000, North Brunswick contained a total of 13,635 households. The majority of all households (9,363 – 68.7%) were family households while 4,272 (31.3%) were non-family households. The family/non-family household mix within North Brunswick is similar to that of Middlesex County, where nearly three quarters of all households (71.8%) are family households and (28.2%) of all households are classified as non-family.

Table 12
Types of Households, North Brunswick & Middlesex County 2000

Type of Household	North Brunswick		Middlesex County	
	Number	Percentage	Number	Percentage
Family Households	9,363	68.7%	190,930	71.8%
Non-family Households	4,272	31.3%	74,885	28.2%
Total Households	13,635	100%	265,815	100%

Source: 2000 United States Census.



The composition of family households is similar between North Brunswick and Middlesex County. In North Brunswick, 77.7 of all family households were married-couple households, compared to 79.3% for the County. North Brunswick had a slightly higher percentage of family households consisting of a primary female householder, without a husband present (16.9%) compared to Middlesex County (15.1%).

Table 13
Types of Family Households, North Brunswick & Middlesex County, 2000

Type of Household	North Brunswick		Middlesex County	
	Number	Percentage	Number	Percentage
Family Households	9,363	100%	190,930	100%
Married Couple Family	7,276	77.7%	151,461	79.3%
Female householder - no husband present	1,583	16.9%	28,812	15.1%
Other	504	5.4%	10,657	5.6%

Source: 2000 United States Census.

The average household size in North Brunswick in 2000 (2.58) was slightly less than the County's average household size of 2.74. Likewise, North Brunswick's average family size (3.12) was slightly less than Middlesex County's average family size of 3.23.



Table 14
Household Characteristics, North Brunswick & Middlesex County, 2000

	North Brunswick		Middlesex County	
Household Size	Number	Percent	Number	Percent
Total	13,635	100%	265,815	100%
1 person	3,339	24.5%	59,544	22.4%
2 person	4,397	32.2%	80,233	30.2%
3 person	2,520	18.5%	48,916	18.4%
4 person	2,154	15.8%	45,002	16.9%
5 person	778	5.7%	20,048	7.5%
6 person	294	2.2%	7,285	2.7%
7 or more persons	153	1.1%	4,787	1.8%
Average Household Size	2.58	-	2.74	-
Average Family Size	3.12	-	3.23	-

Source: 2000 United States Census.

Income

While North Brunswick experienced a significant increase in per capita income (30.8%) between 1989 and 1999, the increase was significantly less than that experienced by Middlesex County (41.8%) or the State (44.3%) over the same period.

In 1999, the average median household income in North Brunswick was \$61,325. This average was almost the same as the County average of \$61,446 and considerably greater than the State average of \$55,146.

Table 15
Per Capita Income, Median Household Income, North Brunswick, Middlesex County & New Jersey, 1989 & 1999

	1990 Per Capita Income	2000 Per Capita Income	Percent Increase	1990 Median Household Income	2000 Median Household Income	Percent Increase
North Brunswick	\$21,734	\$28,431	30.8%	\$49,900	\$61,325	22.9%
Middlesex Co.	\$18,714	\$26,535	41.8%	\$45,623	\$61,446	34.7%
New Jersey	\$18,714	\$27,006	44.3%	\$40,927	\$55,146	34.7%

Source: 1990 & 2000 United States Census.

Table 16 compares the 2000 household income distribution between North Brunswick and Middlesex County. Generally, the household income distribution at the municipal and county levels is comparable. 39.1% of households in North Brunswick reported annual incomes below \$50,000, compared to 39.5% for Middlesex County. Similarly, 22.9% of North Brunswick households reported income above \$75,000, compared to 22.8 for the County.

Table 16
Household Income Distribution 1999, North Brunswick and Middlesex County

Income	North Brunswick		Middlesex County	
	Number of Households	Percent	Number of Households	Percent
Less than \$10,000	678	5.0%	13,102	4.9%
\$10,000 - \$14,999	473	3.5%	9,965	3.7%
\$15,000 - \$24,999	787	5.8%	20,603	7.7%
\$25,000 - \$34,999	1,268	9.3%	24,398	9.2%
\$35,000 - \$49,000	2,110	15.5%	37,097	14.0%
\$50,000 - \$74,999	3,098	22.7%	57,308	21.6%
\$75,000 - \$ 99,999	2,111	15.5%	42,599	16.0%
\$100,000 - 149,999	2,002	14.7%	40,544	15.2%
\$150,000 to \$199,000	703	5.2%	11,823	4.4%
\$200,000 or more	416	3.0%	8,459	3.2%
Total	13,646	100.0%	265,898	100.0%

Source: 2000 United States Census



In 2000, less than 3% of all families in North Brunswick reported incomes below the poverty level, less than the Middlesex County total of 4.2%. Similarly, 1,661 individuals in North Brunswick reported incomes below the poverty level, less than 6.4% for the County.

Table 17
Individuals in Poverty 2000, North Brunswick & Middlesex County

	North Brunswick		Middlesex County	
	Number	Percent	Number	Percent
Total population	36,287	100%	750,162	100%
Individuals below poverty level	1,661	4.6 %	48,205	6.4%
Total families	9,441	100%	192,321	100%
Families below poverty level	259	2.7%	8,047	4.2%

Source: 2000 United States Census

Housing Costs as Percentage of Income

Table 18 shows the housing costs of owner occupants as a percentage of total income. A total of 1,952, or 27.8%, were spending over 30% of their incomes for housing costs. The State affordability threshold for housing as a percent of income is not more than 28% of gross income should be allocated for housing costs.

Table 18
Monthly Owner Costs as a Percentage of Household Income 1999 North Brunswick

	Number	Percent
Less than 20%	3,126	44.6%
20% - 29%	1,919	27.4%
30% or more	1,952	27.8%
Not Computed	15	0.2%

Source: 2000 United States Census



Table 19 shows the housing costs of renter occupants as a percentage of total income. A total of 1,724 households, or 34.1%, were spending over 30% of their incomes on rent. The State affordability threshold for housing as a percent of income is not more than 30% of gross income should be allocated for rent.

Table 19 Gross Rent as a Percentage of Household Income, 1999 North Brunswick		
	Number	Percent
Less than 20%	1,808	35.7%
20% - 29%	1,343	26.5%
30% or more	1,724	34.1%
Not Computed	192	3.8%

Source: 2000 United States Census

Housing Unit Data

In 2000, there were 13,932 housing units in North Brunswick. Of the total housing units, the vast majority (97.7%) are occupied. The Township reported a vacancy rate of 2.1%. Of the Township's 2000 vacant housing inventory (297 units), over one-third (36.4%) were rental units.

Table 20 Housing Units by Occupancy Status, 2000 North Brunswick		
	Number of units	Percent
Occupied housing units	13,635	97.9%
Vacant housing units	297	2.1%
Total	13,932	100%

Source: 2000 United States Census

Housing Units Type and Size Characteristics

The Township has a relatively high rate of home ownership (62.8%). The majority of the Township's housing stock (83%) was constructed prior to 1980. Between 1980 and 2000 a total of 2,348 housing units were constructed, representing 17% of the Township's total housing stock. Well over half of the Township's housing stock (57.4%) is comprised of single family detached/attached housing. A significant portion of North Brunswick's housing stock (21.3%) contain more than ten units, indicating a high number of multi-family housing complexes.



Table 21
Housing Unit Data, 2000 North Brunswick

Characteristics	Number	Percent
Total housing units	13,932	100.0
<i>Units in Structure</i>		
1-unit, detached	5,650	40.6
1-unit, attached	2,355	16.9
2 units	650	4.7
3 or 4 units	842	6.0
5 to 9 units	990	7.1
10 to 19 units	1,515	10.9
20 or more units	1,453	10.4
Mobile Home	477	3.4
<i>Tenure of Occupied Units</i>		
Owner Occupied	8,565	62.8%
Renter occupied	5,070	37.2%
Total Occupied	13,635	100%
<i>Year Structure Built</i>		
1999 - March 2000	308	2.2%
1995 - 1998	887	6.4%
1990 - 1994	1,153	8.3%
1980 - 1989	3,636	26.1%



1970 - 1979	2,738	19.7%
1960 - 1969	2,425	17.4%
1940 - 1959	2,075	14.9%
1939 or earlier	710	5.1%
<i>Units in Structure</i>		
One-detached	5,650	40.6%
One -attached	2,355	16.9%
Two	650	4.7%
Three or Four	842	6.0%
Five to Nine	990	7.1%
Ten to Nineteen	1,515	10.9%
Twenty or More	1,453	10.4%
Mobile Home	477	3.4%
Total	13,932	100%
<i>Number of Rooms</i>		
One	240	1.7%
Two	526	3.8%
Three	1,696	12.2%
Four	2,604	18.7%
Five	2,731	19.6%
Six or More	6,135	44.1%

Source: 2000 United States Census



Years at Residence of Households

Table 22 details the breakdown of housing units in North Brunswick according to years of residence through 2000. Over 30% of all housing units in the Township have had someone move in from 1995 to 1999. Nearly 20% had someone move in from between 1999 and March 2000. Only 15.7% of housing units became occupied prior to 1980.

Table 22 Year Householder Moved into Unit, 2000 North Brunswick		
Occupied Housing Units	Number	Percent
1999 to March 2000	2,593	19.0%
1995 to 1998	4,396	32.2%
1990 to 1994	2,041	15.0%
1980 to 1989	2,412	17.7%
1970 to 1979	1,013	7.4%
1969 and earlier	1,180	8.7%
Total	13,932	100%

Source: 2000 United States Census

Housing Value and Contract Rents

The median house value in North Brunswick in 2000 was \$179,400, which was more than the County median house value of \$168,500. In 2000, the median monthly rent in North Brunswick was \$907, which was also more than the countywide average rent of \$845.



Table 23 Housing Values, 2000 North Brunswick		
<i>Specified Owner Occupied Housing Units By Value</i>		
<i>Value Range</i>	<i>Number</i>	<i>Percent</i>
Less than \$50,000	28	0.4%
\$50,000-\$99,000	352	5.0%
\$100,000 - \$149,999	1,956	27.9%
\$150,000 - \$199,000	2,043	29.1%
\$200,000 - \$299,999	1,976	28.2%
\$300,000 - \$499,000	605	8.6%
\$500,000 - \$999,999	57	0.8%
\$1,000,000 or more	0	0.0%
Total	7,017	100%
Median Value	\$179,400	-
<i>Specified Renter Occupied Units by Contract Rent</i>		
<i>Contract Rent</i>	<i>Number</i>	<i>Percent</i>
Less than \$200	204	4.0%
\$200 - \$299	101	2.0%
\$300 - \$499	90	1.8%
\$500 - \$749	610	12.0%
\$750 - \$999	2,115	41.7%
\$1,000 - \$1,499	1,672	33.0%
\$1,500 or more	196	3.9%
No Cash Rent	79	1.6%
Total	5,067	100%
Median Contract Rent	\$907	-

Source: 2000 United States Census



Housing Conditions

Table 24 details the conditions of housing in North Brunswick based upon the status of the plumbing facilities, kitchen facilities, telephone service and the extent of overcrowding in 2000. These are the factors used in determining housing deficiency. In 2000, less than 1% of all housing units lacked complete plumbing facilities; less than 1% also lacked complete kitchen facilities. Less than 3% of all units were classified as overcrowded (greater than 1.51 persons per room).

Table 24 Indicators of Housing Conditions, 2000 North Brunswick		
	Number	Percent
Status of Plumbing Facilities		
Lacking complete plumbing facilities	15	0.1%
Status of Kitchen Facilities		
Lacking complete kitchen facilities	14	0.1%
Lacking telephone service	105	0.8%
Occupied Units By Persons Per Room		
1.00 or less	12,800	93.9%
1.01 - 1.50	449	3.3%
1.51 or More	386	2.8%

Source: 2000 United States Census

Estimated Future Housing Construction

Table 25 details the dwelling units authorized by building permits since 1990. Between 1990 and 2000 a total of 209 housing units were constructed in the Township. Nearly seventy percent (69.8%) were single-family. The balance is multi-family units.

Table 25 Dwelling Units Authorized by Building Permits, 1990 to 2004 North Brunswick			
Year	Total	Single-Family Units	Multi-Family Units
1990	48	40	8
1991	71	47	24
1992	145	112	33
1993	184	164	20
1994	186	109	77
1995	174	159	15
1996	378	270	108
1997	81	81	0
1998	128	128	0
1999	259	259	0
2000	234	95	139
2001	167	155	12
2002	88	86	2
2003	213	205	8
2004	209	146	63

Source: N.J. Department of Labor/Data Center.

EMPLOYMENT

Employment Status

The unemployment rate in North Brunswick has fluctuated somewhat but has remained under 5% since 1990, with a high of 4.7% in 1992 and a low of 1.8% in 2000. Since 1990, the Township's unemployment rate has been consistently lower than Middlesex County's unemployment rate, which reached a low of 3.7% in 1999 and a high of 7.6% in 1992.

Table 26 Employment and Labor Force, 1990 - 2003, Township of North Brunswick				
	Labor Force	Employment	Unemployment	Unemployment Rate
1990	18,257	17,758	499	2.7%
1991	18,452	17,797	655	3.5%
1992	18,385	17,520	865	4.7%
1993	18,412	17,645	767	4.2%
1994	18,671	18,007	664	3.6%
1995	19,073	18,429	644	3.4%
1996	19,580	18,955	625	3.2%
1997	20,250	19,733	517	2.6%
1998	20,071	19,615	456	2.3%
1999	20,570	20,102	468	2.3%
2000	21,114	20,727	387	1.8%
2001	21,249	20,781	468	2.2%
2002	20,835	20,140	695	3.3%
2003	20,518	19,842	676	3.3%
2004	20,319	19,761	557	2.7%

Source: N.J. Department of Labor/Data Center



Table 27
Unemployment Rates, 1990-2004, North Brunswick and Middlesex County

	North Brunswick	Middlesex County
1990	2.7%	4.5%
1991	3.5%	5.8%
1992	4.7%	7.6%
1993	4.2%	6.8%
1994	3.6%	5.8%
1995	3.4%	5.5%
1996	3.2%	5.2%
1997	2.6%	4.2%
1998	2.3%	3.7%
1999	2.3%	3.7%
2000	1.8%	3.0%
2001	2.2%	4.0%
2002	3.3%	5.4%
2003	3.3%	5.4%
2004	2.7%	-

Comparative Employment Data

Table 28 indicates how residents in North Brunswick and Middlesex County earn their livings. The educational, health and social services industries employed the most people in both North Brunswick and Middlesex County, followed by the manufacturing industry. The next highest employing industry in the Township was professional, scientific, management, administrative, and waste management services, followed by finance, insurance, and real estate.





Table 28
Comparative Employment Data, 2000 North Brunswick and Middlesex County

	North Brunswick		Middlesex County	
	Number	Percent	Number	Percent
Employment by Occupation				
Agriculture, Forestry, Fishing, Hunting, & Mining	0	0.0%	441	0.1%
Construction	645	3.4%	16,784	4.5%
Manufacturing	3,003	15.9%	50,728	13.7%
Transportation, Communications, and Utilities	980	5.2%	24,672	6.7%
Information	932	4.9%	19,426	5.2%
Wholesale Trade	796	4.2%	17,900	4.8%
Retail Trade	1,782	9.4%	41,175	11.1%
Finance, Insurance, and Real Estate	2,022	10.7%	35,229	9.5%
Professional, scientific, management, administrative, and waste management services	2,437	12.9%	48,150	13.0%
Educational, health and social services	4,004	21.2%	68,930	18.6%
Arts, entertainment, recreation, accommodation and food services	910	4.8%	20,289	5.5%
Other services	650	3.4%	14,044	3.8%
Public administration	715	3.8%	13,049	3.5%
Total	18,876	100 %	370,817	100%

Source: 2000 United States Census



COMMUTING CHARACTERISTICS

In 2000, North Brunswick contained a total of 18,519 people who were employed. Of this total, 2,484 persons or 13.4% worked inside the Township and 16,035 people or 86.6% commuted outside of the Township to work. Over half, (58.1%) of residents who commute

outside of the Township to work are employed within Middlesex County. A significant number of residents (6,064 or 32.7%) commute outside of Middlesex County, and a smaller number (1,689 or 9.1%) commute outside of the State.

**Table 29 North Brunswick Residents
Place of Employment 2000**

	Number	Percent
Total workers	18,519	100%
Worked in North Brunswick	2,484	13.4%
Worked Outside North Brunswick	16,035	86.6%

Source: 2000 U.S. Census

**Table 30 North Brunswick Residents
Place of Employment 2000**

	Number	Percent
Total Workers 16 and over	18,519	100%
Worked in Middlesex County	10,766	58.1%
Worked outside Middlesex County	6,064	32.7%
Worked out of State	1,689	9.1%

Source: 2000 U.S. Census



The majority of residents, (88.5%) drive to work. Of these, 78.9% drove alone and 9.6% carpooled. Public transportation accounts for 7.8% of all commuting trips for Township residents.

Table 31 North Brunswick Commuting Characteristics 2000		
	Number	Percent
Total workers 16 and over	18,519	100%
Drove alone	14,604	78.9%
Drove - carpooled	1,776	9.6%
Public Transportation (including taxicab)	1,445	7.8%
Walked	257	1.4%
Bicycle	46	0.2%
Work at home (no commute)	320	1.7%
Commute via Other means	71	0.4%

Source: 2000 U.S. Census

Over half (58.8%) of the Township's commuter residents have a commute of less than 30 minutes each way. Nearly 15% have a commute of greater than one hour each way. The mean travel time to work for residents of North Brunswick was 30.6 minutes.

The following table indicates the average travel time to work for Township residents.

Table 32 Travel Time to Work North Brunswick 2000		
	Number	Percent
Total workers 16 and over	18,519	100%
Worked at home	320	1.7%
Commuters	18,199	98.3%
Total Commuters	18,199	100%
Less than 5 minutes	350	1.9%
5 to 9 minutes	1,453	8.0%
10 to 14 minutes	2,529	13.9%
15 to 19 minutes	2,721	15.0%
20 to 24 minutes	2,597	14.3%
25 to 29 minutes	1,032	5.7%
30 to 34 minutes	2,004	11.0%
35 to 39 minutes	431	2.4%
40 to 44 minutes	718	3.9%
45 to 59 minutes	1,644	9.0%
60 to 89 minutes	1,622	8.9%
90 or more minutes	1,098	6.0%
Mean travel time to work (minutes)	30.6	-

Source: 2000 U.S. Census



SOCIAL CHARACTERISTICS

Educational Attainment

In 2000, a large majority (85.8%) of the Township's population had attained a high school education or higher, and 37% had obtained a bachelor's degree or higher. These figures are comparable to the County, where 84.4% of residents had obtained at least a high school degree, and 33% of residents had earned a bachelor's degree or higher.



Table 33
Educational Attainment, North Brunswick and Middlesex County 2000

	North Brunswick		Middlesex County	
	Number	Percent	Number	Percent
Population 25 Years and Older	25,089	100%	501,552	100%
Less than 9 th Grade	1,222	4.9%	31,015	6.2%
9 th grade to 12 th Grade (non diploma)	2,330	9.3%	47,449	9.5%
High School Graduate (includes equivalency)	6,435	25.6%	145,657	29.0%
Some College (no degree)	4,356	17.4%	84,865	16.9%
Associate Degree	1,463	5.8%	27,033	5.4%
Bachelor's Degree	5,703	22.7%	102,750	20.5%
Graduate or Professional Degree	3,580	14.3%	62,783	12.5%
Percent High School Graduate or Higher	-	85.8%	-	84.4%
Percent Bachelor's Degree or Higher	-	37.0%	-	33.0%



Table 34
Language Spoken at Home, North Brunswick and Middlesex County 2000

	North Brunswick		Middlesex County	
	Number	Percent	Number	Percent
Population 5 years and older	33,854	100%	701,409	100%
English only	22,693	67.0%	467,470	66.6%
Language other than English	11,161	33.0%	233,939	33.4%
Speak English less than "very well"	3,681	10.9%	94,188	13.04%
Spanish	3,174	9.4%	85,403	12.2%
Speak English less than "very well"	1,332	3.9%	42,256	6.0%
Other Indo-European languages	4,656	13.8%	85,050	12.1%
Speak English less than "very well"	1,362	4.0%	29,260	4.2%
Asian and Pacific Islander languages	2,002	5.9%	48,288	6.9%
Speak English less than "very well"	739	2.2%	18,184	2.6%

Language Spoken at Home

Over one-third (33.0%) of the residents of North Brunswick do not speak English as their primary language at home, almost exactly equal that of Middlesex County, where 33.4% of residents do not speak English as their primary language at home. According to the US Census, North Brunswick contains notable numbers of persons who speak English less than well.

Demographic Trends Analysis

When cross analyzing this data against Table 21 – Housing Unit Data, we see a fairly significant mobile population. Mobility is a general measure of how long people maintain residency in their homes. Utilizing the Township's average household size of 2.58 persons multiplied by the actual structures built between 1995 and 1998, roughly 2,288 ± persons would have been associated with these new units. However, 4,396 obtained residency in their current homes in the 2000 Census.



This indicates that over 2,000 people either moved out of North Brunswick with in this timeframe and 2,000 new residents replaced them. Figures based on the years 1999 to 2000 yielded similar results.

As depicted earlier, it remains difficult to pin down specific reasons for the Township's demographic shifts. When comparing Tables 5, 14, 21 and 22, we see several potential explanations for these shifts.

1. Post high school aged young adults depicted in Table 5 may be seeking more urban settings with diverse cultural amenities.
2. The rise in child-rearing adults could be based on an attraction to a strong school system and recreational amenities as indicated in Table 4 and 22.
3. Roughly 50% of the households identified in Table 14, contain only 1 or 2 persons. This indicates a large number of homes without children while simultaneously indicating households whose children may have grown and moved into their own homes. As these households retire, and seek other housing types, such as, condominiums or retirement communities, it leaves a large number of single-family housing vulnerable to child-rearing families.
4. The high percentage of recent moves into the Township identified in Table 22 could be explained by the combination of the aforementioned factors including availability of housing as people retire and move out, new units built, and households seeking a strong school system.

Population and Employment Projections

Creating up-to-date forecasts that are as accurate as possible is difficult. Forecasting population and employment is one of the critical tasks that Metropolitan Planning Organizations (MPO) in New Jersey undertake. These forecasts are used as a basis for transportation studies throughout each MPO's jurisdiction. The North Jersey Transportation Authority (NJTPA) is one of three MPO's in the State and North Brunswick is included in the NJTPA's area of responsibility.

These population and employment projections are utilized in updating the Regional Transportation Plan (RTP) for Northern New Jersey, the region's long-range blueprint for transportation investment, and are therefore an important part of the regional infrastructure investment program. In addition, forecasts underpin a number of other NJTPA products that are reflected in the RTP. These include:



- Air Quality Conformity
- Regional and Corridor Analyses
- North Jersey Strategy Evaluation
- Performance Measurement
- Transportation Disaster Response
- Environmental Justice Analysis

A key aspect of forecasting is coordination with other agencies that create forecasts of their own. By coordinating with these other projection efforts, NJTPA develops forecasts that provide a common foundation for planning activities and future forecasting in the region.

While not an exact science, NJTPA's projections are a reasonable assumption given the current planning and development efforts as well as the redevelopment potential of major redevelopment sites within the Township. Specifically, the Township's Department of Community Development has analyzed the Township's growth since the 2000 Census while projecting future projects. This analysis uncovered that over 1,000 new housing units were granted certificate of occupancy permits through the end of 2005. Taking the Township's average household size of 2.58 persons, and applying it to the 1,091 new housing units built through 2005, and North Brunswick's estimated population increase would equate to 2,815 or 39,105 total persons. NJTPA projected North Brunswick's population in 2005 to be 38,530. Therefore, actual growth exceeded the projection in this case.

Projecting into the next (10) ten years to the year 2015 we see similar results. Future residential projects projected in the next ten years indicate roughly 1,486 additional housing units coming to North Brunswick. Again, assuming the Township's current average household size remains constant (2.58/household) the population increase could add an additional 3,834+/- persons to North Brunswick or 42,939 total persons by 2015. In short, the projections are not far off from the NJTPA projection of 41,250. It must also be noted that some of these units will be age-restricted and average household size does decrease somewhat within such units. Notwithstanding these age-restricted units, the population forecasts are accurate for use in planning North Brunswick's future.

Looking beyond what the Township may know today, the future redevelopment of key industrial sites will play an additional role in Township's population increases. Although it is not known how these major sites will be developed, they will undoubtedly play a pivotal role in the Township's growth- especially the Johnson & Johnson site. When analyzing what is known regarding growth coming to the Township, these major redevelopment efforts will certainly push the Township's growth over what is projected by NJTPA by the year 2020.



Recognizing these population forecasts in no way requires that the Township work toward meeting these numbers. Rather, it means that the Township has analyzed this growth potential and planned to accommodate this growth in an appropriate and responsible manner.

NJTPA Population & Employment Projections Middlesex County North Brunswick Township.						
Population						
2000	2005	2010	2015	2020	2025	2030
36,287	38,530	39,980	41,250	42,300	43,380	44,360
Employment						
2000	2005	2010	2015	2020	2025	2030
22,630	23,380	24,270	25,270	26,080	26,580	27,460





Land Use Element

INTRODUCTION

This Land Use element examines current development trends and sets a vision for future development for the Township of North Brunswick. The Land Use Plan recognizes the existing land uses within the Township and proposes adjustments to the North Brunswick zone plan to address both short and long term land use issues identified by the Township through extensive public input. The Land Use Element will look to the next 20 years as its horizon, and functions as a critical link in achieving the goals and objectives established through the Township's Master Planning efforts. As noted in the Goals and Objectives section, there are three goals for North Brunswick that specifically relate to land use:

- Preserve existing residential neighborhoods.
- Provide a balance of land uses in appropriate locations to address the needs of Township residents and businesses.
- Maximize the potential for expansion of the economic base with uses that support the costs of providing municipal services to North Brunswick residents.

These land use goals and their associated objectives are also combined with the larger community vision for the future of North Brunswick. This vision is to create areas with a "sense of place" while encouraging socio-

economic, economic and community vitality through well-designed land development.

The North Jersey Transportation Planning Authority (NJTPA) forecasts the North Brunswick population to grow by 3,500 people to a population of 39,980 by 2010, and 2,320 additional people by 2020 reaching a total population of approximately 42,300. These estimates indicate that the Township will soon reach build-out as the remaining developable land within the Township is consumed.

North Brunswick continues to actively seek out opportunities to preserve open space for its residents to offset the developed nature of the Township. These notable efforts have been highly effective and are discussed in detail in the Open Space and Recreation Element. Notwithstanding this proactive open space acquisition effort, these acquisitions can be brought to their full potential when combined with changes to zoning, land use, and design standards.

This Land Use Element seeks to establish a development pattern for the Township considering such factors as environmental characteristics, existing land use patterns, compatibility with the planning efforts of adjacent municipalities, and the current and future land use demands of the Township, County, and State. The Land Use Element is broken down as follows; current land use, current zoning, and recommendations for future land use and zoning.

**INSERT MAP:
EXISTING LAND USE MAP**



CURRENT LAND USE

In order to ensure that future growth occurs in a manner that enhances the visual, physical, environmental, and economic health of the community, it is imperative to have a complete understanding of North Brunswick's existing land uses, as well as an awareness of areas in need of specific attention. This understanding will be especially useful as vacant and underutilized parcels are targeted for development and redevelopment, and the Township seeks to positively impact surrounding areas and improve the Township's

overall connectivity through coordinating existing land use and future development.

The Existing Land Use Map depicts the current land use patterns of the Township. North Brunswick has a land area of approximately 12 square miles, or 6,747 acres excluding road and rail right-of-way (R.O.W.). The percentage breakdown of land uses in North Brunswick is seen in Table L-1.

Table L-1 Township of North Brunswick Land Use Summary						
Land Use Classification	Total # of parcels	% of Total parcels	Total Acreage	% of Total acreage	Net Taxable Value	% of Total
Mobile Home Community	1	0.0	88.76	1.3	\$15,457,100.00	0.7
Mid-Rise Age-Restricted	2	0.0	3.93	0.1	\$331,100.00	0.0
Cemeteries and Graveyards	8	0.1	141.34	2.0	\$0	
Farmland Assessed	12	0.1	135.16	1.9	\$1,472,400.00	0.1
Public Property-PSE&G	12	0.1	67.60	1.0	\$0	
Railroad Property	25	0.2	106.04	1.5	\$0	
Public School Property	32	0.3	601.99	8.9	\$0	
Church and Charitable Property	34	0.3	31.77	0.5	\$0	
Apartments	41	0.4	387.23	5.6	\$251,367,600.00	11.0
Other Exempt	50	0.5	31.11	0.4	\$0	
Industrial	73	0.7	765.96	11.0	\$180,222,200.00	7.9
Office	999	0.9	247.02	3.6	\$122,005,000.00	5.3
Commercial	255	2.0	396.67	5.9	\$258,748,200.00	11.3
Public Property	434	4.0	942.88	13.6	\$0	
Vacant	668	6.0	646.97	9.3	\$42,349,900.00	1.9
Condominiums	914	8.3	132.84	1.9	\$69,359,200.00	3.0
Townhouse	2580	23.3	307.05	4.4	\$308,705,300.00	13.5
Single-Family Residential	5767	52.1	1721.78	24.8	\$1,056,127,900.00	46.2
Total	11033	100	6747.06	97.2	\$2,281,138,100.00	100.0



When data from the Existing Land Use Map and Table L-1 are combined, a number of important trends stand out. First, a majority of the Township is residential land uses. Roughly 25% of the total acreage of the Township is dedicated to single-family homes. Single-family uses also account for the highest percentage of the Township's net taxable value (46.2%). North Brunswick offers a variety of single-family housing options, through its four (4) distinct single-family zones.

While apartments, multi-family and/or attached housing such as condominium flats and townhouses represent a smaller portion of the land area (11.1% combined); they represent 27.5% of the tax base. Their location throughout the Township, close to supporting uses, makes them extremely valuable because they offer many different housing options for people. The result is a strong mix of residential options that provides opportunities for more people to live near retail shopping, and professional land uses. This residential proximity is also an influence on retailers as they decide to locate in North Brunswick while also providing housing for its workforce.

Commercial retail space accounts for 11.3% of the tax base. These uses are concentrated primarily along the State highway corridors of Route 1, Route 130 and on Route 27. There are also concentrations of commercial activity at the intersection of Herman Road and Livingston Avenue as well as Hermann

Road and Georges Road. Commercial uses are particularly concentrated in a linear fashion along the Route 1 corridor near the Route 1 and 130 interchange. Most of the commercial uses along the highway corridors are situated to provide a more regional focus as they strongly depend on the regional road network for survival. However, the commercial uses in the Hermann Road, Livingston Avenue and George's Road area serve a more local market.

Office land uses account for 3.6% of the Township's land area and 5.3% of the tax base. These office land uses exist primarily in the northern portion of the Township, and include Wachovia as well as the NJEDA Technology Center. While there are other office land uses located throughout the Township, the northern section represents the largest total space dedicated to those uses. The office uses in other parts of the township are primarily professional office space dedicated to doctors and lawyers offices. In the near future, the DKM site will also be developed as office, and therefore will contribute an additional 50+/- acres of land devoted to office use.

Industrial land uses account for 11.0% of the land area in North Brunswick and 7.9% of the tax base. Industrial uses are concentrated along Jersey Avenue, Route 1, and the Northeast Corridor rail line.



While the major nodes of non-residential activity are along Route 1, some smaller clusters of commercial activity exist on other streets, either currently providing, or having the potential to provide, for the needs of Township residents well into the future. Again, these areas include the Livingston Avenue and Georges Road areas near Hermann Road, as well as the area surrounding the Route 130/Old Georges Road area across from the Renaissance development.

It is also clear that the Township contains a large amount of publicly owned land. While more detail on this subject is in the Recreation and Open Space Element of this plan, most of the land has been purchased by North Brunswick or Middlesex County for the preservation of open space and expansion of the local park system. These open spaces have helped preserve important environmental and wetland areas, such as Hidden Lake and Farrington Lake, while providing much needed recreational space for North Brunswick residents. These lands have also provided the Township with the site for the new North Brunswick Community Park.

The final area of importance is the amount, and location of, vacant land within North Brunswick. While some of this vacant land is located in and around areas already dedicated for preservation, such as Farrington Lake and the properties adjacent to Hidden Lake, there are a number of parcels located near important nodes of activity. Such sites include undeveloped portions of the Renaissance

Development, undeveloped portions of the Transitional Mixed-Use (TMU) zone near Route 1 and Cozzen's Lane, and vacant parcels located near the Okonite and Johnson & Johnson industrial sites. These properties provide the Township with opportunities for in-fill development and redevelopment.

The Planning Board has made it clear that because a property is vacant, that it does not mean that the site should be developed. This plan identifies areas where open space is the most appropriate land use while also identifying vacant land that is appropriate to develop. Notwithstanding what land is appropriate or inappropriate to develop, vacant land does not represent the only prospect for future ratable growth in North Brunswick. Underutilized sites in North Brunswick also exist, providing the need to discuss the most appropriate uses for these sites. To that end, the Township has identified four former industrial sites of critical importance:

- The Johnson & Johnson Site; Route 1 North; Block 148, Lot 5
- The Okonite Cable Site; 1600 Route 1; Block 143, Lot 18.13
- The Truemann Storage Site; 2700 Route 130; Block 224, Lot(s) 5, 2, 6, 8, 87
- The General Automotive Site; Route 1 & Route 130; Block 143, Lot 25.01



While more information regarding future uses for these sites can be found in the recommendations section of this element, it is clear, given their location and size, that these sites present North Brunswick with an unparalleled opportunity. The key to each of these sites will be to ensure the site design is fully integrated into the surrounding neighborhood while improving the local street network and pedestrian connections.

CURRENT ZONING

Zoning in North Brunswick is broken down into twenty-one (21) categories, as shown on the Existing Zoning Map. As a whole, the classifications offer a variety of options in land use. These twenty-one zones can be grouped into five (5) broad categories: residential, neighborhood commercial, highway commercial, industrial, and office/professional. Several adjustments were analyzed by the Planning Board and ultimately deemed necessary to carry North Brunswick forward into the next millennium. These changes will be explored further in the recommendations section. The following section will analyze existing zoning and identify those zones where zone changes may be appropriate.

Residential Districts

There are presently eleven (11) residential zoning districts in the Township. The residential districts of North Brunswick, while different in

**INSERT MAP:
EXISTING ZONING MAP**



density, share similar land use patterns. The primary distinction in these neighborhoods lies in the type of housing units, densities and their associated street network.

The older, more mature housing stock with street patterns that have a moderate to high degree of connectivity in the Township are primarily located around the Municipal Complex area and the Adam's Station area. Many of the remaining residential communities are private communities and enclaves with a low degree of street network connectivity because of the abundance of dead-end streets, cul-de-sacs, and private access drives. While the neighborhood street network produces quiet suburban subdivisions, it does very little to alleviate the congestion along the regional roadway network. This is partly because the local traffic must utilize the regional road network for local shopping needs. Circulation issues will be explained in further depth in the Circulation Element.

Single-family Residential (R-1)

Single-family homes on 20,000 square foot lots constitute the prevailing development pattern in the R-1 zoned areas. The land zoned R-1 exhibits low-density single-family subdivisions. These neighborhoods front on collector roads between Route 130, Georges Road and Farrington Lake. As a general rule, when calculating appropriate densities of zoning, site constraints and roads must be factored in. This plan has used 10% as this number. Therefore, the density in this zone is roughly two 2.0 units/acre.

Most of this zone is developed with the exception of land west of the former Pulda Farm. The remaining parcels have been considered for development consistent with the R-1 zoning. The developable properties consist of approximately 25 acres in total.

Single-family Residential (R-2)

The areas currently zoned R-2 (15,000 square foot lots) represent the medium to low-density single-family residential zone. As shown on the land use map, most R-2 zoned land is located in the following areas:

- Northern reaches of Route 130
- Church Lane south of Route 130
- North of Cozzen's Lane primarily along Route 27
- Aaron Road & Linder Avenue

The density for this zone is approximately 2.6 units per acre. There are several areas throughout the Township where additional development is possible. However, there are approved single-family homes on several of these areas.

R-3 Residential Zone

The areas currently zoned R-3 (10,000 square foot lots) are located in central and northeastern North Brunswick, in between Routes 130 and 1, and a neighborhood west of Jersey Ave. The R-3 zone allows for single-family housing at densities of approximately 4.0 units/acres. The R-3 Zone is close to reaching build-out. With smaller areas of land near Douglas Avenue and one near Oliver Avenue being developed in the R-3 zone, the zone can only support an additional 15-20 residential units.

**R-4 Residential Zone**

The R-4 zones (7,500 square foot lots) are located in the Township's northeast corner along the border with New Brunswick. The zone is representative of the older neighborhoods in the Township and has a very high degree of connectivity through its layout of streets in a grid pattern. The R-4 zone allows for both single-family detached units and two-family dwelling units, while also allowing for boarding and rooming houses. Densities within this zone are set at approximately 5.2 units/acre.

R-4A Residential Zone

The R-4A zones (7,500 square foot lots) are located in the northeastern corner of North Brunswick, north of the Milltown-Georges Road shopping center. The regulations for this zone are almost identical to those in the R-4 zone, with the notable exception that the R-4A zone allows only single-family detached dwellings as a principal use.

R-5 Residential Zone

The R-5 zones (5 acre minimum lots) are located in pockets scattered throughout the Township, although they are primarily oriented along the road corridors of Routes 1, 130, and 27. The R-5 zone allows for garden apartments and their sales offices as principal uses. Bulk regulations keep building sizes small and hold the density of developments at 10 units/acre with no more than 20 contiguous units in a building.

R-6 Residential Zone

The R-6 zone (30,000 square foot lots) is for Planned Residential Development. The areas currently zoned R6 are in the western portion of the Township, along Route 27. The R-6 area was created to help create residential developments around usable open space. As such, the areas currently zoned R-6 are home to parks and lush landscapes. Principal uses in the R-6 zone include single-family homes, attached housing units, and grandfathered garden apartments. The maximum density in the zone is 3.5 units per acre and single-family units must be no less than 50% of the total units developed. Furthermore, the zone was developed to encourage consolidation of small lots and to encourage integrated development in areas of irregular lots. This is achieved by requiring large lots for single-family construction, while reducing lot size if a development includes a minimum of 10 acres. The zone clearly accomplished its goals and has been successfully built-out.

R-7 Residential Zone

The R-7 zone (2 acre minimum lots) was created to address the need for high quality rental housing for the elderly in North Brunswick. There are two (2) areas currently zoned R-7. These include the 200-unit Jack Pincus Apartments, located on Remsen Avenue, and the 150-unit North Brunswick Senior Citizen Apartment building, located at 740 Hermann Road. The primary use in this zone is multistory housing, which is subsidized or priced to be affordable to lower-income families. The maximum density is 50 units/acre and the developments are age-restricted to residents 60 years or older.



R-M Zone

The R-M residential zone allows mobile homes as the principal use. Therefore, the regulations for this zone govern the operation of a mobile home park. The lone R-M zone is located along Route 130 in the southeastern corner of North Brunswick.

R-T-D Zone

The R-T-D Townhouse-Duplex Residential District was created to provide a buffer of dense residential development between lower density residential zones and non-residential uses. To that end, the areas currently zoned R-T-D are located west of Route 1. The largest tract is located between a residential zone and PUD near Hidden Lake. Two other tracts are zoned R-T-D, one near Route 27 and another near Ridgewood Avenue and Newton Street. Maximum density in the zone is 7 units per acre. Principal uses in the R-T-D zone include single-family homes, townhouses, and duplexes.

Special Use Districts

North Brunswick currently has four different special use zones. Generally, the special use zones have been designated by North Brunswick to achieve comprehensive development not possible inside of a single-use zone. To that end, the TMU and PUD zones have helped create concentrations of housing and retail in close proximity to one another while maintaining a separation of uses. These developments have also helped to increase connectivity within the Township. The following section will detail the four special use zones and their relationship to

land use goals and issues in North Brunswick.

Transitional Mixed-Use (TMU) Zone

The Transitional Mixed Use zone is located along the southwestern part of Route 1. It is the intent of the TMU zone to provide a mix of uses within close proximity, while effectively buffering commercial components from nearby residential areas. There are specific regulations governing residential density and square footage for nonresidential space. The design standards in this zone are not as rigid as other zones in the Township, with the intent of achieving stronger buffers between residential communities and commercial uses along Route 1. Principal uses in this zone include single family housing, garden apartments, restaurants, retail, high technology industrial, and other general office uses.

While much of the TMU zone has already been developed, there has been discussion regarding the use of the TMU zone for the development of smaller vacant parcels. While more detailed information will be presented in the Land Use Recommendations section, it is important to note that the zone was created to facilitate development of larger parcels and that many of the remaining vacant parcels are smaller and constrained by wetlands.

PAC Zone

The area currently zoned Planned Adult Community lies between Old Georges Road and Farrington Lake. The zone allows for the construction of age restricted (55 or older), market-rate housing in single-family units,



duplexes, townhouses, or flats. The zoning regulations call for a maximum density of 2.5 units per acre. Several density bonuses associated with this zone allow increased density to just below 5 units per acre. The result of the planning for this zone yielded approval of “The Cascades” development, a market priced age-restricted retirement community. The density bonuses associated with this zone were utilized.

Planned Unit Developments (PUD) Zone

Areas currently zoned for Planned Unit Developments are in the central portion of the Township between Routes 1 and 27 and also Route 1 and Livingston Avenue. Permitted uses in this zone include many types of residential (single family to garden apartments) and non-residential uses (office/professional and commercial space). PUD’s are required to be a minimum of fifty acres and may not exceed more than 50% non-residential.

PUD II Zone

The PUD II zone applies only to the Manor Realty tract between Route 130 and the Northeast Corridor area, now known as Renaissance. This zone is the outcome of a past court settlement aimed at the provision of affordable housing within North Brunswick. As such, the permitted uses are very similar to the PUD zones; except that the PUD II zone allows for flex space buildings allowing a mix of warehouse and office uses, freestanding restaurants, and hotel/convention facilities. The minimum commercial component of this settlement provided for a minimum of 1.5 million square

feet of commercial development, with a 1/3 maximum allowance on retail development. The Township has expressed an interest in reviewing the appropriateness of the non-residential development densities in this zone. More on this subject is located in the Recommendations section.

Education Recreation Research Zone (ERR)

Areas currently zoned ERR are evenly spread throughout North Brunswick because the zone includes local parks, open spaces, and municipal uses. The only prohibited use is dormitories or other types of student or faculty housing. More detail on the specific institutional and public uses in this zone can be found in the Community Facilities Element and Recreation and Open Space Element.

Commercial Districts

North Brunswick has two different primary retail zones: C-1 and C-2. These two zones concentrate commercial development along Routes 27, 130, 1, Livingston Avenue, Milltown Road and Georges Road. C-1 commercial zoning provides for neighborhood retail while the C-2 commercial zoning provides for broader retail needs.

C-1 Zone

The C-1 zone was created for neighborhood, convenience-type retail uses. To that end, most of the areas zoned C-1 are located along Route 130, Georges Road, Livingston Avenue, and Route 27. Permitted uses for the area are smaller-scale retail uses like florists, grocery stores, eating and drinking establishments,



and other smaller scale retail stores. Shopping centers are not permitted in this zone.

C-2 Zone

The C-2 commercial zone is designed for general commercial activity. The C-2 zone allows many of the same retail uses allowed in the C-1 zone plus uses such as shopping centers and hotels. Areas currently zoned C-2 are concentrated along the Route 1 corridor near the interchange with Route 130. Given the purpose of the zone, the uses it allows, and current location, the zoning is appropriate where it exists today.

Industrial Districts

North Brunswick currently has two different industrial zones: I-1 and I-2. Both zones are quite similar, differing only in the intensity of industrial uses allowed. I-1 is for light manufacturing, while I-2 allows some more intensive industrial operations such as sheet metal fabricating. The following section explains the details of each zone and recommends changes to ensure that the zones meet North Brunswick's future land use goals.

I-1 Zone

The areas currently zoned I-1 are located primarily along Livingston Avenue, Jersey Avenue, and the Northeast Corridor, with a smaller area located along Route 130 and Davison's Mill Road. This zone allows light manufacturing, experimental research or testing laboratories, government structures, and warehousing and distribution uses. With a minimum of 10 acres, this zone also allows for the creation of industrial parks.

Concerns have been expressed regarding a portion of the I-1 zone on a 25-acre property near the Manor Apartments. Given the pending redevelopment of the nearby Okonite and Johnson & Johnson sites, the I-1 zoning in this area may no longer be appropriate. Although the site is constrained by wetlands, future zoning should take into account the surrounding redevelopment efforts. More detail on this subject is provided in the Recommendations section.

I-2 Zone

Areas currently zoned I-2 are primarily located along Route 1 and the Northeast Corridor rail line. The principal uses in the I-2 zone are very similar to the I-1 zone, allowing all of the same uses plus sheet metal fabricating, medical or dental clinics, education facilities, and associated hotel/convention facilities. For tracts larger than fifty acres, the developer may submit a general development plan for approval. The I-2 zone also allows for industrial parks on a minimum of 20 acres. Two of the larger tracts of I-2 land, the former Okonite and J&J sites, are subject to review as part of the Master Plan process.

Office Districts

Currently, North Brunswick has two different office zones: General Office (GO) and Office Research (OR). Both zones are primarily located along Routes 1, 27, 130, and Livingston Avenue.

General Office (GO)

The areas currently zoned for General Office



are along Route 1, Route 27, and Livingston Avenue. All located in the north and western sections of the Township, this zone allows professional offices, banks, medical offices, and other office uses. Uses must provide off-street parking, and the maximum floor area ratio is 1. Additionally, bulk and site regulations limit the effect on neighboring uses through buffering requirements.

The General Office zone also allows for the creation of office parks assuming the site contains a minimum of 20 acres. The regulations differ for this section, allowing both a wider array of office uses (such as experimental, research, and testing laboratories) and differing bulk standards.

Office/Research (OR)

The area currently zoned Office/ Research is

located along the northern end of the Route 1 corridor near Rutgers University. This zone was established for the Township to capitalize on its proximity to Rutgers and the important transportation corridor of Route 1, providing a site for integrated corporate office and research facilities. Primary principal uses in this zone include professional offices, experimental research or testing laboratories, educational services, and hotel/convention or retail facilities that are ancillary to the principal uses. This zone allows greater building heights, but mitigates its effect through requiring greater setbacks as building height increases.



RECOMMENDATIONS

Given the relatively small amount of vacant, undeveloped land remaining in North Brunswick, infill development and redevelopment of several older industrial sites are the primary avenues for growth. Therefore, the land use recommendations contained herein attempt to address both the current potential of vacant infill sites and the potential redevelopment of these industrial sites.

The Township Planning Board has reviewed both short-term and long-term approaches to develop and redevelop areas in North Brunswick. In doing so, the Board has taken an approach that reviews all areas of the Township and the impacts each area, and parcel, have on one another. As such, this Plan makes recommendations specific to each area of the Township in a highly coordinated fashion.

When combined, the land use goals and the long-term trends of Township development make clear the need for the development of centers of activity, or areas that exhibit a “sense of place”. However, development must be balanced with recreational needs and open space preservation efforts.

This section will break down land use recommendations for North Brunswick into three (3) areas: General Planning Policy Considerations, Zone Plan Recommendations, and Land Development Ordinance Recommendations. This section also breaks down issues identified by the public and the

Planning Board, and provides recommendations through site-specific analysis. Each site is identified by number (#) and is coordinated to the Proposed Land Use Map included in this Element.

General Planning Policy Considerations:

- Connectivity

The goal of increased connectivity is prevalent throughout much of the Township's 2006 Master Plan. In essence, connecting people with goods and services is an important consideration of any community. To accomplish this, various means such as a strong sidewalk system, a highly connected roadway network, and pedestrian greenways should be considered in every planning effort regardless of size.

Although this plan does not recommend wholesale changes with regard to increasing connectivity, it does point out where improvements could be made to increase the overall quality of life in North Brunswick. In addition, the Township should continue to identify where additional pedestrian and roadway connections could be implemented in the future. These connections could be implemented as development applications and greenway-planning efforts move forward.



- Creating Centers of Activity- Areas with a “Sense of Place”

The Planning Board found it important to explore the idea of creating areas that have a “sense of place”. Centers of activity that create this “sense of place” for people to visit, shop and live, are interchangeably referred to in the planning profession as center-based development; activity nodes; neo-traditional design; and smart growth development. These planning concepts are exhibited in many places in New Jersey such as Metuchen, Princeton, Cranbury, and in their more intense forms, New Brunswick and Hoboken. Center-based development is primarily focused on design rather than on segregation of land uses. Design is paramount to creating development patterns where people can walk, shop and live. When designed well, these places make people feel welcome and provide amenities that encourage them to visit. Pedestrians are a primary focus, although parking and vehicular circulation is important as well. A typical center could have a variety of retail uses side-by-side with residential units located above the ground floor. Centers that exhibit a “sense of place”, in ascending order include, the Hamlet (Crosswicks), Village (Cranbury), Town (Dover, Morris County), Regional (New Brunswick) and Urban (Hoboken).

Due to its automotive orientation, New Jersey’s typical commercial zoning and development have historically lacked pedestrian connectivity and a “sense of place”. As a result, most development serves the automobile without much consideration of pedestrian or bicycle

circulation. The automobile allowed many town planners and designers to plan parcel-by-parcel because access to a development no longer needed to be based on proximity, nor did it have to relate to its surrounding or neighboring parcels.

To improve connectivity and provide a “sense of place”, it is important to incorporate center-based design solutions into the Township’s commercial zoning. Short-term amendments to existing zoning could be considered where development in targeted areas could be subject to additional requirements, such as “build-to lines” rather than setbacks. Build-to lines mandate where buildings will be placed, rather than a traditional setback that mandates a building must be set somewhere beyond a prescribed distance. Build-to lines work to establish development uniformity and work to connect different uses to one another. Other requirements that could help establish a “sense of place” would focus on location of parking facilities, public plazas, and strong streetscape amenities.

While center-based approaches are not appropriate for every section of the Township, an example of an area that exhibits opportunities to create a “sense of place” in North Brunswick is the Livingston Avenue & Hermann Avenue area. In the future the area near Georges Road & Milltown Road and Hermann Road may also be a consideration. These areas could be ideal candidates for center-based development practices, through the inclusion of refined design standards that take advantage of the



existing road network and the close proximity of commercial land uses. Providing a higher degree of pedestrian amenities can work to link the surrounding neighborhoods to the commercial activity. These pedestrian amenities could include street trees, better sidewalks, pedestrian crosswalks and some traffic-calming improvements.

Another area being considered for center-based development is the former Johnson & Johnson (J&J) site. The Township is proactively pursuing the location of a train station at this site, offering the possibility of redeveloping this site as a Transit Village or other type of area that exhibits a “sense of place”.

- Potential Use of the Local Redevelopment & Housing Law

As noted earlier, North Brunswick is a mature suburban community facing a future where most major new development will not occur through developing vacant tracts, but rather through reuse and infill redevelopment. The Planning Board has reviewed changes to zoning, streetscapes, and other market-based solutions to revitalize or encourage redevelopment in some of these areas. However, if these techniques do not produce the desired effects, the Township may need to consider the potential use of the New Jersey State Local Redevelopment & Housing Law 40A:12A-1(LRHL). The LRHL allows a municipality to designate an “Area in Need of Redevelopment” for portions of the town that meet the criteria set forth in the statute. Should an area meet the criteria, the law allows the municipality to create a specific

redevelopment plan and further provides for incentives to encourage redevelopment, such as tax abatements and consolidation of property in accordance with the plan.

There is currently only one area at this time where the Township may wish to consider utilizing the LRHL. This includes Area #5 along Livingston Avenue. However, this approach could be considered in the future for any challenging area that does not respond to market-driven efforts.

Zone Plan Recommendations

- Johnson & Johnson, (J&J) (#1)~

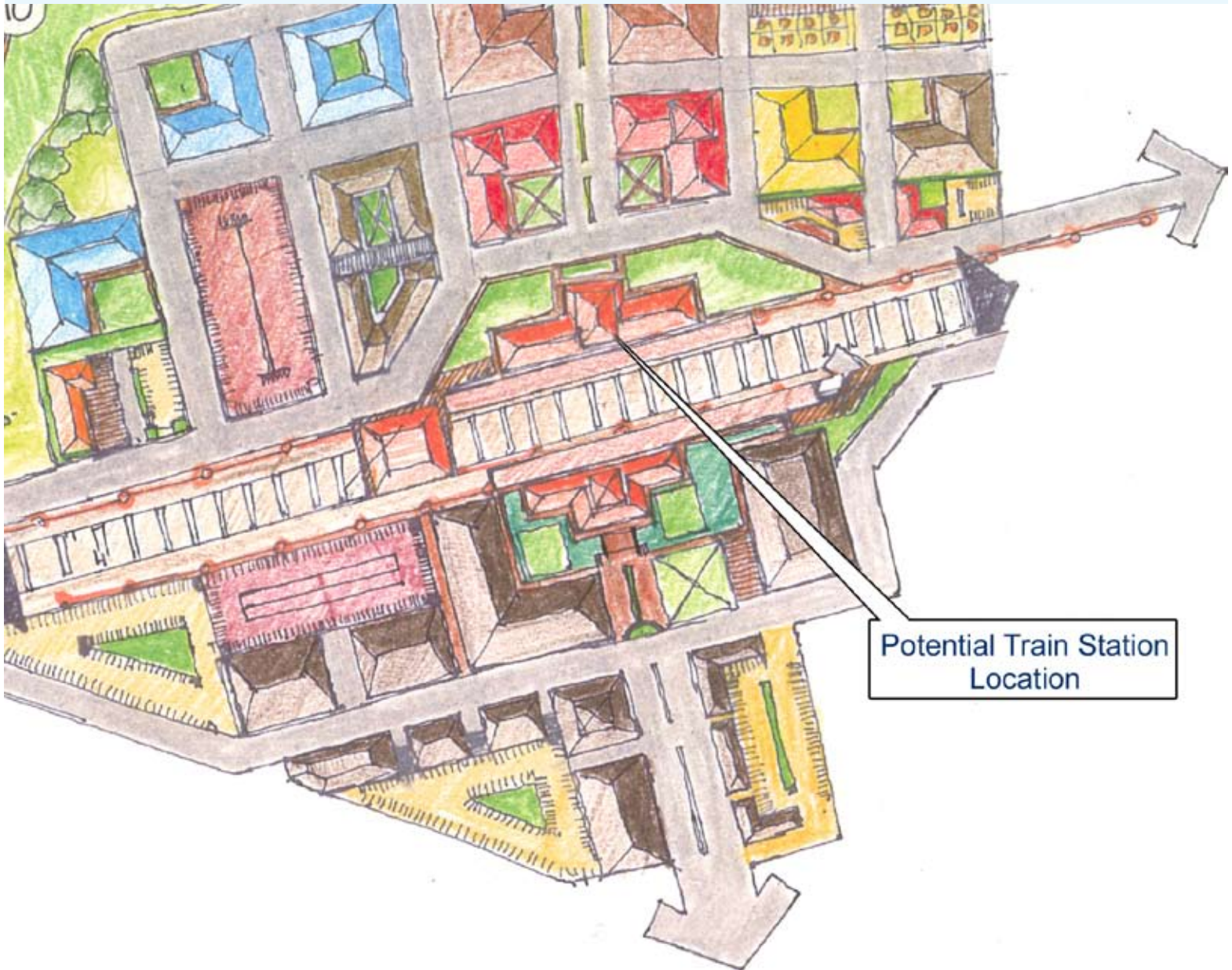
The premier large development tract in North Brunswick, the J&J site, offers the possibility of a rail station with access on the Northeast Corridor Line. The 200± acres of J&J is located along Route 1, and stretches along the south side of Route 1 from approximately Finnegans Lane to Commerce Boulevard.

Concurrently with the Master Plan process, the J&J contract purchasers of the site have engaged in a public process that solicited input through community-based visioning.

The planning process took several weeks to complete. The effort began with several information meetings with the public to educate them about “smart growth” and transit-oriented development. The developer then presented three (3) alternative layouts for a Transit Village at the next meeting. While no densities were discussed, the outcome yielded a form-based transit village design that



A train station located on the J & J site will present the Township with many development options, including a new town center



INSERT MAP:

FUTURE LAND USE CONSIDERATIONS MAP



incorporates residential, retail, office and a rail station. These uses were designed in a mixed-use fashion to facilitate an active pedestrian environment that seeks to create a Town Center with a “sense of place”.

As part of this 2006 Master Plan process, the Township Planning Board considered several other options for the site in addition to the Transit Village that emerged from the Charrette process. These options included a golf community with a center-based commercial area, an office research park, and leaving the existing I-2 zoning in place. All three of these other options appear to be feasible given the site’s location and development constraints.

However, the key factor in determining the ultimate land use mix and density of development for the J&J site, is whether NJ Transit decides that the site is feasible for consideration of a new rail station.

Until such time as NJ Transit completes their analysis of the feasibility of establishing a train station, the Planning Board believes it is inappropriate to delineate specific land uses and densities for this site. It is therefore recommended that the I-1 zoning be retained at this time. This zoning allows for the continuation of office, manufacturing or warehouse uses while NJ Transit completes its studies.

Upon NJ Transit making a determination as to the site’s appropriateness for a rail station, the Planning Board should reinstitute meetings with the owner of the property to determine

the appropriate mix of land uses. However, the Planning Board makes the following two (2) strong recommendations at this time;

- 1) The Township should encourage NJ Transit to expedite its analysis on the feasibility of constructing a rail station at this location; and
- 2) Due to the size of this site and the traffic congestion existing in proximity to this site, any future redevelopment should incorporate a crossing of the Northeast Corridor line to connect Route 1 and Route 130. No decision has been made whether such a crossing should be located at Finnegan’s Lane, in the vicinity of Cozzen’s Lane, or a crossing through the J&J site. This connection between Route 1 and Route 130 appears critical to mitigate the traffic of any major redevelopment at this location.

- Okonite Cable (#2)~

Another site the Township wished to specifically analyze was the former Okonite Cable site. Currently being utilized as a warehouse, the site is located adjacent to the Northeast Corridor and Route 1 near Livingston Avenue and Jersey Avenue.

The Planning Board reviewed several alternatives developed as part of this Master Plan. Options included transit oriented development; an age-restricted community; office-research park; and development under the site’s current industrial zoning. Ultimately, the Board decided that given the site’s location, and current use as a warehouse distribution center, the current I-2 remains appropriate. This plan notes that the



Township may seek to revisit the site's future use as the science and technology initiative along the Route 1 corridor continues to evolve.

Should future planning considerations regarding the site's future take place, all efforts should seek to ensure a higher degree of connectivity through the site and into the surrounding street network. Whether vehicular, pedestrian, or some combination thereof, the existing network of streets provides a great opportunity to redevelop the site while alleviating some local and regional traffic issues. More discussion on this issued is located in the Circulation Element of this Master Plan. Given the site's valuable location, the LRHL may also be a tool the Township could utilize if this site deteriorates and is not redeveloped through private sector

market forces.

- Truemann Storage Site (#3)~

Another site the Township wanted to closely analyze was the Truemann Storage site in the southern tip of the municipality along Route 130. The 25 acre site is currently zoned Industrial (I-I). This plan recommends that the Township rezone the area from industrial use to age restricted housing in order to address the Township's need for housing for the elderly, particularly housing that allows for an assisted living component as well. Some component of commercial use should also be considered to service the residents of the area.

It is recommended that development standards for this zone allow a gross residential density

Providing access to the natural environment through proper planning can improve access to existing facilities within the parks system, such as Farrington Lake





of approximately 10-12-units per acre, with ancillary retail uses ranging from 1,000- 2,000 square feet per gross acre. In addition, it is recommended that additional density bonuses be incorporated into the zoning for this site in order to encourage both the inclusion of an assisted-living facility on the site as well as public access from Route 130 to Oakey's Brook, and ultimately, Farrington Lake.

Dedication of land or easements for access to the Brook could result in an increase of an additional 1-unit per acre. Construction of an assisted-living facility could result in an increase of an additional 1unit per acre for each 50 beds in the facility. These provisions could provide the incentive for a developer to build the assisted living facility while also gaining a potential greenway connection along Oakey's Brook.

General Automotive (#4)~

The former General Automotive site is a cornerstone site within North Brunswick Township. Located at the crossroads of Route 1 and Route 130, the site currently houses an older industrial warehouse building. While many options regarding the site's future were discussed, the Zoning Board of Adjustment, outside of this Master Plan process, recently granted a use variance for a 136,000 square feet shopping center with 20,000 square feet of office space. While this commercial shopping center will not produce a "cornerstone" type building to replace the high profile vacant structure there today, it is proposed to include a higher-end shopping type environment.

The Planning Board reviewed several alternatives to this lifestyle center. These development alternatives included office research; a mixed-use community; and "lifestyle" retail in various design patterns. The Township analyzed traffic impacts associated with these developments. In light of the Zoning Board of Adjustment approval, the Planning Board has decided to leave the zone as is, and upon build-out, will consider rezoning. This way, should the developer not go through with the project, the Planning Board would be able to reevaluate the best use for the site.

- Potential Redevelopment of Livingston Avenue Road Area (#5)~

The Livingston Avenue area, shown as site #5, extends along Livingston Avenue all the way from 12th Street down to Fleetwood Avenue. This area also extends back to the Northeast Corridor line on the southbound side of Livingston Avenue from 12th Street to 16th Street, and several hundred feet deep on the northbound side of Livingston Avenue.

This area is characterized by the following:

- Several abandoned, boarded up commercial buildings that are blighting influences on the area.
- A mixture of small freestanding commercial and office uses, many of which are residential conversions.
- Very small, restrictive lot sizes ranging from 30-50' in width and up to 100' in depth, limiting potential redevelopment



- of the lot.
- Inadequate off-street parking due to the aforementioned small lot sizes
- No unique commercial uses that draw people beyond the immediate area.
- Very unattractive streetscape with deteriorating sidewalks and no pedestrian amenities.
- Between 16th Street and 12th Street, the railroad, and Joyce Kilmer Avenue, an uncomplimentary mix of industrial, automotive, repair and impound yard uses that are inconsistent with the neighborhood commercial zoning.
- Between Fleetwood Avenue and Hawthorne, a unattractive nursery operation.
- An extremely wide pavement section in a 66' wide state right-of-way on Livingston Avenue, making pedestrian crossing difficult.
- An extremely narrow right-of-way on How Lane, leading to inadequate turning lanes to facilitate traffic flow at the intersection of How Lane and Livingston Avenue.
- Severe traffic congestion in the area of Livingston Avenue and How Lane
- A proliferation of different types of permanent and temporary signage.
- A 7+ acre nursery operation at the far southern end of Livingston Avenue on the northbound side.

The Planning Board acknowledges Township Council attempts to revitalize this area through

seeking funding for streetscape improvements to make the area more attractive and pedestrian friendly. However, given the many limiting characteristics described herein, there is concern that streetscape improvements alone may not trigger revitalization of this area. As such, it is recommended that the Township give serious consideration to studying this area further in order to determine the appropriateness of declaring this area and "Area in Need of Redevelopment" under the LRHL.

Should the Township determine that it is not appropriate to pursue redevelopment under the LRHL, it is recommended that the Township continue seeking funding to effectuate the streetscape improvements to beautify the area and make it attractive and safe for pedestrians. If streetscape improvements come to fruition, consideration should be given to developing new zoning standards for this area to require buildings to be constructed closer to the street with parking to the rear of the buildings, and limiting the amount and type of signage.

- Georges Road, Hermann and Milltown Road Business Improvement District Area (#6)~

Along with the Livingston Avenue area, the Georges Road, Hermann Road and Milltown Road area forms the eastern half of the civic corridor of Hermann Road. Because of this important intersection of commercial, residential, and government uses, this area presents an opportunity to enhance an already economically vibrant commercial node into one

that adds even more value by including better pedestrian amenities.

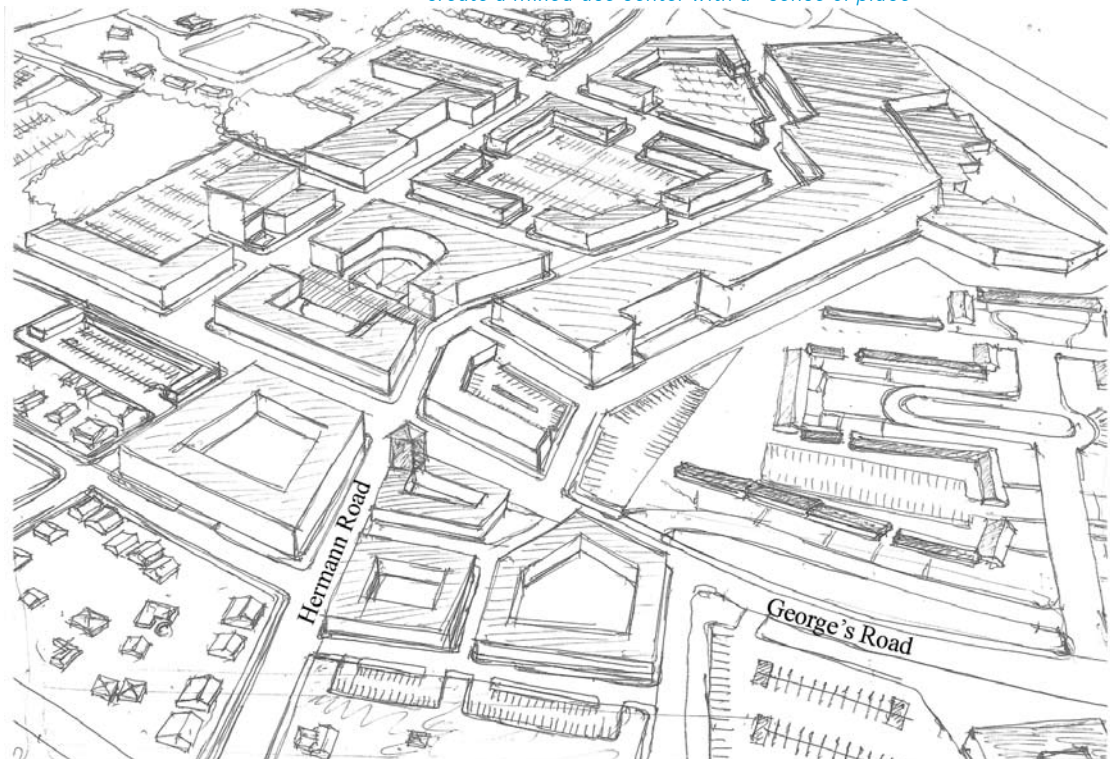
Because of the outstanding potential this area possesses, this plan recommends two (2) approaches the Township can take to improve the area. As such, the plan recommends short-term improvements and long-term considerations.

The area as it exists today, is surrounded by dense R-4 and R-4A residential zones. Streetscape improvements along Georges Road, and its side streets, would go a long way toward improving the pedestrian potential of the area. These shorter-term improvements could include new sidewalks, street trees, street furniture, and crosswalks. However, because funding is difficult to obtain, the Township should continue

to focus on the Livingston Avenue streetscape project before taking on this new area.

Long-term considerations would be much more ambitious. Given the junction of two successive “T” intersections, one at Milltown Road and Georges Road and one at Hermann Road and Georges Road, the Township could eventually consider eliminating the Hermann Road T-intersection. Consideration should be given to replacing the T-intersection with a solid four-way intersection where additional opportunity for economic development could be achieved along the additional frontage created. A sketch depicting how this area could look is depicted in Figure A-1. In essence, a revised road network could lead to additional development parcels, and if designed properly, could create a tremendous “sense of place” for all of North

Figure A-1: Long-term considerations for Area #6 could look to create a mixed-use center with a “sense of place”





Brunswick.

A project of this scope may be many years away. Such an effort would require intense planning and community participation, particularly from landholders. Should the Township seek to pursue such an endeavor, redevelopment may be a long-term future consideration. Redevelopment is not a recommendation for this area, but the area should continue to be evaluated. Perhaps a community-based plan could reveal the true, value-added development potential, and redevelopment may never be needed because the landowners see the value in participating in such an endeavor.

- Finnegan's and Route 27 Area (#7)~

There is vacant land along Finnegan's Lane that is zoned for neighborhood commercial use, but abuts single-family residential. This area presents potential conflicts due to its close proximity to residential uses and zones. To address these concerns, the Planning Board has determined that the creation of a new C-3 zone will help better buffer residential neighborhoods while maximizing the development potential within the zone. Recommended standards for a new C3 Zone are included in the Land Development Ordinance Recommendations Section of this plan.

Once the C-3 zoning standards are established, this plan recommends that the area delineated as #7a, be rezoned to include the residential friendly provision that will be created by the ordinance. The section labeled as #7b on the Future Land Use Map should be rezoned R-2 to

be consistent with the Board of Adjustment's approval for single family homes on Sutter Road.

- Route 27 and Broadway Avenue Area (#8)~

The area of Route 27 at Broadway Road, Sherwood Boulevard, and Ruth Road is currently zoned R-6 at Broadway Road and Sherwood Boulevard and General Office (GO) at Ruth Road.

The Planning Board determined that extending the existing General Office (GO) Zone south along Route 27 to encompass the Devries Landscaping site at 2442 Route 27 north is appropriate at this time. The zone would extend approximately 250 feet from Route 27. The Future Land Use Map has mapped where this change should likely occur.

- TMU Zoning at Cozzen's Lane (#9)~

Given the lack of development on some of the smaller vacant properties zoned TMU in the area of Cozzen's Lane, and the fact that the zone was designed for larger development tracts, the Planning Board has explored different options to encourage development. These options included rezoning the area, possibly creating a new zone, and reworking the current TMU standards. After review and discussion with the Planning Board, this plan recommends that the TMU zone be amended to use C-2 commercial zoning standards. The zone would be amended to include the language; "Effective as of (the date of acceptance of the ordinance) the TMU zone will utilize the development standards



found in Article XIV, General Commercial Zone (C2)."

- Luke Park Area- Greenway and Open Space Considerations (#10)~

This area has been identified for potential acquisition because of its proximity to Luke Park, thereby facilitating the recommendations in the Recreation and Open Space Element. The area's environmental characteristics and ability to connect open spaces with neighborhoods and a potential greenway network make it a prime addition to the Township's Open Space network. This opportunity extends south across Route 1 and ties into the County-owned land and along Oakey's Brook, and creates tremendous opportunity to coordinate with the Greenway Plan discussed in the Recreational and Open Space Element.

- TMU Zoning at Aaron Road (#11)~

The Planning Board weighed several options for the undeveloped portion of the TMU zone. Options included amending the TMU zone as set forth in item #9, creating a new mixed-use zone, and rezoning the area to General Office. In the end, the Planning Board feels that the General Office (GO) Zone is most appropriate at this time and could work well with the prospective redevelopment of the J&J site. Consideration should also be given to continuing Hartland Commons south to Finnegan's Lane by way of Gardenia Drive. More discussion surrounding the Hartland Commons extension is located in the Circulation Element of this Master Plan.

Should the property remain vacant, the Planning Board should revisit this area to see if more can be done to coordinate with the J&J redevelopment effort as discussed previously.

- North Brunswick South at Oakey's Brook (#12)~

Given the environmental features of the area, and potential to be connected into a greater greenway network, the Township has identified the properties in this area for potential acquisition. Additionally, the proximity of Davidson's Mill Pond Park makes the area an ideal location for open space conservation. Such acquisitions would encompass the areas currently zoned R2 and I2. These areas are identified in the Recreation & Open Space Element of this Plan. The underlying zoning is recommended to remain in effect.

- Renaissance PUD (#13)~

The Renaissance PUD was created as part of a court settlement agreement that detailed the number of housing units, as well as the amount of non-residential space that was permitted. Currently, while over 3/4ths of the residential component has been constructed, less than 1/3rd of the non-residential has been constructed. As such, the Township felt it prudent to analyze the appropriateness of the intensity of development proposed for the remaining non-residential areas.

The current settlement agreement between the Township and the Renaissance Developers calls for a minimum of 1.5 million square feet of



commercial space, of which retail can make up only one third of the development. Currently, 145,000 square feet of the retail component has been constructed. This leaves the potential to build an additional 355,000 square feet of retail and 1,000,000 square feet of office space on approximately 49 remaining acres.

This plan recommends that the Township consider working with the Renaissance developers to amend the court settlement to densities that are more appropriate and reasonable. What is more appropriate from a planning perspective for North Brunswick is a reduction of the commercial component considered for the remaining developable 49+ acres.

Although yet to be fully designed, the current agreement could produce a development that would contain four (4) large- five (5) story office buildings, as well as four (4)- five (5) story parking garages to handle the 1,000,000 square-foot non-retail component. The remaining retail component (355,000 square feet) would add approximately one (1) story if configured within the ground floor of the office buildings. The associated retail parking would produce roughly 12 acres of surface parking or two (2) additional floors within all four office-parking garages. In total, the build-out of the current Renaissance agreement would yield a Floor Area Ratio (FAR) of .63 FAR. Due to the site's size and dense development allowances, designing this area is difficult. The only way to accomplish this FAR is to go up in height, which is out of character in North Brunswick.

Upon analysis of existing office parks in North Brunswick, the NJEDA Technology Center on Route 1 in particular, this plan has identified office development patterns that the Township has found to be appropriate. Therefore, the prospective mass of development the Renaissance agreement allows is inappropriate when compared to other North Brunswick office parks. When adding in the retail component, and associated parking, the development is even more inappropriate.

What is appropriate development on the Renaissance site would be a Floor Area Ratio (FAR) of approximately .30 FAR, or roughly a total of 640,000 square feet. The Township should however, consider allowing the 1/3 retail component in place. Since the development has already built 145,000 square feet of retail, that would leave 68,444 square feet of retail, should the .30 FAR be found appropriate by the Township.

Analyzing the potential build-out of this agreement further leads this plan to the recommendation that any development on the Renaissance site should consider swapping the 10-acre school site that was set aside for use as a school by the Board of Education for other vacant acreage owned by the developer. This school site is located in close proximity to where a rail station is likely to be located. Given the impending redevelopment of the Johnson & Johnson site directly across the rail line from Renaissance, it is important that any changes to the agreement work to



create synergy with this development and the prospective rail station. Moving this school site to a portion of the 49-acre tract would provide the developer of Renaissance with 10 acres that offers tremendous opportunity to offer a special product that works to build on the “sense of place” that is being pursued at J&J. Such commercial development, particularly tall multi-story office buildings, are completely out of proportion with North Brunswick’s character along Route 130, but would be more appropriate near the prospective rail station.

While the Planning Board is not recommending changes to the Court settlement agreement at this time, it has reviewed the area’s potential to be better designed and the ability to be fit into the much larger train station planning effort.

- Greenway Connections at Farrington Lake (#14)~

As noted in detail in the Recreation and Open Space Element, Farrington Lake is one of the Township’s biggest assets. As such, the Township should look to acquire property that enhances connections to the Lake from the North Brunswick park system. Therefore, the specific properties detailed in the Open Space Plan and represented on the Proposed Land Use Map should be targeted for acquisition. If the Township cannot acquire the land, especially since applications for development are forthcoming, greenway connections with Farrington Lake should be required of any development on these properties. Preliminary analysis has indicated that several alignments of a greenway through these properties are possible.

- North Brunswick Community Park (NBSP) (#15)~

Given the creation of North Brunswick Community Park, the current I-2 zoning for the park site should be changed to ERR. The properties adjacent to the park should remain I-2. Furthermore, these adjacent properties, as detailed in the Open Space Plan and depicted on the Proposed Land Use Map, should be targeted for acquisition because of their importance in ensuring greenway connections and land uses consistent with that of the park.

Although it is difficult to determine what zoning is most appropriate for the properties adjacent to the park, recent presentations before the Planning Board yielded an idea for a gasoline station with a convenience store. This development does not appear appropriate adjacent to this 105-acre park. What remains the most appropriate use for the property is for a public facility or extension of the park.

It is recommended that the property maintain its I-1 zoning. It is also recommended that the Township actively attempt to acquire the property.

- Adam’s Lane and Wood Avenue Area (#16)~

This section of Route 130, between Adams Lane and Wood Avenue, was analyzed by the Planning Board. It was decided that it should be rezoned GO given that some of the frontage is currently developed as commercial and the uses surrounding the area are consistent with



such a zone.

- Adam's Lane and Northeast Corridor Area (#17)~

Parcels in this area are identified in the Recreation and Open Space Element as sites for potential acquisition. Proximity to NBCP and numerous Township-owned properties, as well as the presence of environmental constraints are among the reasons the Township should continue to acquire all out-parcels in this area. The Township intends to utilize these properties for public purposes. Furthermore, this area could be utilized as a means of improving circulation in the Township and will be discussed in the Circulation Element of this plan.

- Area Surrounding Okonite (#18)~

The area south of the former Okonite Cable site is currently constrained by wetlands according to NJDEP data, although only a formal wetlands delineation will verify this. However, should certain road connections be made to improve Cozzen's Lane and other potential roads identified in the Circulation Element of this Master Plan, the redevelopment of Okonite will make the tract a prime candidate for development or for public use.

This plan specifically identifies this area because the Township should consider revisiting its zoning should advances toward redeveloping the former Okonite Cable site be made. Coordinating land use with prospective circulation improvements should be a prime consideration when planning future

development in this area. The surrounding neighborhoods should also be an important factor in any future planning efforts.

- Ottawa Avenue Area (#19)~

The Planning Board received a request to rezone this property to high-density, age-restricted housing. This property is a long and narrow lot that abuts industrial land uses. While there has been some consideration of changing this R-3 zone, given the presence of industrial uses and the desire by the Township to create suitable buffers between conflicting uses and zones, rezoning to facilitate age-restricted development next to industry is inappropriate.

The Planning Board specifically finds that mid-rise, age-restricted housing adjacent to the Church & Dwight facility would not be an appropriate land use type. The adjacent industrial operation is a 24-hour operation that generates noise associated with loading and unloading activities. Church & Dwight recently constructed a sound wall in an attempt to mitigate noise at the second-story windows of adjacent residential uses. It is unreasonable to expect that noise generated from the facility would not negatively affect residents in an adjacent mid-rise building should it be permitted.

- Old George's Road Area (#20)~

The area currently zoned G-O along Old George's Road and Route 130 is recommended



to remain so. However, as J&J is redeveloped with the possibility of a train station, the area will undoubtedly be presented with new opportunities in the future. As part of a greater vision for development and circulation that is being pursued at J&J, this area of the Township is one such area where the Planning Board has noted its desire to revisit the area once more is known regarding J&J and a rail station.

- Hidden Lake (#21)~

The Hidden Lake area is identified as green on the Proposed Land Use Map because of the large amounts of Township-owned property. As identified in the Open Space and Recreation Element, the Township should continue to purchase all out-parcels south of Harold Street for future public purpose.

- Wachovia (#22)~

The Wachovia site is currently zoned GO. It is recommended that this site be designated OR Office Research. In addition, the Township should consider either purchasing the rear portion of the site near the High School or working with the property owner to utilize it as public open space. Wetlands are a consideration in this area and a delineation may be necessary to determine their extent. However, the area allows for a natural extension of public school property and greenway connections to the surrounding neighborhoods.

- Potential expansion and rezoning of the NJEDA Innovation Zone (#23)~

Future zoning considerations for this area

of the Township are those where zoning changes will take advantage of the science and technology initiative along the Route 1 corridor. Rezoning, or combining OR with I2, zoning allows the zone to be more marketable to the unique requirements of the high-technology sectors. Combining these two zones allows both the office and wet-laboratory space (a more industrial type use) to be permitted in the same zone without variance and provides the Township an additional marketing tool when attracting new economic development.

To ensure this Innovation Zone is as marketable as possible, the Township may wish to consider meeting with the NJEDA to discuss whether or not any potential changes to the Township's zoning need to occur.

- Cozzen's Lane Area (#24)~

The Planning Board received a request to rezone this property to high-density, age-restricted housing. This property is a long and narrow lot that abuts industrial land uses. While there has been some consideration of changing this R-3 zone, given the presence of industrial uses and the desire by the Township to create suitable buffers between conflicting uses and zones, rezoning to facilitate age-restricted development next to industry is inappropriate.

The site was approved by the Zoning Board of Adjustment for mid-rise, age-restricted housing. The Township Council appealed the decision arguing that the extent of the deviation granted was so severe as to be tantamount to rezoning



the property. The Township Council prevailed in Superior Court and the Board of Adjustment approval was reversed.

The Planning Board specifically finds rezoning this property for mid-rise, age-restricted housing is inappropriate. The adjacent industrial uses are unattractive and not compatible with age-restricted housing. In addition, the proposed density is a radical departure from the R-2 zone adjacent to and across the street from the site. The site is also isolated from any convenient shopping or amenities to service senior residents. There are several sites in the Township that are better suited for this type of use.

Land Development Ordinance and Other General Recommendations

In addition to changes in the zone plan, and specific projects to be undertaken, this section details recommendations to the land development ordinance for North Brunswick in order to enhance an already comprehensive set of development regulations.

- Creation of a new C-3; Neighborhood Business Zone

As discussed in Item #7 in this Land Use Plan,

the Township should consider creating a new C3 zone that provides a more neighborhood based commercial area. The new zone could consider the following requirements:

- Permitted Uses: Drugstore, dry cleaners (on-site dry cleaning prohibited), convenience stores (on-site liquor sales prohibited), antique stores, beauty salons (including personal services; massages, manicures, etc), jewelers and banks
- Prohibited Uses: On-site cooking and dining, alcoholic beverage sales or consumption.
- Standards
 - o Each individual commercial tenant may not exceed 12,000 sq. ft.
 - o Off-street Parking, subject to provisions of Article XXIV of this chapter. However, sites fitting the provisions under Criteria D shall prohibit parking in the front yard.
- Setbacks:
 - A. Minimum setback is 50 ft (See item D.)
 - B. Front yards may permit parking with the exception of properties that fit criteria D (below). No parking maybe closer than 20 ft. from the curb line.
 - C. Standards in Article XXVI shall apply.
 - D. Where the front yard of the property fronts a local street and where such



frontage is across from residential zoning and/or residential land uses, the setback shall be within 0' to 15' ft of the right of way. (To facilitate a "corner-store" type development.)

- *Greenways and Bike/Pedestrian Connections*

Potential connections into a greater Township Greenway Plan, once created, should be implemented through all affected development applications. By including this as a requirement for all affected development applications, each property owner would be required to develop his or her piece of the Township-wide network, set aside land, or make a contribution to the greenway, in order to ensure the greenway is implemented. The Township should consider adding language into the LDO that requires these amenities.

- *Article XXVI.- Landscaping and Buffers*

Where possible, the Township should give consideration to allowing buffers to be utilized as part of its greenway and park connection goals. Such public use of these buffer areas may require the dedication of land, or the purchase of an easement, that would allow the use of greenways, trails, and paths within these areas.

- *Article XII. R-7 Residential District*

The Township should consider revising 205-64:C to read: fifty-five (55) years of age or

over.

- *Green Development Design and Practice*

As described in the Open Space and Recreation Element in detail, the Township should work to implement Green Development techniques wherever feasible. As noted in the Conservation Element of this Plan, the Township should consider further investigation into Green practices, particularly as the Township is interested in the "Science and Technology Initiative" along the Route 1 corridor. Within this industry, many companies are actively seeking these types of buildings. The Planning Board also notes, that even small efforts by municipal governments, can work toward sustaining and improving the environment.

This plan recommends that the Township consider establishing a committee to research such an "Green" initiative. Members of such a committee could include a Council Liaison, Open Space Committee member, Planning Board member, as well as a Township Staff.

Plan Implementation

The Township has many different recommendations outlined in this plan. However,



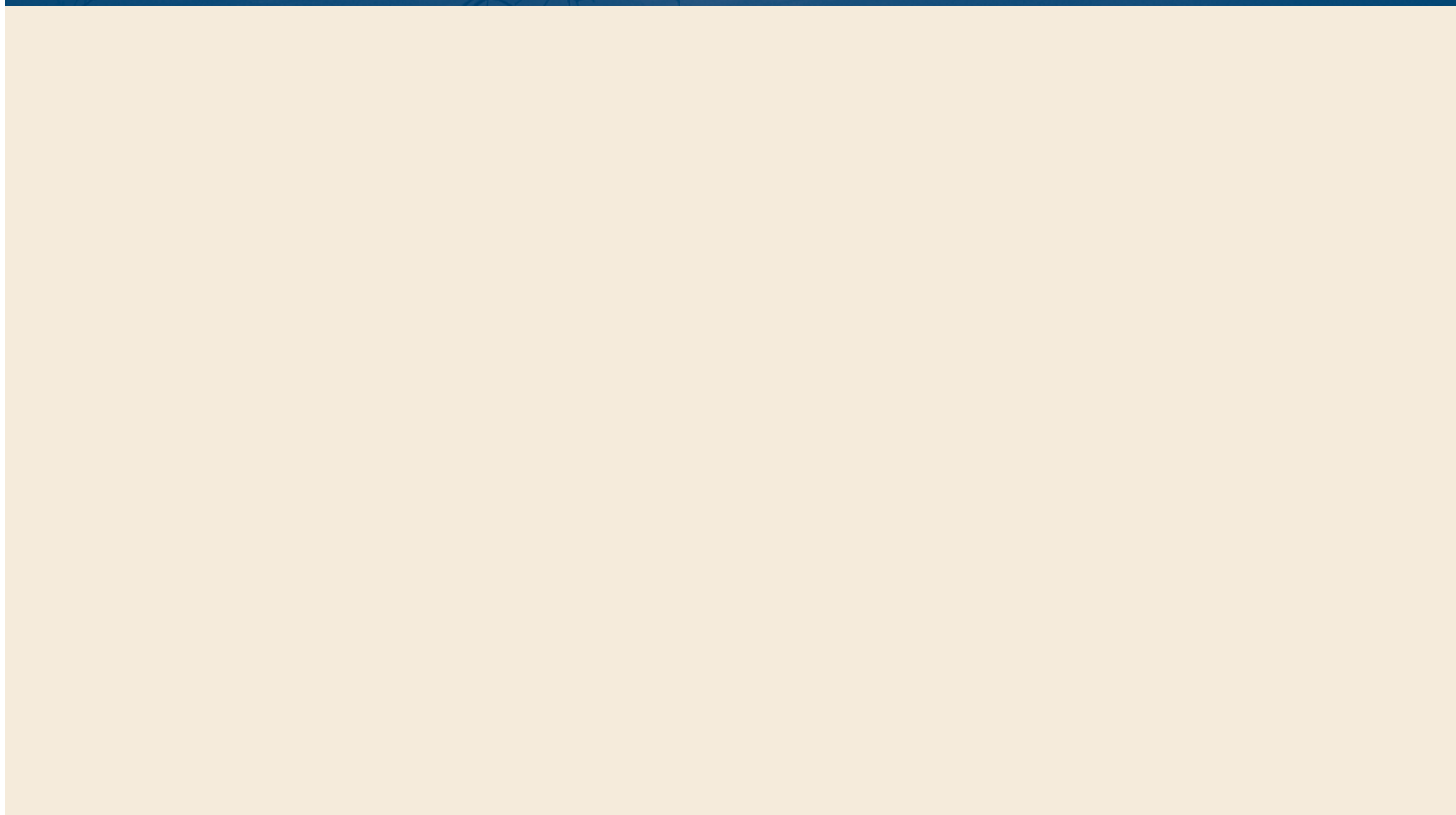
it is impractical to think that implementation of all of them can, or should, happen right away. This plan recommends a prioritization of recommendations outlined in this Land Use Element in order to provide the Township some focus moving forward.

1. Work with NJT for a potential rail station location.
2. Pursue center-based design strategies for the Livingston Avenue area (Area #5). Continue to pursue streetscape funding to implement the streetscape plan.
3. Actively pursue the purchase of open space, particularly where potential development pressures could inappropriately develop the property (near North Brunswick Community Park).
4. Work to rezone the properties identified for change in this plan including the minor changes recommended for the

Land Development Ordinance.

5. Review the potential to implement a streetscape project for George's Road (Area #6) once the Livingston streetscape project is completed.
6. Continue to review properties surrounding J&J once more is known regarding the site's development.
7. Create the new zoning standards outlined in this plan for their ability to be implemented into the zone plan for the Township.

INSERT MAP:
FUTURE LAND USE PLAN MAP





Circulation Element

INTRODUCTION

The North Brunswick roadway network is dominated by the presence of the regional transportation corridor network. The township's network contains no less than six major state routes, each with significant congestion problems at numerous intersection locations. Three state highways - Routes 1, 130 and 27 - traverse the township in a north-south direction, and are intended to serve the travel needs of the state level traveler. These routes have sparse connectivity to the local system, and by their nature are disassociated from the community and its mobility needs. Three state routes connect the northern part of the township to New Brunswick (Routes 26, 91 and 171). Several county roadways operate with substandard geometry or operate poorly. The Northeast Rail Corridor bisects the eastern and western portions of the township and in doing so limits the east - west connectivity. The combined result of these conditions is a township street system is fragmented, has limited alternative route opportunities and is overly dependent on the performance of too few key roadways. A by-product is a transportation system dependent on the automobile above all other mode choices for mobility.

A township-wide Traffic Plan was undertaken to form the basis of the Township's Master Plan Transportation Element. The goals of this Township-wide Traffic Plan were to:

- Produce a plan that documents existing traffic conditions throughout the Township

- Assess the level of service at key intersections
- Project traffic generated by development of vacant and underutilized land
- Assess the impact of future local and regional development on traffic conditions throughout the Township
- Identify and document the need for improvements to various intersections and roadway segments
- Recommend specific improvements to alleviate traffic congestion problems anticipated over the next ten to fifteen years, and
- Project order of magnitude costs for recommended roadway intersection improvements.

The plan was developed in several key phases, working closely with the Planning Board and Traffic Advisory Board. First, an overview of existing conditions was conducted. This included field observations, turning movement data collection at fifteen locations and traffic count data at five locations, and a review of existing data and traffic studies. Specific data collection locations were determined with the Planning Board. Level of service conditions at the identified intersections were calculated for weekday morning and afternoon peak hours.

Relevant traffic studies and plans were also reviewed. These included the Finnegan's Lane Extension Study (Maser Consulting), the NJDOT Route 1 Study, NJDOT Adams Lane/Route 130



Project, and the Sayreville 6V Project to replace the Route 1 Bridge.

Traffic volume projections (AM and PM peak hourly weekday and weekend) were prepared for three development sites, each with two different development scenarios:

- The old Okonite Cable Site on northbound Route 1 located on the Livingston Avenue Extension
- The Treumann Storage Site on northbound Route 130 located south of Quarry Lane, and
- The old General Automotive Site at the intersection of Routes 1 and 130.

A fourth development site, the J & J site on northbound Route 1 located north of Finnegan's Lane and south of Adams Lane, was not examined, as the ultimate land use mix and density was not established at the time this Circulation Element was prepared. As noted elsewhere, due to the size of the site, its development potential, existing traffic congestion and its proximity to rail, a study of traffic impacts and multi-modal transportation solutions will be essential.

Trip generation on the existing roadway network from the approval project and/or vacant or underutilized sites was performed. As part of this analysis, construction of the Finnegan's Lane Extension project was examined for appropriateness and impacts, including traffic estimates for diversion. Recommendations for improvements were developed, with order-of-magnitude design and construction costs.

The proposed Master Plan Circulation Element recommendations described below are divided into four main categories: (1) network circulation conceptual elements, (2) intersection and roadway improvements, (3) operational and safety improvements, and (4) other initiatives. Network circulation conceptual elements are intended to improve local mobility. The next two sets of recommendations -- Intersection and Roadway Improvements, and Operational and Safety Improvements -- address current problems. The fourth set of recommendations, Other Initiatives, examines issues raised in local discussions during the development of circulation element recommendations. A summary of all recommendations is provided in Figure 14: Action Plan at the end of this document.



NETWORK CIRCULATION CONCEPTUAL ELEMENTS (FIGURE 1)

The network concepts illustrated in Figure 1 are intended to be designed for local usage – two lanes with shoulders and accommodation of pedestrian and bicycle activity. Six conceptual elements are recommended.

1. Hartland Commons Extension (Figure 2)

Hartland Commons should be continued from Aaron Road to Finnegan's Lane along the north edge of Route 1. The new section of road will provide a parallel alternative route to Route 1 and improve access and circulation to new commercial development.

2. Commerce Road to Finnegan's Lane Frontage Road

To supplement the local network, a new roadway similar in concept to the Hartland Commons is recommended for the eastern edge of Route 1.

3. Cozzen's Lane Network

The Cozzen's and Adams Lane intersection is heavily congested and performs poorly. Heavy traffic volumes, poor geometric design, and conflicts built into the network are among the contributors to inadequate performance.

Vehicles traveling east on Cozzen's Lane towards the intersection of Route 1 and Adams Lane/Cozzen's Lane must typically turn left onto Adams Lane approximately 190 feet west of the intersection. These vehicles have difficulty turning onto Adams Lane because the queue on Adams Lane backs up past Cozzen's

Lane. A major redesign of the intersection is necessary. Two phases are recommended:

Phase A (Figure 3)

Adding a series of local streets to the area bounded by Hartland Commons to the north, Cozzen's Lane to the east, Route 1 to the south, and Elizabeth Street to the west is recommended. These local streets will provide connectivity, which will enhance the local network.

Phase B (Figure 4)

This scheme builds upon Phase A by extending Cozzen's Lane across Route 1 with a grade-separated structure. Access from Route 1 to Cozzen's Lane will be provided by a new local street just north of Route 1. This access will allow the jug handle at Adam's Lane to be removed. Phase B also includes an extension of Cozzen's Lane over the NJ Transit tracks to link with network streets to the south.

**INSERT FIGURE 1:
NETWORK CIRCULATION CONCEPTUAL
ELEMENTS**

**INSERT FIGURE 2:
HARTLAND COMMONS EXTENSION**

**INSERT FIGURE 3:
COZZENS LANE NETWORK (PHASE A)**



4. Central Network (Figure 5)

The Central Network provides a local parallel alternative to Route 1 by linking together several existing roads between Route 130 and Adam's Lane. From west to east, these roads include Birchwood Court, Society Way, and Carolier Lane. The conceptual network will increase access from nearby residences to local businesses and schools. For instance, residents from the Birchwood Court Apartments and the apartments along Society Hill Way would be able to reach the Arthur Judd Elementary School and North Brunswick High School using local roads instead of Route 1.

5. Milltown Road Interchange Network (Figure 6)

An interchange network is proposed to extend and link the network created by the NJDOT Route 1, the Section 6V project, and the frontage network developed for the Route 1 and 130 interchange. Parallel alternatives to Route 1 will be created east of the Milltown Road intersection both to the north and south of Route 1. Two new roundabouts are proposed to replace the partial cloverleaf interchange between Route 1 and Milltown Road with full access to Route 1, Milltown Road and Main Street. The roundabouts and parallel roads will also provide frontage for new commercial development.

6. Finnegan's Lane

The Finnegan's Lane Connection is a proposed project to re-connect Finnegan's Lane between

Route 1 and Route 130 to provide an additional east-west connecting route within North Brunswick Township. Adam's Lane (CR608) is the only roadway in the North Brunswick network south of the junction of Route 1 and 130 to provide east-west connection. The intersection with Route 1 is the primary constraining point in the system. Volume to capacity ratios exceed 1.0 in the AM and 1.2 in the PM peak periods. The ratios mean that there are more vehicles in today's traffic conditions than the intersection can process. Establishing a new east-west route will provide an alternative roadway for local and regional travel, relieve congestion at existing intersections, and potentially influence development patterns in the vicinity of the project.

Project Need

A number of resources, analysis and previous efforts support the need for the Finnegan's Lane Connector:

- The 1985 Middlesex County Comprehensive Plan identified the need for the Finnegan's Lane Connector and included the project in the Plan.
- The 1999 Middlesex County Comprehensive Plan dropped the Finnegan's Lane project because of concern regarding anticipated wetland impacts, not due to the absence of project need.



- The Central Jersey Transportation Forum (CJTF) identified east-west access as the forum's highest priority planning issue.
- The NJDOT Route 1 Regional Growth Strategy – Corridor Working Group Briefing Note #11, Regional Economic & Transportation Development Framework states; “There is also poor east-west access in the southern portion of this sub-market (.eg. North and South Brunswick Townships) as the highway system is highly fragmented and does not connect from the Turnpike to the arterial system west of Route 1.
- The only existing east-west connecting roadway in North Brunswick, Adams Lane, cannot absorb additional traffic in its current configuration. East and west approaches to the Route 1 intersection are over capacity during AM and PM peak periods.
- Network modeling and analysis performed by the URS for the CJTF determine that the roadway network between Route 1 and 130 service east-west access through out the study area including the South Brunswick areas was at 90% capacity in 1997 and will grow to over 140% by 2020 if improvements are not made to the local network. The analysis also observed “All major east-west roads between US 1 and US 130 are expected to exceeds available capacity on critical sections in 2020 “Do Nothing” Scenario”.
- A Feasibility Assessment Study prepared by Maser Consulting determined that Emergency Management Service response time from the Volunteer Engine Co #2 areas south and east of the unit station is compromised.

The Maser study investigated six separate alternatives on new alignments for project cost and wetland impacts. Two existing routes, Adam's Lane and Dean's Lane, were also studied. All new alignment alternatives connect Route 1 to Route 130 on a four-lane section, with bridges that will carry Finnegan's Lane over Route 1, Route 130 and the Northeast Rail Corridor. The alternatives also include interchanges for movements onto and off of Routes 1 and 130. Each movement will be controlled by a traffic signal.

Three alternatives with alignments that intersect Route 1 and Route 130 at the existing intersection with Finnegan's Lane were determined to be feasible. Alternative “D” included a viaduct over the wetland areas, and does not provide local access from the connection between Route 1 and Route 130. Alternative D was preferred, generally due to the reduced impact to right-of-way (ROW) and wetlands, and the value placed on its ability to connect directly to Finnegan's Lane on both sides of the Northeast Corridor, and not connect to the existing network.

**INSERT FIGURE 4:
COZZENS LANE NETWORK (PHASE B)**

**INSERT FIGURE 5:
CENTRAL NETWORK**

**INSERT FIGURE 6:
MILLTOWN ROAD INTERCHANGE NETWORK**



The estimated construction cost in 2002 for the preferred alternative was approximately \$90 million. Potential wetland impact was estimated at 5.7 acres, which at that level would trigger a federal review of the permit. An assessment of Alternative D further identified the following required permits: Individual Freshwater Wetlands Permit, Major Stream Encroachment Permit and New Jersey Soil Erosion and Sediment Control Permit.

The wetlands permitting process requires a sound demonstration of project purpose and need, and a thorough study of potential prudent alternatives to avoid or minimize impacts to existing wetlands and protected cultural resources. Neither the Maser Study report nor the study performed in 1988 by Fellows, Read and Associates clearly indicate whether all prudent alternatives were identified and evaluated. The Adam's Lane (CR 608) and Dean's Lane (CR610) alternatives did not appear to be as thoroughly developed as other new possible alignments between Adam's Lane and Dean's Lane. An additional concern is the need to address newly revised NJDEP stormwater management runoff requirements. Meeting these requirements may have the potential to increase the scope and potential impacts of the project.

While the Maser study cited the current Emergency Service response time deficiency brought on by the limited network as a project need, an evaluation of cost-effectiveness of the No Build alternative to provide acceptable system-wide response time should also be

performed to support the need position.

Regional traffic modeling studies have not been performed and are normally considered important in projects of regional significance and substantial cost. Modeling can be an important asset in developing a project needs statement, setting a project scope, testing alternatives and supporting the development of forecasted volumes for design purposes. Preliminary investigation of the existing conditions indicates that a two-lane roadway may be sufficient cross-section to carry the traffic in the segment between Route 1 and 130. If a reduced section is feasible, it could have significant consequences on the project cost, impact to wetlands, and other considerations. Modeling would provide the proper data to make these kinds of determinations.

Traffic Analysis

The performance of the proposed connection and potential impacts on the performance of the surrounding network was evaluated for this traffic plan by estimating the potential for the existing traffic to divert to the new facility. An estimated 450-600 additional peak period vehicles will use Finnegan's Lane between Route 1 and 27. The proposed Alternative D intersections along Finnegan's Lane will all operate at LOS C or better, the majority of which will operate at LOS B. No approach will operate under LOS C.

The intersections of Route 1 and Adam's Lane/Cozzen's Lane and Route 27 and Cozzen's Lane were analyzed using the reduced volumes



that would occur as a result of the Finnegan's Lane Connection. Volumes that were shifted to Finnegan's Lane were removed from the above mentioned intersections and a LOS analysis was performed.

The intersections of Route 27 and Cozzen's Lane and Route 1 and Adam's Lane/Cozzen's Lane will both improve operation with the Finnegan's Lane Connection. With the Finnegan's Lane Connection, the Route 1 and Adams/Cozzen's Lane intersection improves from the existing E/F to D/D. The LOS category remains "F" at Cozzen's and Route 27; however, intersection delay will decrease 30% from 126.9 seconds to 84.3 seconds in the A.M. peak hour, and 45% from 305.5 seconds to 172.4 seconds in the P.M. peak hour.

Geometric changes and timing modifications are also proposed to improve the level of service. Adding separate southbound through and left turn lanes, and permitting a protected westbound right turn during the southbound lead phase, will increase the LOS to C at Route 27 and Cozzen's Lane. The Connection, as proposed, will improve the performance of the local system.

Additional Finnegan's Lane Recommendations

The proposed use of the J&J site as a regional rail station for NJ Transit operations on the Northeast Corridor line is under review by the Township. The concept is not developed to the sufficient detail to be considered in the Finnegan's Lane evaluation. The traffic generated by the proposed rail station will

have a measurable effect on the surrounding roadway network and should be evaluated as part of the study when the station form and operation are better known.

A study of alternative east-west connections serving the North Brunswick and South Brunswick areas should be initiated and included in the NJTAP Regional Program for Study and Development. The following should be contemplated in developing the report:

- The study should re-focus on a project needs statement, re-establish project scope and develop and test a broad range of alternatives north and south of Finnegan's Lane.
- The study should build on the findings of the Route 1 Bus Rapid Transit Study and the Route 1 Regional Growth Strategy Study.
- The potential for a new station location on the AMTRAK's Northeast Corridor adds tremendously to the project need and should be considered.
- The previously developed \$90 million estimated cost for the Connector reflects the high design of the current project scope. A project at that level of cost will likely be difficult to program.
- Important objectives of the study effort are 1) the project scoping should attempt to reduce overall project cost and 2) integrate the project into the local network.





INTERSECTION AND ROADWAY IMPROVEMENTS (FIGURE 7)

Four areas are recommended for intersection and roadway improvements. The goal of this group of recommendations is to decrease congestion while increasing capacity. “Level of service,” or LOS, is a descriptive mechanism which has been developed to indicate how well an intersection performs based on control delay per vehicle. The highest quality of operation with the minimum rate of delay is termed Level of Service A (LOS A). The highest and worst delay condition is LOS F. A more detailed discussion of LOS is included in Appendix A.

Several current state and local projects affecting the township are examined below in concert with these recommendations. Detailed HCM reports to support these improvements are provided in Appendix B.

1. Route 1 and Finnegan’s Lane (Figure 8)

	Level of Service (AM/PM)				
	EB	WB	NB	SB	Overall
Existing	F/F	D/D	F/F	F/E	F/F
Recommended	D/D	E/D	C/C	C/C	D/C

Doubling the eastbound left lane from a single lane to two lanes is proposed for Finnegan’s Lane. Currently, the intersection of Route 1 and Finnegan’s Lane operates at LOS F during the morning and afternoon peak hours. The left turn operates well above capacity. Adding a second left turn lane will improve the LOS to an E in the morning peak hour and a D in the afternoon peak hour. The volume to capacity ratio drops to below 1.0 with two lanes serving the left turn demand. The performance of the intersection is improved with the additional left turn lane.

Route 1 transitions from three lanes in each direction to two lanes per direction south of the Aaron Road signal. The lane reduction is a bottleneck and causes queuing and congestion as the southbound lanes merge. The intersection of Route 1 and Finnegan’s Lane operates at LOS F in the morning and afternoon peak hours, primarily due to the reduced number of lanes on Route 1. Widening Route 1 to three lanes in each direction from south of Finnegan’s Lane to the existing three lane section will raise the Finnegan’s Lane intersection to a LOS E in the morning peak hour and C in the afternoon peak hour.

Both proposed improvement projects - widening Route 1 to three lanes in each direction and constructing an additional left turn lane on eastbound Finnegan’s Lane - are recommended.

**INSERT FIGURE 7:
INTERSECTION & ROADWAY IMPROVEMENTS**

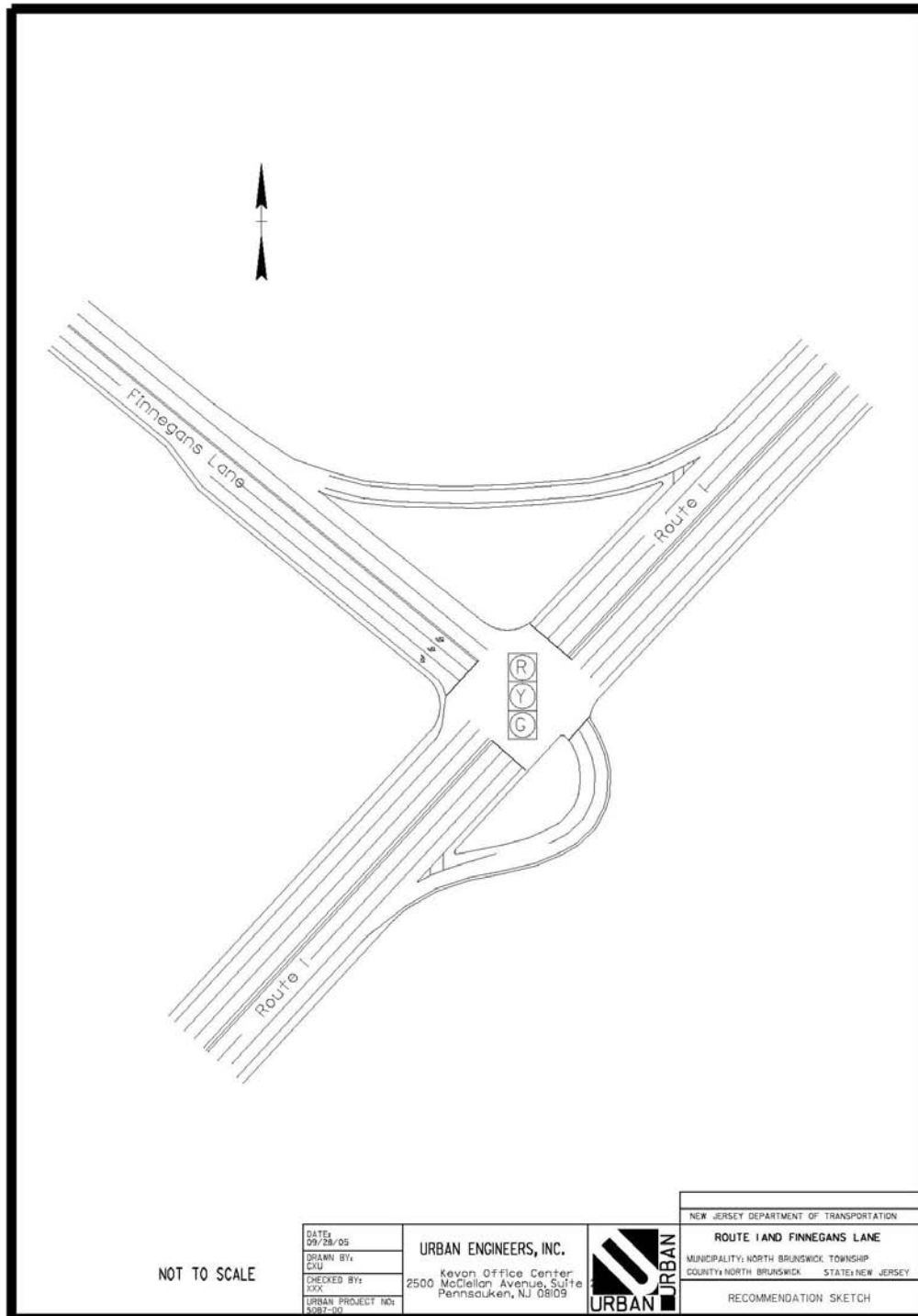


FIGURE 8 – ROUTE 1 AND FINNEGAN'S LANE



2. Cozzen's Lane Corridor

Cozzen's Lane provides an east-west connection from Route 1 to Route 27. It is a two-lane roadway that currently carries high traffic volume.

Route 27 and Cozzen's Lane (Figure 9)

The intersection of Route 27 and Cozzen's Lane operates at LOS F in the morning and afternoon peak hours. The southbound approach operates at LOS F in the morning and afternoon peak hours and the westbound right turn movement operates at LOS F in the morning peak hour.

	Level of Service (AM/PM)				
	WB Left	WB Right	NB	SB	Overall
Existing	D/D	F/D	B/C	F/F	F/F
Recommended	D/D	C/B	C/D	B/C	C/D

An additional southbound lane on Route 27 and an additional westbound lane for separate right and left turn movements are recommended. This will change the southbound approach from one shared left/through lane to one dedicated left turn lane and one dedicated through lane. The westbound right turn movement would have a protected phase during the southbound lead left turn phase.

Middlesex County has proposed widening Cozzen's Lane from the culvert at Sabella Park to Route 27. As recommended above, the widening will add a median left turn lane in the segment leading to the Route 27 intersection and present the median lane through to the Sabella Park area. The project will increase the capacity of Cozzen's Lane, increase the flow from Route 1 to Route 27 and decrease congestion between intersections. Intersection capacity at Route 1 will remain the same.

Widening, however, will encourage vehicles to travel at higher speeds in the residential and recreational portion of the corridor. A continuous three-lane section is inconsistent with the traffic demand expectations and incompatible with local context and traffic management objectives. Figure 10 shows a modified design that provides protected pedestrian crossings and protection of left turning vehicles.

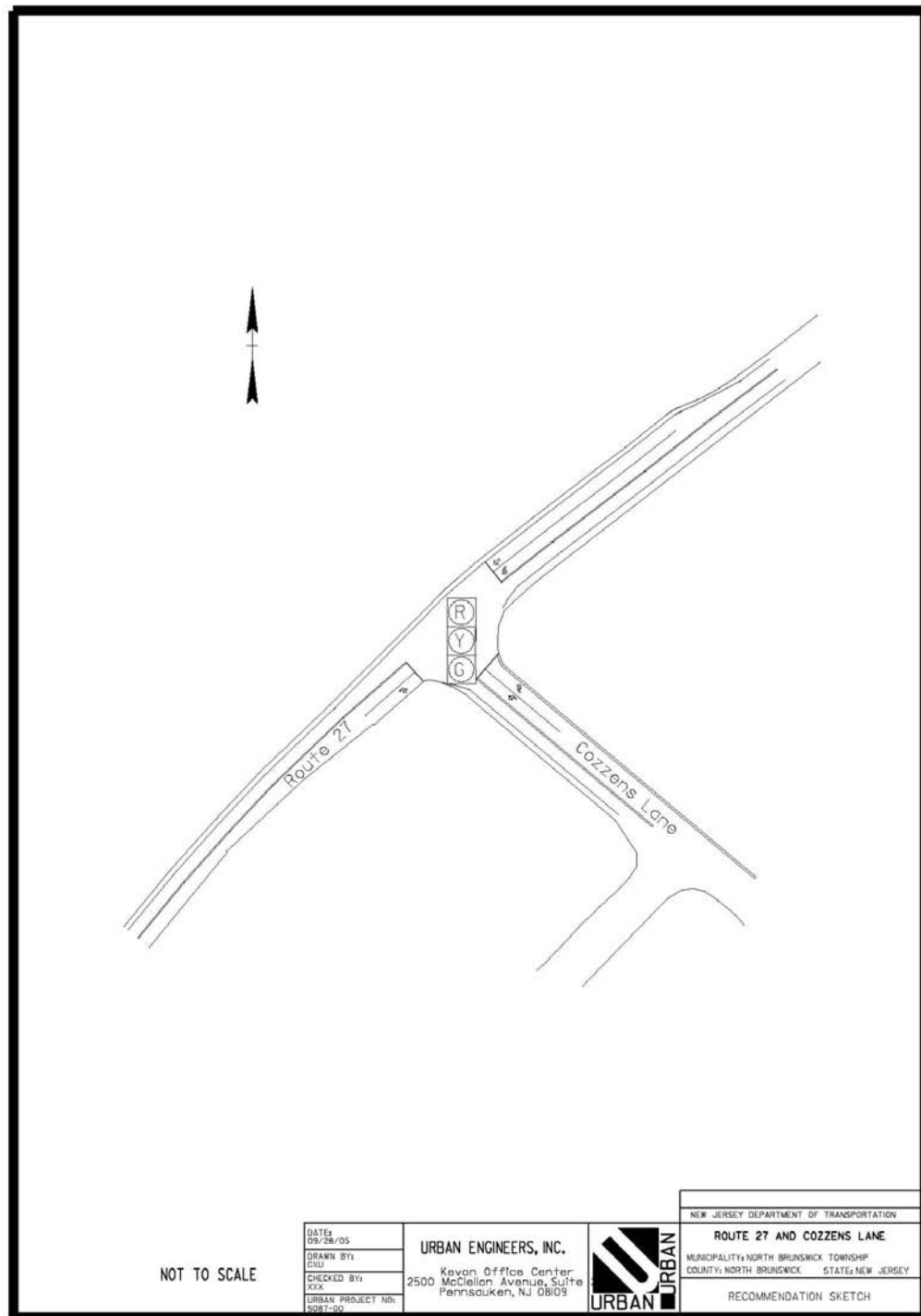
**FIGURE 9 – ROUTE 27 AND COZZEN'S LANE**



FIGURE 10 – COZZEN’S LANE CORRIDOR



3. Adams Lane Corridor (Figure 11)

Adams Lane is North Brunswick's primary east-west roadway south of the Route 1 and 130 interchange. It is a two-lane roadway connecting Route 1, Cozzen's Lane and Route 130 carrying high volume of local and through traffic.

Adams Lane traffic volume is constrained by the traffic volume processed by the Route 1 and Route 130 intersections. The existing two-lane geometry, however, is not the principal contributor to roadway performance. Rather than widening Adams Lane and focusing major improvements at Route 1, Route 130 and the Northeast Corridor Bridge, investing in additional network to increase east – west capacity through North Brunswick is a better long-term option. In the same vein, an improvement to the Adams Lane curve section that increases level of design and speed is not recommended. Figure 11 shows an improvement concept that promotes traffic management and improves the pedestrian and residential environment.

4. Route 26 (Livingston Avenue) and How Avenue

Livingston Avenue and How Lane is a three-legged signalized intersection. The eastbound approach has one dedicated left turn lane and one dedicated right turn lane. The right turn lane is about 75 feet long and provides storage for approximately three vehicles. Therefore, the eastbound leg operates primarily as one shared left/right lane. The northbound approach has one dedicated left turn lane and

one dedicated through lane. The southbound approach has one dedicated through lane and one dedicated right turn lane.

The overall intersection level of service is LOS C for the morning peak hour and LOS E for the afternoon peak hour. During the morning peak hour the eastbound approach operates at LOS E. During the afternoon peak hour the eastbound approach operates at LOS F.

	Level of Service (AM/PM)			
	EB	NB	SB	Overall
Existing	E/F	B/C	B/B	C/E
Recommended	C/E	B/C	B/B	B/D

The short storage length for the eastbound right turn lane contributes to the poor levels of service experienced at the intersection and on the eastbound approach. Vehicles making right turns onto Livingston Avenue are blocked from the right turn lane by vehicles waiting to make left turns. This can be seen in the long queue lengths that occur on the eastbound approach. The following table shows both the average queues for the eastbound approach.

	EB Queue Length (in feet)
	Average
AM Peak	600
PM Peak	1225



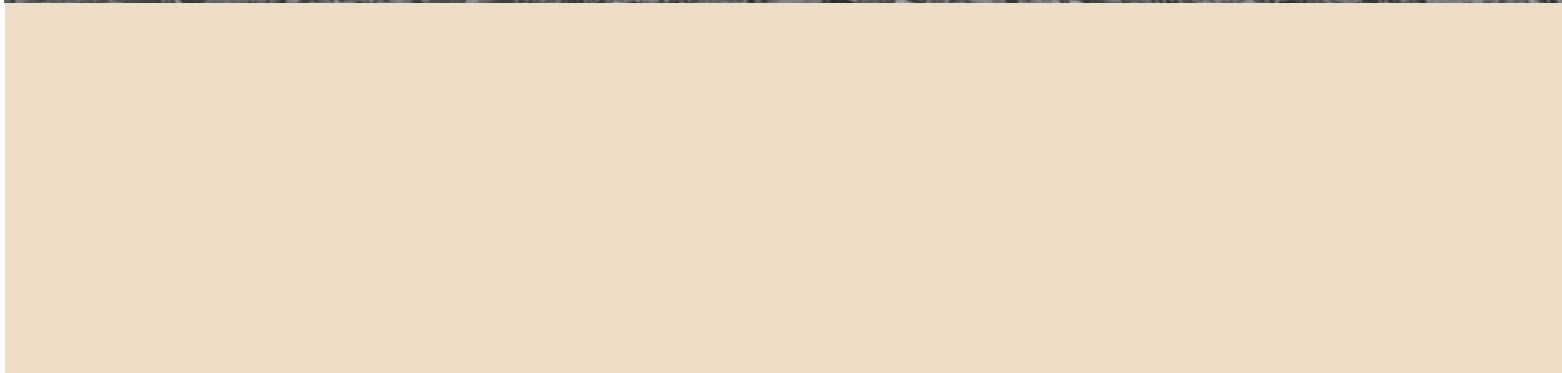
FIGURE 11 – ADAMS LANE CORRIDOR

INSERT FIGURE 12:

ROUTE 26 (LIVINGSTON AVE) AND HOW LANE



This intersection is a candidate for a modern roundabout. Modern roundabouts are recognized by NJDOT as safe and efficient alternatives to signalization. They provide a safe environment for pedestrians and bicyclists. Preliminary analysis on the roundabout concept depicted in Figure 12 shows that it would perform in the LOS B/C range and reduce the queue condition on the eastbound approach. In this application the roundabout would help to signal to vehicles entry into the Livingston Avenue commercial district, provide traffic calming and be a supportive measure for the Livingston Avenue Streetscape Project.





OPERATIONAL AND SAFETY IMPROVEMENTS

Operational and safety conditions were analyzed to develop recommendations that will increase the driver and pedestrian performance and safety at intersections. Eleven recommendations for operational and safety improvements are proposed. These actions are generally intended to be immediate, low cost initiatives.

1. Route 1 and Commerce Boulevard (Figure 13)

The eastbound approach to the intersection is the poorest performing lane group. The LOS is E in the AM and F in the PM peak periods. The highest volume group on eastbound Commerce Boulevard is the left turn movement. Re-striping the center lane on eastbound Commerce Boulevard from a through lane to a shared left/through lane would more evenly distribute the traffic on this approach and help to decrease the queue length for vehicles making the eastbound left turn.

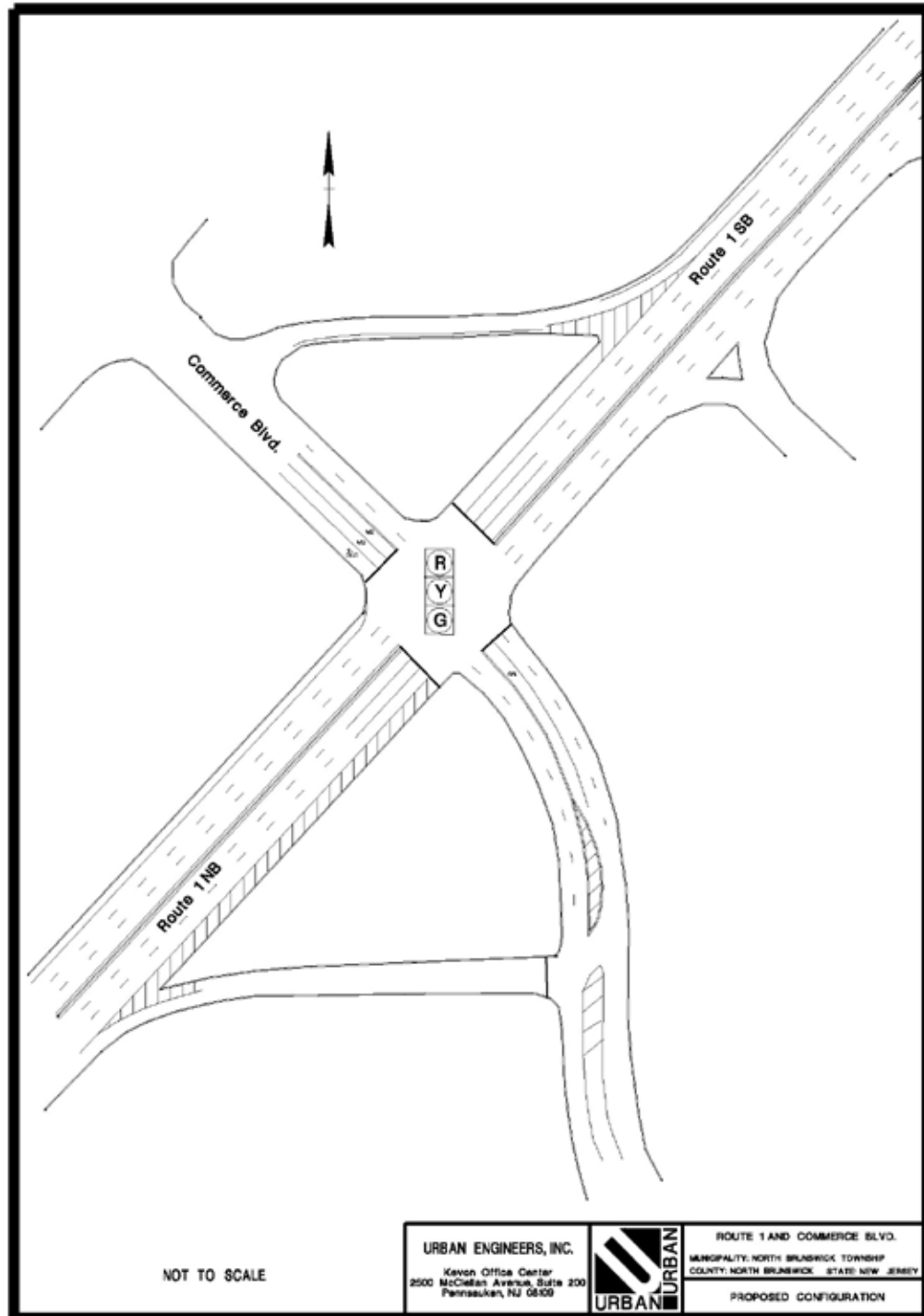
The double left turn condition would, however, require a split phase operation for the east-west movements, meaning that the east and west bound traffic would move during separate periods of the signal. The amount of time required for the side street phases would increase from 42 to 46 seconds. The eastbound left turn movement has a LOS E in the morning peak hour and LOS F in the afternoon peak hour. The modification of the lane configuration to include the double eastbound left turn lane improves the afternoon peak hour to LOS E and reduces delay during the AM, but not enough to improve the LOS.

An effective alternative to lane reassignment would be to modify intersection timing to protected/permitted for the east and westbound phase and reassign green time from Route 1 to the side street. The eastbound left turn will improve from E to D in the AM and from F to D in the PM.

While the lane configurations should remain the same, the timing should be modified. An eastbound only phase should be added and the overall green time for the eastbound movement should be increased. The following shows a comparison between the existing and recommended LOS.

	Level of Service (AM/PM)				
	EB	WB	NB	SB	Overall
Existing	E/F	D/D	B/B	B/B	B/C
Recommended	D/D	D/D	C/C	C/C	C/C

Pedestrians appear to have difficulty crossing Route 1 at this location. Many people who live in the residential units behind Commerce Boulevard cross Route 1 to get to the bus stop. According to the signal timing, activating the pedestrian pushbutton will guarantee 25 seconds of pedestrian clearance time. The green time does satisfy the minimum requirement, but without pedestrian heads, there is no indication of when the signal may be changing.

**FIGURE 13 – ROUTE 1 AND COMMERCE BOULEVARD**



2. Route 1 and Adams Lane/Cozzen's Lane

The intersection of Route 1 and Adams Lane/Cozzen's Lane operates at LOS E for the morning peak hour and LOS F for the afternoon peak hour. The eastbound and westbound approaches both operate at LOS F for the morning and afternoon peak hours and the northbound approach operates at LOS E for the morning peak hour.

	Level of Service (AM/PM)				
	EB	WB	NB	SB	Overall
Existing	F/F	F/F	E/D	B/B	E/F
Recommended	D/E	D/D	C/D	C/C	C/D

The lane configuration can be modified within the existing ROW. The northbound approach should be widened from three through lanes to four through lanes. This can be accomplished by carrying the deceleration lane for the Adams Lane jug handle through the intersection in the shoulder lane and continuing it into the deceleration lane for the jug handle for Jersey Avenue. The eastbound approach should be widened from two lanes to three lanes to include one dedicated left turn lane, one dedicated through lane, and one shared through/right lane. The westbound approach should be widened from two lanes to three lanes to include one dedicated left turn lane, one dedicated through lane, and one dedicated right turn lane.

Modifications to Adams Lane Bridge are not included in this recommendation and should be developed to support a major improvement to traffic circulation along Cozzen's Lane and the intersection with Route 1.

3. Route 130 and Renaissance Boulevard

The intersection of Route 130 and Renaissance Boulevard operates at LOS E for the afternoon peak hour. The northbound left turn movement operates at LOS F in the afternoon peak hour and the southbound approach operates at LOS F in both the morning and afternoon peak hour.

	Level of Service (AM/PM)				
	EB	NB	NB LEFT	SB	Overall
Existing	C/C	B/C	D/F	F/F	D/E
Recommended	D/D	A/A	D/D	C/C	C/C

While the lane configurations should remain the same, the timing should be modified to improve the level of service at this intersection.

4. Route 130 and Washington Place

The intersection of Route 130 and Washington Place operates at LOS F in the morning peak hour. The northbound and westbound approaches operate at LOS F for both the morning and afternoon peak hours.



	Level of Service (AM/PM)				
	WB	NB	SB	SB LEFT	Overall
Existing	F/F	F/F	A/A	D/D	F/D
Recommended	E/E	E/D	A/A	D/D	D/C

The westbound approach should be re-striped for one dedicated left turn lane and one dedicated right turn lane. Timing modifications at this location are also recommended.

5. Route 130 and Davidson's Mill Road / Finnegan's Lane

Route 130 and Davidson's Mill Road is a four-legged signalized intersection. The eastbound approach (Finnegan's Lane) has one shared left/through lane and one dedicated right turn lane. The westbound approach (Davidson Mill Road) has one shared left/through/right lane. The northbound approach has one dedicated left turn lane, one dedicated through lane, and one shared through/right lane. The southbound approach has one dedicated left turn lane, one dedicated through lane, and one shared through/right lane.

Currently, the signal operates on a 90 second cycle length. The overall intersection level of service for both the morning and afternoon peak hours is LOS F. During the morning peak hour, the westbound, northbound, and southbound approaches all operate at LOS F. During the afternoon peak hour, the northbound and southbound approaches operate at LOS F.

	Level of Service (AM/PM)				
	EB	WB	NB	SB LEFT	Overall
Existing	C/C	F/E	F/F	F/F	F/F
Recommended	C/D	E/D	E/D	D/D	D/C

The poor levels of service experienced at the intersection are due to three principal reasons: (1) high volumes of northbound and southbound through traffic, (2) relatively high side street volumes, and (3) the need for an exclusive left turn phase on the northbound and southbound approaches.

Three improvements are recommended to improve the operations at the intersection:

- 1) Add exclusive right turn lanes on both northbound and southbound Route 130.
- 2) Restripe the eastbound Finnegan's Lane approach to a dedicated left turn lane and a shared through/right lane.
- 3) Use a 120 second cycle length with optimized signal timings.

With these recommended improvements, the overall intersection level of service is LOS D for the morning peak hour and LOS C for the afternoon peak hour. During the morning peak hour, all approaches operate at LOS E or better. During the afternoon peak hour, all approaches operate at LOS D or better.



6. Georges Road (Route 171) and Milltown Rd. and Hermann Rd.

The Georges Road southbound left turn movement of the intersection of Georges Road and Milltown Road operates at LOS F in the

	Level of Service (AM/PM)				
	NB	SB	SB LEFT	WB	Overall
Existing	C	E	F	C	D
Recommended	C	B	C	C	C

afternoon peak hour.

While the lane configurations should remain the same, the afternoon timing should be modified to provide more green time to the southbound only phase.

Georges Road (Route 171) and Hermann Road

Poor pavement and striping conditions at the intersection contribute to erratic driving and collisions. The intersection should be repaved and re-striped to provide a safer driving environment. Intersection lighting may be inadequate. A lighting analysis should be performed to determine if more lighting assemblies should be installed. Removal of Right Turn on Red (RTOR) is recommended due to poor sight distance

Georges Road (Route 171) and Milltown Road

Poor pavement and marking conditions at the intersection contribute to erratic driving and collisions. The intersection should be repaved and re-striped to provide a safer driving environment.

7. Jersey Avenue (Route 91) and How Lane

The Jersey Avenue northbound left turn movement of the intersection of Jersey Avenue and How Lane operates at LOS F in the afternoon peak hour. The southbound left turn movement operates at LOS E during the same time period. In the morning peak hour, the Jersey Avenue southbound left turn and the How Lane eastbound through movement both operate at LOS E.

The afternoon timing should be modified to provide more green time to the northbound left turn movement. This will increase the LOS from F to E. Given the nature of the intersection and the high volumes of both passenger cars and trucks, further improvements cannot be made without widening. Widening of the How Avenue Bridge over the Northeast Corridor to meet the four lane cross sections at Jersey Avenue should be considered when and if the bridge is ready for replacement.

8. Cleremont Avenue and Linwood Place

Currently, Cleremont Avenue is under stop control. Converting to a four-way stop has been suggested as a method of traffic calming.

Over 380 vehicles travel through the intersection during the afternoon peak hour. Almost 90% of these vehicles use Linwood Place, and thus do not have to stop or slow down at the intersection. Warrants for a four way stop installation is based on meeting volume criteria established by the MUTCP. A four way stop is not a recommended installation for the sole



purpose of traffic calming. The intersection does not meet the MUTCP warrants for a 4-way stop sign application. Speed tables, humps, pavement treatment, etc are better applications for managing vehicle behavior. Introducing traffic calming measure along Linwood Place and Cleremont Avenue should be investigated.

9. Aaron Road and Hartland Commons

This intersection should be modified to permit all movements. Restricting the southbound right turn and eastbound left turn movements was originally instated to prevent traffic entering and exiting the commercial development north of the intersection, including late evening movie theatre patrons, from using Aaron Road and the surrounding neighborhoods west of the intersection as a cut-through to and from Route 27. Site analysis has shown that no clear cut-through route exists by using Aaron Road. The restriction has little effect, because it is easy for vehicles to circumvent the restrictions, as site observations have demonstrated.

10. Route 27 and Cozzen's Lane

Pedestrian crosswalks should be provided at this location. Many pedestrians cross at this location and only pushbuttons are provided. Crosswalks should be added at the intersection along with pedestrian heads.

Intersection lighting at this location may be substandard. A lighting analysis should be performed to determine if more lighting assemblies should be installed.

11. Livingston Avenue (Route 26) and How Lane

A 'No Turn on Red' sign is located at the intersection along southbound Livingston Avenue at the stop bar. Many vehicles traveling from southbound Livingston Avenue onto westbound How Lane violate the 'No Turn on Red' sign at this intersection. At times the vehicles in violation of the 'No Turn on Red' nearly collide with vehicles turning left onto How Lane that have a green arrow.

Placement of 'No Turn On Red' signs at the stop bar is not desired because the sign is not visible from vehicles at the stop bar. Instead, it is recommended that a 'No Turn On Red' sign is placed on the far side mast arm, so that the vehicles stopped at the intersection traveling southbound can easily see the sign and obey the regulation.



REDEVELOPMENT SITES TRAFFIC ANALYSIS

1. Introduction

A trip generation analysis was performed to quantify the impacts that proposed developments would have on the existing roadway network throughout the township. Four sites were analyzed: General Automotive, Okonite, Treumann Storage and Johnson & Johnson. For each site, two development scenarios were created. The following is a list of the proposed development scenarios for each site:

- General Automotive
 - Scenario 1 – 125,000 square feet of retail and 20,000 square feet of general office space.
 - Scenario 2 – 1,000,000 square feet of office research, including the Wachovia property.
- Okonite
 - Scenario 1 – 561 units of age-restricted housing and 15,000 square feet of retail.
 - Scenario 2 – 530,000 square feet of office research.
- Treumann Storage
 - Scenario 1 – 280 units of age-restricted housing and 20,000 square feet of retail.
 - Scenario 2 – 180 units of age-restricted housing, and a C2 zone to include a bank, pharmacy, health club, and a high turnover sit-down restaurant.
- Johnson & Johnson
 - Scenario 1 – Transit Village with age-restricted Housing with Golf Community.
 - Scenario 2 – Mixed-use Transit village

2. Trips Generated

Trip generation rates for the assumed land uses were established using the Institute of Transportation Engineers (ITE) Trip Generation manual, 7th edition. The rates predict the number of trips beginning and ending during the A.M. and P.M. peak hours for the adjacent street traffic. The table below shows the number of new trips generated during the peak hours for six scenarios. These scenarios exclude Johnson & Johnson because more specific discussion will follow.

Table 1: New Trips Generated by Development Scenario

Development	Scenario	AM Peak Hour Trips		PM Peak Hour Trips	
		Entering	Exiting	Entering	Exiting
General Auto	1	95	40	140	170
	2	1030	215	165	920
Okonite	1	30	30	50	35
	2	545	115	90	490
Treumann	1	20	20	35	30
	2	115	105	160	145



The trips were distributed throughout the existing network based on existing traffic circulation patterns and logical routes for vehicles entering and exiting the township.

3. Impacts

A Level of Service analysis was performed for the A.M. and P.M. peak periods for each scenario. All intersections where a predicted increase in traffic would result from the future development were analyzed. The Okonite Scenario 1 and Treumann Scenario 1 developments did not require a LOS analysis due to the low additional traffic volumes generated by these sites during the peak periods, and their insignificant effect on the intersection LOS.

Table 2 summarizes the anticipated impact at traffic signals. The shaded cells indicate locations where the measured impacts to LOS and delay are significant.

4. Johnson & Johnson (J&J)

Trip generation for the J&J site was found to be premature at this point in time. The Township has been recently engaged in a planning process with the contract purchasers of the J&J site and specific densities for each land use type have not been presented to the public at this time. While LOS on Route 1 will certainly be impacted through the site's redevelopment, generating the site's traffic impact would be mere guesswork.

As part of the planning effort surrounding J&J, the Township has also discussed the construction of a rail station with New Jersey Transit. As the Township continues to work with NJ Transit for

a rail station at this location, traffic impacts should be analyzed as part of the station's planning process. Traffic impacts of the station should also be analyzed in-concert with the site's future development impacts. However, the key factor in determining the ultimate land use mix and density of development for the J&J site, and associated traffic impacts, is whether NJ Transit decides that the site is feasible for consideration of a new rail station. The Township should encourage NJ Transit to expedite its analysis on the feasibility of constructing a rail station at this location.

While additional analysis is recommended, the need for an additional east-west roadway connection in this area of North Brunswick is apparent. The east-west roadway connection has been the subject of past Township planning efforts surrounding Finnegan's Lane. While no decision has been made with regard to the feasibility of extending Finnegan's Lane, given the pending redevelopment of J&J, an additional roadway crossing of the Northeast Corridor appears necessary to alleviate the impacts on Route 1.

Additionally, it appears that redevelopment of J&J into a Transit Village will require multiple points of ingress and egress from the site to reduce potential choking points. As such, analysis of a road that parallels Route 1 with potential connections to Finnegan's Lane, Aaron Road, Commerce Boulevard and Cozzen's Lane appears to be necessary. These connections appear critical to mitigate the traffic of any major redevelopment at this location.

Table 2: Traffic Impact by Site/Scenario

Intersection	Site/Scenario						Okonite			Treuemann		
	General Auto						#2			#2		
	Existing LOS		#1		#2		AM	PM	AM	PM	AM	PM
Route 1 & Finnegan's Lane	F (136)	F (116)	F (140)	F (122)	F (174)	F (136)	F (156)	F (126)	F (138)	F (119)		
Route 1 & Commerce Boulevard	B	C	B	C	B	C	B	C	B	C		
Route 1 & Adams/Cozzen's Lane	E	F (128)	E	F (132)	F (122)	F (134)	F (87)	F (148)	E	F (133)		
Route 130 & Davidson's Mill Road	F (199)	F (191)	F (203)	F (199)	F (234)	F (215)	F (218)	F (202)	F (210)	F (196)		
Route 130 & Renaissance Boulevard	D	E	D	E	D	E	D	E	E	E		
Route 130 & Washington Place	F (87)	D	F (88)	D	F (91)	D	F (90)	D	F (96)	E		
Route 130 & Carolier Lane	N/A	D	N/A	D	N/A	D	N/A	D	N/A	D		
Route 130/171 & Route 1 SB Ramp	N/A	B	N/A	B	N/A	B	N/A	B	N/A	B		
Route 27 & Cozzen's Lane	F (127)	F (306)	F (129)	F (308)	F (146)	F (307)	F (137)	F (306)	F (129)	F (308)		
How Lane & Jersey Avenue	D	D	D	D	D	D	D	D	D	D		
Livingston Avenue & How Lane	B	C	B	C	C	C	B	C	B	C		
Livingston Avenue & Ridgewood Avenue	B	B	B	B	B	B	B	B	B	B		
Livingston Avenue & Hermann Road	B	C	B	C	C	C	B	C	B	C		
Georges Road & Milltown Road	C	D	C	D	C	D	C	D	C	D		
Georges Road & Hermann Road	C	E	C	E	C	E	C	E	C	E		
Georges Road & Cranbury Cross Road	B	C	B	C	B	C	B	C	B	C		



Other Initiatives

This section addresses local concerns on selected traffic issues, which were investigated during the development of the Circulation Element.

Replacement of 6 Mile Run Bridge on Route 27

The new Route 27 Bridge over the Six Mile Run is scheduled for construction completion in May 2008. The NJDOT design for the bridge provides for two lanes, one in each direction, with shoulders. Applying a traffic growth rate of 2% per year, Route 27 will reach capacity of the two-lane bridge section in approximately 20 to 25 years.

The operation or service volume of the Cozzen's Lane and Route 27 intersection controls the quantity of traffic that can be processed on Route 27. The bridge at two lanes will process more traffic than the signal at Cozzen's Lane can process.

The NJDOT State Highway Access Management Code, Administrative Code Title 16, Chapter 47, establishes a "Desirable Typical Section" (DTS) for every segment of the State highway system, and can be changed by Departmental action. The DTS is the Department's long-range plan for highway configuration and is used to determine level of service thresholds for access applications.

A DTS for Route 27 has been established at four lanes throughout the entire length of North Brunswick. The number of through lanes assigned to Route 27 is inconsistent with the present configuration and the anticipated bridge design. A four lane Route 27 highway is inconsistent with the traffic demand expectations and incompatible with local context and traffic management objectives. North Brunswick should petition to change the DTS to a two-lane classification.

Bicycle/Pedestrian Circulation/Alternatives to Automotive Transportation

Continuous sidewalk and bicycle systems are essential for walking and bicycling to be competitive alternative modes to the automobile. These systems are a critical component to the Circulation Element, and are instrumental in achieving the goal of connectivity. These systems should be provided wherever feasible, especially when creating development patterns that exhibit a "sense of place".

Sidewalks are considered warranted whenever the road and land development conditions are such that pedestrians regularly move or will move along the highway. A separate walkway is often preferable, but a roadway shoulder will also provide a safer pedestrian accommodation than walking on the roadway. Portions of state, county and local systems do not accommodate pedestrians. Isolated segments of sidewalk appear on or about signalized intersections.



The Environmental Commission has developed a preliminary inventory of existing bicycle/pedestrian facilities and needed bicycle/pedestrian improvements in the Township, and a plan for bicycle accommodation priorities. Missing sidewalk segments, and the priorities established for on-street and off-street facilities should be studied further in conjunction with the Greenway effort recommended in the Open Space and Recreation Plan.

Adams Lane Truck Restrictions

Heavy trucks account for approximately 5-6% of all traffic on Adams Lane between Route 1 and Route 130. During the morning peak hour, the percentage of heavy trucks rises to 7 percent. In the morning peak hour, the volume of heavy trucks is about 40 percent and about 35 percent in the afternoon. HCM 2000 defines heavy trucks as those with more than four tires.

Restricting truck usage on this section of Adams Lane will not have a noticeable effect on the LOS of the intersection of Route 1 and Adams Lane/Cozzen's Lane. Although the Adams Lane westbound movement LOS improves, the Cozzen's Lane eastbound movement worsens. This is a result of a higher percentage of trucks making the left turn onto northbound Route 1 from eastbound Cozzen's Lane, since they would no longer be able to go straight across onto Adams Lane.

Although truck restriction will not improve the LOS, it will help to reduce queue lengths on Adams Lane. The restriction will also prolong the life of the pavement on Adams Lane and the bridge over the railroad tracks.





Housing Element

INTRODUCTION

In the case of Southern Burlington County NAACP v. the Township of Mount Laurel, (commonly known as Mount Laurel I), the New Jersey Supreme Court established the doctrine that developing municipalities in New Jersey have a constitutional obligation to provide a realistic opportunity for the construction of low and moderate income housing in their communities. In its Mount Laurel decision, decided on January 20, 1983 (Mount Laurel II), the Supreme Court stated that this constitutional responsibility extended to all municipalities in New Jersey. The Court also established various remedies, including the “builder remedy” or court-imposed zoning, to ensure that municipalities actually addressed this obligation.

In response to the Mount Laurel II decision, the New Jersey Legislature adopted the Fair Housing Act in 1985 (Chapter 222, Laws Of New Jersey, 1985). The Fair Housing Act established a Council On Affordable Housing (COAH) as an administrative alternative to the courts. COAH was also given the responsibility of establishing various housing regions in the state, determining regional and municipal fair share affordable housing obligations, and adopting regulations establishing the guidelines and approaches that municipalities may use in addressing their affordable housing need.

Under COAH's regulations, low income households are defined as those with incomes

no greater than 50 percent of the median household income, adjusted for household size, of the housing region in which the municipality is located. Moderate-income households are those with incomes no greater than 80 percent, but no less than 50 percent of the median household income, adjusted for household size, of the housing region. For North Brunswick, the housing region is defined by COAH as Region 3, and is comprised of Middlesex, Hunterdon and Somerset Counties.

COAH recently promulgated a Third Round of regulations. Unlike the previous two rounds, COAH's new Third Round methodology determines a municipality's affordable housing need based on the actual growth of the municipality. The need for affordable housing in a municipality is now calculated through the sum of the following:

- Rehabilitation Share- Deficient housing units occupied by low and moderate income households;
- Remaining Prior Round (1987 – 1999) Obligation- Units assigned to a municipality by the Council or the court for the period 1987 through 1999 that were not realized;
- Growth Share- the affordable housing need generated by a municipality's actual growth (2004 – 2014) based upon the number of new market rate housing units constructed and the number of new jobs created as a result of non-residential development.



The Rehabilitation Share for affordable housing is the number of existing housing units as of April 1, 2000 that are both deficient and occupied by households of low or moderate income. This number is calculated by COAH. The Remaining Prior Round (1987 – 1999) Obligation from the first and second fair share rounds have been recalculated by COAH to include data from the 2000 Census.

The “Growth Share” is for the period January 1, 2004 through January 1, 2014. This number is projected based upon municipal growth projections. These projections include both population and employment growth and must be converted into a projected growth share affordable housing obligation by applying a ratio of one (1) affordable unit for every eight (8) new market-rate residential units projected, plus one (1) affordable unit for every twenty-five (25) newly created jobs as measured by new or expanded non-residential construction projected in the municipality. The growth share projections are converted into actual growth share obligation when market-rate units are newly constructed, and non-residential developments receive permanent certificates of occupancy.

This methodology requires a municipality to project the growth it expects to have over the next ten years and, to do this, the municipality must provide the following supporting documentation to be submitted with the Housing Element:

1. A projection of the municipality’s probable future construction of housing for 10 years covering the period January 1, 2004 through January 1, 2014 based upon the following minimum information for residential development:
 - Certificates of Occupancy issued since January 1, 2004;
 - Construction... and Demolition* Permits issued and projected (Although COAH does not mandate demolitions be calculated);
 - Approvals of applications for development; and
 - Historic trends of, at least, the past 10 years, which shall include demolitions and Certificates of Occupancy issued;
2. An analysis of the existing jobs and employment characteristics of the municipality, and a projection of the probable future jobs must also be calculated using the same criteria.
3. An analysis of how existing zoning or planned changes in zoning provide adequate capacity to accommodate residential and non-residential growth projections.

**COAH regulations state that demolitions may be considered. They do not mandate this subtraction.*



4. MPO Growth Projections through 2015 or growth projections for 2015 in an endorsed plan approved by the State Planning Commission to analyze whether prospective development matches growth demands.

This report provides an evaluation of the current North Brunswick Housing Element & Fair Share Plan in light of COAH's Third Round Methodology, and provides the Township an understanding of how the new rules will effect development. The current Fair Share Housing Plan, certified by COAH on October 1, 2003, remains valid until September 3, 2009. This report analyzes the Township's Housing Element & Fair Share Plan and provides recommendations relative to future compliance with COAH's Third Round regulations. The report is broken down as follows:

PART I. MUNICIPAL SUMMARY AND THE SECOND ROUND PLAN

PART II. PROJECTED FUTURE GROWTH & GROWTH SHARE CALCULATION

PART III. RECOMMENDATIONS FOR THE THIRD ROUND

MUNICIPAL SUMMARY

North Brunswick, located in Middlesex County, is approximately 12.14 square miles in land area. The Township is bounded by Milltown Borough, East Brunswick, South Brunswick, New Brunswick and Franklin Township.

While detailed demographics and housing data are provided in the Community Profile Element of this Master Plan, the population of North Brunswick has increased from 31,287 in 1990 to 36,287 in 2000. The 2000 median age in the Township was 35.4 years, which was consistent with the Middlesex County median age of 35.7 years. The median household size is 2.58 persons. The housing stock of the Township is predominantly single-family detached dwelling units with the highest percentage of homes built between 1980 and 1989. According to the guidelines established by COAH, North Brunswick is located in Housing Region 3, a region that consists of Hunterdon, Middlesex and Somerset Counties.

The summary page of North Brunswick's second-round COAH certified plan outlines the Township's Second-Round obligation. Through that plan, the Township addressed its prior round obligation through various projects detailed in the plan. In fact, COAH granted North Brunswick a credit of 282 surplus housing units that may be applied toward the Township's future affordable housing obligations.



In the Third Round Rules, COAH provides each municipality with an adjusted second round obligation- despite having a certified plan. This adjustment was based primarily on the 2000 Census data. According to the new Third Round calculations, North Brunswick has a rehabilitation obligation of 24 units and a prior round (1987-1999) obligation of 398 units. During the second round planning process, the Township utilized 489 as its *Pre-Credited Housing Need* (395 new and 94 rehab). Therefore, the COAH adjusted Pre-Credited housing figure indicates that three (3) additional newly constructed units shall be provided and seventy (70) less rehabilitated units needing to be realized.

When analyzing the Township's second-round calculations, it was determined that additional credits in Regional Contribution Agreements (RCA) and age-restricted units, not credited during the planning process in 2003 because of COAH's rules capping their allowance, will apply in the next round. These credits will be applied to all future affordable housing obligations that will be generated through COAH'S new Growth-Share methodology. Again, Growth-share is calculated through new development that has taken place and will prospectively take place, in the Township retroactive to January 1, 2004. The second-round calculations, as applied to COAH's adjusted second-round obligation breakdown is as follows:





Second-Round Adjustments* *(As will be reflected in the future Third Round Plan)	
Total	Description
398	Total New Construction Need
	Prior-cycle Credits April 1, 1980 – December 15 1986
205	Jack Pincus Section 8
+ 14	Developmentally Disabled- (Serv & Dev.Dis.Assoc.of NJ)
219	TOTAL PRIOR CYCLE CREDITS
	Total Second Round Need
398	Pre-credit need
- 219	Prior-cycle credit
179	POST CREDIT NEED
	Maximum Regional Contribution Agreement Allowance
179	Post Credit Need
X 0.5	50% RCA limit
89*	Maximum RCA permitted
	*Manor RCA contribution to date=135. The 46-unit credit can be applied to Third Round. Manor is also obligated to provide an additional 213 units. Up to 50% of the future Growth Share Obligation may be met through RCAs.
	Maximum Age-restricted Allowance
179	Post Credit Need
X 0.25	25% Maximum Senior Housing Component
45*	MAXIMUM AGE_RESTRICTED UNITS PERMITTED
	* Age-restricted credits can only be credited toward a new construction obligation realized in town and may not be applied to an obligation that has deducted RCA's from the calculation.
	Total Second Round Breakdown (Applicable to the Third Round)
+219	Prior Round Credits
+45	Age-restricted units (Although COAH allocated 100 age-restricted units credits in the Township's second round, this plan notes that only 45 are eligible. The balance of 105 of the 50 units generated by 740 Hermann Road will be applied to the Third Round.)
+200	Governor's Pointe
+8	Alternative Living Arrangements
+89	RCA (The remaining 46 of the 135 previously transferred RCA's may be applied to the Third Round on top of the additional 213 RCA's that Manor is obligated to pay the Township)
+15	Rental Bonus
576	Total Credits
-398	COAH's Second Round Adjusted Calculation
178*	Credits generated from Second Round Calculation
	*Of these credits, 162 are non-restrictive credits that the Township may apply freely to any new construction obligation generate by Growth Share. These credits are reflective of excess credits generated by Governor Pointe and not utilized in meeting the Second Round calculation.
	Additional Credits Not identified in the original Second Round Plan (Applicable to the Third Round)
+105	Age-restricted units (North Brunswick Senior Rental Housing) Capped at 50% of total Growth Share.
+259	RCA (Remaining Manor obligation- including 33 remaining) Capped at 50% of total Growth Share.
364	Total Credits potentially eligible in addition to Second Round Calculation
+178	Credits from Second-Round
542	Potential Credits to apply to Third Round



PROJECTED FUTURE GROWTH & GROWTH SHARE CALCULATION

As previously noted, the Third Round methodology includes a municipality's "growth share", which is based on a municipality's actual market-rate residential and non-residential growth. Projection of a municipality's probable future construction of housing and future jobs and employment characteristics must cover the ten-year period from January 1, 2004 through January 1, 2014 and must rely on the following information:

- Construction permits issued and projected (Demolition may be subtracted, but not mandated by COAH)
- Approved and anticipated applications for development
- Historic trends of, at least, the past 10 years, which includes certificates of occupancy issued (Anticipated Demolition may be subtracted, but not mandated by COAH)

Beyond the documented internal growth patterns, a municipality must also take into consideration growth projections for 2015 based on an endorsed plan approved by the State Planning Commission, or, if that information is not available, municipal population, household, and employment growth projections published by the municipality's metropolitan planning organization (MPO). In the case of North Brunswick, the MPO is the North Jersey Transportation Planning Authority (NJTPA), which serves Middlesex, Monmouth, Hunterdon, Somerset, Sussex, Morris, Hudson, Bergen, Essex and Union Counties.

RESIDENTIAL AND NON-RESIDENTIAL GROWTH

MPO 2015 Projections

The Township of North Brunswick is relying on the population and employment forecasts produced by the North Jersey Transportation Planning Organization (NJTPA). According to their estimates, the population in North Brunswick will increase to 41,250 by the year 2015. This is an overall increase of 15.3 percent. Employment is forecasted to grow at a lower rate of 11.6 percent. The County overall is forecasted to have a slightly lower rate of growth in population (13.8%) than North Brunswick and a higher rate of employment (17.6%). As stated in the Community Profile Element of this Master Plan, these numbers are reasonable given the growth projected in this Housing Element.



North Jersey Transportation Planning Authority Population Projections & Employment Projections						
North Brunswick Township	2000	2005	2010	2015	# Change	% Change
Population	36,287	38,530	39,980	41,250	5,579	15.3%
Employment	22,630	23,380	24,270	25,270	2,640	11.6%
Middlesex County	2000	2005	2010	2015	# Change	% Change
Population	750,200	785,600	819,700	854,000	103,800	13.8%
Employment	406,200	428,900	452,100	477,900	71,700	17.6%

ACTUAL & PROJECTED CERTIFICATES OF OCCUPANCY

The residential and non-residential projects listed below measure the number of approvals and projected approvals for development that would result in permanent certificates of occupancy (CO's) by the year 2014. For purposes of giving the Township a complete analysis of prospective development, the plan has included the potential redevelopment of J&J and Treumann Storage as well as the former General Automotive site that was recently approved as a lifestyle center. In doing so, the plan projects a reasonable development of these sites, although final details are unknown at this time.

Residential

The table below reflects future residential construction based on site-specific analysis of development applications, both approved and anticipated. The table includes all market-rate development that will have certificates of occupancy issued by 2014. As the table shows, North Brunswick is projected to have a total residential growth of 1,841 units by 2014.



North Brunswick- Anticipated Residential Development 2004-2014

	04	05	06	07	08	09	10	11	12	13	14	Total
Approved												
Residential Units	7	11										18
Renaissance*	145	192	66	66	67	67	67					670
Anticipated												
DOUGLAS AVENUE			4	3								7
Matzel & Mumford				9	8							17
Johnkins				3	3							6
Skaritka					8	8	7					23
Abode				3								3
Cascades				81	81	81	82					325
Church Lane South					2	3						5
Church Lane @ Forest Lane								4	4	4		12
Blackhorse Lane						12	12	11				35
Violet & Finnegan's							6	6				12
Thomas Avenue				2								2
Evelyn Street						2	2					4
EIGHTH STREET				2								2
J&J								100	100	100	100	400
TREUMANN					150	150						300
SUBTOTAL BY YEAR	152	203	70	169	319	323	176	121	104	104	100	
TOTAL												1,841



*Although Renaissance was subject to a court settlement agreement, it utilized Regional Contribution Agreements (RCA) to transfer the project's affordable housing obligation off-site. As such, all growth after January 1, 2004 is subject to Growth Share calculations according to the COAH guidelines. The RCA credits associated with the agreement will continue to apply toward the Township's future Growth Share and therefore the Township will not lose them. The settlement agreement detailed that a total of 348 units will be provided in the form of RCA's. To date, 135 RCA's have been transferred to New Brunswick and Carteret. As depicted in the Second Round Adjustment table, the Township's Second Round obligation was recalculated based on COAH's readjustment of this obligation. This recalculation shows that of the 135 RCA's transferred, 89 will be credited toward round two while the balance of 46 will apply to the Third Round. The Township will then have a total of 259 RCA's which it may apply toward its affordable housing obligation. As with prior COAH rounds, Third Round RCA's remain capped at 50% of the total obligation. In essence, the Township will be able to apply these 259 RCA credits toward future obligations of up to 518 total units.

Projected buildout since 2004 at Renaissance includes 670 units that will contribute toward the Township's Growth Share. Therefore, the Renaissance residential component generates the need to provide 83.7 (84) affordable units in the Township. The other component to the affordable housing obligation that Renaissance generates is the increase in jobs associated with prospective non-residential growth. As detailed in the Land Use Element, Renaissance has the ability to construct 1.5 million square feet of commercial space with a 1/3 retail maximum allowance. While 145,000 square feet of retail has been built prior to January 1, 2004, the remaining 355,000 square feet of retail and 1.0 million square feet of non-retail commercial space have yet to be built. Although the Land Use Element discusses the appropriateness of the total commercial component in detail, the current agreement in effect is what this Housing Element uses as a means to calculate the site's Growth Share. Therefore, should the site reach buildout, 1.0 million and 355,000 square feet of commercial space yields 3,000 and 355 jobs respectively, which totals 134.2 (134) additional affordable housing units. Combined with the residential growth share, Renaissance generates a total of 218.2 (218) affordable housing units.



Non-Residential

The table below reflects future non-residential construction based on site-specific analysis of development applications, both approved and anticipated, that are expected to have certificates of occupancy issued by 2014. The developments are broken down by use group. Renaissance is not included in this section because no development is expected at this time.

As the tables show, North Brunswick is projected to have a non-residential growth in office, mercantile, assembly (i.e. restaurants, entertainment) storage, hotel and institutional uses. The projected non-residential development totals 933,625 square feet. Each chart below represents the total non-residential growth by its use group because each use group has a specific job generation calculation associated with it.

North Brunswick- Anticipated Office Development ~Use Group B
2004-2014

	04	05	06	07	08	09	10	11	12	13	14	Total	Total Jobs
Schmidt Lane Medical				40,000								40,000	120
R + 1 3 0 Medical												22,000	66
Shamy				12,300								12,300	37
Stanbury				20,000								20,000	60
Squibb		150,000										150,000	450
Valley National Bank		4,500										4,500	13.5
Wachovia		4,500										4,500	13.5
Total												253,300	760

North Brunswick- Anticipated Mercantile Development ~Use Group M
2004-2014

	04	05	06	07	08	09	10	11	12	13	14	Total	Total Jobs
Renaissance Square		54,440										54,440	54
Len Lisa		19,000										19,000	19
Jeremy Plaza			5,800									5,800	5.8
Verizon				5,000								5,000	5
Dunkin Donuts			2,000									2,000	2
Stanbury				136,000								136,000	136
Hess Retail			3,000									3,000	3
J&J							50,000	50,000	50,000	50,000		200,000	200
Treumann					25,000							25,000	25
Total												450,240	450



North Brunswick- Anticipated Storage Development ~Use Group S

2004-2014

	04	05	06	07	08	09	10	11	12	13	14	Total	Total Jobs
Rt1 Self Storage		118,900										118,900	24
Total												118,900	24

North Brunswick- Anticipated Hotel & Motel Development ~Use Group R1

2004-2014

	04	05	06	07	08	09	10	11	12	13	14	Total	Total Jobs
Staybridge Suites				61,635								61,635	49
Comfort Suites				41,150								41,150	33
Total												102,785	82

North Brunswick- Anticipated Institutional Development ~Use Group I

2004-2014

	04	05	06	07	08	09	10	11	12	13	14	Total	Total Jobs
Quisenberry	8,400											8,400	17
Total												8,400	17

North Brunswick- Total Anticipated Development by Use Group ~ Non-Residential

2004-2014 (Square Feet)

	04	05	06	07	08	09	10	11	12	13	14	Total	Total Jobs
Total CO's													
B- Office		159,000	22,000	72,300								253,300	760
M- Mercantile Uses		73,440	10,800	141,000	25,000			50,000	50,000	50,000	50,000	450,240	450
S- Storage Uses		118,900										118,900	24
R1- Hotel/Motel				102,785								102,785	82
I- Institution	8,400											8,400	17
Totals												933,625	1,329



GROWTH SHARE & FAIR SHARE DETERMINATION

The new Third Round rules and regulations outline how municipalities must project growth share obligations. Based on the certificates of occupancy (CO's), permit, approval and MPO growth data and analysis a municipality must plan for every eight (8) market-rate residential certificates of occupancy one (1) affordable housing unit obligation. For non-residential development, a municipality must plan for one affordable housing unit with every 25 newly created jobs measured by new or expanded construction outlined by use group. The non-residential breakdown by use group is provided by COAH and is reflected in the following table:

Use Group	Description	Square Feet Generating One Affordable Unit	Jobs Per 1,000 Square Feet
B	Office buildings. Places where business transactions of all kinds occur. Includes banks, corporate offices, government offices, professional offices, car showrooms outpatient clinics and research facilities.	8,333	3
M	Mercantile uses. Buildings used to display and sell products. Includes retail stores, strip malls, shops and gas stations.	25,000	1
F	Factories where people make, process, or assemble products. Includes automobile manufacturers, electric power plants, foundries, and incinerators. F use group includes F1 and F2.	12,500	2
S	Storage uses. Includes warehouses, parking garages, lumberyards, and aircraft hangers. S group includes S1 and S2. .	125,000	0.2
H	High Hazard manufacturing, processing, generation and storage uses. H group includes H1, H2, H3, H4 and H5.	25,000	1
A1	Assembly uses including concert halls and TV studios.	12,500	2
A2	Assembly uses including casinos, night clubs, restaurants and taverns.	8,333	3
A3	Assembly uses including libraries, lecture halls, arcades, galleries, bowling alleys, funeral parlors, gymnasiums and museums but excluding houses of worship	8,333	3
A4	Assembly uses including arenas, skating rinks and pools.	8,333	3
E	Schools K – 12	25,000	1
I	Institutional uses such as hospitals, nursing homes, assisted living facilities and jails. I group includes I1, I2, I3 and I4.	12,500	2
R1	Hotels and motels	31,250	0.8



Residential

The total projected residential growth, as previously determined, is reflected in this section. The table below reflects the total actual and projected certificates of occupancy. As shown, the Township has an overall projected net residential growth of 1,841 units.

North Brunswick- Anticipated Development and Demolitions
Residential 2004-2014

	04	05	06	07	08	09	10	11	12	13	14	Total
Total CO's	152	203	70	169	319	323	176	121	104	104	100	1,841

Using the final net growth number, outlined per year, the growth share obligation can be determined. As this is reflective of projected market-rate development, the net growth is divided by eight (8) because COAH mandates that every eight (8) market rate units generates the need for one (1) affordable housing unit. This, in turn, gives North Brunswick a total residential growth share obligation of 230.1 (or 230) affordable housing units.

- 1,841 prospective market rate units / 8 = 230.1 affordable housing units

Non-Residential

The total projected non-residential growth, as previously determined, reflects a projected growth in jobs of 1,329 by the year 2014. The following table highlights non-residential growth both actual and projected.

North Brunswick- Anticipated Development -
Non-Residential 2004-2014

	04	05	06	07	08	09	10	11	12	13	14	Total Sq Ft	Total Jobs
Total CO's													
B- Office		159,000	22,000	72,300								253,300	760
M- Mercantile		73,440	10,800	141,000	25,000			200,000				450,240	450
Uses													
S- Storage		118,900										118,900	24
Uses													
R1- Hotel/ Motel				102,785								102,785	82
I- Institution	8,400											8,400	17
Net Jobs													1,329



Using the final growth number, outlined per year, the growth share obligation can be determined. The actual number of jobs gained is included here. As this is reflective of only projected non-residential development, the net growth is divided by twenty-five (25). This, in turn, gives North Brunswick a total non-residential growth share obligation of 53.1 (or 53) affordable housing units. This number does not include prospective demolitions.

- $1,329 \text{ total prospective jobs} / 25 \text{ jobs} = 53.1 \text{ affordable housing units}$

Adding the residential growth share of 230 units to the non-residential growth share of 53 units, the Township's total growth share obligation will prospectively be 283 units. The Township understands that these numbers are a projection and the actual growth share obligation will be calculated based upon residential and non-residential certificates of occupancy issued between January 1, 2004 and January 1, 2014. On an annual basis, the Township will compare its pro-rated growth share projection with its pro-rated growth share obligation and the actual number of affordable units that have been constructed to meet the obligation.

- $230 \text{ residential growth share} + 53 \text{ non-residential growth share} = 283 \text{ affordable housing units}$

Demolitions

Under COAH's Third Round Rules, the Township may choose to reduce a development's growth share calculation by factoring in the number of jobs lost through demolition. The following table characterizes how demolitions would factor into the Township's Growth Share calculation. However, North Brunswick is in a unique position, when compared to the rest of New Jersey. This is because the Township is carrying a large number of credits forward into the Third Round. As a result, it may not be in the Township's interest to deduct demolitions from its calculations. The following chart details all anticipated demolitions by site. The purpose is to review how demolitions could affect the Township's Growth Share Obligation so that the Township can decide on how they wish to handle the situation.



North Brunswick- Anticipated Demolitions- Non-residential														
	04	05	06	07	08	09	10	11	12	13	14	Total Sq Ft	Total Job Loss	
Total Demolitions														
B- Office														
Valley National	19,490											19,490	58.4	
Stanbury			19,000									19,000	57	
Comfort Suites			25,000									25,000	75	
J&J								212,872				212,872	638.6	
*TOTAL group B												276,362	829.1	
S- Storage Uses														
Treumann					1,368							1,368	0.27	
Stanbury			88,594									88,594	17.7	
J&J								650,034				650,034	130	
*TOTAL group S												739,996	148	
F- Factory Uses														
J&J								260,608				260,608	521.2	
*TOTAL group F												260,608	521.2	
M- Mercantile														
J&J								17,647				17,647	17.6	
Truemann				2,781								2,781	2.7	
*TOTAL group M												20,248	20.2	
A2 Assembly														
J&J								17,666				17,666	52.9	
*TOTAL GROUP A2												17,666	52.9	
TOTAL PROSPECTIVE JOB DECREASE													1,571.4	
ASSOCIATED AFFORDABLE HOUSING UNITS													62.8	

According to the Division of Codes and Standards (as the Township has reported), North Brunswick averages 5 housing demolitions yearly based on an average of the last 9 years of available data. The table below reflects the total projected demolitions that have permits and those that are projected as possible losses of residential units per year.

The table also includes the actual certificates of occupancy and demolitions accrued in 2004. Demolitions reflect an overall decrease of 55 residential units, which gives the Township an overall projected net residential growth of 1,786 units.



North Brunswick- Anticipated Development and Demolitions
Residential 2001-2014

	04	05	06	07	08	09	10	11	12	13	14	Total
Total CO's	152	203	70	169	319	323	176	121	104	104	100	1,841
Demolitions	5	5	5	5	5	5	5	5	5	5	5	55
Net	147	198	65	164	314	318	171	116	99	99	95	1,786

Applying demolitions to the Township's total prospective residential and non-residential growth obligation of 283 units there is a total non-residential reduction of -62.8 (-63) units and a residential reduction of -55 units. This in turn would leave North Brunswick a total growth share obligation of 165 affordable housing units.

- 283 total obligation – 63 non-residential demolitions and – 55 residential demolitions = 165

As deducted from this analysis, the Township will essentially gain credit for 118 affordable housing units should it decide to net-out demolitions. Because the Township has such an extraordinary number of credits, it may choose not to deduct demolitions from the Growth Share calculation. Doing so would provide the Township with the ability to leverage its credits toward gaining more revenue for its affordable

housing trust fund. This would enable the Township to be more creative in its use of affordable housing trust monies. Such creative use of this fund could be an aggressive housing rehabilitation program, or a down-payment assistance program amongst other potential uses. Conversely, the Township could benefit from netting-out demolitions in a way that allows the Township to carry its credits much further into the future.

Notwithstanding this argument, the Township's extraordinary number of credits allows it to be in a position to make such a decision. Either direction the Township chooses with regard to demolitions, this Plan has shown that the Township will be in a good position whatever it decides.

Determination of Total Obligation

The Third Round methodology for determining a municipality's obligation is now composed of three parts:

- Deficient housing units occupied by low and moderate income households which is referred to as rehabilitation share;
- Remaining Prior Round (1987 – 1999) Obligation assigned to a municipality



- by the Council or the court for the period 1987 through 1999; and
- The share of the affordable housing need generated by a municipality's actual growth (2004 – 2014) based upon the number of new housing units constructed and the number of new jobs created as a result of non-residential development.

North Brunswick's total obligation is represented in the table below. As determined by COAH, the Township has a rehabilitation obligation for the years 1999-2014 of twenty-four (24) units and a 1987-1999 Prior Round obligation of 398. Adding in the previously determined Growth Share obligation of 283, the Township's total obligation for both COAH rounds combined is 680 units.

North Brunswick Obligation*	
Rehabilitation Share 1999-2014	24
1987-1999 Prior Round Obligation	398
Projected Growth Share (prospective)	283*
Total New Construction Obligation	680

*Does not include demolition reduction.



RECOMMENDATIONS FOR THE THIRD ROUND

COAH does provide some flexibility when applying Third Round rules, although it is clear that the Township must set a direction for how to handle affordable housing and how it will apply COAH's rules and regulations. Rules and regulations must be applied equally to all development applications. Arbitrary or discretionary actions have not been looked upon favorably by COAH, but concrete regulations are generally supported. In order to remain defensible to prospective Court challenges, once the Township decides the direction it will take when dealing with affordable housing and its associated regulations, no exceptions may be made unless parameters and exceptions are specifically spelled out within the Township's ordinances.

Future Development

When analyzing the Township's Second Round Obligation, Third Round Growth Share Obligation, all the credits that have accumulated, and the new Growth Share Ordinance, the Township is well positioned to deal with any and all future housing obligation once the Second Round Fair Share Plan expires in 2009. As discussed previously, COAH allows for municipalities to carry prior-round credits into the Third Round. The Township carries a significant credit forward into the Third Round: 542 units.

Of the Township's 542 credits, the Township may utilize 162 without any restriction, whereas both RCA and Age-restricted units are restricted

to 50% of the new construction obligation. Total RCA credits equal 259, while the age-restricted units available to the Township for credit total 105. When applying these restrictive credits, a point to note is that age-restricted units may be applied only towards the Township's new construction obligation. For example; if a Growth Share obligation of 200 units was to come about, then 50% of this 200 may utilize RCA, or 100. The remaining 100 units may apply age-restricted credits; however, the Township may only apply the 50% age-restricted limit to the 100 remaining and not the original 200 units. This is the case because COAH does not allow age-restricted credits to be applied to units that are transferred out of town, which RCA's are by definition.

Another important point to add is that the minimum charge on an RCA in the Third Round must be set at a minimum of \$35,000/unit and the Manor agreement was drafted when COAH rules set the limit at \$25,000/unit. The Township may need to revisit this agreement if necessary; especially seeing as though Renaissance is in-fact generating a Growth Share obligation.

Growth Share Ordinance

Notwithstanding the RCA discussion, the Township has recently adopted a new Growth Share Ordinance (which is appended to this plan). This ordinance was drafted to ensure that any new affordable housing obligation would be met in the future. The Township



need only to ensure it keeps accurate track of development and carefully allocate the credits it has at its disposal. It must also ensure major developments to handle the burden they place on the Township. This Growth Share ordinance will ensure that these developments will handle their share. Given the non-residential component of Renaissance being in question, this Growth Share ordinance, and its inclusionary component, is critical to North Brunswick's future development.

Furthermore, the Growth Share ordinance applies to all new development within the Township and applies inclusionary techniques to construct units on-site or pay an in-lieu of fee of \$120,000 per affordable unit not constructed on-site. Fees are applicable to both residential and non-residential development. Regardless of the project size, a growth share fee in lieu of construction is applied.

As stated previously, when applying COAH's new rules, the Township must apply them equally across the board. The current Growth Share Ordinance does not state that demolitions for new development application are applied when calculating the in-lieu of construction fee. This plan concludes that it is appropriate that the ordinance determines the fee in this manner. However, it must be pointed out that should the Township decide not to utilize demolitions as part of its Growth Share ordinance, the Township may not deduct demolitions when calculating its own overall housing obligation.

Whatever the Township decides in the case of demolitions, it must apply its decision equally toward every development.

Lastly, an important point to note is that while a Growth Share ordinance is permitted as part of a Township's regulations without a COAH certified Third Round Fair Share Housing Plan, the ordinance would not be protected by COAH from court challenges. Although the current Second Round Plan does not expire until 2009, nothing prohibits the Township from filing a new Third Round Plan. The Township may consider filing a Third Round Plan to gain additional protection for this ordinance.

Rehabilitation

As part of the Second Round Plan, the Township utilized a Small Cities grant to develop and administer a rehabilitation program to meet its need. Through this program, the Township was able to rehabilitate a great number of units. At this time, funding has come exclusively through the Small Cities program and the Township should continue to utilize these funds to meet the current Third Round obligation.

The Township understands that it must provide sufficient funds to complete no less than half of the obligation by year five of the certified plan. With this in mind, Small Cities may be insufficient to provide all the rehabilitated housing required by COAH. This will mean utilization of other methods such as a development fee ordinance, or Growth



Share Ordinance. Regardless of the funding mechanism, a (10) ten-year deed restriction is required by COAH to be placed on all rehabilitated units to gain credit.

Inclusionary Development

The Township's Growth Share ordinance requires that every major development that includes multi-family housing, must construct the affordable housing obligation that it generates, within the project. The Township may also consider the following as part of its overall affordable housing strategy.

- 1) The affordable housing generated by a project must be realized within North Brunswick because RCA's are capped and the Township's current credits include many additional RCA's.
- 2) Units provided off-site must be eligible for COAH credit and therefore deed restricted for up to 30-years.
- 3) Density bonuses may be considered. Provided that all affordable units are provided on-site.
- 4) All units provided on-site could be interweaved throughout the site.
- 5) The Township could also decide that the construction of affordable units within a larger development will be designed similarly to the market-rate units. The intent of this stipulation is to ensure that families are not left with a unit that requires more upkeep or increased energy costs because of a lower standard heating system or window treatment amongst other things.
- 6) The Township may also choose to utilize the affordable housing trust fund it will create as part its COAH approved spending plan to assist low and moderate-income citizens buy-down the cost of purchasing existing units in the Township.



740

North Brunswick Senior Housing



Community Facilities Element

INTRODUCTION

The Community Facilities Element provides an assessment of the existing inventory and future needs of the public service facilities of North Brunswick Township, including schools, fire and police protection, emergency medical services, and libraries. The locations of the Township's community facilities are graphically displayed on the Community Facilities Map. In many ways, the quantity and quality of these facilities is the most visible aspect of government. The presence or absence of high quality community facilities has a direct influence on where people choose to live, shop and locate a business.

Utilizing the Township's demographic composition, this Element will provide an evaluation of municipal resources, existing service levels, and potential deficiencies, while considering future facility and service needs. Understanding how these facilities can be utilized and upgraded offers an opportunity to improve the quality of life for current residents and businesses, while supporting future development efforts.

ISSUES IDENTIFICATION

Community facility issues, concerns and suggestions were identified as part of the public input process. The community expressed their interest in addressing the following:

- The need for a community center
- The need for a new senior center
- The need for a new or expanded library

- Improving access to or facilitating the relocation of the post office
- Exploring the appropriateness of "Community-based Schools", given the apparent build-out of the existing school facility improvement program

INVENTORY & ANALYSIS

~Municipal Facilities- Town Hall

The Township's administrative offices are located on Hermann Road. This location contains all of the Township's governmental departments with the exception of the Department of Public Works. The Municipal Complex is accessible Monday through Friday from 8:30 a.m. to 4:00 p.m., except holidays. Access is provided through the North Brunswick Township website at www.northbrunswickonline.com for business hours, an overview of each department's responsibilities and contact information.

Although not in the geographic center of the Township, the facility is well positioned given convenient access to Route 1 and Route 130 and the remainder of the Township.

In 1982, a study showed that the Township needed a new facility to handle its operations. The Township formally acted on this recommendation in 1993 and constructed a municipal complex complete with state of the art Police Headquarters. The site also included space for the construction of a Senior Citizen



Housing Complex adjacent to the Municipal Complex.

Overall, the facility adequately addresses the needs of the Township's administrative services. There is also a 3,000 square-foot third floor in the building that is currently not in use. This additional space was well planned to enable future growth within the administrative branch of North Brunswick Government. Currently there are no facility needs, beyond utilization of the third floor, into the foreseeable future.

~Police Department

The North Brunswick Police Department is also located at the Municipal Complex. The current force includes approximately 84 uniformed members with an additional 16 non-uniformed members employed by the Township.

Realizing that enforcement of laws and incarceration alone would not eliminate the root causes of crime, the North Brunswick Police Department initiated a department-wide Community Operational Policing strategy. Community Operational Policing (C.O.P.) is a partnership among all Township police officers and its citizens to work together to identify, prioritize and solve community problems

and improve the quality of life. Through this strategy the Department's efforts are directed to reducing crime and the fear of crime, increasing citizen satisfaction with their services, and working with other Township and public agencies to solve problems that impact North Brunswick residents and businesses.*

Space within the existing Police Headquarters seems adequate given the current and prospective force. However, with growth being considered in the southern portion of the Township, the location of a substation to compliment the EMS and Fire Facility could be a future need.

~Fire Department Facilities

The Township of North Brunswick consists of three (3) volunteer fire companies and one (1) Emergency Medical Services (EMS) unit. Company #1 is located at 600 Cranbury Cross Road, Company #2 is located at 2030 Route 130 north, and Company #3 is located at 1470 Cozzens Lane. These three fire companies work together to provide fire protection for the entire Township of North Brunswick.

*www.northbrunswickonline.com



Fire Company #1 is looking to make improvements to the existing firehouse at Cranbury Cross Road. Because no decision has been made regarding the status of equipment, the actual improvements needed are yet to be finalized. The company is considering expansion to include a 4th bay and additional space to display an antique engine. Meeting and conference space, as well as a new “day-room”, are also considerations. Should a day-room be included in the design of the addition, the firehouse would require a diesel ventilation system. Currently, the Company is raising funds and pursuing grant monies to accomplish this task, although no estimated costs have been determined.

The facility at Fire Company #2 does not appear to have major needs, although some minor upgrades are needed. With the prospective Renaissance substation becoming available shortly, Fire Company #2 does not appear to have short-term facility needs.

Fire Company #3's facility has been recently renovated to handle the size of their apparatus. Although this work was recent, the remainder of the station needs significant attention. The initial renovation effort identified that a new roof was needed. The company patched the roof temporarily as the needed funds for a total replacement were not available. The patch should last until 2008. Other needs of the facility include a new heating, ventilation and air conditioning unit, and structural work on the rear wall where a temporary one is now in place, as well as ADA accessibility. Costs for

these improvements have yet to be identified.

A new 911 Emergency Medical Services substation is also being constructed within the Renaissance neighborhood. This ancillary facility will contain (2) two-bays and provide a dual function of fire and EMS services. Fire Company #2 and the First Aid Squad are equipping the facility. The substation will also contain a bunkroom, containing 8-beds, where crews can be housed during significant weather events or other emergency situations.

Equipment

Each fire company is equipped independently and is able to respond to single company calls and general alarms. Overall, it must be noted that fire-fighting apparatus is “ideally” meant for 20 years of active use. Obviously, the type of equipment and its quality of construction affect useful lives. Nevertheless, the companies have an expectation of a 20 year life expectancy when purchasing equipment because costs can easily reach \$500,000 and above for a new vehicle, depending on the accessories the apparatus is equipped with.

Fire Company #1 has (3) three pieces of fire fighting apparatus; all (3) three are Class-A Engines (pumpers). One, a 2000 Pierce, is set up for rescue and extrication. Another, a 1989 Pierce, has another 4-5 years of expected service. The third apparatus, a 1984 Pierce, is in the process of being replaced, although it is in great shape. The replacement engine will arrive in May 2006 and will cost \$370,000, with no optional equipment added.

**INSERT MAP:
COMMUNITY FACILITIES**



Maintenance on all apparatus is superb, with annual testing and routine maintenance checks. Company #1 has the luxury of having the ability to maintain their vehicles through the expertise of some of the volunteers.

An interesting note regarding Fire Company #1 is that it still maintains a 1937 Peter Persch Engine. This 69-year-old antique was the first engine purchased and in service in North Brunswick Township. Although a point of pride, the engine does present a space issue for the Company as discussed previously.

Fire Company #2 has three (3) pieces of fire fighting apparatus. This includes one (1) Ladder Truck (12 years old) and two (2) engines. Of the (2) two engines, one is a 2003 model and the other a 1987 model. The 1987 engine has recently been damaged in an accident and is in need of replacement. While insurance reimbursement only covered 25% of the replacement costs, a new engine with similar equipment is estimated at roughly \$800,000. The other engine, the 2003 model, seems as though it is not as effective as prior models. Fire Company representatives have suggested that this engine may only last ten of the originally anticipated 20 years. Company #2 has declared that two (2) engines are needed to be effective.

Fire Company #3 has four (4) pieces of equipment including one (1) Ladder Truck (12 years old), two (2) engines and a brush truck (30 years old). One of the engines is 17 years old and is limited to fire fighting (Class A). The

other engine purchased was a “demonstration” vehicle and is in need of repair frequently. This demo-engine was acquired in 2004. Fire Company #3 believes it needs a new engine.

The future development and redevelopment efforts of the Township will need to be monitored by the Township to ensure that additional growth will not degrade the level of service for fire protection. The Fire Department should remain involved in the Township’s development and redevelopment efforts to maintain an adequate level of service for fire protection in the future. Currently, the equipment contained within all three companies can reach (7) seven floors of development. While this may be adequate to serve future buildings that may be constructed in the Township, water pressure may become an issue to reach taller heights. As such, fire pressure pumps, which are incorporated in the Uniform Construction Code, are created. Should major development or redevelopment in the Township come to fruition, the Township should investigate its ability to mandate that developers make contributions to the Department or supplement equipment needs.

Operational Expenses

The North Brunswick Fire Department is a volunteer organization that relies heavily on funds raised through special events and funds donated by the community. The Department does not rely on a fire tax, which some communities utilize to support their local departments.





Each fire company also receives a stipend of \$60,000 per company from the Township. This source of Township funds is limited by state statute, which limits the maximum monetary contribution. The statute does not limit the Township's ability to provide other means of support. Township Council may provide additional support upon authorization for such items as equipment purchases, utilities, and insurance payments. For instance, recently the Township has supported the Fire Companies through the purchase (3) three new emergency generators, one hundred (100) units of self-contained breathing apparatus (SCBA) totaling \$100,000, and an additional \$500,000 for a new radio system in 2001. The Township also pays for utilities, phone, cable, electric, vehicular insurance, and some liability insurance.

Other sources of funds and donations are accomplished through a variety of means such as cellular tower host fees (Company #1 and #2 only) and an Industrial Fund Drive, which targets larger companies. Fire Company #2 also rents their assembly hall to offset operational costs. The Industrial Fund drive has severely waned in the past few years with the closing of Johnson & Johnson and downsizing of other industrial sites throughout the Township. Currently, the Township's fire companies generate approximately \$60,000/year through this drive. In the past, the support of J&J and Bristol-Myers Squibb used to surpass this amount.

It is widely understood by the Fire Department and the Township that these vital services

cannot be supported solely by contributions through volunteer fundraising efforts. As such, the Township has determined that all options should remain open for discussion regarding future operational expenses. All agree that a stable source of funding would assist with recruitment of volunteers, and more importantly, will stabilize the ability to deliver quality services far into the future. Securing a stable source of income is an issue not unique to North Brunswick. Some towns have gone to such measures as creating fire districts where funding comes through taxation. However, representatives of the three fire companies have stated that they prefer to remain a volunteer organization.

The Township should, as always, continue to work with the Department on funding issues, and should also investigate the feasibility of requiring payments or contributions as a condition of approval for all major development applications that would require additional services, facilities or equipment.

Operations

Each company operates as an independent station, each with its own chief and volunteer membership. From 6:00 a.m. to 6:00 p.m., all three (3) companies respond as General Alarms are sounded during this time frame. After 6:00 p.m., each company responds within its jurisdiction for calls such as extradition from vehicles, brush fires and other calls that do not involve a structural fire. It should be noted that each company coordinates with EMS for use of the Technical Rescue Vehicle



should it be needed. All general calls (those involving structural fires or potential thereof) are responded to by all three (3) companies at all times. Because of the nature of fire fighting and other services provided by the companies, each chief has the ability to sound a General Alarm if they see the need to, particularly when they recognize appropriate manpower may be unavailable to ensure a timely response.

The type of call, time of day, and weather conditions largely affect who responds to an emergency call. Given this reality, the Chief's role in being able to sound different alarm levels becomes even more important. Weather conditions, the fact that responder numbers drop from 6pm-8am, and the urgency of the call (whether an activated alarm or actual fire) determine the decision that all three Chiefs may have to make.

There is an expectation that a minimum of 25% of all calls is attended to by each volunteer. When looking at this demand on the volunteers, it elevates the need for additional membership to alleviate the demand placed on these first responders. The current roster of volunteers, department-wide, should be commended for their dedication to the critical service they provide North Brunswick residents.

All three (3) companies have Mutual Aid Agreements with other municipalities should additional assistance be required.

While these Mutual Aid Agreements allow for teams from other municipalities to assist

when needed, population increases and the associated increase in calls throughout the region affect all first responders' ability to assist North Brunswick.

Personnel

The North Brunswick Fire Department is a 100% volunteer service. The average available personnel at any given call during the day is estimated at 10-15 volunteers. At night, depending on the type of call received, an average of 4 can be routinely relied upon to respond. Many of the current volunteer members are aging and the need for young volunteers is evident.

Gaining additional volunteers is a difficult task. Some Department volunteers have indicated that some of the reasons limiting recruitment of young volunteers is the pursuit of higher education goals and lack of other incentives outside of pride in community service. A discussion with the Chiefs suggested that research was needed into exploring innovative recruiting techniques such as tax breaks or other incentives.

In response to this volunteer need, the Township Administration has made the plea to North Brunswick residents through Mayor Womack declaring 2006, "The Year of the Volunteer." As the population in North Brunswick continues to rise, particularly with the potential of redevelopment of four former major industrial sites, the need for additional volunteers will become increasingly important.



Calls & Response

Currently, the Fire Department experiences on average of 1-2 emergency calls per day. There were 705 calls made in 2005. Of these calls, officials identified that 200 were carbon monoxide detector related, and only 10% of these calls were real emergencies. These false calls are usually attributed to dying batteries. Response to calls takes time, energy and resources in both personnel and equipment. The Township should continue to work with the Department in disseminating information to the public on issues such as battery replacement in order to reduce the need for unnecessarily dispatching the fire companies.

Response time is an extremely important consideration for all first responders. As such, the Township has created alternative means for getting response teams to calls by creating “back door” connections to properties and areas within the Township. These connections are roads and entranceways that are gated with electronically controlled gates. Opening and closing the gates is controlled by response vehicles being equipped with the proper equipment. The gates are located at:

- Wood Avenue
- Ridgewood Avenue (Rear of Walmart)
- Chrome Street
- Middlesex County Morgue

Two more gates are being considered at the Cascades Development on Wood Avenue and Community Park at 8th Street. The issue of access and gated streets is important because it can reduce response time tremendously. The

identification of other roads and properties where these connections could occur should continue to be pursued.

The issue of control of these gates has also been discussed. As detailed previously, control remains within a properly equipped vehicle. For better emergency management, control of these gates should also be maintained at Police Headquarters as well. Wood Avenue is currently the only gate that can be controlled from Headquarters. This function would provide the Township an additional layer of access if evacuation were needed.

Other measures of improving response time are through techniques such as preemption, additional east-west road connections, and constructing the connecting dead-end streets. All of these measures involve the Township’s roadway network in one way or another.

- Preemption is a coordination of traffic signals along Routes 1 and 130 where a call to dispatch is made and the traffic signals are coordinated to allow unimpeded flow to the scene of a call.
- East-west connections are explored in the Traffic Element and are important to the movement of apparatus across the Township.
- Constructing the missing pieces of roadway such as Thomas Avenue could also provide effective movement of equipment.



These techniques should continue to be analyzed for their appropriateness and effectiveness. As additional development comes to North Brunswick and roads become more congested, these measures can greatly assist first responders in getting to the scene of the call quickly.

~Emergency Medical Services

Facilities

The North Brunswick First Aid and Rescue Squad (EMS) unit is located at 880 Ridgewood Road. The current facility was originally constructed in 1955, with another building constructed in 1994. There are (7) seven bays with room for (7) seven vehicles. It seems to be in a good state of repair.

A new 911 Emergency Medical Services substation is being constructed at Renaissance. This Ancillary EMS Facility will contain (2) two-bays and provide a dual function of fire and EMS services. As with Fire Company #2, the First Aid Squad is equipping the facility with their current equipment. The substation will contain a bunkroom, containing 8-beds, which the (2) two primary crews in service may use to rest. The facility is also in a convenient location for Secondary EMS Crew access in case of inclement weather and other emergencies. When occupied, this facility will undoubtedly improve response time given population increases in the southwest portion of the Township and the current EMS facility's location at Ridgewood Avenue.

Equipment

Currently, the EMS Department has (3) three ambulances and (1) one Technical Rescue Vehicle. The Fire Department provides backup in case of rescue. Ambulatory services do not support Advanced Life Support (ALS), which includes intravenous medication and other advanced rescue measures. These ALS needs are met through Robert Wood Johnson Hospital in New Brunswick and a satellite station in South Brunswick. The Technical Rescue Vehicle mentioned above is equipped with the "Jaws of Life", building collapse and trench rescue apparatus.

Equipment needs include remote control of the emergency access points and replacement of aging equipment that has outlived its useful life. One such vehicle, the 1995 Suburban, has been utilized for nearly every call in the Township. The vehicle is scheduled to be replaced this year. The feasibility and need for an additional ambulance is also being explored.

Operational Expenses

The North Brunswick First Aid and Rescue Squad is also a volunteer organization. EMS relies on donations and a \$70,000 maximum donation through the Township. This donation is set at a maximum figure by state statute. As with fire services, the Township is also able to make other contributions to the EMS squad's equipment and needs outside of monetary allocations. Currently, the Township supports the EMS squad through its provision of utility and electric services, ancillary equipment purchases and other insurance-based endeavors.



Currently, the majority of emergency services funding comes through donations. Donations have been decreasing over the years, and as such, the EMS unit has been discussing whether or not it is practical to implement a billing system based on usage. In essence, they are investigating all options to help offset operational expenses. There is much discussion about how the EMS will operate in the future, but no consensus on the solution. One idea that has been offered has been the idea of directly billing the insurance companies of those who require medical attention. This idea changes the EMS by making it more of a professional operation rather than the traditional volunteer service. Notwithstanding these discussions, there is a concern that the squad may not be able to continue to support the needs of the community through being solely a volunteer service.

Operations

Because of the added pressures of population on this vital service, EMS has contracted by Memorandum of Understanding (MOU) with Rural Metro Ambulance Corporation (RMAC), a private company, from 6am- 6pm. After this period of activity, the Township's Volunteer force is again utilized (6pm – 6am). Only the ambulance service provided by RMAC is billed directly to insurance companies. Otherwise, all volunteer service is subsidized through donations and Township budget. Recently, the Township has been informed that RMAC will be leaving New Jersey. As such, the Township is in negotiations with Robert Wood Johnson to replace RMAC in order to ensure this valuable service remains unaffected.

The Township does have Mutual Aid Agreements in place that allow for teams from other municipalities to assist when needed. However, population increases affects those municipalities and their ability to assist North Brunswick because of increasing calls in surrounding communities. Therefore additional development in North Brunswick and the communities of Franklin, South Brunswick, Milltown, and East Brunswick may affect current service levels.

A point worth note in this section is that 37 percent of all calls EMS experiences occur while responding to another call. More discussion will take place in the Calls section.

Personnel

The North Brunswick First Aid and Rescue Squad operates through volunteer service. As with the Fire Department, Mayor Womack's plea to North Brunswick residents declaring 2006 "The Year of the Volunteer" will hopefully help. As the population in North Brunswick continues to rise, particularly with the potential redevelopment of (4) four former major industrial sites, the need for additional volunteers will become increasingly important.

Calls & Response

Population is also reflected in the amount of calls that require attention. Currently, the Township experiences 8-10 emergency response calls per day. There were 3,100 calls made in 2005. Officials feel that as the population increases, so too will the amount of calls. Fifty-five percent (55%) of all calls occur



during 6am to 6pm. During this time, thirty-seven (37%) of all these calls come during the response to the first calls.

Other issues affecting the amount of calls involve different land uses and demographic changes that result in more calls than normal. Land use issues involve group homes and medical facilities. Group homes and medical facilities draw additional calls, as these facilities tend to not have their own transport systems in place. The County workhouse also draws approximately 100 calls per year in spite of their own medical aid being located on-site.

Demographic issues demanding additional attention from EMS involve everything from age distribution to ethnic differences. Obviously, as the overall community age increases, so too will the need for additional EMS services.

Another issue affecting call volume is a basic misunderstanding, on the part of some residents, regarding when it is or is not appropriate to call for an ambulance. Some residents call for ambulatory services for basic sick calls when doctor visits may be more appropriate level of service is also affected because of translation needs. The Township should continue to work with EMS in disseminating information through such measures as posting information on the Township website, notes in tax bills and other low-cost measures that may assist in reducing the need for unnecessary calls.

The Township has recently passed an ordinance that prohibits the misuse of EMS service calls.

The issue of backdoor gate facilities and preemption is discussed in the Fire Department's Calls & Response section.

~Department of Public Works

The Township Department of Public Works (DPW) is located on Quarry Lane. The Department is divided into six divisions: Streets and roads, solid waste, recycling, buildings and grounds, vehicle maintenance and stormwater. DPW is responsible for a variety of tasks including:

- Maintenance of Township-owned buildings and grounds
- Maintenance of Township streets
- Maintenance of storm sewers
- Stormwater systems
- Participating in special events such as community and neighborhood cleanups and other activities
- Responding to emergencies such as storm events

The department also coordinates the collection of garbage and recyclables. Recycling collection is contracted to a private hauler and is done bi-weekly.

As the Township undergoes continued redevelopment, improvements to the transportation network are likely. Mass transit will also be a major component of the revitalization and rejuvenation of North Brunswick. Due to its job description, the



Department will be in a critical position to assist the Township to realize its goals. It seems that currently the Public Works facility is well suited for space, with the ability to expand minimally to the north of the current facility. The Township may also be considering a review of the *Van Deursin* property for possible use of the land for DPW use.

The DPW has identified the need for additional space to store salt and sand supplies west of the Northeast Corridor rail line. Possible Locations for such supply space are the Hidden Lake area and possibly the rear of Fire Company #3.

~Library

The North Brunswick Public Library is located on Hermann Road near Town Hall. A Director and Board of Trustees manage the library. The library is open (7) seven days a week and offers a valuable resource to North Brunswick residents.

The North Brunswick Public Library also has The Friends of the North Brunswick Public Library, a nonprofit group, support it in various ways, including:

- Promoting public awareness and support of the library.
- Advocating for library funding and pro-library legislation.
- Donating materials and equipment (these have included two computers, a printer and a workstation for the children's section.)
- Providing funds for the rental book collection and the rotating video circuit.

- Sponsoring special programs such as the annual "Artist-in-Residence."
- Providing scholarships for two North Brunswick Township High School students annually for outstanding service to the North Brunswick Township High School Library.
- Contributing to a holiday book distribution project of Middlesex County public libraries.
- Encouraging gifts from the community.

In 2003 the Township partnered with the North Brunswick Public Library Board of Trustees to evaluate the library space and come up with recommendations for improving and renovating the existing library, as well as evaluating alternative sites where an entirely new library could be constructed.

The architects Arcari & Iovino, P.C., in association with the firm Library Development Solutions, developed a report dated December 12, 2003. The document produced by this group summarized the need for additional library space and the current site's ability to handle such an increase. The study determined that 34,265 square feet was needed at a minimum. Costs for such a facility were projected at \$11,126,891. This included land costs that exceed realistic costs because they were based on Realty data sheets rather than the market. A more realistic figure details \$9,676,891 as a more realistic cost. It should also be noted that the land recommended for the library was adjacent to North Brunswick Community Park along Route 130. Costs for renovating and



adding to the existing facility were projected at \$6,927,433. It was determined that other sites needed to be pursued.

The study evaluated nine potential new locations for a library. They are summarized as follows:

- Site #1: Milltown Road Shopping Mall
- Site #2; Herman Road across from Town Hall
- Site #3: 1368 How Lane
- Site #4; Jersey Avenue
- Site #5; Third & Oliver Ave (Township owned)
- Site #6; High School Site
- Site #7; Route 130 adjacent to Community Park
- Site #8; Renaissance
- Site #9; Regal Cinema

As discussed in the 2003 report, Site #7 was the recommended site for a new library facility. This plan recommends that, Site #2 should also be pursued given its proximity to Town hall, senior housing and access to Routes 1 and 130. The property is an excellent location for such a facility given the surrounding neighborhoods. Locating a library on site #2 would require a land swap with the Board of Education since some of the BOE's property would be required. Another site not contemplated in the 2003 report, but worth consideration, is the J&J site. While not available at the time of the 2003 report, the site may be feasible as a new library location, particularly if the site is redeveloped as a Town Center.

Should a new library be constructed in the future, the existing library site may prove useful as another public use, such as a new senior center or community center.

~Senior Citizen Center & Programming

The Senior Citizen Center is located at 15 Linwood Place. There is currently no room to expand at this site. The building is owned and maintained by the Township under the direction of the Department of Parks, Recreation & Community Services. The center provides activities and information to the residents of North Brunswick who are 60+ years of age. No dues or membership is required to participate in the programming. The facility is open Monday thru Friday 8:30am - 4:00pm. Transportation is also provided to the center from 8:00am – 4:00pm. The transportation office is located within the center.

The programs offered at the Senior Center are extensive. The challenge for the Director and staff is ensuring the continual review of the programming from participant input in order to provide well-attended activities. Some of the activities offered to North Brunswick Senior Citizens include:

- Olympic Day
- Bridge, Bingo, Chess
- Meals on Wheels (for those with limited mobility)
- Special Events such as a Trip to the NJ Performing Arts Center, and the Winter and Spring Dances



- Exercise Classes, including Senior Walk
- Crocheting

A program worth highlighting is the Senior Swim program. The Department of Parks, Recreation and Community Services has partnered with the School System to provide swimming classes at the North Brunswick High School Pool. This program is offered (3) three days a week to North Brunswick Seniors. This program is a full-aquatics program and serves over 1,000 North Brunswick residents.

According to the public input received for this Master Plan, there is a need for an expanded or new Senior Citizen Center. Given the small size of the land at the current location of the center at Linwood Place, a new facility should be a future consideration. The Department currently makes maximum utility of the center. However, in the event that additional programming and/or staff are added, a new center may need to be constructed, especially as the senior population increases due to age-restricted developments.





The Township could consider the inclusion of a new senior citizen facility within new development, particularly if such development is dedicated to age-restricted living. Any such facility should be a public endeavor whereby the Township partners with any developer that is willing to locate such a facility on site.

Other sites that may be suitable include the current library site, should the library move to a different location within the Township and the J&J site.

As the Township plans for a new senior citizen facility, the current site may be suitable for other public uses such as a community center.

~Community Center

The Township does make good use of its arrangements with the Board of Education, especially providing use of the pool and gymnasium. However, scheduling has proven difficult at times because the schools have programming needs as well. Township officials have made it clear that a separate community center facility would be an excellent addition to the Township.

Notwithstanding current programming, should the Township seek to expand on its current offerings, especially basketball and swimming, the construction of a community center would be the ideal choice in the future. Should J&J be developed as a new town center, the site may prove to be a suitable location for a community center.

~School Facilities

Current Facilities and Enrollment

The Township of North Brunswick Public School District contains (6) six public schools, with a student population of approximately 5,405 students. The Township of North Brunswick School District consists of the North Brunswick High School (grades 9-12), Linwood Middle School (grades 6-8), the Parson's Elementary School, Livingston Park Elementary School, John Adams Elementary School, and the Arthur Judd Elementary School (elementary schools grades K-5). The schools vary in age, size, architecture and student population. Also part of the North Brunswick Public School District is a half-day childcare program for students who are currently enrolled in the system. North Brunswick Township Board of Education (BOE) offers an Adult Community Education Program with sessions in the spring and fall. The district also provides a Summer Enrichment Program for students Pre-K age 4 thru Grade 6.



Table 1 Enrollment by School - 2004		Total Students
Parson's Elementary School, (elementary school grades K-5)		611
Livingston Park Elementary School, (elementary school grades K-5)		532
John Adams Elementary School, (elementary school grades K-5)		544
Arthur Judd Elementary School (elementary school grades K-5)		639
Linwood Middle School (grades 6-8)		1,319
North Brunswick High School (grades 9-12)		1,651

North Brunswick Public School Enrollment		
School Year		Total
2004-2005	actual	5405.0
2003-2004	actual	5398.5
2002-2003	actual	5274.0
2001-2002	actual	5181.5
2000-2001	actual	5060.5
Source: NJ Department of Education		

As is apparent from the following table, enrollment at North Brunswick Public Schools has been increasing over the last several years, as families have chosen to locate in North Brunswick to place their children within this Blue Ribbon District. With a capital improvement program on-going, the improvements may have difficulty keeping up with population demands in the future

One issue in being able to keep up with demand on the system is that the Board of Education is limited in how far they may look into the future to address capital facility needs. The State Department of Education requires that each municipality must have a (5) Five-year capital facilities plan. This plan is limited to (5) five years because projecting growth can be a daunting task. Given the high costs of school facilities, the reason for such a short growth projection timeline is because the Department of Education has determined that this was the most appropriate means to ensure taxpayer dollars are not wasted on projects not needed.

Notwithstanding the schools' inability to look into the future further than (5) five years, the Township may, through this Community Facilities Element, present options for future consideration and proactive planning. Ultimately, any decision to add to a school(s), construct new or re-program, belongs to the Board of Education. This Element merely attempts to characterize the system in way





that Township Officials are aware of potential issues moving forward into North Brunswick's future.

Currently the North Brunswick district is involved in a \$29 million renovation of the North Brunswick Township High School. The building project includes additional classrooms, state of the art technology, a broadcast media center, a new auditorium, new cafeteria and physical education facilities. This project involves only the physical plant of the school and not the recreational lands that surround. Once complete, the additions and renovations will reach a "functional capacity" of 1,850 students where current enrollment is now 1,651. "Functional capacity" means the number of students that can be housed in a building in order to have sufficient space for it to be educationally adequate for the delivery of programs and services necessary for student achievement of the Core Curriculum Content Standards. Functional capacity is determined by dividing the existing gross square footage of a school building by the minimum area allowance per full time equivalent (FTE) student for the grade level students contained therein. The project is scheduled to be completed by September of 2006 and is slated to be of use at least until 2009.

The Board of Education has also completed an evaluation of elementary and middle school facilities. A proposed \$32,433,000 renovation/additions project is underway now that a referendum passed in January 2006. This project is designed to ensure a high quality,

blue ribbon education for all the children of North Brunswick and is expected to meet the needs of the school system for at least the next five years. There are several goals of this expansion effort:

- To adequately house the anticipated number of students through 2009.
- Ensure the kindergarten program can go to a full-day schedule
- Ensure adequate space can be provided to bring the special-education students back to the system. This goal was created to educate children in their home district while ensuring the efficient delivery of education and associated transportation costs.

In essence, this expansion effort for the elementary and middle-school will push these schools to their functional capacity given the North Brunswick system's current program. Functional capacity for the elementary schools will reach 650 students each upon the completion of the project. To see how this future capacity compares to the schools; current enrollment, refer to Table 1.

Enrollment Projections

Based on increases in population from past US Census and forecasts provided by the North Jersey Transportation Planning Authority, North Brunswick will likely experience another 3,690 citizens by 2010 and an additional 2,320 (6,010) by 2020 (Source: North Jersey Transportation Planning Authority- see Community Profile for additional discussion on these forecasts). This represents a 10%



increase by 2010 and an additional 5.8% for the proceeding years to 2020. This plan also took into consideration new housing units yet to be constructed in Renaissance as well as what could be expected in future redevelopment projects to understand whether the NJTPA numbers were reasonable or not.

While the schools have a slightly different way of analyzing their projections, they have factored what seems to be a growth rate of approximately 2.2% to their student population. It is reasonable to assume that with new development coming to North Brunswick that the NJTPA projections may come to fruition and the school system could experience more students than expected. In reality, population increases will likely fall somewhere between the school's projections and NJTPA forecasts.

School officials agree that while forecasting is not an exact science, another interesting point is that many communities that have aging populations, as North Brunswick has, experience single-family home turnover. In other words, "empty-nesters" are eventually replaced by families seeking larger homes. This could also lead to increases in school-aged children. In North Brunswick's 2000 Census profile, 50% of single-family homes contained no children.

Future Facility Needs

Functional capacity is the key to ensuring the Township has adequate school facilities to meet educational requirements. However, functional capacity, according to educational

planners, will vary depending on how the building is utilized in its programming. The Board of Education retains the ability to adjust programming, re-align grades and to take other measures deemed appropriate to ensure each facility can give what it must to accommodate the efficient delivery of education within budgetary constraints.

The architect for North Brunswick's school facility planning has indicated that the system is at terminal capacity, notwithstanding space that could be accommodated with program adjustments. This is because future expansions will prove difficult given the "core area" (lunch room, library, etc) as well as travel time between classes, particularly at the high school.

While understanding the Board of Education's inability to look beyond (5) five years, and because the Township realizes that future space needs are evident, the BOE has agreed that there is no downside to keeping its options open. As such, the Township has been proactive in addressing the needs of the schools through its approval of new major development projects. Having up-to-date knowledge of school needs remains critical to major development planning efforts and approvals.

An example of the Township's proactive approach lies in the Renaissance PUD agreement where it was identified that 10 acres of land for an additional school should be set-aside for the future. Future planning efforts, particularly at the Johnson & Johnson site, could also consider such an arrangement. Two



(2) sites the Township could consider for future school use include:

The Renaissance Site

According to the Board of Education, there are factors that are of extreme concern for the Board when considering the 10-acre Renaissance site as a suitable school location. Limiting factors at the Renaissance site are the PSE&G gas line and its proximity to the Northeast Corridor. Opportunity does exist to work with the property owner to negotiate an exchange of land, exchanging a site that was identified within the Renaissance site as commercial for the 10 acre school site. This site may prove more valuable to the owner as the land is near the Northeast Corridor and a potential rail station. In essence, the 10 acre school tract could become transit-related commercial or mixed-use. The property the Board of Education would gain access to would be closer to Route 130.

Hidden Lake

Although the Hidden Lake Area of the Township does not currently draw a large number of students, it is a site that deserves consideration as a site for future school use. Hidden Lake is an area constrained by wetlands in some locations. However, the large number of Township-owned parcels and upland areas make it a feasible consideration. A wetland delineation should be performed on the area to give the Township and schools an accurate assessment of the site's actual suitability.

Even so, given the wetland situation, the school could be developed as a LEED Certified Facility (Green-Build) thereby utilizing the wetland areas for educational purposes, such as the Willow School in Hunterdon County has done.

Community-based Schools

Finally, with the Township's aggressive pursuit of land for school sites within major development sites, the Township should consider designing any new school as a community-based school. Being a fully developed community, it is difficult to develop a school that is not a community-based school by nature. Community-based schools are those that are designed in a way that allows convenient access by foot and whose facilities are shared by the community at-large.

Convenient access is an aspect of community-school design that maximizes the student population's ability to walk to school. This access also allows for reduced costs in bussing. Obviously, less bus use also produces fewer emissions. Sharing school facilities with the community is another aspect of a community-based school. Sharing the facility works two-fold. First, the school can be designed to allow use of the building itself. Second, school grounds can offer public use of recreational facilities.

Although it would be complex to arrange staffing, administration, and costs, sharing a school building may allow activities such as use of the auditorium as a community theatre,



use of the library as a satellite public facility during off hours, or shop classes that allow partnerships with the business community. The second aspect of a community-based school, school grounds, has tremendous benefit because of the typical land-bank associated with schools. The grounds surrounding schools could be shared with the Township's recreation programming.

Another complexity in a shared school facility is liability insurance. Although not a fatal flaw of deterrence, the Township and Board of Education would need to create a joint insurance fund that covers both entities.

~Community Services

Within the Township of North Brunswick are social service programs run by the Department of Parks, Recreation and Community Services. Within the Department are the following Committees; Board of Health- including Animal Control, Cultural Arts, Environmental Commission, Heritage Days Committee, Media Advisory, Municipal Alliance, Open Space, Recreation Advisory, September 11th Committee.

The Department of Parks, Recreation and Community Services offers a variety of additional programs in addition to the Senior Citizen programming detailed earlier. The Township is efficient in delivering both the programming itself, and equally as important, information to residents detailing what is offered by the Township. To meet this marketing need, the Township provides a very detailed and well-

constructed Activities Schedule Brochure. The brochure/ booklet is delivered (2) two times a year: once in the Spring & Summer and once again in the Fall & Winter. This booklet outlines everything that the Department delivers - senior programs, youth activities, sporting calendars, and so on. It is a great community resource.

Transportation Program

The Township also offers an extremely comprehensive Transportation Services program. This service is provided to Senior Citizens and to citizens with Special Challenges. The Transportation office is located within the Senior Center on Linwood Avenue. Currently the service operates Monday through Friday 8:00am – 4:00pm and provides transportation for medical needs, grocery shopping, swimming, special events, and trips. The center currently has (7) seven full-time employees including; (1) one supervisor, (2) two clerical with (1) one part-time driver.

The Transportation Center is experiencing similar issues to that of the Senior Center itself. Space at the center is an issue, especially in an already constrained parking area. Busses and vehicles need to be parked, staff needs to park and seniors need to park. It is not practical to park the vehicles on the street in the surrounding neighborhood. The transportation center's needs inhibit full utilization of the parking lot by the center's users.

Currently there are (8) eight vehicles that need to be parked, and in addition, those vehicles need to be warmed up before use. With the



neighborhood so close, diesel fuel emissions become a nuisance for residents. If practical, the Township should consider relocating the center to a more suitable location. Such a location should be close to the Township's maintenance facility for fueling, maintenance, and storage issues. The current setup at the Senior Center seems to be unable to keep up with the demand given current site configuration.

Some of the other programs offered by the Township are:

- **Project LEAL-** Project LEAL is a before and after school recreational childcare program. For 22 years the program has provided hundreds of North Brunswick children with a safe, supervised extension of the school day. Children who attend North Brunswick Township schools, grades K-6 are eligible to participate in the program, which is offered at the Elementary School facilities after regular hours.
- **Community Childcare (CCC)-** As discussed in the Schools section, the Board of Education administers this half-day program for kindergarten students who require full day care. CCC is based at John Adams Elementary School on Redmond Street. The Township's Parks Department provides transportation for students who are also enrolled in the program.
- **Aquatics Program-** The Township provides a fabulous swim program that is offered by a diverse age group.

Programs are offered for children and adults alike. Ages span from 6 months to senior citizens. It is offered at the North Brunswick High School Pool.

- **Summer Camp-** An excellent program that takes children in 6th – 8th grade enrolled in the program to all sorts of fun and interesting places.
- **Youth Council-** The council is an empowered group of 25 students from 7th – 12th grade that are chosen to participate in a variety of programs. Programs include an interface with the Senior Citizens, participation in community plantings, Winter fest, etc.

~Post Office

The current Post Office facility in North Brunswick is located on Livingston Avenue. The facility has very limited parking on site. The site is completely inadequate to serve the needs of North Brunswick postal customers. While not under the control of the Township, the Township should continue to ask for the support of State and Federal legislators to relocate the facility to a site more appropriate. Again, J&J may be a suitable site for the relocation of a new postal facility.



RECOMMENDATIONS

~Police Department

- Continually assess the number of officers necessary to have a well-staffed police force that is able to proactively police the Township given projected population increases.
- Investigate the need and feasibility of locating police substation(s) within major redevelopment projects, or potential to utilize the Renaissance substation, for prospective future needs.

~Fire Department/Emergency Medical Services

- Continue to proactively seek willing volunteers to provide a strong surplus of available personnel to meet the increasing needs of a changing and increasing population.
- Pursue discussion of a stable source of funding for Fire and EMS services so that equipment and facilities necessary to provide services can continue to meet the Township's demands.
- Continue to develop the substation at Renaissance for emergency backup and future need.
- Continue the pursuit of east-west connectors, and paper street connections such as Thompson Avenue, to improve the circulation patterns within the Township, therefore improving response time.

- Continue review of additional “back-door” roadway connections with electronically controlled gates. Work to create a remote system that can be controlled from Headquarters should the need arise.
- Investigate the ability to charge a special levy against certain industries or major development sites that require additional services.
- Investigate the ability to mandate that facilities that require EMS additional services provide their own means of transport.

~Library

- Continue to work to create a new library that can keep up with the demands of North Brunswick residents.
- Continue to pursue potential library locations and continue discussions with the Board of Education regarding the feasibility of a potential land swap to locate the facility along Hermann Road.

~Senior Citizen Center

- Identify a location for a new senior center to replace or supplement the current center on Linwood Avenue. Major redevelopment sites should be reviewed for consideration.
- Continuously work with senior groups on improved programming.
- Work in concert with the library facility planning effort to determine the feasibility of utilizing existing



structures. (e.g. determining whether the current library site could serve as a senior citizen center.

~Community Center

- Determine the need and feasibility of constructing a community center for all North Brunswick residents.
- Work in concert with senior center and library planning efforts to determine the feasibility of utilizing the existing senior center as a community center should a new senior center site be found.

~Schools/Board of Education

- Continue to work with the Township by making school facilities available for community recreation and other community related activities and programs.
- Continue to discuss the feasibility of locating a school at Renaissance given the major redevelopment initiative at Johnson & Johnson. Consideration of gas line easements and proximity to the Northeast Corridor should be included.
- Continue assembling out parcels within the Hidden Lake area for a potential future school location.
- Review the feasibility of a “Green School” within the Hidden Lakes region, given the area’s environmental characteristics, should a new school be needed.

- Seeing as the schools cannot look beyond a (5) five year period, continue to be proactive in the pursuit of new school sites within the longer range planning efforts of the Township.

~Social Services/Programming

- The Township should establish a full listing of all services offered by both Township and non-profit groups on the NorthBrunswickOnline website to supplement their brochure efforts.
- Continuously ensure that programs are reviewed for inclusion of additional programs given the needs of a changing and increasing population.
- Continue to provide superior recreation, activity space and programs for all North Brunswick citizens.
- Proactively address the changing population demographics to ensure the diversity of North Brunswick and its programming remains secure.
- Ensure staffing levels are such that the Township is able to continue providing the wonderful diversity of programs currently offered.
- Consider the demand placed on Transportation Services and determine the feasibility of relocating the associated facility to a more appropriate site.



IMPLEMENTATION

~Short Term

- Continue looking for inclusion of all public facilities within new major developments.
- Continue developing the EMS and Fire Company #2 substation.
- Continue discussion with the Board of Education and a land survey for the new library.
- Investigate the ability to charge fees, require on-site operation, etc., for fire and EMS services.
- Work with elected officials to pursue discussion ability of creating a community center perhaps in concert with a new senior center.
- Continue to pursue an adequate post office facility.

~Long Term

- Continue analyzing programs that North Brunswick residents seek.
- Continue to work with the Board of Education to understand facility needs.
- Continue improving the street network to ensure access and quick response times for EMS, Fire, and Police activity.
- Determine feasibility of creating a community center perhaps in concert with a new senior center.

Recreation and Open Space Element

INTRODUCTION

The Township of North Brunswick recognizes the central-role played by parks and recreation facilities in maintaining the Township's quality of life and its reputation as a desirable place to live and work. Great parks are an essential part of family-oriented communities like North Brunswick, providing residents with open space and needed recreational space. When parks and recreation facilities are well designed, they also have the potential to function as public commons, increasing the sense of community throughout the Township. To that end, North Brunswick is actively engaged in the continued development and maintenance of its many fine parks and open spaces, leading to increases in the number of parks, the purchase of additional open space, and the passage of an open space property tax assessment.

The ultimate goal of the Township is to develop a comprehensive parks and recreation system consisting of large, highly accessible facilities that serve the entire community and small, community-oriented facilities that serve individual neighborhoods. Therefore, this section lays out a future plan for parks in North Brunswick by detailing existing park and open space facilities in North Brunswick, analyzing current and future park needs, and making recommendations for future action based on open space and recreational standards, population projections, and public input.

ISSUES IDENTIFIED

The following issues, concerns, and suggestions specific to parks, recreation, and open space were identified during the public outreach process.

- Analyze the remaining vacant tracts of land and make recommendations for sites to be added to the Township's open space inventory and/or for other public use;
- Evaluate whether the Township needs to acquire additional recreational space for inclusion into the open space and recreation inventory;
- Analyze the location of existing parks, public buildings, and population centers to determine the need for additional pedestrian and bikeway connections;
- Evaluate the most appropriate standard for assessing the Township's need for additional active and passive recreational /open space;
- Ensure the effective utilization of all the Township's recreational facilities;
- Farrington Lake is a tremendous asset to be utilized to its maximum potential;





PAST PLANNING EFFORTS – A SUMMARY

The Township's open space and recreational planning efforts date back to 1989, when it commissioned Candeub, Fleissig and Associates (CFA) to write a plan. This plan acted as a baseline of information that comprehensively depicted and made recommendations for improvements to the Open Space and Recreation network. This document served as the launching point for an update that occurred in 2000 with Maser Consulting. The CFA plan was appended to the 2000 Open Space and Recreation Plan. The Township then took this effort and began a proactive campaign to provide for the needs of North Brunswick, largely through the efforts of the Township Council, Open Space Committee and Department of Parks, Recreation and Community Services.

The Township aggressively kicked-off its open space campaign in 1999, when a non-binding referendum was passed that supported the inception of an Open Space tax. The Township has since utilized this money to purchase property and make various other parks improvements outlined in this plan.

1989 OPEN SPACE AND RECREATION MASTER PLAN

The 1989 Open Space and Recreation Master Plan had two main “thrusts” – the acquisition of additional land for large, centralized active recreation facilities, and the development of existing municipal lands for both active and

passive recreation uses. Accordingly, the plan established a set of goals and objectives, summarized below:

Goals

- Provide open space in the proper amount and location to meet the existing and future needs of North Brunswick residents.
- Maximize the efficiency and utility of existing and future parks and open space areas through the design and provision of active and passive recreation facilities.
- Establish the open space linkages necessary to create a unified system of open space and facilitate bicycle and pedestrian access.

Objectives

- To provide 8-acres of recreational open space for every 1,000 persons to meet the needs of the community. Although the acquisition and development of this open space will occur on a continuing basis, two phases are anticipated based on population growth levels. Phase I is based upon a Township population of 36,800, and is an expected midpoint between current population numbers and the population in North Brunswick when full development is reached. Phase II anticipates full development, and is based upon a population of 43,500. Phase I and II should provide



- 294 acres and 348 acres of developed open space respectively, based upon the above population estimates.
- To develop two additional large, centralized active recreation-oriented parks for community use. These facilities should be comparable in size and nature to Veterans Park, Sabella Park, and Babbage Park and should be located in the western third of the community so as to provide a uniform distribution of these types of facilities throughout the Township.
 - To provide the following additional active recreation facilities for Phase I:
 - o 1 adult baseball field
 - o 4 adult softball fields
 - o 7 youth baseball/softball fields
 - o 10 football/soccer fields
 - o 6 full-size basketball courts
 - o 3 tennis courts
 - o 1 volleyball court
 - To provide for additional active recreation facilities for Phase II:
 - o 1 adult baseball field
 - o 1 adult softball field
 - o 3 youth baseball/softball fields
 - o 3 football/soccer fields
 - o 3 full-size basketball courts
 - o 3 tennis courts
 - o 1 volleyball court
 - To provide for additional passive recreation use of major wetland areas, stream corridors, significant wooded areas, and water bodies. These areas should include:
 - o Hidden Lake
 - o Luke Park
 - o Farrington Lake Open Space and Conservation Areas
 - o Oakey's Brook
 - o Six Mile Run as part of Hidden
 - o Lawrence Brook
 - o Stream corridor from the Renaissance development along the east side of the Middlesex County detention facility to Lawrence Brook.
 - To develop a linear system of parks and bikeways/pedestrian walks to improve circulation and facilitate linear-oriented activities such as hiking, jogging, etc. At a minimum, the following areas should all be linked with one another through this system:
 - o Veterans Park/North Brunswick Township High School Complex
 - o Sabella Park
 - o Babbage Park
 - o Municipal Building complex
 - o Hidden Lake and Farrington Lake Open Space and Conservation Areas
 - o Any additional major recreation areas which are developed in the interim
 - To provide convenient crossings for bicycle and pedestrian traffic of the major transportation routes which divide the Township. A minimum of three bicycle/pedestrian crossings of Routes 1 and 130, and the Amtrak line should be provided. One crossing of



each of the above transportation routes should be located in the western, central and eastern portions of the Township.

2000 MUNICIPAL OPEN SPACE AND RECREATION PLAN

The 2000 Municipal Open Space and Recreation Plan sets forth several general findings, including: that the Township relies heavily on Board of Education athletic facilities in order to meet recreation demands, that the Township's sports programs still have scheduling problems, and that proper maintenance of the fields is not possible. The plan also found that there is an adequate supply of open space for passive recreation and open space conservation uses, that the Township as a whole is notably deficient in the amount of land devoted to active recreation, and that the Township is deficient in the size of its community parks and neighborhood parks.

In general, the 2000 Municipal Open Space and Recreation Plan found that many of the recommendations of the 1989 plan were still valid. The 2000 plan reiterated the three enumerated goals of the 1989 plan and added a fourth goal:

- Provide a large centralized active recreation complex with fields and ancillary facilities that will support the Township's sports programs while providing the opportunity for tournament play.

The 2000 plan revised the objectives found in the 1989 plan to read as follows:

- Provide at least 8-acres of municipal parkland per 1,000 population. At least 6-acres per 1,000 population should be devoted to active recreation.
- Provide sufficient active recreational facilities in each geographic area of the Township. All neighborhoods within the Township should have reasonable access to a mini-park/playground.
- Provide barrier free accessibility to, and throughout, each recreation site as mandated by the Americans with Disabilities Act of 1990.
- Provide a sufficient number of athletic fields so that fields can be given a "rest period" to recuperate and regenerate fresh playing surfaces.
- Open park use to all population segments by introducing recreation activities that appeal to the mature participant, such as paths for pleasure walks, bicycling, jogging, and horseshoes. The majority of existing park uses tends to favor children and team sports.
- Encourage the continuation of the excellent cooperation in administering recreation activities and programs between the Township and the Board of Education.
- Provide facilities for the existing and emerging interest in sports such as lacrosse, skateboarding, roller hockey and rock climbing.



- Establish a linear system of greenways, bikeways and walkways to provide linkages between major park and open space areas and population centers, as well as between the park and open space areas themselves.
- Require all future developers, whether residential, office, industrial, or commercial to provide recreational amenities for their residents and/or employees.
- In conjunction with the Circulation Plan Element of the Master Plan, convenient crossings of Routes U.S. 1/U.S. 130 and the Amtrak rail line for bicycle and pedestrian traffic should be studied and proposed.

In general, the goals of the 2000 Municipal Open Space and Recreation Plan remain relevant today. The main goals of the 2000 plan were the provision of adequate open space; more effective utilization of existing facilities; establishment of open space linkages, and the construction of a large, centralized active recreation complex. The central ideas of the first three goals remain valid, and can be found, with slightly different wordings, in the Goals and Objectives Element of this Plan. The fourth goal, that of a new recreation complex, will be achieved with the construction of the planned North Brunswick Community Park.

Most of the objectives of the 2000 plan also remain relevant. One objective that should be disregarded is the provision of 8-acres of parkland per 1,000 residents. As discussed

later in this Plan, the 8-acres/1,000 population standard is no longer used as a recreation and open space standard by the State Green Acres program. Instead, Green Acres recommends utilizing two different methods together, one that's based on total acreage and another that's designed as a guide to determine specific facility needs at community parks, recreation and open space areas.

This Plan provides a review of the past planning efforts and the current goals and objectives outlined during the 2006 Master Plan process. In doing so, the Plan provides recommendations to help the Township continue its parks and open space efforts.

PLAN IMPLEMENTATION EFFORTS

The Township has taken many steps in implementing the goals and objectives of past planning efforts. While there is always more work to do, this section provides a brief review of the Township's work to date. In 2001 the Township undertook a full, detailed audit of each facility, again with Maser Consulting, that was used as the backbone of the Township's proactive parks initiative that was to follow. This audit was created as a means to document and analyze each park with the goal of implementing the recommendations of the 2000 Open Space and Recreation Plan.

Since 2000, the Township has undertaken the task of refurbishing all of its pocket parks. This task included: replacing all playground



equipment, resurfacing basketball courts and tennis facilities including backboards and netting, as well as the installation of other Park amenities such as benches, water fountains, and pavilions. To accomplish this enviable task, the Township has spent \$827,754.00 over the last five years. Based upon conversations with the Director of Parks, Recreation, and Community Service and the Open Space Committee, only very minor upgrades in a few playground areas remain needed.

Another step the Township has taken to implement past plans was to develop Park Facility Redevelopment Plans for its three existing major recreational facilities: Veterans Park, Babbage Park and Sabella Park. To coincide with the development of these major planning efforts, the Township Council has dedicated approximately \$2.75 million in General Capital Funds to improve these facilities. These funds can be utilized to undertake the renovation and upgrade of any of these three facilities. To complement this aggressive pursuit, the Township has also received \$1.0 million dollars from the Middlesex County Open Space Fund for the Sabella Park project and an additional \$500,000 for improvements to North Brunswick Community Park.

A point worthy of note is that the Veterans Park renovation is complicated by the presence of heavy metals that exceed NJDEP residential standards. These levels are considered non-hazardous and result from the property's previous use prior to being developed as a park. The effort to redevelop this park is part

of a joint remediation effort to ensure the park can safely be used into the foreseeable future. The Township has also authorized the purchase of (2) two parcels adjacent to the High School, formerly owned by the Udeshi & Astone families, as part of this remediation effort. Acquisition of these parcels will undoubtedly help secure the long-term success of the remediation effort.

The Township has also undertaken many other projects associated with parks and open space. From access improvements to land acquisitions. These additional efforts are detailed as follows:

Luke Park

For many years, Luke Park did not function as a recreational facility. In fact, past planning efforts recommended no action be taken given wetland constraints. While wetlands may limit the development of this park, the Township did meet with residents to discuss the park's future. The Township Council, Mayor and PR and CS heard many concerns and determined that some space could be utilized as a neighborhood park containing a basketball and playground area that included a tot-lot and swing set.

North Brunswick Conservation Area

The Township has proactively undertaken acquisition of all out parcels in the Hidden Lake area south of Harold Street. To accomplish this, the Township utilizes open space funding as well as land it holds north of Harold to land swap and negotiate acquisition of all



out-parcels south of Harold. As all parcels are assembled, the Township will continue to analyze the property for its most appropriate public use, as decisions on the property's best use have yet to be made. A portion of the property could be utilized as an addition to the Hidden Lake Conservation Area, but the property is also an ideal location for both a future school site and an auxiliary site for the Department of Public Works. The Community Facilities Element also discusses this area as a potential school site.

The Cascades

"The Cascades," formerly known as the Pulda farm, is another property that the Township has included, at least partly, into the open space network. As part of the Township Planning Board's approval of the development application, access to land along Farrington Lake was required. This requirement details the construction of an American, with Disabilities Act (ADA) accessible walkway and pier. Formal access will be provided through construction of a pedestrian walkway from the "dead end" at Wood Avenue down to the Lake.

Renaissance Planned Unit Development (PUD)

As a condition of the Renaissance PUD approval, the developer set aside and constructed a 14.13 acre park facility. This area is included in the Township's current inventory. The Township took title to the park in 2002 and is now responsible for upkeep and maintenance.

Another aspect of the Renaissance approval was the dedication of ten (10) acres to be utilized by the Township for public use. The Township has since deeded the site to the Board of Education (BOE) as a potential school site. This deed expires in 2008, and will revert back to the Township unless a school is built, or contract is executed by then. The Township will continue to analyze the property for its most appropriate public use, as the BOE has concerns regarding the site, and decisions on the property's best use have yet to be made. The Community Facilities Element of this plan addresses this issue in more detail.

Caruso Field

The Township has recently effectuated a land swap with the Board of Education for Caruso Field. The deal includes 8-acres of park and Little League baseball facilities adjacent to the Maple Meade Board of Education Administration Building in exchange for 1.5 acres of Township-owned land adjacent to Parson's Elementary School.

Additional Open Space and Recreation Initiatives

The Township also has several other areas of open space and recreational initiatives. These initiatives range from open space acquisition to circulation improvements and planning for additional athletic fields. Examples include:

- Identifying potential open space acquisition parcels such as the 5.79 acres of land at Tall Oaks adjacent to Applegate Park



- Acquiring (4) four acres of the “Schmidt” parcel on Willowbrook Drive while actively seeking an additional 4 acres of same.
- Actively working with NJ Department of Transportation to allow better pedestrian circulation along Adam’s Lane. This is important, especially as “North Brunswick Community Park”, located west of Adam’s Lane, comes on-line, given the park’s proximity to this roadway and large number of residents east of Adam’s Lane.
- An agreement between the Township and Middlesex County regarding the construction of two athletic fields near the Juvenile Detention Center; as part

of the expansion and renovation of the County Detention Center. Middlesex County agreed to develop two lighted fields suitable for football and soccer in an area near the Detention facility, adjacent to Route 130. The fields include parking, bleachers, player benches and goal posts.

North Brunswick Community Park (NBCP)

The former 105-acre Otken Farm was purchased by the Township for the purpose of developing a “world-class” park and recreational facility. Since acquiring the property, the Township has developed a detailed development plan that includes a two (2) phased approach to achieve build-out.

Enhanced connections to parks are an important component of a truly great parks system





Phase I: (60 acres) of the project includes:

- 3 full sided soccer fields
- 2 lit full-sided soccer fields
- 2 lit softball fields
- 2 lit handball fields
- Lawn area
- 2 tot lots
- 2 play lots
- 3 comfort/building concession
- Jogging path
- Stormwater management
- 547 parking spaces

Phase II: Includes:

- Skate park
- 2 volleyball
- 2 handball
- 2 paddle ball
- 2 basketball
- 2 tennis courts
- 1 comfort/building concession
- 1 play lot
- 1 tot lot
- Dog park
- Amphitheater
- 2 multi-purpose fields
- 1 pool
- 1 tot pool
- 171 parking spaces

While funding has been provided for Phase I, which is currently underway, no final decision to finalize the build-out has been made due to limitations on the additional funding needed.

The Township is also exploring additional acquisition of land surrounding the park at 8th, 9th, 10th, and 11th Streets. The Township currently owns parcels in this area, and further acquisition could effectively improve access to the park.





EXISTING CONDITIONS

The Township of North Brunswick is served by a diverse and growing system of parks and open spaces. Currently North Brunswick, as shown in Table OP-1 and the Parks Inventory Map, has twenty-four facilities on 375.14 acres. These facilities can be divided into two categories: municipal parks and open spaces. Together, this system of facilities offers the residents of North Brunswick a wide array of active and passive recreational options. Active recreation

generally connotes intensive movement, such as organized sports. Passive recreation generally involves activities, like strolling or picnicking, which emphasize the open space of a park. As the Parks Inventory Map indicates, the geographic distribution of parks and open space around North Brunswick is fairly even, with most neighborhood areas having access to either a formal park or a natural area.



Table OP-1 Existing Parks and Open Space

Facility	Size (Acres)	Amenities
Municipal Park Areas		
Applegate Park	0.9	Basketball, playground
Babbage Park	16.72	Baseball, basketball, flagpole, football field, light, pavilion, picnic area, playground, restrooms, soccer fields, trails
Brunswick Knolls Playground	1.85	Basketball, playground, tennis courts
Boyd Tot Lot & Ponds	2.4	Fishing, playground
Colonial Gardens Playground	0.5	Basketball, playground
Columbus Park	0.25	Sitting area
Eisenhower Playground	1.19	Basketball, playground
Farrington Oaks Playground	1.31	Basketball, playground
Frisch Park	1.3	Baseball, basketball, playground
Hermann Park	2.42	Basketball, playground, tennis courts
JFK	5.16	Soccer fields
Renaissance Park	14.13	Baseball, flagpole, lights, pavilion, picnic area, playground, restrooms, soccer fields
Martin Luther King Playground	0.27	Basketball, playground
Sabella Park	28.97	Baseball, basketball, flagpole, football field, lighted pavilion, picnic area, playground, restrooms, soccer fields
Vanderbilt Park	0.33	Playground
Veterans Park	16.87	Baseball, flagpole, pavilion, picnic area, playground, restrooms, soccer field, tennis courts
Senior Citizen Center	1.26	Picnic area, bocce/shuffleboard, community center
Municipal Subtotal	96.99	
Open Space Areas		
Farrington Lake Conservation Area	146.2	Camping, fishing, trails
Hidden Lake Open Space and Conservation Area	50.94	Fishing, picnic
Luke Open Space and Conservation Area	22.60	Natural wildlife, playground
The Ramble	7.57	Open space
North Brunswick Open Space and Conservation Area	42.13	Natural wildlife (Check to see if this is adjacent to Hidden Lake if so, pull from inventory as we want to maybe allow school.)
Hoover Tract	3.42	Natural wildlife, fishing, picnic
Open Space Subtotal	278.65	
Total	375.14	



Municipal Parks and Special Use Facilities

Currently, North Brunswick has sixteen municipal park areas on 95.73 acres, ranging in size from the smallest (Columbus Park) to the largest (Sabella Park). These parks commonly provide a healthy mix of basketball courts, playgrounds, and picnic areas. Some of the larger parks also contain amenities such as playing fields and trails. The Senior Citizens Center is a special use facility with an outside component that offers passive recreational options. Together, the parks system works to provide an important mix of recreational options for residents of all ages. Amenities contained within all parks are detailed in Table OP-1.

The Township's October 2000 *Municipal Open Space and Recreation Plan* identified a need for more active recreation options, particularly soccer, baseball, and football fields. In response, the 104.79-acre future North Brunswick Community Park (NBCP) site was designed to become the centerpiece of the North Brunswick park system. As previously discussed, this park fills the need for more active recreation space and will offer space for lighted sports fields of all sizes, while also providing the Township with passive options, such as a walking/jogging path. When the NBCP project is completed, municipal active recreation acreage will grow to over 200 total acres.

Another property that will prospectively be added to the future inventory of recreational space is the former DKM site on Route 1. Consisting of just over 50-acres, the property will be divided

into two parcels with approximately one-half of the site being devoted to development and expansion of the NJEDA's "Technology Center", while the other 25 acres will become an addition to the Middlesex County Parks system. The site will be developed by the County for formal recreation activities including soccer and youth baseball.

Open Space

In addition to the system of municipal parks, North Brunswick also offers a large supply of open space and unique wildlife areas. Much of this open space is concentrated along the eastern edge of the Township, bordering Farrington Lake. These areas offer a mix of uses, including camping, fishing, and walking trails. The remainder of open spaces are spread throughout the Township. Areas like The Ramble and the Hidden Lake Open Space and Conservation Area are located closer to the heart of North Brunswick, providing great undeveloped open spaces that residents can enjoy. Combined, the six open space areas offer the Township 278.65 acres of open space and wildlife areas.

Future Need

While it is clear North Brunswick's system of parks and open spaces provides a wide array of options for all residents, it is also important to understand whether these facilities are adequate for both today's needs and future needs. Given the Township's recent increases in both its elderly and school age populations, it is important to consider both the amount and type of recreation demanded by the

INSERT MAP:
PARKS INVENTORY



community. There are several standards that can be used to determine a community's park and open space needs. The two standards used in this plan (New Jersey Balanced Land Use and National Recreation and Park Association) are based on land area and benchmarked levels of population, respectively. It should be noted that, in the past, the New Jersey Department of Environmental Protection's Green Acres Program had its own standard, recommending 8-acres of parks and open space lands for every 1,000 residents. The Green Acres Program now, however, utilizes the Balanced Land Use method (3% of developed and developable land preserved for recreation) as its total acreage standard. Green Acres further recommends that the National Recreation and Park Association (NRPA) standards be used as a guide to determine specific community park, recreation and open space needs.

~New Jersey Balanced Land Use Standards

The New Jersey Balanced Land Use Standard for Recreation is a method identified in the 2003-2007 New Jersey Statewide Comprehensive Outdoor Recreation Plan. This plan requires that 3% of developed and developable land within a municipality be preserved for recreation. This calculation is based on total acreage within a municipality, excluding land impacted by steep slopes and wetlands. According to the NJ Balanced Land Use standard, North Brunswick has a 184-acre surplus of parks and open space (see Table OP-2).

~National Recreation and Park Association (NRPA) Standard

The NRPA standards are more detailed than the New Jersey Balanced Land Use Standards. As such, NJDEP's Green Acres Program recommends using the NRPA standards in conjunction with NJ Balanced Land Use standards in order to develop an accurate assessment of a municipality's open space and recreation needs. The NRPA standard categorizes parks and establishes a standard need per 1,000 people for each park type (e.g. neighborhood park, community park, etc.) The NRPA suggests that a community's park system, at a minimum, be comprised of a "core" system of parklands with a total of 6.25 to 10.5 acres per 1,000 people. Some of the categories, such as special facilities and natural resource areas, do not have specific standards. The NRPA standards are meant as a guide for municipalities and should be utilized as such. The true determination of how a municipality's system functions is measured by the demand placed on it by its residents.¹ NRPA definitions of park types, as well as a breakdown of North Brunswick's parks and open spaces using the park characterizations employed in the NRPA standard, can be found below.

¹Recreation, Park, and Open Space Standards and Guidelines



Mini-Park

- Use - Specialized facilities that serve a concentrated or limited population or specific group such as tots or senior citizens.
- Characteristics – Within neighborhoods and in close proximity to apartment complexes, townhouse development or housing for the elderly.
- Service Area – $\frac{1}{4}$ mile

Neighborhood Park/Playground

- Use – Area for intense recreational activities, such as field games, court games, crafts, playground apparatus area, skating, picnicking, wading pools, etc.
- Characteristics – Suited for intense development. Easily accessible to neighborhood population – geographically centered with safe walking and bike access. May be developed as a school-park facility.
- Service Area – $\frac{1}{4}$ to $\frac{1}{2}$ mile

Community Park

- Use – Area of diverse environmental quality. May include areas suited for intense recreational facilities, such as athletic complexes and large swimming pools. May be an area of natural quality for outdoor recreation, such as walking, viewing, sitting and picnicking. May be any combination of the above, depending upon site suitability and community need.

- Characteristics – May include natural features, such as water bodies, and areas suited for intense development. Easily accessible to neighborhoods served.
- Service Area – 1 to 2 miles

Within these park characterizations, the NRPA also recommends that the (3) three main parks categories are located within general distances to the residents of a community. As depicted in the NRPA Buffer Map, the location of these facilities is a function of access. When comparing these park locations to the remainder of the community, it is important to recognize that some parks in North Brunswick seem to have multiple functions. For example, North Brunswick Community Park will have equipment located within the park that is characteristic of pocket and neighborhood parks. Therefore, the service area could in fact become a function of two or more of the following recommended distances. The NRPA Buffer Map also contains such a hybrid classification for a graphic depiction of this discussion.



Additional NRPA Standards

NRPA also recommends other, more regionally based standards. These standards are inappropriate for inclusion into the North Brunswick system as the burden of creating such facilities belongs to a County rather than municipality.

North Brunswick Township Park Classification ²	
Residential Pocket Parks .25 to .5 acres/1,000	Boyd Tot Lot & Ponds Columbus Park Vanderbilt Park Luke Park
Neighborhood Park 1 to 2 acres/1,000	Applegate Park Brunswick Knolls Playground Colonial Gardens Playground Eisenhower Playground Farrington Oaks Playground Frisch Park Hermann Park Renaissance Park JFK Park Martin Luther King Playground
Community Parks 5.0 to 8 acres/1,000	Babbage Park Sabella Park Veterans Park North Brunswick Community Park
Natural Resource Areas No Recommended Size	Farrington Lake Open Space and Conservation Area Hidden Lake Open Space and Conservation Area Luke Park Open Space and Conservation Area The Ramble North Brunswick Open Space and Conservation Area Hoover Tract
Special Use	Senior Citizens Center

²Classifications based on the Township's 2000 Municipal Open Space and Recreation Plan-Parks & Recreation Site Assessment.



The following table compares the total amounts of acreage needed to satisfy the New Jersey Balanced Land Use and NRPA standards.

AVAILABILITY OF MUNICIPAL PARKS AND OPEN SPACE, 2006 Table OP-2				
Category	Municipal Parks Area Standard	Recommended Municipal Parks Area	Existing Area	Park and Recreation Surplus/Deficit
N.J. Balanced Land Use	3% of developed/developable area	190.42	375.14	+184.72
NRPA Standard				
Mini Parks	0.5 acres/1,000 persons (.25- min)	19.4 (9.718)	2.98	-16.42 (-6.738)
Neighborhood Parks	2 acres/1,000 persons (1-min)	77.7 (38.872)	14.9	-62.8 (-23.972)
Community Parks	8.0 acres/1,000 persons (5-min)	310.9 (194.36)	77.85	-233.05 (-116.51)
~Assessment based on US Census Bureau's 2004 estimated population - 38,872 for North Brunswick. ~All minimum NRPA Standards are indicated in (parenthesis).				

Source: *New Jersey Statewide Comprehensive Outdoor Recreation Plan; National Recreation and Park Association*

Table OP-2 shows that, per the NJ Balanced Land Use standard (based on total acreage), North Brunswick has an overall parks and open space surplus of approximately 185-acres. The NRPA standards, also shown in Table OP-2, give a more detailed assessment of what the specific needs are within North Brunswick's existing parks system. NRPA standards indicate that North Brunswick has a deficit of Mini-Parks, Neighborhood Parks and Community Parks. It is important to note that NRPA states in their guidebook that they seek to shift away from absolute standards and encourage communities to self-direct based on their specific needs. This is an important point to note as some parks have multiple functions as will be discussed later in this plan.

**INSERT MAP:
NATIONAL RECREATION & PARK ASSOCIATION
STANDARDS RECOMMENDED DISTANCE TO PARK
FACILITIES**



The need for additional Mini-Parks and Neighborhood Parks could be met through a variety of solutions, including retrofitting/redesigning existing parks, and developing small portions of existing open space lands as parks. Although a viable alternative, the acquisition of additional land to satisfy the Mini-Park and Neighborhood Park deficits is not a necessity. Rather, the Township would be well served by more fully utilizing, and taking advantage of its existing parks and vast open space lands. (Again, when reviewing the NRPA standards, it is important to recognize that the numbers above do not take into account the totals from natural resource areas or special facilities, which represents approximately 75% of North Brunswick's park supply.)

With regard to Community Parks, it should be noted that, upon completion of the "North Brunswick Community Park", the Township would make great strides in meeting the NRPA standard in the *Community Park* category. Looking at parks from a different perspective this plan also believes that some parks have dual functions because the amenities contained within them allows them to be classified as more than one park type. Prime examples are the Township's Community Parks: Sabella, Veteran's and Babbage. These parks have equipment that function as small mini parks and neighborhood type parks. Therefore, the Township could comfortably meet the

standards set forth in the NRPA guidelines in Mini and Neighborhood Parks if these parks are viewed as addressing the needs for these types of parks.

When the NRPA standard and the Balanced Land Use standard are considered together, it becomes apparent that North Brunswick has a significant amount of parks and open space and that the Township could address most, if not all, of the specific park deficits identified above through more effective utilization of existing park and open space lands. This plan also points out that programming needs and desires of the community must also be a factor.

Beyond an analysis of the total parks and open space needed in North Brunswick, it is also important to take stock of the specific recreational facilities. One standard for determining the need for specific facilities is the National Recreation and Parks Association Standards for Recreation, Park and Open Space. These standards are based on average facilities needed for a given population level. The chart below describes where the Township of North Brunswick stands according to the National Recreation and Parks Association (NRPA) Recreation, Park and Open Space Standards and Guidelines based on information provided by the Department of Parks, Recreation, and Community Service and information gathered through site visits.



North Brunswick Recreation Facilities Analysis ³								
January, 2006								
Use	NRPA Standard	NRPA Need	Current NB Facilities	Current Net	NB Community Park (NBCP) (Future)	County Detention Facility (Future)	Future Net w/ county and NBCP	Prospective year 2020 Net
Basketball	.2/1,000	7.8	8.5	+0.70	2	0	+2.70	+2.04
Tennis	.5/1,000	19.4	13	-6.4	2	0	-4.40	-6.15
Baseball	.2/1,000	7.8	8	+0.20	6	0	+6.20	+5.54
Volleyball	.2/1,000	7.8	1	-6.8	2	0	-4.80	-5.46
Football	.05/1,000	1.94	2	+0.06	0	1	+1.06	+0.885
Soccer	.1/1,000	3.88	5	+1.12	4.5	1	+6.62	+6.27
Golf	.04/1,000	1.55	0	-1.55	0	0	-1.55	-1.69
Pool	.05/1,000	1.94	0	-1.94	1	0	-0.94	-1.115
Cricket	1/region	Based on demographics	0	0	0	0	0	0
Lacrosse	1/20,000	1.94	0	-1.94	0	0	-1.94	-2.11

The chart shows that the Township exceeds the NRPA standards for some facilities. With the additional facilities that North Brunswick Community Park will provide when built out, North Brunswick will have addressed the majority of its recreational need for specific facilities. The only uses that will still be underrepresented are tennis, volleyball, and golf. Additionally, it should be noted that the Township's schools also offer many recreational facilities. The Township should continue to work with the Board of Education to ensure that school recreational facilities remain an integral part of the Township's already excellent park system. It is important to point out that the NRPA numbers in the above table are only a rough guide to the number of facilities needed. Specific demands should be strongly rooted in the programming needs of the Township.

The North Jersey Transportation Planning Authority (NJTPA) forecasts the North Brunswick population to reach 39,980 by 2010 and 42,300 by 2020 creating the need for even more acres of parks and open space when using the NRPA standards. Past open space and recreation plans have indicated a total buildout of 43,500 people given the zoning in 1989. While the build-out number is one that seems reasonable, the Township must also be cognoscente to the future redevelopment of four large tracts of former industrial land. As a result, these four properties may result in the need to adjust the Township's recreational needs in the future.

³Based on the US Census Bureau's 2004 Estimated Population for North Brunswick-38,872 persons



Based on future population increases to the year 2020, the Township will need to continually evaluate the programming of recreational activities. Since the total acreage recommended is based on percentage of developable land (Balanced Land Use Standards), the Township is well suited given the actual land devoted to parks and open spaces.

Considering the level of projected population growth, current parks and open space, and the 105 additional acres from the North Brunswick Community Park site, it is clear that North Brunswick currently has more than enough combined park and open space acreage to build a great park system. To accomplish this,

North Brunswick need only connect and provide better access into the current park system. This should be accomplished by several means:

1. Continuing the Township's proactive approach to open space acquisition, particularly in areas where it is difficult accessing the existing park facilities.
2. Utilizing environmental data and coordinating acquisition of environmentally constrained sites into the system.
3. Continuing to work with developers to utilize portions of development sites for cross access easements and public open spaces.



GREENWAY CONNECTIONS

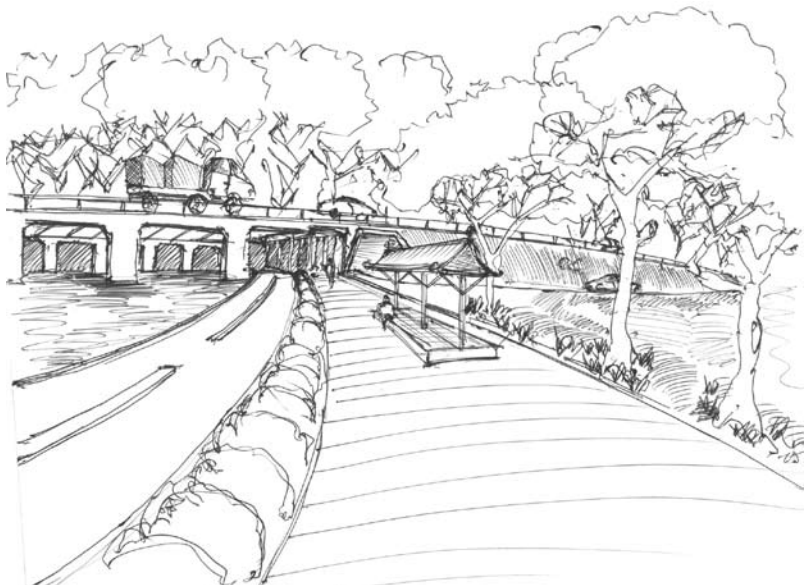
As discussed earlier, one way to ensure an efficient delivery of park facilities is to provide connections to them. To accomplish this, this plan has created a Conceptual Greenways Map that depicts the possible connections that North Brunswick can make. Although North Brunswick is served by a number of parks, recreation facilities, and natural areas, connections between these facilities and surrounding neighborhoods need improvement. The fastest way to ensure that the current system is well used is through improved accessibility.

It is well documented that pedestrian pathways through comprehensive greenway planning become tremendous assets to the community and are extremely popular with the surrounding residents. By keeping pedestrians and bikes off the roads, these pathways address safety and circulation issues. No longer do people have to consume car exhaust or worry about getting struck by a vehicle as one can easily travel through open space corridors and parkland. Further, it has been found that these pathways actually become an amenity to sell homes in the neighborhoods

that they save, therefore increasing property values and improving the quality of life.

Based on GIS data, tax maps, aerial photography and discussions with Township officials, the Conceptual Greenways Map proposes areas that could connect the various parks and open spaces in the Township. The recommended greenway path falls into five types of land categories; Township-owned land; other public land requiring negotiation; roadway improvements such as striping, signage, etc.; future Township acquisition targets; and areas where a private/public partnership would be needed.

In order to solidify this map as the greenway plan for the Township, more research needs to be done to determine the actual feasibility of the conceptual alignments. It is a recommendation of this plan that the Recreation and Open Space Committee continue pursuing this aspect of the plan.



The abandonment of the rail spur at the north end of the Township presents tremendous greenway opportunities

**INSERT MAP:
CONCEPTUAL GREENWAY OPPORTUNITIES**





PARKS AND OPEN SPACE RECOMMENDATIONS

Taking into account the existing park conditions, analysis of open space needs, and the public participation issues, the following section outlines recommended changes to improve the current parks, recreation, and open space system in North Brunswick.

The key for North Brunswick is to maximize the potential of the current system and to improve connections within the system. As detailed above, North Brunswick already has access to a large amount of parks and open space. Most likely, this supply is enough to meet the community's needs, but only if the Township's current holdings are used to their full potential. The following recommendations are intended to ensure that North Brunswick utilizes its parks and open spaces to their fullest potential in order to create and maintain a world-class parks system.

- *Improved Connections/Greenways*
 - This Plan recommends that the Township prepare a comprehensive Greenways Plan, which identifies and prioritizes potential greenway sites and presents a strategy and implementation plan for acquiring/preserving recommended sites and/or easements.
- *Land Acquisition.* In order to continue to improve upon and supplement the Township's already excellent open space system, this plan recommends that the Township continue to acquire land for a variety of uses including new parkland, additions to existing parks and connections to the existing system. Location of these sites is also numbered to graphically depict its location. The Future Land Use Map provided in the Land Use Element is the graphic representation. This plan recommends the following specific potential acquisition sites. Each site corresponds to the Acquisition Opportunities Map.
 1. Continue pursuit of properties surrounding Community Park to enhance access, improve buffers and create additional future opportunities for expansion.
 2. Consideration should be given to purchasing the 7.5 acres along Route 130 adjacent to Community Park, either for parkland, a community center or other Township use.
 3. The Township should continue to acquire out-parcels of land near Hidden Lake. This land should be set aside for potential community facility sites.
 4. Skaritka Site (Block 227, Lot 41.01, 41.02, 18) – acquisition of approximately 18 acres. An

INSERT MAP:
ACQUISITION OPPORTUNITIES



application for subdivision approval has been scheduled to the Planning Board. Regardless, the Township should diligently pursue the property for inclusion into the open space network of the Township. If combined with the Johnkins tract, it would facilitate connection into the greater Greenway network and to Farrington Lake. If these sites cannot be acquired, pedestrian connections providing access to the lake should be required.

5. Johnkins Property (Block 227, Lot 17.05) – The Planning Board is currently hearing an application for a 6-lot subdivision and is working to create an easement for pedestrian access to Township-owned land along the waterway through the Johnkins Tract. This effort should continue moving forward and would be particularly beneficial if the Skaritka site, or public access through the site, is obtained.
6. Treumann Storage – The Planning Board should work with the property owner, and any potential development application, to gain access to, to preserve, that portion of the site closest to the stream corridor.
7. The Van Deursin property (Block 224, Lot 84) - The Township should pursue acquisition of the property in order to protect the stream corridor and provide better access to the lakefront from the Treumann Site.
8. The approval of the “Amber Wood” tract (Block 74, Lot(s) 25, 26, 27, 28, 31.01, 31.02, 1.01, 1.02) was rescinded because of its limited development potential. This land has been acquired and there is an application to do a community forestry plan to harvest the land. The Township should acquire this land to link Luke Park to the remainder of the neighborhood and possibly create additional connections to Finnegans Lane and across Route I if feasible.
9. Halpern Property/Atlantic Realty (Block 4, Lot 23.01) – The Township should attempt to acquire this parcel in an attempt to connect Luke Park to the PSE&G easement and the greater greenway network.
10. Where available and feasible, continue to purchase land along Farrington Lake to improve access to the lake while increasing buffers.
11. Work with Wachovia Bank, or any prospective future user of the site, to preserve forested wetlands behind the High School near Independence Drive.



12. Continue pursuit of acquiring land adjacent to the J&J site to tie into the Conservation of Oakey's Brook and the greater Greenway network.
 13. Pursue acquisition of land near Oakey's Brook.
 14. Continue pursuit of acquiring all out-parcels near Adam's Lane.
- *Better Utilization of Farrington Lake.*
 - People looking for the opportunity to fish in North Brunswick currently stand on the overpass of the bridges that cross Farrington Lake. Public inlets already exist on the lake, but no well positioned publicly owned docks exist to give anglers other options. In addition, much of the lake is inaccessible to residents seeking a simple stroll along the water. The Township has a tremendous opportunity to improve utilization of Farrington Lake. This plan recommends the following:
 - 1. The nature trail near Farrington Boulevard is the basis for great access to the lake. Expand a system of trails, particularly down to the water's edge above and below the dam so that people can safely enjoy the beauty of the area.
 - 2. Pursue discussion with PSE&G to utilize the power line right-of-way adjacent to the park to build biking/walking trails that could lead down to a public fishing dock at the waters' edge.
- 3. Work with East Brunswick Township, Millstone Borough and Middlesex County to create a remarkable regional resource for all to enjoy.
 - 4. Continue to work with the County on a suitable location and construction of a boat launch.
 - 5. Continue to pursue connections to Farrington Lake off of Church Lane.
- *Strategic expansion of the current system.*
 - While the community already meets its needs for open space, this does not mean the Township cannot do more to build on its current system. Strategic expansion of parklands should be considered, such as additional facilities based on changing program needs.
 - Continue to work with the County on the development of the 25-acre DKM tract.
 - *Additional Recommendations.*
 - Continue to coordinate park and recreation plans with existing and planned Board of Education facilities to ensure that all recreational facilities work in concert.
 - Again, create a Greenway Plan that identifies parcels to be utilized, size and type of pathways, and strategies



for partnering with other public entities.

- Continue to apply for all available funding for park development and open space preservation.
- Work with the County to determine designated bike routes within North Brunswick to improve connectivity and bike/pedestrian safety throughout the Township. (see Circulation Element for a full discussion of bicycle/pedestrian issues and recommendations)
- Take steps to assure that all parks are ADA and special needs accessible.
- Continue to review the existing parks and recreation facilities to ensure that they are keeping up with the needs of the Township's growing population, particularly as major development projects are approved and built.

These recommended improvements, if implemented, will improve accessibility and increase utilization of North Brunswick's parks and open spaces, making the Township an even more attractive place to live.



IMPLEMENTATION PLAN

~Short Term

- Improve opportunities to use Farrington Lake through public trails and a public dock.
- Work with PSE&G to make use of the power line easements that cross North Brunswick in coordination with a detailed Greenway Plan.
- Continue developing North Brunswick Community Park as the center of a the park network.
- Work with the County to determine designated bike routes within North Brunswick to improve connectivity and bike/pedestrian safety throughout the Township.
- Create a detailed Greenway Plan.
- Continue to work with the County on development of land at the Correctional Facility as an extension of the parks system.
- Continue to work with the County on development of land at the Correctional Facility as part of the Greenway Plan.
- Continue to work with the County on development of a boat launch and public access along Farrington Lake

~Long Term

- Continue to evaluate the parks and open space system as it relates to meeting the needs of a growing and evolving population.
- Continue to evaluate development applications for possible easements and public land set-asides for connections and inclusion into the parks and open space system.
- Continue pursuit of possible connections within the parks and open space system.
- Continue to apply for all available funds to improve and upgrade the parks system.
- Selectively look for opportunities to expand the current park system by acquiring environmentally sensitive lands.
- Work to ensure that new developments are connected into the park system as these sites are developed.



Conservation Plan Element

INTRODUCTION

The Township of North Brunswick is a fully developed mature suburban community characterized by residential neighborhoods along with commercial and industrial areas. Most sections of the Township have been altered by human activity. The Township does, however, have large areas devoted to open space and parks and extensive waterfront lands surrounding a large lake.

If North Brunswick is to maintain its character as a suburban Township, the preservation of its limited remaining open spaces and environmentally sensitive features is vital. Conservation measures regarding lakefront management are critically important, and measures such as emphasis on street trees and shade tree installation can play a significant role in improving aesthetics.

ISSUES IDENTIFIED

The public input process outlined several conservation related issues to address in the 2006 Master Plan. Some of these issues will be addressed in other Elements of this plan, such as the Land Use or Open Space and Recreation Elements. Public input through the Master Plan process identified an interest in addressing the following issues:

- Analyze the remaining vacant tracts of land and determine where additional land acquisitions may be warranted;

- Assess the Township's regulations to determine if additional measures are warranted to protect natural resources;
- Review possible incentives to encourage the use of renewable energy sources in developments (Green Build Technology).
- Determine the appropriateness of preparing an Environmental Resources Inventory given the built-out nature of the Township.

PURPOSE

The Conservation Plan recognizes the important role that natural resources play in maintaining the unique character of North Brunswick. The purposes of the Plan are as follows:

- To document environmentally sensitive features such as lakes, wetlands, and flood hazard areas;
- To provide environmental data to inform land use decisions including potential zoning revisions;
- To review the environmental characteristics of the Township in order to provide focus on potential preservation efforts;
- To provide environmental data to coordinate the Township's environmental features with potential land acquisition targets and the Open Space & Recreational needs of the Township.



NATURAL RESOURCES

Surface Water Features

North Brunswick contains two (2) lakes - Farrington Lake and Hidden Lake. Farrington Lake forms a large portion of the eastern boundary of the Township while Hidden Lake is a much smaller water feature located near Hidden Lake Drive in the west. There are several streams in the Township worthy of note as well: Oakley's Brook at the border of South Brunswick; Mile Run at the border of New Brunswick; Six Mile Run in the west; and Lawrence, Sucker's and Mae Brooks all in the eastern portion of the Township.

Farrington Lake serves as the boundary between North Brunswick and East Brunswick with smaller portions dividing the Township from South Brunswick. The shoreline along the lake within North Brunswick is approximately (3) three miles in length. The lake is a man-made feature created by a dam structure near the convergence of Millstone Borough, East Brunswick Township and North Brunswick. The dam effectively holds back the Lawrence Brook, and its tributaries Mae Brook and Sucker's Brook. The lake has created a great resource for the community and wildlife in the community.

Hidden Lake is approximately (4) four acres in size and is surrounded by a fairly extensive wetland system within the midst of single-family residential land uses. Fed extensively by Six-Mile Run, the lake is also adjacent to

a large number of vacant Township-owned parcels within the wetland system. It is part of the Millstone Watershed.

Wetlands

Watersheds are the areas that drain to a common waterway, such as a stream, lake, estuary, wetland, or, ultimately, the ocean. Watersheds include both the water feature itself and the entire land area that drains to it. Wetlands are one area where water collects within the drainage area of a watershed and are a vital part of the watershed. Wetlands are particularly important to watersheds as their components of vegetation and soils help improve water quality. They also provide essential habitat for wildlife.

Wetlands are located in various parts of North Brunswick with a significant amount of the Township's total wetland areas being located in the southern portion of the Township. According to New Jersey Department of Environmental Protection (DEP) data, there are 1,423.9 acres of wetlands in the Township; this equates to roughly 2 square miles in total. The Hidden Lake area contains large amounts of wetlands that extend along the headwaters of the Millstone River Watershed and, more specifically, the headwaters of Six-Mile Run. Within the same vicinity, Luke Park also contains wetlands.

INSERT MAP: WETLANDS



The wetlands in Luke Park extend south across Route 1 into the Lawrence Brook Watershed and generally follow the streams toward Lawrence Brook and Farrington Lake. Wetlands also follow Oakley's Brook, which is a tributary to Lawrence Brook. This particular section of the North Brunswick wetland system affects certain portions of the development sites of Johnson & Johnson, Renaissance, and to a lesser degree, Treumann Storage.

Wetlands are also scattered through the Community Park area then across Adam's Lane northward. These wetland areas generally run between Route 1 and Route 130 and follow natural drainage channels within and around the neighborhoods in this section of the Township. Wetlands are also a factor near the High School area as well as the Wachovia site where they then come in contact with Sucker's Brook, another tributary of Lawrence Brook.



Natural & Critical Habitat Areas

NJDEP data on Natural and Critical Habitat areas indicates that North Brunswick has limited areas of grassland and forested natural habitat. These habitats are ranked as merely suitable or priority habitat, rankings of 1 or 2, respectively, of the 5-class ranking system (5 being the most important because they contain Federal endangered species.) Many of these areas within North Brunswick contain development, with a large area focused on the Renaissance neighborhood as depicted on the Natural Habitat Map.

Critical Habitat Areas are areas where it is believed, based on unique environmental features, that the habitat deserves a critical ranking as a potential habitat area. This analysis developed into the Critical Habitat data that is graphically depicted on the Critical Habitat Map. Because of the developed suburban character of the Township, North Brunswick contains very few critical habitat areas. As indicated in the data, Farrington Lake and Lawrence Brook, between Quarry Lane and Church Lane, contain suitable habitat areas that could support the Wood Turtle. This area extends into South Brunswick and is identified as Critical Habitat by NJDEP.

Flood Hazard Areas

Flood Hazard Areas are those areas in the Township that the Federal Government has deemed to be potential areas for flooding during significant storms. The mapping, created by the Federal Emergency Management Agency (FEMA), is primarily used for flood insurance purposes and is derived by analyzing the height of floodwaters and compared to the elevation of the land adjacent to the water feature. The floodwaters that FEMA delineates are based on storms whose frequency occurs once in 100 years; this is referred to as the 100-year flood event.

Flood hazard information from FEMA, shown on the Wetlands and Flood Hazard Areas Map, indicates four (4) 100-year floodplain areas, each associated with one of the Township's lakes or stream corridors. These areas are mapped on the Floodplain Map.

One specific area subject to flooding is along One-Mile Run located at the border of North Brunswick and New Brunswick. This area is flood prone primarily because of the size restrictions of the culverts along the Northeast Corridor rail line and local roadways. These culverts effectively act as weirs and thus hold back the stream's waterflow and cause backups into the streets and surrounding properties.

INSERT MAP: NATURAL HABITATS

INSERT MAP: CRITICAL HABITATS

INSERT MAP: FLOODPLAINS



Open Space

The Township of North Brunswick contains over 375.14 acres of existing open space and recreation lands with an additional 105 acres anticipated in 2006 in the form of the planned North Brunswick Community Park (Open Space & Recreational Areas Map). In addition to many areas of active recreation space, there are also six open space areas such as The Ramble, Farrington Lake Recreational Area and Hidden Lake where the majority of land is passive. An inventory of the Township's Recreation and Open Space Inventory and a full discussion of proposed improvements are included in the Recreation and Open Space Plan Element. Notwithstanding current publicly owned open space, the Township should continue to coordinate this Element's environmental data when considering future acquisition targets.

Soils

Knowledge of soil types, characteristics, and their geographic distribution can assist the planning and policy processes and influence the growth and development of a community. Data on soil depth, permeability, water table, and other physical properties is useful when determining the suitability of soils for foundation construction, location of septic fields, landscaping, and construction of roads, athletic fields and parks. The soil data in this report is provided by the National Resources Conservation Service of the United States Department of Agriculture, which started conducting national soil samples in 1999 and continues today.

As depicted in the Soils Map, North Brunswick has 50 different soils, divided into 22 major types. The most prevalent soils are the Nixon series, which is associated with the Lawrence Brook Watershed within the Lower Raritan, South River and Lawrence Water Management Area along the eastern portions of the Township. These soils represent over 40% of the major soil series in the Township.

The Township wanted to specifically analyze four major redevelopment sites with regard to soils; these sites include Treumann Storage, Johnson & Johnson, Okonite and General Automotive. It should be noted that the soil characterizations depicted herein do not eliminate the need for on-site investigation.

Treumann Storage

Treumann Storage contains soils of Fallsington, Mullica and Nixon Variants. The Fallsington variant is a poorly draining soil while Mullica is a very poorly draining soil and Nixon a moderate draining soil. All of these soils are characterized by shallow depth to the seasonal high water table and therefore limitations on shallow excavations and dwellings with basements need consideration.

Johnson & Johnson

The Johnson & Johnson site is characterized by Reaville, Reaville Variant, Nixon and Fallsington Variants and Elton soil types. With similar drainage qualities as the Treumann Storage site, J&J also is subject to some minor restrictions on shallow excavations and dwellings with basements.



Okonite

Okonite is characterized by the Urban Land soil category. This category is usually typical of heavy fill activity that was used to either bury wet soils or to level the ground. As such, this soil class usually does not present development constraints, although the site would be subject to on-site investigation regardless of this classification.

General Automotive

The General Automotive site consists of the Urban Land soil category, Elkton, Fallsington, Lenni, Keyport and Sassafras soil types. This mix of soil types, especially with a large amount of Urban Land, typically does not limit development. Any limitations that could potentially be discovered through on-site investigation usually are remedied by engineering controls.

This analysis of soil types reveals that there should not be concerns regarding the development potential of these sites. Given current engineering techniques, and the lack of significant soil constraints, these sites should not experience any real development difficulties from a soils suitability standpoint.

GREEN BUILDING PRACTICES

The U.S. Green Building Council (USGBC) is the nation's foremost coalition of leaders from across the building industry working to promote buildings that are environmentally responsible, profitable and are healthy places to live and work. The USGBC is the organization that developed standards by which Green development practices are measured.

The Leadership in Energy and Environmental Design (LEED) Green Building Rating System is a national consensus-based, market-driven building rating system designed to accelerate the development and implementation of green building practices. In short, it is a system for designing, constructing and certifying buildings. LEED is designed for rating new and existing commercial and institutional buildings; however, active committees with the Council are developing criteria addressing other types of project standards such as those that will govern neighborhood-based projects. Benefits of including Green Building in North Brunswick are¹:

Environmental benefits:

- Enhance and protect ecosystems and biodiversity
- Improve air and water quality
- Reduce solid waste
- Conserve natural resources

Economic benefits:

- Reduce operating costs
- Enhance asset value and profits

¹www.usgbc.com

INSERT MAP: SOILS



- Improve employee productivity and satisfaction
- Optimize life-cycle economic performance

Health and community benefits:

- Improve air, thermal and acoustic environments
- Enhance occupant comfort and health
- Minimize strain on local infrastructure
- Contribute to overall quality of life

Cities and regions across the country have incorporated “green building” practices into local ordinances, incentives and guidelines. The Township should consider further investigation into Green practices, particularly as the Township is interested in the “Science and Technology Initiative” along the Route 1 corridor. Within this industry, companies are actively seeking these types of buildings. Companies that actively seek Green buildings include Genentech, Rockwell International Corp, PNC Bank, Hines, and Bank of America to name a few. There is a toolkit that provides an invaluable summary of green building programs that can empower the Township to make some of these innovative changes and be a leader in the State of New Jersey in this endeavor. The Environmental Commission could spearhead this effort and provide additional information so that the Planning Board and Township may consider such an initiative in the future.¹

MIDDLESEX COUNTY

The Middlesex County Planning Board coordinates County involvement in planning functions and programs relating to land use and environmental and infrastructure issues in the County. The Township Environmental Commission should continue to coordinate with the County on the environmental issues of North Brunswick, as the County’s ability to coordinate and leverage regional resources is valuable.

ENVIRONMENTAL RESOURCE INVENTORY

Through the public input process, the Township thought it was necessary to determine the usefulness of performing a detailed Environmental Resource Inventory (ERI). An Environmental Resource Inventory is an unbiased report of data that describes the current state of the various environmental resources in a community. It is a compilation of text and maps, and forms the baseline documentation that the community can use to evaluate, and possibly revise, planning documents, policy initiatives, and local ordinances to better protect the remaining resources, and when possible, improve the state of the natural environment.

The ERI is not a policy statement or a plan. Rather, it is a detailed objective listing of the resources in the community. It can be used

¹www.usgbc.org



as a tool for Environmental Commissions, Planning Boards and Zoning Boards, as well as the Township administration and the public at large. ERI's are often the basis for resource protection ordinances in a community, which are designed to protect the resources inventoried in the ERI. Whether the ERI is an amendment to the Master Plan, a part of a Conservation

Element, or a separate reference document, it is always seen as dynamic and revisable as circumstances on the ground evolve and change. The Environmental Commission should consider applying for funding to undertake such a project.

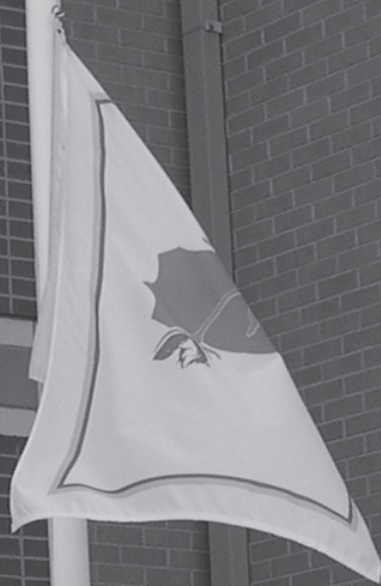


Conservation Plan Element



RECOMMENDATIONS

- Protect and enhance the water quality of Farrington and Hidden Lake through the adoption of ordinances that protect the Township's water supply. These ordinances can include limiting the use of certain landscaping fertilizers, innovative designs of on-site stormwater management, and other measures deemed appropriate upon further investigation.
- Improve public access to Farrington Lake where feasible and coordinate with the Recreation program to provide an integrated trails system.
- The Environmental Commission should consider creating an Environmental Resource Inventory to provide additional information that could be useful as the Township continues to build out and efforts are made to develop more heavily constrained sites.
- The Environmental Commission should gather detailed information on Green Building practices so that future considerations may be given toward including such development practices within the Township's Land Development Ordinances.
- The Environmental Commission should consider developing a Community Forestry Plan in order to take advantage of State funding resources to purchase trees for parks and streetscape programs.
- Where property becomes available, consider preserving additional land adjacent to Farrington Lake, particularly in the area between Quarry Lane and Church Lane, to correspond with habitat areas that could support the woodland.
- Continue analyzing the Township's Zoning Ordinance for inclusion of new technologies involving landscaping, parking lot design regulations, and use of appropriate landscaping species to see if additional measures are warranted. This could include, green-paving techniques or reduced parking requirements for certain developments.



PTL ROBERT HEACOCK
819 DLT 2 1954



IN HONOR OF THE OFFICERS WHO MADE THE ULTIMATE
SACRIFICE IN THE LINE OF DUTY

SOMEBODY KILLED A POLICEMAN TODAY AND A PART OF AMERICA DIED
A PIECE OF OUR COUNTRY WAS TAKEN AWAY TO PROTECT
WILL BE BURIED WITH THE SUSPECT WHO SHOT HIM
THE SUSPECT WHO SHOT HIM
WITH COUNSEL DEMANDS THAT HE BE RELEASED
WHILE A YOUNG WIDOW LIES IN BED WITH HER KIDS AND SPEND LONG LONELY NIGHTS
THE BEAT THAT HE WALKED WAS HIS HOME
JUST AS IF HE'D GONE OFF TO WAR
THOUGH THE FLAG OF OUR NATION WON'T FLY AT HALF MAST
TO HIS NAME THEY WILL ADD A GOLD STAR
YET SOMEBODY KILLED A POLICEMAN TODAY
IN YOUR TOWN OR MINE
WHILE WE SLEPT IN COMFORT BEHIND OUR LOCKED DOORS
A COP PUT HIS LIFE ON THE LINE
NOW HIS GHOST IS BEAT ON A DARK CITY STREET
HE ANSWERED THE CALL OF HIMSELF GAVE HIS ALL
AND A PART OF AMERICA DIED



HONOR ROLL





Utility Plan Element

INTRODUCTION

This Utility Plan Element analyzes the public water system, the sanitary sewerage system and the stormwater system.

all off-site impacts generated by the development.

ISSUES AND IDENTIFICATION

Several key issues emerged from the public impact phase of the Master Plan.

1. That there is a need to assess the history of breaks and the physical condition of water mains, sewer mains and storm sewers located in roads that are proposed for reconstruction and/or milling and resurfacing, so that utility improvements can be timed accordingly.
2. That mapping and all mains, manholes and valves would be a great benefit to future efforts to plan for and maintain the system.
3. That those areas where capacity is currently an issue, or may become an issue as future development and redevelopment comes to fruition, must be identified for study.
4. That all new developments should be required to assess not only the impacts within their development, but also all off-site impacts upon the water system, sewer system, or stormwater system.
5. That major developments should be required to address all on-site costs and a proportionate cost of

WATER DISTRIBUTION SYSTEM

The current Water Distribution System.

- Water Supply

The Township of North Brunswick currently draws its water supply from the Delaware and Raritan Canal. The New Jersey Water Supply Authority ((NJWSA) owns and operates the water supply in the canal, and the Township contracts directly with NJWSA for its water supply.

The Township has been approved to draw 8 MGD from the canal, regardless of whether or it utilizes the entire amount. Recent figures reveal that the Township averages 5.5 MGD over the course of a full year. Peak period usage in the middle of the summer ranges from 7.5 MGD to 7.8 MGD. This peak flow is less than the 8 MGD limitation currently facing the Township.

As future development and redevelopment activity comes to fruition, the Township may need to increase the amount of the draw presently permitted. This ultimate draw required cannot be predicted at this time due to uncertainties related to the ultimate buildout of the J&J and Okonite sites.



-Water Treatment

The Township's Water Treatment Plant is located in Franklin Township at Suydam and Canal Roads. The Township owns and operates the Water Treatment Plant. The Water Treatment Plant currently has an operations capacity of approximately 10 MGD. The possibility exists to increase this capacity to 20 MGD, if substantial capital improvements are made.

The system also includes (3) three elevated storage tanks that together store approximately 9 million gallons of water.

Pumping facilities located at the Water Treatment Plant, at the Nassau Street tank and the Adams Lane tank are also integral parts of the system.

History of Water Utility Planning Efforts

-1993 Water Distribution System Master Plan

The Township's past and current water planning efforts include a Water Distribution System Master prepared in December of 1986 and updated in 1993. The 1993 update contains detailed information and recommendations regarding the entire water system. Many of the recommendations contained in the report remain valid today. While the Township has taken steps to implement the recommendations of the 1993 Master Plan update, the following recommendations remain in effect today;

- In order to meet the ultimate storage

requirements and increase productivity of the WTP, the construction of a booster pump station and a 3.0 MG storage tank in the Northeast quadrant of the Township. This should be completed as demands reach the WTP's 10 MGD capacity.

- Improve operation of the system by:
 - Cleaning water lines at George's Road;
 - Cleaning water lines at Jersey Avenue;
 - Complete the Rt27 water main from Masoma Road to Seneca Road;
 - Loop the Old George's Road main to Rt130;
 - Connect the main between Jersey Avenue and Rt1;
 - Extend the main from Elizabeth Street to Willowbrook Drive;
 - Construct a main in Aaron Road;
 - Construct a main in George's Road;
 - Construct a main from Aaron Road to the southwest water tank.
- Continuation of upgrading water mains below 6" in diameter
- Continuation of the cleaning and lining program where demonstrated problems of tuberculation exist, thus negatively affecting water quality and fire flow efficiency.
- Continue looping the system, where necessary, to improve water quality and pressure.



-2005 Kearny Drive Water Study

In 2005, the Township undertook a study of the Farrington Boulevard, Independence Boulevard and Kearney Drive Water Distribution System. This planning focus was in response to many resident complaints of discolored water and low water pressure. The area the report focused on was east of Route 130 from Victory Avenue to Gerry Road along Kearny Drive. The report made several recommendations that attempt to solve the water quality and pressure issues within this specific area of the Township. The Township Engineer has indicated that the recommendations included in this report also pertain to the entire system.

- Mapping the system and determining the location, size and condition of all water mains.
- The cleaning and lining program should be implemented.
- The Water Distribution Model should be updated.
- Interconnection between dead-ends, parallel mains and looping to provide increased water quality.
- Replacement of mains where investigation determines need.

-2006 Bulk Water Study

Concurrent with this 2006 Master Plan, the Township commissioned a Bulk Water Study to determine the cost effectiveness of upgrading the WTP or the possibility of purchasing bulk water from three different purveyors: Middlesex Water Company, American Water Service, and the City of New Brunswick. The report analyzed

current and future development needs in order to recommend the most cost effective means to meet future demand. The report ultimately recommended that the most cost effective solution was to upgrade the existing water treatment facility.

While all these reports have certainly provided significant guidance to the Township, other studies are needed. These studies will be discussed in the Future Water Utility Needs section.

Recent Improvements

Since 2002, the Township has spent approximately \$2.5 million on repairs and improvements to the water treatment plant, all of which were funded through direct budget appropriations by the Township. These expenditures have been made on a priority basis to insure the continued ability to provide safe drinking water to approximately 11,000 customer accounts.

The Township has also spent \$2.4 million on water distribution system improvements, all funded through the Township's capital budget. These improvements included water main replacement, cleaning and lining of pipes, and looping the system or connecting dead-ends.

In an effort to address the concerns and recommendations expressed in the North Brunswick 1993 Water Master Plan and 2005 Kearny Drive Water Study, the following water system improvements have been implemented:



- Construction of a 1MG elevated storage tank in the southwest portion of the Township.
- Provided looping of watermain in the West Lawrence Street – Stelle Avenue area; Maple Avenue area; Lee Avenue area and Second Avenue area.
- Provided cleaning and relining of various existing water mains for thirty streets within an area located in the southwest portion of the Township.
- Replacement of the water main along Church Lane, and in doing so, also looped the dead-end to improve water quality and pressure.

The Township, through its Planning and Zoning Board review process, continues to encourage and/or require multiple interconnections of existing and proposed water systems to provide looping within the systems. In addition, existing water mains continue to be replaced in conjunction with Township road improvement projects where required.

To continue implementing the recommendations of the 1993 Master Plan, the Township anticipates spending approximately \$400,000 per year on water main replacements to be funded through capital debt issuance and approximately \$50,000 per year funded through the water utility operating budget. To date, the replacement of water mains has primarily focused on replacing cast-iron mains that experience tuberculation (iron growth).

Future Water Utility Needs

-Cleaning & Lining

As distribution systems age, certain types of mains are affected by a build up of reduced iron called tuberculation. Tuberculation reduces the effective size (inside diameter) of the main, thereby reducing flow capacity and lowering operating pressures in the system. Tuberculation is also a potential cause of discoloration of the water being distributed.

As previously described, a portion of the recommended annual cleaning and lining program has previously been implemented. Cleaning and lining consists of the physical cleaning of the inside of the mains to remove the tuberculation, followed by the cement lining of the cleaned main. The lining prevents further tuberculation build up.

In those areas where tuberculation exists, two alternatives exist: clean & line, or replace. If problems exist in areas with a history of breaks, and the streets are being opened as part of the Township's Roadway Improvement Program, replacement of the line may be necessary. Otherwise, since cleaning and lining is minimally invasive and improves flow capacity and increases operating pressures in the system, other more extensive improvements may be avoided. The Township Engineer has recommended that the Cleaning and Lining Program be continued in areas where demonstrated problems exist or are reported.



-Future Planning Studies

Notwithstanding the studies previously discussed, this element recognizes the additional studies needed to evaluate the utility system. While the Township has just completed the Bulk Water Study, additional studies will be necessary in the future. Upon conversation with Township staff, as well as the Township Engineer, the additional studies needed to update and better assess the Township's water utility infrastructure needs include:

- A water distribution model to pinpoint pressure problem areas where main replacement or looping the system (connecting dead-end streets and cul-de sacs) will improve water pressure. The model will enable the Township to focus on problem areas and prioritize how it will address them. The Township is planning to undertake this effort during the 2006-2007 budgetary cycle.
- A Water Distribution System Master Plan was prepared for the Township in 1986 and updated in 1993. That Plan identified various improvements that were recommended to be implemented in four phases associated with four identified target areas in the Township. Some of the recommendations included in that Plan have been implemented, including the construction of the 1.0 MG southwest elevated storage tank and a portion of the annual cleaning and lining program. Other improvements have also been implemented by private developers.

It is recognized that the system characteristics have changed due to these improvements. In addition, zoning changes that have been adopted since 1993 have affected both the Township wide demand at build-out and the localized improvement needs. Lastly, major property tracts which are being evaluated for re-development will also affect the system and necessitate improvements.

In order to properly prepare for the future development under the current zoning, or redevelopment under any rezoning currently being considered by the Planning Board, an accurate planning tool is required to determine the effect of development upon the water system infrastructure. It is recognized that an update of the Water Distribution System Master Plan, including the development of a Township wide hydraulic computer model, the evaluation of the current zoning upon recommended improvements, and an evaluation to determine the affect of rezoning major property tracts would be beneficial.

Such a planning tool would be of paramount importance to both the Township and to developers alike. Accordingly, it is the recommendation of this Board that the Water Distribution System Master Plan be updated at this time.



-Future Water Allocation & Demand

Although the Township currently operates within its permitted 8.0 MGD allocation, and room for upgrades at the plant exists, the ultimate development build-out of the Township may reach roughly 20 MGD in the future based upon the Water Distribution System Master Plan. It is noted, however, that Plan was based on information from the 1980's and early 1990's. Since that time, zoning has been reduced and the affects of protecting the environment has diminished the potential development in the Township. Accordingly, the ultimate maximum day usage for the Township is expected to be significantly lower than 20 MGD.

Notwithstanding these capacity improvements, the New Jersey Water Supply Authority (NJWSA) controls the distribution of water from its current source, the D&R canal. Accordingly, the Township would need to negotiate an agreement with NJWSA in order to purchase additional water allocation.

In 2005, the Township pursued the cost effectiveness of continuing to treat its own water supply. The Township Engineer, CME, in conjunction with H2M Engineers, was hired to study the issue thorough the North Brunswick Bulk Water Study. That report recommends continuation of the Township's own water treatment because it was proven to be more cost effective than purchasing water supply from other sources. The report concluded that the Township should bring the capacity of the current WTP up to 10 MGD.

With prospective zoning changes and new development being considered for the J&J site and Treumann Storage (totaling over 225 redevelopable acres), water allocations and future demands must be considered. As noted earlier, all costs for such an analysis should be covered by the developer of each proposed project. The Township may also wish to consider passing all up-front costs for potential bulk water purchases on the development. The Township will need to continue to evaluate this prospective need as future redevelopment draws on the system.

SEWERAGE SYSTEM

The Current Sanitary Sewer System

Currently, all of North Brunswick's sanitary sewage is collected through the Mile Run Interceptor and transported into the Middlesex County Sewage Authority's (MCUA) Raritan Trunk Sewer for treatment at the regional treatment plant in Sayreville. After treatment, the effluent is discharged into the Raritan Bay. In general, all of the wastewater generated by the Township is currently conveyed to the Mile Run Interceptor, which is shared by the Borough of Milltown, the City of New Brunswick and the Township of Franklin. The Mile Run Interceptor conveys the combined flow to facilities of the Middlesex County Utilities Authority for treatment.

The North Brunswick transmission system currently has eight pumping stations: How Lane, Church Lane, Edly's Lane, Schmidt



lane, Princess Drive, West Lawrence Brook, Farrington Boulevard, and Johnson & Johnson. Significant maintenance and/or replacement has taken place recently. Although there are no issues regarding capacity of the pumps, the How Lane pump is the only pump in need of rehabilitation or replacement.

Sewage flow from the Township is measured at four meter chambers located in the northeastern quadrant of the Township because this is where the meter stations link with the Mile Run Interceptor: 12th Street, Remsen Avenue, Georges Road, and Livingston Avenue. The majority of the North Brunswick sewerage system is connected through a series of 24 inch interceptor sewer lines. However, the lines from Remsen and Livingston are 36 inches.

History of Sewer Utility Planning Efforts

A Wastewater Facilities Plan was prepared for the Township in 1986. The purpose of that Plan was to review recent zoning changes and subsequent development applications, and to review specific components of the wastewater collection system's capabilities to handle additional flow from undeveloped areas. That Plan had a range of improvements that were recommended to be implemented in many of the wastewater drainage basins of the Township.

The 1986 Wastewater Facilities Plan provided the Township with a review of the existing wastewater system. The report further reviewed deficiencies in capacity and made

recommendations in order to provide additional capacity in specific areas of the Township subject to development pressures.

The 1986 report detailed several issues associated with the system. In particular, the report detailed the problems with flow surcharges upstream and downstream of the Schmidt Lane pump station. The report also noted that the system was also affected by infiltration and inflow issues. The other area of focus included the Edly's Lane pump station. Again, these areas were the focus of development pressures during the 1986 report.

Recommendations of the 1986 Plan included;

- Divert flow from the Schmidt Lane pump station to the Livingston Avenue pump station to alleviate pressure at Schmidt Lane.
- Upgrade the Edly's Lane Pump and run a parallel main along the Maple Mead Interceptor to divert flow from Mile Run. Flow from Renaissance should be diverted to this main.
- Divert flow from the Mile Run Interceptor by working with South Brunswick to create a joint Pump Station facility.
- Further study of the Sewerage System for the six (6) other sewer basin areas of the Township.

Recent Improvements

Since 2002, the Township has spent \$2.5 million on sewer pump station improvements (Schmidt Lane and West Lawrence station



reconstructions, plus repairs to Princess Drive and Edly's Lane), mostly funded through sewer capital improvements and NJ Environmental Infrastructure Trust Fund (NJEIT) funding. The How Lane pump, while still functional at this time, will also need eventual replacement.

Specifically, improvements were made to address the surcharge and infiltration and inflow problems that plagued the Schmidt Lane facility. The Township moved forward with one of the proposed solutions from the 1986 Master Plan and developed the Princess Drive pump station by building a new force main to connect with the Livingston Avenue connector. To coincide with these improvements, North Brunswick has also replaced the wet well at the Schmidt Lane facility.

The Township has spent, and/or committed, approximately \$500,000 on improvements to the collection system. It is expected that the Township will continue to spend approximately \$250,000 per year on replacement of aging sewer mains; in concert with its road improvement plans.

Future Sewer Utility Needs

-Mile Run Interceptor

The 1986 Wastewater Facilities Report detailed one major concern for the Township's sewerage system: capacity in the Mile Run Interceptor. The Interceptor is not owned or operated by North Brunswick, but is an integral part of the entire sewerage system. The 1986 Plan had estimated the full capacity of the Mile Run Interceptor to be 81 MGD, of which North

Brunswick is allotted 20 MGD by contract. Because of recent upgrades by MCUA, the Sayreville treatment plant has increased capacity and therefore can handle additional flows. The concern for North Brunswick is how to get these flows from the Township system to the county system efficiently. At the time of the 1986 study, it was speculated by New Brunswick that the Mile Run Interceptor could only handle an additional 1 MGD of effluent. Today, it is believed that the Mile Run Interceptor is at capacity.

-Collaboration with South Brunswick & Update Wastewater Utilities Plan

The 1986 Wastewater Facilities report also called for North Brunswick to seriously consider a second connection to the MCUA's Raritan Trunk Sewer line. This connection would be made through the joint construction of a 30-inch forced main with the Township of South Brunswick along the existing sewer line easement. The joint line would also combine the Edly's Lane pump and adjacent South Brunswick pump facilities. This endeavor would then bypass the Mile Run Interceptor and connect directly into Lower Trunk Line at the Raritan River. By bypassing Mile Run, the Township hopes to relieve some of its capacity issues.

Through the years, as the Township has been developed, concerns have been raised regarding the future capacities of the existing sewer system. Many alternatives have been investigated by the Township in anticipation of possible future impacts to the Township



sewer system with full build-out under the current zoning requirements. As a result, there is an Agreement between North Brunswick and South Brunswick for the construction of a Joint Force Main from the area of the two pump stations to the facilities of the Middlesex County Utilities Authority. This would allow for an increase in the conveyance capacities of both communities. The associated contributory flow increases and cost sharing is included in the Agreement.

However, recognizing that changes in zoning that reduce development potential have occurred since the time of the Agreement, it would be prudent to re-evaluate the anticipated wastewater that the southeast quadrant would generate. Further, redirecting discharge from the Farrington Boulevard Pump Station and West Lawrence Pump Station out of the Mile Run Interceptor basin, and into the Joint Force Main, should also be considered.

Wastewater from South Brunswick is conveyed by the Maple Meade Interceptor that runs through the southeastern portion of the Township to South Brunswick's Pump Station 13 (at Edly's Lane), where it is conveyed to facilities of the Middlesex County Utilities Authority for treatment.

The Maple Meade Interceptor also collects flow from the southeast portion of North Brunswick Township. At a location further downstream, a proportional amount of flow is diverted from the Maple Meade Interceptor and back into the Township at the Township's Edly's Lane Pump Station.

In addition, the system leading to the Remsen Avenue basin is at or above capacity during high flow events. There has been review of the condition and a recommendation has been made to install a relief sewer from the Remsen Avenue basin to the 12th Street basin in the area of Livingston Avenue.

In order to properly prepare for the future development under the current zoning, or redevelopment under any rezoning currently being considered by the Planning Board, an updated review of the wastewater collection system should be performed. Accordingly, it is the recommendation of this Board that the Wastewater Facilities Plan be updated at this time.

Impacts of Future Development & Redevelopment

Major redevelopment sites within North Brunswick will provide varying degrees of development intensity and the potential for greater sewage generation than exists today. To address this, Township officials agree that any development should be required to analyze its site capacity as part of their respective development application. This will provide the Township a continuing update of sewer flow a new development or redevelopment is proposed to generate.

Potential redevelopment of major development sites addressed in this Master Plan are included in this section. While difficult to quantify the actual impacts on the sewer system, this section provides potential impacts to the



current system while also providing focus on where future studies may be needed.

- J&J & Okonite Sites

The Johnson & Johnson site represents the largest redevelopment area for the sewerage system to accommodate. As of today, this site is far less an impact on sewage than the 1986 Wastewater Plan had estimated. The 1986 Plan estimated that the I-2 zoning in the area of J&J, and Okonite, would produce .564 MGD of average daily wastewater flow which represents the highest average and peak daily flow numbers. However, despite being zoned I-2, the Okonite site is historically a low waste generator, indicating that the standard I-2 zone estimate is high for the site and that any future redevelopment may cause a net increase in volume for the system.

Wastewater generated from the J&J and Okonite sites flow by gravity to a 24-inch interceptor on Livingston Avenue, which in turn discharges into the 36" inch Livingston Avenue Relief Interceptor, and is ultimately discharged into the Mile Run Interceptor. Flow from these sites is metered at the 12th Street Meter Chamber. Due to the lack of concrete redevelopment plans for both the Okonite and J&J site, it is impossible to determine the exact level of flows to be generated. However, this plan points out that the future impacts will undoubtedly have an affect on the already overburdened Mile Run Interceptor.

The Johnson & Johnson pumping station remains a special case for the Township. While once maintained by the Township, in more recent years Johnson & Johnson has maintained the facility. Wastewater generated from the Johnson & Johnson property flows by gravity via on-site gravity mains to the Johnson & Johnson Pump Station. The flow from the 18"-inch Johnson & Johnson force main discharges into a 24"-inch interceptor on Livingston Avenue and is ultimately discharged into the Mile Run Interceptor. Given the pending redevelopment of the site, North Brunswick faces the question of how to handle this facility in the future (i.e. whether the potential redeveloper would be responsible for the station operation and maintenance or whether the Township should absorb the facility into its system). This is an issue that the Township should continue to pursue.

Notwithstanding the issue of the J&J pump station, capacity within the system and impacts downstream from these major redevelopment opportunities must be monitored. Again, any future development will have an impact on the Mile Run Interceptor.

- Treumann Storage Site

Wastewater generated from the Treumann property would flow by gravity into the Maple Meade Interceptor, through the North Brunswick/South Brunswick Splitter Chamber, and through a 24"-inch interceptor to the Edly's Lane Pump Station. The flow



from the 12"-inch Edly's Lane Force Main discharges into a 24"-inch main which in turn discharges into the 36inch Livingston Avenue Relief Interceptor, is metered at the 12th Street Meter Chamber and is ultimately discharged into the Mile Run Interceptor.

The Planning Board has determined that Age-restricted housing with ancillary retail is the most appropriate use for the Treumann site. The Township has few capacity concerns with regard to future development on the Truemann Site although it does have concerns regarding the capacity of the Mile Run Interceptor. However, without specific plans for developing the site, it is impossible to predict the full effect of any proposed development.

- General Automotive Site

Wastewater generated from the General Automotive property flows by gravity through existing mains to the southerly corner of the property, flows across Route 130 and through the Twin Brooks Estates subdivision to the West Lawrence Pump Station. The flow from the 10-inch West Lawrence Force Main discharges into a 24-inch interceptor on Elmwood Place, is metered at the Remsen Avenue Meter Chamber and ultimately discharged into the Mile Run Interceptor. The West Lawrence Pump Station is currently being upgraded.

The Zoning Board has recently approved 130,000 square feet of retail space and 20,000 square feet of general office space at this site. Utilizing current NJDEP criteria, this equates to approximately 15,000 gallons per day of wastewater generation. Given the fact that this site has been vacant, and flows go through the overburdened Mile Run Interceptor, future impacts may need to be addressed.

In order to properly prepare for the future development under the current zoning, or redevelopment under any rezoning currently being considered by the Planning Board, an updated review of the wastewater collection system should be performed. Accordingly, it is the recommendation of this Board that the Wastewater Facilities Plan be updated at this time.



STORMWATER SYSTEM

The recent adoption of the Stormwater Management Regulations by NJ DEP have prompted municipalities to be more aggressive in addressing how stormwater will be managed. North Brunswick has realized the importance of maintenance of the stormwater system and as such, has continued to charge the Department of Public Works with the task of monitoring, and maintaining the system.

The Township also ensures the stormwater system is managed and improved through new development applications. All prospective developments must review on-site drainage issues as well as the downstream affects. While new development is encouraged to handle all stormwater run-off on-site, the stormwater regulations do allow for contributions to off-site mitigation. The Township may wish to analyze this aspect of the regulations in detail because impending redevelopment efforts, such as the J&J site, may require multiple-means of handling storm water.

Recent Accomplishments

The Township has recently begun to record the system through a remote camera that can televise the inside of pipes to record the conditions of the piping. While more is to be done, this technology allows the Township to accurately understand what is occurring beneath the surface. This project works directly with the larger, mapping of the system project, discussed below.

The Township has also worked to correct drainage issues along the One-Mile Run Stream corridor. The Township has made several improvements to the system to resolve drainage concerns, including backups into the surrounding streets.

Future Considerations

-Mapping the System

The Township has identified several issues that require further study, or are in need of improvement. One issue that was identified was the need to map the entire system to identify stormwater issues. Mapping the system is in accordance with the Stormwater Regulations and will provide the Township with a complete and detailed understanding of the entire stormwater system. Once the mapping is completed, the Township may consider studying potential problems discovered in the mapping exercise. This could include the possibility of pipe realignment, pipe replacement, and a cleaning of the system.

-Stormwater Mitigation Plan

The Township should also require proposed development to submit a stormwater mitigation plan. This plan should be provided for any proposed development that is granted a variance or exemption from the stormwater management design and performance standards presented in the Municipal Stormwater Management Plan.



New Jersey's stormwater mitigation requirements offer a hierarchy of options that clearly offset the effect on groundwater recharge, stormwater quantity control, and/or stormwater quality control that will be created by granting the variance or exemption.

The Developer's obligations include, but are not limited to, the following criteria:

1. The mitigation project must be implemented in the same drainage area as the proposed development. The project must provide additional groundwater recharge benefits, or protection from stormwater runoff quality and quantity from previously developed property that does not currently meet the design and performance standards outlined in the Municipal Stormwater Management Plan.
2. If a suitable site cannot be located in the same drainage area as the proposed development, the mitigation project may provide mitigation that is not equivalent to the impacts for which the variance or exemption is sought, but that addresses the same issue. For example, if a variance is given because the 80 percent TSS requirement is not met, the selected project may address water quality impacts due to a fecal impairment.
3. The municipality may allow a developer to provide funding or partial funding to the municipality for an environmental enhancement project that has been

identified in a Municipal Stormwater Management Plan, or towards the development of a Regional Stormwater Management Plan. The funding must be equal to or greater than the cost to implement the mitigation outlined above, including costs associated with purchasing the property or easement for mitigation, and the cost associated with the long-term maintenance requirements of the mitigation measure.

-Severe Stormwater Erosion near Farrington Lake

The Township is experiencing severe erosion along the banks of Farrington Lake where a 36" stormwater main drains into the Lake. This site is located just north of the PSE&G substation near Clinton Avenue. While not an emergent concern to health and safety, the Township will need to address the issue once funding allows. Perhaps, should a mitigation plan be created and implemented, this project could be funded by development that potentially affects this area.

-New Development Applications

Recognizing that all development will have an impact on the generation and characteristics of stormwater discharge, all applications to the Planning and Zoning Boards should be required to include a report that provides the anticipated stormwater flows to be generated by the proposed site development. The report should also provide a description of the adequacy of the downstream stormwater system to accept the proposed flows.



CAPITAL IMPROVEMENT PLAN

The Township's six-year Capital Improvement Plan specifies planned improvements to Township facilities, roads, traffic & circulation, stormwater management, sanitary sewers, parks and lakes. Proposed improvements include sewer and water pipe and manhole replacement, curb cuts and handicapped accessible sidewalk ramps, and new water quality structures. The Township will continue to allocate approximately \$400,000 annually in its utility operating budget. Allocations include approximately \$250,000 on minor improvements at the Water Treatment Plant and \$150,000 per year on replacement of sewer mains. Other improvements include approximately \$400,000 per year on water main replacements through capital debt issuance.

Recommendations

Taking into account the uncertainty in future development and the issues that came up throughout the planning process, the following recommendations should provide North Brunswick with an effective means to address its long term sewer and water needs.

- Continue to pursue the funds necessary to commission a new comprehensive review and mapping of water and sewer facilities, helping provide North Brunswick with a good baseline understanding with many new developments on the horizon.
- Given the pending development and redevelopment throughout North Brunswick, development should be required to analyze site capacity and potential impacts on the system on future water and sewer needs. This additional analysis is part of a larger land use recommendation that the Township should require development to consider its regional context before being approved.
- Update the Water and Sewer Utilities Master Plans.
- The Township should continue to plan and implement new utility infrastructure to replace aging and obsolete systems and serve redevelopment areas. Focused attention should be paid to areas that have demonstrated problems.
- Continue working with the Roads Department to reduce the number of dead-end water lines, North Brunswick will improve its water flow, quality and pressure.
- To provide the necessary water service to the Johnson & Johnson site North Brunswick should connect the site to the Renaissance Water Tower through a 16" water main.
- North Brunswick should continue the pursuit of various means to meet future water demands of development in the Township.
- North Brunswick and South Brunswick should continue to explore a combined



new connection into the Raritan Trunk Line and the MCUA system.

- Given the concerns about capacity along the Mile Run Interceptor, a full study should be commissioned to understand the current state of this important sewerage line. However, because Milltown, Franklin, and New Brunswick also use the line, they must be part of the study as well as financial contributors. The County also needs to be integral in the effort.
- Continually analyze the Georges Road meter basins' ability to handle flow of former industrial properties once redeveloped into more intensive areas.
- Continue to evaluate the How Lane pump for potential rehabilitation or replacement.
- Continue to pursue whether it is appropriate for the Township to take over operations and maintenance of the J&J Pump Station.
- Continue to pursue the improvement of the efficiency of the distribution by determining the sources of unaccounted-for flow.
- Develop a Stormwater Mitigation Plan for developments that may be required to make off-tract improvements to the system.



Comparison With Other Plans Element

INTRODUCTION

The Municipal Land Use Law requires that all municipal master plans consider the relationship of their master plan to plans of contiguous municipalities, county plan and the New Jersey State Development and Redevelopment Plan (State Plan). This section reviews the plans and zoning ordinances of municipalities bordering North Brunswick Township, the plans of Middlesex County, and the current 2001 State Plan.

RELATIONSHIP OF THE MASTER PLAN TO ADJACENT MUNICIPALITIES

Five municipalities border the Township of North Brunswick, four (4) located in Middlesex County and one (1) in Somerset County. Surrounding municipalities within Middlesex County are South Brunswick Township, East Brunswick Township, Millstone Township, and the City of New Brunswick. Franklin Township, located in Somerset County, borders the western edge of North Brunswick. The zoning of these municipalities is discussed as follows. The Regional Context Map depicts the actual locations and spatial relationships between these municipalities.

City of New Brunswick

New Brunswick is located directly north of North Brunswick. Zoning and land uses along these municipalities borders consists of industrial along the western edge. Institutional (Rutgers University) and office uses are located along

the northeastern border. Located between the industrial and intuitional areas are residential zoning and land uses. Generally, the zones, and their respective land use match well with those in North Brunswick and are consistent.

East Brunswick Township

East Brunswick is located to east of North Brunswick. Millstone Borough also shares a smaller portion of this boundary. These municipalities are separated from North Brunswick by the Lawrence Brook and Farrington Lake. East Brunswick zoning and its respective land uses, are primarily residential along this section of North Brunswick. The zones, and their respective land uses, match well with those in North Brunswick and are consistent.

Millstone Township

Millstone Township is located along a small portion of North Brunswick Township. As previously indicated, Millstone and North Brunswick are separated by the Lawrence Brook and portions of Farrington Lake. Millstone Borough is entirely residential along the border with North Brunswick. The residential zones are compatible with those located in North Brunswick Township and are consistent.

South Brunswick Township

The zoning and existing land use in the Township of South Brunswick consists of residential uses along the southwest portion of North Brunswick Township with some land

INSERT MAP: REGIONAL CONTEXT



RELATIONSHIP OF THE MASTER PLAN TO MIDDLESEX COUNTY PLANNING EFFORTS

located along Route 130 zoned and utilized as industrial. Properties in these zones have been developed as the existing zoning permits. Generally, the zones and their respective land use match well with those in North Brunswick and are consistent.

Franklin Township

Route 27 defines the border between Franklin Township and North Brunswick. Zoning and land uses, along this state roadway corridor, are a mix of commercial- retail and residential. While North Brunswick has considered some changes to the zoning along this roadway, these changes remain consistent with the planning efforts of Franklin. Therefore, the zones and their respective land uses are compatible with North Brunswick Township.

Middlesex County Growth Management Strategy (GMS)

Between 1990 and 1995, Middlesex County prepared a three-phase Growth Management Plan to address infrastructure need, regional design system and growth management strategies. While taking a sub-region approach, the principal focus of Phase I for the Southwest Region, where North Brunswick is located, was to assess the need for sewer and road infrastructure improvements to accommodate existing and future development.

The next phase in the County's Growth Management Strategy was a Phase II Report which focused on alternative approaches to managing actual growth in Middlesex County. In order to analyze the approaches, five specific case studies were conducted in the report, including the Route 130 Corridor in North Brunswick and South Brunswick. This Route 130 case study included more detailed potential impacts than the Phase I study and further analyzed the impacts of development on water utilities, wastewater utilities, roads, parks and open space, and stormwater management. In conclusion, the report cited growth management techniques that ranged from the inception of impact fees, traffic reduction ordinances, to the creation of special improvement districts.

The Phase II report also recommended the creation of multi-use centers, establishment of off-highway inter-local links between



developments, designation of greenways, and improved east-west access between Route 1 and Route 130. Through North Brunswick's 2006 Master Plan effort, the plans of the Township and the Middlesex County Growth Management Strategy are compatible.

Middlesex County Improving Mobility to Transit and Activity Centers in Middlesex County Plan

The *Middlesex County Improving Mobility to Transit and Activity Centers in Middlesex County Plan* was created in April of 2000 and outlines the transportation network throughout the County. While the Master Plan is completely consistent with this plan, it should be pointed out that the Township objective of creating an additional Rail Station should be included into the County's Transportation efforts.

Middlesex County Open Space and Recreation Plan

The *2003 Middlesex County Open Space and Recreation Plan* details the County's open space and recreational facilities. The document updates the goals, objectives, and data of the County's 1995 Plan. The plan also included potential acquisition targets, recreational improvements, and linkage recommendations (Greenways).

In the 2003 plan, the County outlined potential acquisition targets including, Pulda Farm, Skaritka Farm, Otken Farm and the First Union Site on Route 130. While these sites were

worth noting in the plan, the Township should work with the County to update the acquisition target inventory to include the properties identified in the Township's 2006 Open Space and Recreation Plan Element, particularly as Pulda and Skaritka have approved and pending development applications, respectively. Furthermore, the Otken acquisition was accomplished, and is now being constructed as the 105-acre North Brunswick Community Park.

Proposed recreation improvements identified in the County plan included Farrington Lake. The recommendations include biking and walking trails, lighting, and boat ramp. This recommendation is consistent and remains appropriate to pursue.

Greenway linkages were also discussed in the County plan. The (2) two areas recommended in the plan include a Lawrence Brook/Farrington Lake alignment from the Raritan River to Plainsboro and an Oakley's Brook to Six-Mile Run alignment to Franklin Township. While these County's linkages are consistent with North Brunswick's planning efforts, the Township should pursue including the local greenway plan into the County Master Plan as a part of the regional network.

Overall, this 2006 North Brunswick Master Plan is consistent with the County's Open Space and Recreation Plan.



RELATIONSHIP OF THE MASTER PLAN TO STATE OF NEW JERSEY PLANNING EFFORTS

2002 Middlesex County Bicycle and Pedestrian Plan

The goals of the Middlesex County Bicycle and Pedestrian Plan is to establish a countywide bicycle and pedestrian network, establish awareness, and facilitate improvements. The Township's 2006 is consistent with these goals. In-fact the Master Plan has taken this approach a step further by providing more detail insight as what needs to be done at the local level to implement such a program in the Recreation & Open Space Element through a conceptual Greenway network.

State of New Jersey- State Development and Redevelopment Plan

The 2006 North Brunswick Township Master Plan is substantially consistent with the plans and policies of the New Jersey State Development and Redevelopment Plan (State Plan), which was adopted by the New Jersey State Planning Commission on March 1, 2001. The State Plan's preparation process compared the planning policies of the various governmental levels and established the Cross Acceptance process as the methodology for attaining compatibility between local, County and State Plan. The Township participated in this two-year State Planning process.

The SDRP emphasizes center oriented development patterns that create "communities of place" or a "sense of place". This philosophy is compatible with the goals and objectives of the North Brunswick Master Plan in that the Land Use Plan is designed to retain the Township's character while looking to establish specific areas where a "sense of place" can be achieved.



- Planning Areas

The Township of North Brunswick participated in the cross acceptance process, which included several meetings with State and County staff and presentations of land use issues at several public hearings. The State Plan planning areas are shown on State Development and Redevelopment Plan Map.

The State Plan allocates land into five categories known as Planning Areas (PA). As shown on the State Plan Map, North Brunswick Township contains two (2) of the five (5) Planning Areas including the Metropolitan Planning Area (PA1) and the Environmentally Sensitive Planning Area (PA5).

The Metropolitan Planning Area represents the largest portion of the Township. The State Plan

defines this area as higher density post-war suburbs that are fully developed which applies to the majority of North Brunswick.

The Environmentally Sensitive Planning Area (PA5) is contiguous land area with valuable ecosystems and wildlife habitat. These planning areas are characterized by watersheds, wetlands and other environmentally sensitive lands. The wetlands and stream corridors such as the Lawrence Brook and Farrington Lake are prime examples in North Brunswick Township.

The Township's 2006 Master Plan is consistent with the State's Development and Redevelopment Plan.

INSERT MAP:

STATE DEVELOPMENT AND REDEVELOPMENT PLAN



APPENDIX A: LEVEL OF SERVICE

APPENDIX A: LEVEL OF SERVICE

Level of Service

As summarized in the Highway Capacity Manual 2000 (HCM2000), “level of service” (LOS) is a quality measure describing operational conditions within a traffic stream, generally using service measures such as speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience. Six levels of service are defined and identified with a letter designation that corresponds to the operating condition. Levels of Service range from “A”, which is the best operating condition, to “F”, which is the worst.

At signalized intersections, factors that affect the approach capacities include: traffic volume, traffic movements, traffic composition,

geometric characteristics, arrival patterns, traffic signal timing, and human factors. A descriptive mechanism has been developed which indicates, on the basis of control delay per vehicle, the relative smoothness of intersection operation (described as “level of service”). The various levels of service and delays are summarized in Table 10.

Delays cannot be related to capacity in a simple one-to-one fashion. It is possible to have delays in the LOS “F” range without exceeding roadway capacity. High delays can exist without exceeding capacity if one or more of the following conditions exist:

- Long signal lengths;
- The particular traffic movement experiences a long red time; or,
- The progressive movement for a particular lane group is poor.

Level of Service	Expected Delay	Average Control Delay per Vehicle (seconds)
A	Very low delay, good signal progression; most vehicles do not stop at intersection.	< 10
B	Good signal progression; more vehicles stop at intersection than Level of Service A.	>10 and < 20
C	Fair progression; significant numbers of vehicles stop at intersection.	>20 and < 35
D	Unfavorable progression; congestion and cycle failures become noticeable; longer delays; high v/c ratios; most vehicles stop at intersection.	>35 and < 55
E	Considered the limit of acceptable delay; poor progression; high v/c ratio; frequent cycle failures.	>55 and < 80
F	Unacceptable delay; poor progression; oversaturation; many cycle failures; v/c ratios > 1	> 80

Source: HCM2000



APPENDIX B: HCS REPORTS

HCS2000- DETAILED REPORT

General Information

Analyst MW
Agency or Co. Urban Engineers
Date Performed 8/2/05
Time Period A.M. Peak Hour - Weekday

Site Information

Intersection Route 1 & Finnegans Lane
Area Type All other areas
Jurisdiction North Brunswick
Analysis Year 2005
Project ID 5087-00 dual EB LT & widen

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N _i	2	0	1	0	2	0	0	3	0	0	3	0
Lane group	L		R		LT			T			T	
Volume, V (vph)	734		297	13	110			1929			1947	
% Heavy vehicles, %HV	2		4	0	10			6			7	
Peak-hour factor, PHF	0.96		0.75	0.75	0.79			0.93			0.92	
Pretimed (P) or actuated (A)	A		A	A	A			P			P	
Start-up lost time, I _s	2.0		2.0		2.0			2.0			2.0	
Extension of effective green, e	2.0		2.0		2.0			2.0			2.0	
Arrival type, AT	2		2		2			4			4	
Unit extension, UE	2.0		2.0		2.0			2.0			2.0	
Filtering/metering, I	1.000	1.000	1.000		1.000			1.000			1.000	
Initial unmet demand, Q _b	1.0		1.0		1.0			1.0			1.0	
Ped / Bike / RTOR volumes	0		0	0								
Lane width	12.0		12.0		12.0			12.0			12.0	
Parking / Grade / Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking maneuvers, N _m												
Buses stopping, N _B	0		0		0			0			0	
Min. time for pedestrians, G _p	3.2			3.2								

Phasing	EB Only	EW Perm	03	04	Thru Only	06	07	08
Timing	G = 39.0	G = 17.0	G =	G =	G = 67.0	G =	G =	G =
	Y = 3	Y = 6	Y =	Y =	Y = 8	Y =	Y =	Y =
Duration of Analysis, T = 0.25			Cycle Length, C = 140.0					

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted flow rate, v	765		396		157			2068			2112	
Lane group capacity, c	957		654		401			2337			2315	
v/c ratio, X	0.80		0.61		0.39			0.88			0.91	
Total green ratio, g/C	0.28		0.42		0.12			0.48			0.48	
Uniform delay, d ₁	49.2		36.4		56.8			26.5			27.2	
Progression factor, PF	1.050		1.156		1.000			0.798			0.798	
Delay calibration, k	0.32		0.14		0.04			0.50			0.50	
Incremental delay, d ₂	4.5		1.2		0.2			5.4			6.9	
Initial queue delay, d ₃	0.0		0.0		0.1			0.0			0.0	
Control delay	53.8		37.6		57.1			31.9			34.1	
Lane group LOS	D		D		E			C			C	
Approach delay	48.3			57.1			31.9			34.1		
Approach LOS	D			E			C			C		
Intersection delay	36.9			X _c = 0.80			Intersection LOS			D		

HCS2000™

Copyright © 2000 University of Florida, All Rights Reserved

Version 4.1c

HCS2000™ DETAILED REPORT

General Information

Analyst MW
Agency or Co. Urban Engineers
Date Performed 8/2/05
Time Period P.M. Peak Hour - Weekday

Site Information

Intersection Route 1 & Finnegan Lane
Area Type All other areas
Jurisdiction North Brunswick
Analysis Year 2005
Project ID 5087-00 dual EB LT & widen

Volume and Timing Input

	EB			WB			NB			SB				
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
Number of lanes, N _i	2	0	1	0	2	0	0	3	0	0	3	0		
Lane group	L		R		LT			T			T			
Volume, V (vph)	360		193	8	210			2296			1941			
% Heavy vehicles, %HV	1		3	13	2			4			2			
Peak-hour factor, PHF	0.91		0.83	0.75	0.85			0.95			0.94			
Pretimed (P) or actuated (A)	A		A	A	A			P			P			
Start-up lost time, I _s	2.0		2.0		2.0			2.0			2.0			
Extension of effective green, e	2.0		2.0		2.0			2.0			2.0			
Arrival type, AT	2		2		2			4			4			
Unit extension, UE	2.0		2.0		2.0			2.0			2.0			
Filtering/metering, I	1.000	1.000	1.000		1.000			1.000			1.000			
Initial unmet demand, Q _b	1.0		1.0		1.0			1.0			1.0			
Ped / Bike / RTOR volumes	0		0	0										
Lane width	12.0		12.0		12.0			12.0			12.0			
Parking / Grade / Parking	N	0	N	N	0	N	N	0	N	N	0	N		
Parking maneuvers, N _m														
Buses stopping, N _B	0		0		0			0			0			
Min. time for pedestrians, G _p	3.2			3.2										
Phasing	EB Only	EW Perm	03		04		Thru Only		06		07		08	
Timing	G = 29.0	G = 21.0	G =		G =		G = 73.0		G =		G =		G =	
	Y = 3	Y = 6	Y =		Y =		Y = 8		Y =		Y =		Y =	
Duration of Analysis, T = 0.25								Cycle Length, C = 140.0						

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted flow rate, v	396		233		258			2417			2065	
Lane group capacity, c	719		594		528			2595			2646	
v/c ratio, X	0.55		0.39		0.49			0.93			0.78	
Total green ratio, g/C	0.21		0.38		0.15			0.52			0.52	
Uniform delay, d ₁	50.3		35.6		54.6			23.1			19.9	
Progression factor, PF	1.011		1.119		1.000			0.732			0.732	
Delay calibration, k	0.09		0.04		0.04			0.50			0.50	
Incremental delay, d ₂	0.5		0.2		0.3			7.6			2.4	
Initial queue delay, d ₃	0.0		0.0		0.1			0.0			0.0	
Control delay	50.8		35.8		55.0			30.6			22.3	
Lane group LOS	D		D		D			C			C	
Approach delay	45.3			55.0			30.6			22.3		
Approach LOS	D			D			C			C		
Intersection delay	30.3			X _c = 0.77			Intersection LOS			C		

HCS2000- DETAILED REPORT

General Information

Analyst MW
Agency or Co. Urban Engineers
Date Performed 8/2/05
Time Period A.M. Peak Hour - Weekday

Site Information

Intersection Route 1 & Finnegan Lane
Area Type All other areas
Jurisdiction North Brunswick
Analysis Year 2005
Project ID 5087-00 North Brunswick Master Plan

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N _i	1	0	1	0	2	0	0	2	0	0	2	0
Lane group	L		R		LT			T			T	
Volume, V (vph)	734		297	13	110			1929			1947	
% Heavy vehicles, %HV	2		4	0	10			6			7	
Peak-hour factor, PHF	0.96		0.75	0.75	0.79			0.93			0.92	
Pretimed (P) or actuated (A)	A		A	A	A			P			P	
Start-up lost time, I _i	2.0		2.0		2.0			2.0			2.0	
Extension of effective green, e	2.0		2.0		2.0			2.0			2.0	
Arrival type, AT	2		2		2			4			4	
Unit extension, UE	2.0		2.0		2.0			2.0			2.0	
Filtering/metering, I	1.000	1.000	1.000		1.000			1.000			1.000	
Initial unmet demand, Q _b	1.0		1.0		1.0			1.0			1.0	
Ped / Bike / RTOR volumes	0		0	0								
Lane width	12.0		12.0		12.0			12.0			12.0	
Parking / Grade / Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking maneuvers, N _m												
Buses stopping, N _B	0		0		0			0			0	
Min. time for pedestrians, G _p	3.2			3.2								
Phasing	EB Only	EW Perm	03	04		Thru Only	06		07		08	
Timing	G = 15.0	G = 32.0	G =	G =		G = 76.0	G =		G =		G =	
	Y = 3	Y = 6	Y =	Y =		Y = 8	Y =		Y =		Y =	
Duration of Analysis, T = 0.25							Cycle Length, C = 140.0					

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted flow rate, v	765		396		157			2068			2112	
Lane group capacity, c	442		555		765			1853			1835	
v/c ratio, X	1.73		0.71		0.21			1.12			1.15	
Total green ratio, g/C	0.36		0.36		0.23			0.54			0.54	
Uniform delay, d ₁	40.0		42.8		44.8			32.0			32.0	
Progression factor, PF	1.102		1.102		1.022			0.695			0.695	
Delay calibration, k	0.50		0.24		0.04			0.50			0.50	
Incremental delay, d ₂	338.2		3.7		0.1			60.3			74.7	
Initial queue delay, d ₃	8.1		0.1		0.0			1.9			2.0	
Control delay	386.4		46.6		44.8			94.2			108.7	
Lane group LOS	F		D		D			F			F	
Approach delay	270.5			44.8			94.2			108.7		
Approach LOS	F			D			F			F		
Intersection delay	135.6			X _c = 1.45			Intersection LOS			F		

HCS2000™ DETAILED REPORT

General Information

Analyst MW
Agency or Co. Urban Engineers
Date Performed 8/2/05
Time Period P.M. Peak Hour - Weekday

Site Information

Intersection Route 1 & Finnegans Lane
Area Type All other areas
Jurisdiction North Brunswick
Analysis Year 2005
Project ID 5087-00 North Brunswick Master Plan

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N _i	1	0	1	0	2	0	0	2	0	0	2	0
Lane group	L		R		LT			T			T	
Volume, V (vph)	360		193	8	210			2296			1941	
% Heavy vehicles, %HV	1		3	13	2			4			2	
Peak-hour factor, PHF	0.91		0.83	0.75	0.85			0.95			0.94	
Pretimed (P) or actuated (A)	A		A	A	A			P			P	
Start-up lost time, l _i	2.0		2.0		2.0			2.0			2.0	
Extension of effective green, e	2.0		2.0		2.0			2.0			2.0	
Arrival type, AT	2		2		2			4			4	
Unit extension, UE	2.0		2.0		2.0			2.0			2.0	
Filtering/metering, I	1.000	1.000	1.000		1.000			1.000			1.000	
Initial unmet demand, Q _b	1.0		1.0		1.0			1.0			1.0	
Ped / Bike / RTOR volumes	0		0	0								
Lane width	12.0		12.0		12.0			12.0			12.0	
Parking / Grade / Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking maneuvers, N _m												
Buses stopping, N _B	0		0		0			0			0	
Min. time for pedestrians, G _p	3.2			3.2								

Phasing	Excl. Left	EW Perm	03	04	Thru Only	06	07	08
Timing	G = 15.0	G = 32.0	G =	G =	G = 76.0	G =	G =	G =
	Y = 3	Y = 6	Y =	Y =	Y = 8	Y =	Y =	Y =
Duration of Analysis, T = 0.25			Cycle Length, C = 140.0					

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted flow rate, v	396		233		258			2417			2065	
Lane group capacity, c	395		358		805			1888			1926	
v/c ratio, X	1.00		0.65		0.32			1.28			1.07	
Total green ratio, g/C	0.36		0.23		0.23			0.54			0.54	
Uniform delay, d ₁	54.2		50.1		46.0			32.0			32.0	
Progression factor, PF	1.102		1.022		1.022			0.695			0.695	
Delay calibration, k	0.50		0.18		0.04			0.50			0.50	
Incremental delay, d ₂	45.9		3.3		0.1			130.3			43.0	
Initial queue delay, d ₃	9.1		0.2		0.0			1.9			1.9	
Control delay	109.2		53.6		46.1			164.2			76.8	
Lane group LOS	F		D		D			F			E	
Approach delay	88.6			46.1			164.2			76.8		
Approach LOS	F			D			F			E		
Intersection delay	116.1			X _c = 1.17			Intersection LOS			F		

HCS2000* DETAILED REPORT

General Information

Analyst *MW*
 Agency or Co. *Urban Engineers*
 Date Performed *8/2/05*
 Time Period *A.M. Peak Hour - Weekday*

Site Information

Intersection *Route 27 & Cozzens Lane*
 Area Type *All other areas*
 Jurisdiction *North Brunswick*
 Analysis Year *2005*
 Project ID *5087-00 North Brunswick Master Plan*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N _i	0	0	0	1	0	1	0	1	1	0	1	0
Lane group				L		R		T	R		LT	
Volume, V (vph)				200		412		779	123	242	504	
% Heavy vehicles, %HV				2		3		2	2	2	5	
Peak-hour factor, PHF				0.79		0.91		0.89	0.75	0.90	0.86	
Pretimed (P) or actuated (A)				A		A		P	P	A	P	
Start-up lost time, I _i				2.0		2.0		2.0	2.0		2.0	
Extension of effective green, e				2.0		2.0		2.0	2.0		2.0	
Arrival type, AT				2		2		4	4		4	
Unit extension, UE				2.0		2.0		2.0	2.0		2.0	
Filtering/metering, I				1.000	1.000	1.000		1.000	1.000		1.000	
Initial unmet demand, Q ₀				1.0		1.0		1.0	1.0		1.0	
Ped / Bike / RTOR volumes	0			0		0	0		0			
Lane width				12.0		12.0		12.0	12.0		12.0	
Parking / Grade / Parking	N		N	N	0	N	N	0	N	N	0	N
Parking maneuvers, N _m												
Buses stopping, N _B				0		0		0	0		0	
Min. time for pedestrians, G _p	3.2			3.2			3.2					
Phasing	WB Only	02	03	04	SB Only		NS Perm		07	08		
Timing	G = 20.0	G =	G =	G =	G = 5.0		G = 50.0		G =	G =		
	Y = 5	Y =	Y =	Y =	Y = 3		Y = 7		Y =	Y =		
Duration of Analysis, T = 0.25								Cycle Length, C = 90.0				

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted flow rate, v				252		452		876	164		856	
Lane group capacity, c				393		348		1035	879		578	
v/c ratio, X				0.64		1.30		0.85	0.19		1.48	
Total green ratio, g/C				0.22		0.22		0.56	0.56		0.64	
Uniform delay, d ₁				32.4		35.0		11.5	6.7		16.0	
Progression factor, PF				1.019		1.019		0.671	0.671		1.000	
Delay calibration, k				0.17		0.50		0.50	0.50		0.50	
Incremental delay, d ₂				2.7		154.1		8.5	0.5		225.6	
Initial queue delay, d ₃				0.1		10.3		0.0	0.0		6.2	
Control delay				35.3		199.4		20.0	7.2		247.9	
Lane group LOS				D		F		C	A		F	
Approach delay				140.7			18.0			247.9		
Approach LOS				F			B			F		
Intersection delay	126.9			X _c = 1.47			Intersection LOS			F		

HCS2000™

Copyright © 2000 University of Florida, All Rights Reserved

Version 4.1c

HCS2000™ DETAILED REPORT

General Information

Analyst MW
Agency or Co. Urban Engineers
Date Performed 8/2/05
Time Period P.M. Peak Hour - Weekday

Site Information

Intersection Route 27 & Cozzens Lane
Area Type All other areas
Jurisdiction North Brunswick
Analysis Year 2005
Project ID 5087-00 North Brunswick Master Plan

Volume and Timing Input

			EB			WB			NB			SB		
			LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N _i			0	0	0	1	0	1	0	1	1	0	1	0
Lane group						L		R		T	R		LT	
Volume, V (vph)						384		346		668	170	378	792	
% Heavy vehicles, %HV						1		1		1	2	1	1	
Peak-hour factor, PHF						0.89		0.91		0.88	0.90	0.91	0.91	
Pretimed (P) or actuated (A)						A		A		P	P	A	P	
Start-up lost time, I _i						2.0		2.0		2.0	2.0		2.0	
Extension of effective green, e						2.0		2.0		2.0	2.0		2.0	
Arrival type, AT						2		2		4	4		4	
Unit extension, UE						2.0		2.0		2.0	2.0		2.0	
Filtering/metering, I						1.000	1.000	1.000		1.000	1.000		1.000	
Initial unmet demand, Q _b						1.0		1.0		1.0	1.0		1.0	
Ped / Bike / RTOR volumes			0			0		0	0		0			
Lane width						12.0		12.0		12.0	12.0		12.0	
Parking / Grade / Parking			N		N	N	0	N	N	0	N	N	0	N
Parking maneuvers, N _m														
Buses stopping, N _B						0		0		0	0		0	
Min. time for pedestrians, G _p			3.2			3.2			3.2					
Phasing	WB Only	02	03		04		SB Only		NS Perm		07		08	
Timing	G = 25.0	G =	G =		G =		G = 8.0		G = 42.0		G =		G =	
	Y = 5	Y =	Y =		Y =		Y = 3		Y = 7		Y =		Y =	
Duration of Analysis, T = 0.25									Cycle Length, C = 90.0					

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted flow rate, v				432		380		760	188		1284	
Lane group capacity, c				496		444		878	739		528	
v/c ratio, X				0.87		0.86		0.87	0.25		2.43	
Total green ratio, g/C				0.28		0.28		0.47	0.47		0.59	
Uniform delay, d ₁				32.5		32.3		17.7	11.9		18.5	
Progression factor, PF				1.049		1.049		0.815	0.815		1.000	
Delay calibration, k				0.38		0.37		0.50	0.50		0.50	
Incremental delay, d ₂				14.9		14.5		11.1	0.8		650.1	
Initial queue delay, d ₃				0.2		0.3		0.1	0.0		6.8	
Control delay				47.6		47.0		28.9	12.8		675.4	
Lane group LOS				D		D		C	B		F	
Approach delay				47.3			25.7			675.4		
Approach LOS				D			C			F		
Intersection delay	305.5			X _c = 2.16			Intersection LOS			F		

HCS2000™

Copyright © 2000 University of Florida, All Rights Reserved

Version 4.1c

HCS2000- DETAILED REPORT

General Information

Analyst MW
Agency or Co. Urban Engineers
Date Performed 8/2/05
Time Period A.M. Peak Hour - Weekday

Site Information

Intersection Route 27 & Cozzens Lane
Area Type All other areas
Jurisdiction North Brunswick
Analysis Year 2005 - SB L + T
Project ID 5087-00 North Brunswick Master Plan

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N _i	0	0	0	1	0	1	0	1	1	1	1	0
Lane group				L		R		T	R	L	T	
Volume, V (vph)				200		412		779	123	242	504	
% Heavy vehicles, %HV				2		3		2	2	2	5	
Peak-hour factor, PHF				0.79		0.91		0.89	0.75	0.90	0.86	
Pretimed (P) or actuated (A)				A		A		P	P	A	P	
Start-up lost time, I _i				2.0		2.0		2.0	2.0	2.0	2.0	
Extension of effective green, e				2.0		2.0		2.0	2.0	2.0	2.0	
Arrival type, AT				2		2		4	4	4	4	
Unit extension, UE				2.0		2.0		2.0	2.0	2.0	2.0	
Filtering/metering, I				1.000	1.000	1.000		1.000	1.000	1.000	1.000	
Initial unmet demand, Q _b				1.0		1.0		1.0	1.0	0.0	1.0	
Ped / Bike / RTOR volumes	0			0		0	0		0			
Lane width				12.0		12.0		12.0	12.0	12.0	12.0	
Parking / Grade / Parking	N		N	N	0	N	N	0	N	N	0	N
Parking maneuvers, N _m												
Buses stopping, N _B				0		0		0	0	0	0	
Min. time for pedestrians, G _p	3.2			3.2			3.2					
Phasing	WB Only	02	03	04	SB Only		NS Perm		07	08		
Timing	G = 18.0	G =	G =	G =	G = 12.0		G = 45.0		G =	G =		
	Y = 5	Y =	Y =	Y =	Y = 3		Y = 7		Y =	Y =		
Duration of Analysis, T = 0.25							Cycle Length, C = 90.0					

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted flow rate, v				252		452		876	164	268	588	
Lane group capacity, c				354		610		932	792	319	1207	
v/c ratio, X				0.71		0.74		0.94	0.21	0.84	0.49	
Total green ratio, g/C				0.20		0.39		0.50	0.50	0.67	0.67	
Uniform delay, d ₁				33.9		26.6		16.7	9.7	26.1	2.9	
Progression factor, PF				1.008		1.127		0.767	0.767	0.383	0.383	
Delay calibration, k				0.23		0.26		0.50	0.50	0.35	0.50	
Incremental delay, d ₂				5.7		4.3		18.1	0.6	16.9	1.4	
Initial queue delay, d ₃				0.2		0.1		0.1	0.0		0.0	
Control delay				39.8		31.0		35.0	10.3	26.9	4.3	
Lane group LOS				D		C		C	B	C	A	
Approach delay				34.1			31.1			11.4		
Approach LOS				C			C			B		
Intersection delay	25.4			X _c = 0.85			Intersection LOS			C		

HCS2000- DETAILED REPORT

General Information

Analyst MW
Agency or Co. Urban Engineers
Date Performed 8/2/05
Time Period P.M. Peak Hour - Weekday

Site Information

Intersection Route 27 & Cozzens Lane
Area Type All other areas
Jurisdiction North Brunswick
Analysis Year 2005 - SB L + T
Project ID 5087-00 North Brunswick Master Plan

Volume and Timing Input

			EB			WB			NB			SB		
			LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N _i			0	0	0	1	0	1	0	1	1	1	1	0
Lane group						L		R		T	R	L	T	
Volume, V (vph)						384		346		668	170	378	792	
% Heavy vehicles, %HV						1		1		1	2	1	1	
Peak-hour factor, PHF						0.89		0.91		0.88	0.90	0.91	0.91	
Pretimed (P) or actuated (A)						A		A		P	P	A	P	
Start-up lost time, I _i						2.0		2.0		2.0	2.0	2.0	2.0	
Extension of effective green, e						2.0		2.0		2.0	2.0	2.0	2.0	
Arrival type, AT						2		2		4	4	4	4	
Unit extension, UE						2.0		2.0		2.0	2.0	2.0	2.0	
Filtering/metering, I						1.000	1.000	1.000		1.000	1.000	1.000	1.000	
Initial unmet demand, Q _b						1.0		1.0		1.0	1.0	0.0	1.0	
Ped / Bike / RTOR volumes			0			0		0	0		0			
Lane width						12.0		12.0		12.0	12.0	12.0	12.0	
Parking / Grade / Parking			N		N	N	0	N	N	0	N	N	0	N
Parking maneuvers, N _m														
Buses stopping, N _B						0		0		0	0	0	0	
Min. time for pedestrians, G _p			3.2			3.2			3.2					
Phasing	WB Only	02	03		04		SB Only		NS Perm		07		08	
Timing	G = 22.0	G =	G =		G =		G = 16.0		G = 37.0		G =		G =	
	Y = 5	Y =	Y =		Y =		Y = 3		Y = 7		Y =		Y =	
Duration of Analysis, T = 0.25									Cycle Length, C = 90.0					

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted flow rate, v				432		380		760	188	416	868	
Lane group capacity, c				437		764		773	651	402	1170	
v/c ratio, X				0.99		0.50		0.98	0.29	1.03	0.74	
Total green ratio, g/C				0.24		0.48		0.41	0.41	0.62	0.62	
Uniform delay, d ₁				34.2		19.6		24.2	15.7	27.9	6.3	
Progression factor, PF				1.030		1.214		0.882	0.882	0.519	0.519	
Delay calibration, k				0.49		0.04		0.50	0.50	0.50	0.50	
Incremental delay, d ₂				39.9		0.2		28.5	1.1	54.2	4.3	
Initial queue delay, d ₃				3.3		0.0		0.7	0.0		0.0	
Control delay				77.3		19.8		53.4	16.9	68.6	10.6	
Lane group LOS				E		B		D	B	E	B	
Approach delay				50.4			46.2			29.4		
Approach LOS				D			D			C		
Intersection delay	40.2			X _c = 1.09			Intersection LOS			D		

HCS2000™

Copyright © 2000 University of Florida, All Rights Reserved

Version 4.1c

HCS2000™ DETAILED REPORT												
General Information							Site Information					
Analyst	MW						Intersection	Route 1 & Commerce Blvd				
Agency or Co.	Urban Engineers						Area Type	All other areas				
Date Performed	8/2/05						Jurisdiction	North Brunswick				
Time Period	A.M. Peak Hour - Weekday						Analysis Year	2005				
							Project ID	5087-00 North Brunswick Master Plan				
Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N_i	1	1	1	1	2	0	0	3	0	0	3	0
Lane group	L	T	R	L	TR			T			T	
Volume, V (vph)	248	38	33	1	52	7		2339			2348	
% Heavy vehicles, %HV	0	0	0	0	0	0		4			15	
Peak-hour factor, PHF	0.80	0.75	0.75	0.75	0.75	0.75		0.90			0.90	
Pretimed (P) or actuated (A)	A	A	A	A	A	A		P			P	
Start-up lost time, l_i	2.0	2.0	2.0	2.0	2.0			2.0			2.0	
Extension of effective green, e	2.0	2.0	2.0	2.0	2.0			2.0			2.0	
Arrival type, AT	2	2	2	2	2			4			4	
Unit extension, UE	2.0	2.0	2.0	2.0	2.0			2.0			2.0	
Filtering/metering, I	1.000	1.000	1.000	1.000	1.000			1.000			1.000	
Initial unmet demand, Q_b	1.0	1.0	1.0	1.0	1.0			1.0			1.0	
Ped / Bike / RTOR volumes	0		0	0		0						
Lane width	12.0	12.0	12.0	12.0	12.0			12.0			12.0	
Parking / Grade / Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking maneuvers, N_m												
Buses stopping, N_B	0	0	0	0	0			0			0	
Min. time for pedestrians, G_p	3.2			3.2								
Phasing	EW Perm	02	03	04	Thru Only	06	07	08				
Timing	G = 36.0	G =	G =	G =	G = 90.0	G =	G =	G =				
	Y = 6	Y =	Y =	Y =	Y = 8	Y =	Y =	Y =				
Duration of Analysis, $T = 0.25$							Cycle Length, $C = 140.0$					
Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted flow rate, v	310	51	44	1	78			2599			2609	
Lane group capacity, c	344	489	415	354	914			3199			2893	
v/c ratio, X	0.90	0.10	0.11	0.00	0.09			0.81			0.90	
Total green ratio, g/C	0.26	0.26	0.26	0.26	0.26			0.64			0.64	
Uniform delay, d_1	52.1	41.3	41.3	40.2	41.0			8.7			10.0	
Progression factor, PF	1.037	1.037	1.037	1.037	1.037			0.460			0.460	
Delay calibration, k	0.41	0.04	0.04	0.04	0.04			0.50			0.50	
Incremental delay, d_2	25.0	0.0	0.0	0.0	0.0			2.4			5.1	
Initial queue delay, d_3	0.6	0.0	0.0	0.1	0.0			0.0			0.0	
Control delay	77.7	41.3	41.4	40.3	41.0			11.1			15.1	
Lane group LOS	E	D	D	D	D			B			B	
Approach delay	69.2			41.0			11.1			15.1		
Approach LOS	E			D			B			B		
Intersection delay	17.5			$X_c = 0.90$			Intersection LOS			B		

HCS2000™ DETAILED REPORT

General Information

Analyst MW
Agency or Co. Urban Engineers
Date Performed 8/2/05
Time Period P.M. Peak Hour - Weekday

Site Information

Intersection Route 1 & Commerce Blvd
Area Type All other areas
Jurisdiction North Brunswick
Analysis Year 2005
Project ID 5087-00 North Brunswick Master Plan

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N_i	1	1	1	1	2	0	0	3	0	0	3	0
Lane group	L	T	R	L	TR			T			T	
Volume, V (vph)	289	7	53	11	63	15		2194			2413	
% Heavy vehicles, %HV	0	0	0	0	0	0		3			8	
Peak-hour factor, PHF	0.79	0.75	0.88	0.75	0.93	0.75		0.82			0.94	
Pretimed (P) or actuated (A)	A	A	A	A	A	A		P			P	
Start-up lost time, I_i	2.0	2.0	2.0	2.0	2.0			2.0			2.0	
Extension of effective green, e	2.0	2.0	2.0	2.0	2.0			2.0			2.0	
Arrival type, AT	2	2	2	2	2			4			4	
Unit extension, UE	2.0	2.0	2.0	2.0	2.0			2.0			2.0	
Filtering/metering, I	1.000	1.000	1.000	1.000	1.000			1.000			1.000	
Initial unmet demand, Q_b	1.0	1.0	1.0	1.0	1.0			1.0			1.0	
Ped / Bike / RTOR volumes	0		0	0		0						
Lane width	12.0	12.0	12.0	12.0	12.0			12.0			12.0	
Parking / Grade / Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking maneuvers, N_m												
Buses stopping, N_B	0	0	0	0	0			0			0	
Min. time for pedestrians, G_p	3.2			3.2								
Phasing	EW Perm	02	03	04	Thru Only	06	07	08				
Timing	G = 36.0	G =	G =	G =	G = 90.0	G =	G =	G =				
	Y = 6	Y =	Y =	Y =	Y = 8	Y =	Y =	Y =				
Duration of Analysis, T = 0.25							Cycle Length, C = 140.0					

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted flow rate, v	368	9	60	15	88			2685			2559	
Lane group capacity, c	340	489	415	367	898			3230			3081	
v/c ratio, X	1.08	0.02	0.14	0.04	0.10			0.83			0.83	
Total green ratio, g/C	0.26	0.26	0.26	0.26	0.26			0.64			0.64	
Uniform delay, d_1	52.0	40.4	41.7	40.6	41.2			8.9			8.9	
Progression factor, PF	1.037	1.037	1.037	1.037	1.037			0.460			0.460	
Delay calibration, k	0.50	0.04	0.04	0.04	0.04			0.50			0.50	
Incremental delay, d_2	72.6	0.0	0.1	0.0	0.0			2.7			2.8	
Initial queue delay, d_3	10.6	0.0	0.0	0.1	0.0			0.0			0.0	
Control delay	135.2	40.4	41.8	40.7	41.2			11.6			11.7	
Lane group LOS	F	D	D	D	D			B			B	
Approach delay	120.4			41.1			11.6			11.7		
Approach LOS	F			D			B			B		
Intersection delay	20.4			$X_c = 0.90$			Intersection LOS			C		

HCS2000TM DETAILED REPORT

General Information

Analyst MW
Agency or Co. Urban Engineers
Date Performed 8/2/05
Time Period A.M. Peak Hour - Weekday

Site Information

Intersection Route 1 & Commerce Blvd
Area Type All other areas
Jurisdiction North Brunswick
Analysis Year 2005 - Timing Mod.
Project ID 5087-00 North Brunswick Master Plan

Volume and Timing Input

			EB			WB			NB			SB		
			LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N_i			1	1	1	1	2	0	0	3	0	0	3	0
Lane group			L	T	R	L	TR			T			T	
Volume, V (vph)			248	38	33	1	52	7		2339			2348	
% Heavy vehicles, %HV			0	0	0	0	0	0		4			15	
Peak-hour factor, PHF			0.80	0.75	0.75	0.75	0.75	0.75		0.90			0.90	
Prefimed (P) or actuated (A)			A	A	A	A	A	A		P			P	
Start-up lost time, I_i			2.0	2.0	2.0	2.0	2.0			2.0			2.0	
Extension of effective green, e			2.0	2.0	2.0	2.0	2.0			2.0			2.0	
Arrival type, AT			2	2	2	2	2			4			4	
Unit extension, UE			2.0	2.0	2.0	2.0	2.0			2.0			2.0	
Filtering/metering, I			1.000	1.000	1.000	1.000	1.000			1.000			1.000	
Initial unmet demand, Q_b			1.0	1.0	1.0	1.0	1.0			1.0			1.0	
Ped / Bike / RTOR volumes			0		0	0		0						
Lane width			12.0	12.0	12.0	12.0	12.0			12.0			12.0	
Parking / Grade / Parking			N	0	N	N	0	N	N	0	N	N	0	N
Parking maneuvers, N_m														
Buses stopping, N_B			0	0	0	0	0			0			0	
Min. time for pedestrians, G_p			3.2			3.2								
Phasing	EB Only	EW Perm	03		04		Thru Only		06		07		08	
Timing	G = 22.0	G = 19.0	G =		G =		G = 82.0		G =		G =		G =	
	Y = 3	Y = 6	Y =		Y =		Y = 8		Y =		Y =		Y =	
Duration of Analysis, T = 0.25									Cycle Length, C = 140.0					

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted flow rate, v	310	51	44	1	78			2599			2609	
Lane group capacity, c	437	597	508	187	482			2915			2636	
v/c ratio, X	0.71	0.09	0.09	0.01	0.16			0.89			0.99	
Total green ratio, g/C	0.31	0.31	0.31	0.14	0.14			0.59			0.59	
Uniform delay, d_1	42.2	36.3	36.4	52.5	53.5			15.5			19.1	
Progression factor, PF	1.072	1.072	1.072	1.000	1.000			0.608			0.608	
Delay calibration, k	0.23	0.04	0.04	0.04	0.04			0.50			0.50	
Incremental delay, d_2	4.5	0.0	0.0	0.0	0.1			4.6			15.3	
Initial queue delay, d_3	0.1	0.0	0.0	0.2	0.0			0.0			0.1	
Control delay	46.9	36.4	36.4	52.7	53.6			20.1			34.5	
Lane group LOS	D	D	D	D	D			C			C	
Approach delay	44.4			53.6			20.1			34.5		
Approach LOS	D			D			C			C		
Intersection delay	28.9			$X_c = 0.85$			Intersection LOS			C		

HCS2000- DETAILED REPORT

General Information

Analyst MW
Agency or Co. Urban Engineers
Date Performed 8/2/05
Time Period P.M. Peak Hour - Weekday

Site Information

Intersection Route 1 & Commerce Blvd
Area Type All other areas
Jurisdiction North Brunswick
Analysis Year 2005 - Timing Mod.
Project ID 5087-00 North Brunswick Master Plan

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N_i	1	1	1	1	2	0	0	3	0	0	3	0
Lane group	L	T	R	L	TR			T			T	
Volume, V (vph)	289	7	53	11	63	15		2194			2413	
% Heavy vehicles, %HV	0	0	0	0	0	0		3			8	
Peak-hour factor, PHF	0.79	0.75	0.88	0.75	0.93	0.75		0.82			0.94	
Pretimed (P) or actuated (A)	A	A	A	A	A	A		P			P	
Start-up lost time, l_i	2.0	2.0	2.0	2.0	2.0			2.0			2.0	
Extension of effective green, e	2.0	2.0	2.0	2.0	2.0			2.0			2.0	
Arrival type, AT	2	2	2	2	2			4			4	
Unit extension, UE	2.0	2.0	2.0	2.0	2.0			2.0			2.0	
Filtering/metering, I	1.000	1.000	1.000	1.000	1.000			1.000			1.000	
Initial unmet demand, Q_b	1.0	1.0	1.0	1.0	1.0			1.0			1.0	
Ped / Bike / RTOR volumes	0		0	0		0						
Lane width	12.0	12.0	12.0	12.0	12.0			12.0			12.0	
Parking / Grade / Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking maneuvers, N_m												
Buses stopping, N_B	0	0	0	0	0			0			0	
Min. time for pedestrians, G_p	3.2			3.2								
Phasing	EB Only	EW Perm	03	04	Thru Only	06	07	08				
Timing	G = 22.0	G = 22.0	G =	G =	G = 79.0	G =	G =	G =				
	Y = 3	Y = 6	Y =	Y =	Y = 8	Y =	Y =	Y =				
Duration of Analysis, T = 0.25							Cycle Length, C = 140.0					

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted flow rate, v	368	9	60	15	88			2685			2559	
Lane group capacity, c	464	638	542	224	549			2836			2704	
v/c ratio, X	0.79	0.01	0.11	0.07	0.16			0.95			0.95	
Total green ratio, g/C	0.34	0.34	0.34	0.16	0.16			0.56			0.56	
Uniform delay, d_1	45.2	33.8	35.0	50.4	51.1			19.0			19.0	
Progression factor, PF	1.087	1.087	1.087	1.000	1.000			0.654			0.654	
Delay calibration, k	0.31	0.04	0.04	0.04	0.04			0.50			0.50	
Incremental delay, d_2	8.4	0.0	0.0	0.0	0.1			8.4			8.6	
Initial queue delay, d_3	0.2	0.0	0.0	0.2	0.0			0.0			0.0	
Control delay	53.8	33.8	35.0	50.6	51.2			27.3			27.6	
Lane group LOS	D	C	D	D	D			C			C	
Approach delay	50.8			51.1			27.3			27.6		
Approach LOS	D			D			C			C		
Intersection delay	29.7			$X_c = 0.86$			Intersection LOS			C		

HCS2000- DETAILED REPORT

General Information		Site Information	
Analyst	MW	Intersection	Route 1 & Adams/Cozzens Lane
Agency or Co.	Urban Engineers	Area Type	All other areas
Date Performed	8/2/05	Jurisdiction	North Brunswick
Time Period	A.M. Peak Hour - Weekday	Analysis Year	2005
		Project ID	5087-00 North Brunswick Master Plan

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N _i	1	1	0	1	1	0	0	3	0	0	4	0
Lane group	L	TR		L	TR			T			TR	
Volume, V (vph)	210	334	33	144	223	172		2749			1600	119
% Heavy vehicles, %HV	2	9	3	6	2	7		4			15	1
Peak-hour factor, PHF	0.75	0.95	0.75	0.84	0.77	0.88		0.97			0.83	0.75
Pretimed (P) or actuated (A)	A	A	A	A	A	A		P			P	P
Start-up lost time, I _s	2.0	2.0		2.0	2.0			2.0			2.0	
Extension of effective green, e	2.0	2.0		2.0	2.0			2.0			2.0	
Arrival type, AT	2	2		2	2			4			4	
Unit extension, UE	2.0	2.0		2.0	2.0			2.0			2.0	
Filtering/metering, I	1.000	1.000		1.000	1.000			1.000			1.000	
Initial unmet demand, Q _b	1.0	1.0		1.0	1.0			1.0			1.0	
Ped / Bike / RTOR volumes	0		0	0		0				0		0
Lane width	11.0	11.0		11.0	11.0			12.0			12.0	
Parking / Grade / Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking maneuvers, N _m												
Buses stopping, N _B	0	0		0	0			0			0	
Min. time for pedestrians, G _p	3.2			3.2						3.2		
Phasing	Excl. Left	EW Perm	03	04		Thru & RT	06		07		08	
Timing	G = 11.0	G = 35.0	G =	G =		G = 76.0	G =		G =		G =	
	Y = 3	Y = 7	Y =	Y =		Y = 8	Y =		Y =		Y =	
Duration of Analysis, T = 0.25							Cycle Length, C = 140.0					

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted flow rate, v	280	396		172	484			2831			2087	
Lane group capacity, c	186	417		181	415			2702			3251	
v/c ratio, X	1.51	0.95		0.95	1.17			1.05			0.64	
Total green ratio, g/C	0.35	0.25		0.35	0.25			0.54			0.54	
Uniform delay, d ₁	16.6	53.2		29.6	52.5			32.0			15.7	
Progression factor, PF	1.097	1.033		1.097	1.033			0.695			0.695	
Delay calibration, k	0.50	0.45		0.45	0.50			0.50			0.50	
Incremental delay, d ₂	253.3	31.1		52.0	98.0			31.5			1.0	
Initial queue delay, d ₃	19.4	0.8		4.4	8.7			1.3			0.0	
Control delay	289.3	85.1		85.9	159.2			64.8			16.6	
Lane group LOS	F	F		F	F			E			B	
Approach delay	169.7			140.0			64.8			16.6		
Approach LOS	F			F			E			B		
Intersection delay	68.0			X _c = 1.59			Intersection LOS			E		

HCS2000~ DETAILED REPORT

General Information

Analyst MW
Agency or Co. Urban Engineers
Date Performed 8/2/05
Time Period P.M. Peak Hour - Weekday

Site Information

Intersection Route 1 & Adams/Cozzens Lane
Area Type All other areas
Jurisdiction North Brunswick
Analysis Year 2005
Project ID 5087-00 North Brunswick Master Plan

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N _i	1	1	0	1	1	0	0	3	0	0	4	0
Lane group	L	TR		L	TR			T			TR	
Volume, V (vph)	324	640	11	163	276	172		2671			1702	239
% Heavy vehicles, %HV	1	9	18	1	5	3		3			8	2
Peak-hour factor, PHF	0.87	0.82	0.75	0.89	0.90	0.78		0.97			0.94	0.89
Pretimed (P) or actuated (A)	A	A	A	A	A	A		P			P	P
Start-up lost time, I _s	2.0	2.0		2.0	2.0			2.0			2.0	
Extension of effective green, e	2.0	2.0		2.0	2.0			2.0			2.0	
Arrival type, AT	2	2		2	2			4			4	
Unit extension, UE	2.0	2.0		2.0	2.0			2.0			2.0	
Filtering/metering, I	1.000	1.000		1.000	1.000			1.000			1.000	
Initial unmet demand, Q _b	1.0	1.0		1.0	1.0			1.0			1.0	
Ped / Bike / RTOR volumes	0		0	0		0				0		0
Lane width	11.0	11.0		11.0	11.0			12.0			12.0	
Parking / Grade / Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking maneuvers, N _m												
Buses stopping, N _B	0	0		0	0			0			0	
Min. time for pedestrians, G _p	3.2			3.2						3.2		
Phasing	Excl. Left	EW Perm	03	04	Thru & RT	06	07	08				
Timing	G = 11.0	G = 35.0	G =	G =	G = 76.0	G =	G =	G =				
	Y = 3	Y = 7	Y =	Y =	Y = 8	Y =	Y =	Y =				
Duration of Analysis, T = 0.25							Cycle Length, C = 140.0					

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted flow rate, v	372	795		183	528			2754			2080	
Lane group capacity, c	188	420		188	413			2728			3426	
v/c ratio, X	1.98	1.89		0.97	1.28			1.01			0.61	
Total green ratio, g/C	0.35	0.25		0.35	0.25			0.54			0.54	
Uniform delay, d ₁	16.7	52.5		21.9	52.5			32.0			15.2	
Progression factor, PF	1.097	1.033		1.097	1.033			0.695			0.695	
Delay calibration, k	0.50	0.50		0.48	0.50			0.50			0.50	
Incremental delay, d ₂	459.0	410.7		57.5	142.9			19.6			0.8	
Initial queue delay, d ₃	19.1	8.6		7.7	8.7			1.3			0.0	
Control delay	494.9	471.7		87.0	204.1			52.9			16.0	
Lane group LOS	F	F		F	F			D			B	
Approach delay	479.1			173.9			52.9			16.0		
Approach LOS	F			F			D			B		
Intersection delay	128.4			X _c = 2.09			Intersection LOS			F		

HCS2000~ DETAILED REPORT

General Information

Analyst MW
Agency or Co. Urban Engineers
Date Performed 8/2/05
Time Period A.M. Peak Hour - Weekday

Site Information

Intersection Route 1 & Adams/Cozzens Lane
Area Type All other areas
Jurisdiction North Brunswick
Analysis Year 2005 - 4T NB EB L/2T WB L/T/R
Project ID 5087-00 North Brunswick Master Plan

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N _i	1	2	0	1	1	1	0	4	0	0	4	0
Lane group	L	TR		L	T	R		T			TR	
Volume, V (vph)	210	334	33	144	223	172		2749			1600	119
% Heavy vehicles, %HV	2	9	3	6	2	7		4			15	1
Peak-hour factor, PHF	0.75	0.95	0.75	0.84	0.77	0.88		0.97			0.83	0.75
Pretimed (P) or actuated (A)	A	A	A	A	A	A		P			P	P
Start-up lost time, I _i	2.0	2.0		2.0	2.0	2.0		2.0			2.0	
Extension of effective green, e	2.0	2.0		2.0	2.0	2.0		2.0			2.0	
Arrival type, AT	2	2		2	2	3		4			4	
Unit extension, UE	2.0	2.0		2.0	2.0	3.0		2.0			2.0	
Filtering/metering, I	1.000	1.000		1.000	1.000	1.000		1.000			1.000	
Initial unmet demand, Q _b	1.0	1.0		1.0	1.0	0.0		1.0			1.0	
Ped / Bike / RTOR volumes	0		0	0		0				0		0
Lane width	12.0	12.0		12.0	12.0	12.0		12.0			12.0	
Parking / Grade / Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking maneuvers, N _m												
Buses stopping, N _B	0	0		0	0	0		0			0	
Min. time for pedestrians, G _p	3.2			3.2						3.2		
Phasing	Excl. Left	EW Perm	03	04		Thru & RT	06		07		08	
Timing	G = 20.0	G = 37.0	G =	G =		G = 65.0	G =		G =		G =	
	Y = 3	Y = 7	Y =	Y =		Y = 8	Y =		Y =		Y =	
Duration of Analysis, T = 0.25							Cycle Length, C = 140.0					

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted flow rate, v	280	396		172	288	196		2831			2087	
Lane group capacity, c	403	868		413	492	399		3081			2780	
v/c ratio, X	0.69	0.46		0.42	0.59	0.49		0.92			0.75	
Total green ratio, g/C	0.43	0.26		0.43	0.26	0.26		0.46			0.46	
Uniform delay, d ₁	33.2	44.9		30.3	46.8	43.5		28.8			25.3	
Progression factor, PF	1.163	1.041		1.163	1.041	1.000		0.818			0.818	
Delay calibration, k	0.22	0.04		0.04	0.12	0.11		0.50			0.50	
Incremental delay, d ₂	4.3	0.1		0.2	1.2	1.0		5.7			1.9	
Initial queue delay, d ₃	0.1	0.0		0.1	0.1			0.0			0.0	
Control delay	37.7	45.1		30.6	48.1	44.5		34.5			27.2	
Lane group LOS	D	D		C	D	D		C			C	
Approach delay	42.0			42.4			34.5			27.2		
Approach LOS	D			D			C			C		
Intersection delay	33.7			X _c = 0.86			Intersection LOS			C		

HCS2000- DETAILED REPORT

General Information

Analyst MW
Agency or Co. Urban Engineers
Date Performed 8/2/05
Time Period P.M. Peak Hour - Weekday

Site Information

Intersection Route 1 & Adams/Cozzens Lane
Area Type All other areas
Jurisdiction North Brunswick
Analysis Year 2005 - NB 4T EB L/2T WB L/T/R
Project ID 5087-00 North Brunswick Master Plan

Volume and Timing Input

			EB			WB			NB			SB		
			LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N _i			1	2	0	1	1	1	0	4	0	0	4	0
Lane group			L	TR		L	T	R		T			TR	
Volume, V (vph)			324	640	11	163	276	172		2671			1702	239
% Heavy vehicles, %HV			1	9	18	1	5	3		3			8	2
Peak-hour factor, PHF			0.87	0.82	0.75	0.89	0.90	0.78		0.97			0.94	0.89
Pretimed (P) or actuated (A)			A	A	A	A	A	A		P			P	P
Start-up lost time, I _s			2.0	2.0		2.0	2.0	2.0		2.0			2.0	
Extension of effective green, e			2.0	2.0		2.0	2.0	2.0		2.0			2.0	
Arrival type, AT			2	2		2	2	3		4			4	
Unit extension, UE			2.0	2.0		2.0	2.0	3.0		2.0			2.0	
Filtering/metering, I			1.000	1.000		1.000	1.000	1.000		1.000			1.000	
Initial unmet demand, Q _b			1.0	1.0		1.0	1.0	0.0		1.0			1.0	
Ped / Bike / RTOR volumes			0		0	0		0				0		0
Lane width			11.0	11.0		11.0	11.0	12.0		12.0			12.0	
Parking / Grade / Parking			N	0	N	N	0	N	N	0	N	N	0	N
Parking maneuvers, N _m														
Buses stopping, N _B			0	0		0	0	0		0			0	
Min. time for pedestrians, G _p			3.2			3.2						3.2		
Phasing	Excl. Left	EW Perm	03		04		Thru & RT		06		07		08	
Timing	G = 19.0	G = 43.0	G =		G =		G = 60.0		G =		G =		G =	
	Y = 3	Y = 7	Y =		Y =		Y = 8		Y =		Y =		Y =	
Duration of Analysis, T = 0.25									Cycle Length, C = 140.0					

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted flow rate, v	372	795		183	307	221		2754			2080	
Lane group capacity, c	418	981		306	537	482		2871			2705	
v/c ratio, X	0.89	0.81		0.60	0.57	0.46		0.96			0.77	
Total green ratio, g/C	0.46	0.31		0.46	0.31	0.31		0.43			0.43	
Uniform delay, d ₁	45.8	47.8		31.8	43.6	39.1		33.7			29.5	
Progression factor, PF	1.199	1.067		1.199	1.067	1.000		0.862			0.862	
Delay calibration, k	0.40	0.33		0.13	0.11	0.11		0.50			0.50	
Incremental delay, d ₂	19.8	4.8		2.3	0.9	0.7		9.7			2.2	
Initial queue delay, d ₃	0.4	0.0		0.2	0.1			0.0			0.0	
Control delay	66.0	52.6		34.3	44.6	39.8		43.4			31.6	
Lane group LOS	E	D		C	D	D		D			C	
Approach delay	56.9			40.5			43.4			31.6		
Approach LOS	E			D			D			C		
Intersection delay	41.8			X _c = 0.94			Intersection LOS			D		

HCS2000™

Copyright © 2000 University of Florida, All Rights Reserved

Version 4.1c

HCS2000™ DETAILED REPORT

General Information

Analyst MW
 Agency or Co. Urban Engineers
 Date Performed 8/3/05
 Time Period A.M. Peak Hour - Weekday

Site Information

Intersection Livingston Ave & How Lane
 Area Type All other areas
 Jurisdiction North Brunswick
 Analysis Year 2005
 Project ID 5087-00 North Brunswick
 Master Plan - Existing

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N_i	0	0	0	0	0	0	1	1	0	0	1	1
Lane group		LR					L	T			T	R
Volume, V (vph)	460		144				230	317			177	613
% Heavy vehicles, %HV	6		10				8	4			11	3
Peak-hour factor, PHF	0.91		0.88				0.88	0.79			0.85	0.83
Pretimed (P) or actuated (A)	A		A				A	P			P	P
Start-up lost time, I_i		2.0					2.0	2.0			2.0	2.0
Extension of effective green, e		2.0					2.0	2.0			2.0	2.0
Arrival type, AT		4					4	4			4	4
Unit extension, UE		2.0					2.0	2.0			2.0	2.0
Filtering/metering, I		1.000					1.000	1.000			1.000	1.000
Initial unmet demand, Q_b		1.0					1.0	1.0			1.0	1.0
Ped / Bike / RTOR volumes	0		0	0						0		0
Lane width		16.0					12.0	12.0			12.0	12.0
Parking / Grade / Parking	N	0	N	N		N	N	0	N	N	0	N
Parking maneuvers, N_m												
Buses stopping, N_B		0					0	0			0	0
Min. time for pedestrians, G_p	3.2			3.2						3.2		
Phasing	EB Only	02	03	04	NS Perm		NB Only		07		08	
Timing	G = 32.0	G =	G =	G =	G = 23.0		G = 18.0		G =		G =	
	Y = 5	Y =	Y =	Y =	Y = 6		Y = 6		Y =		Y =	
Duration of Analysis, T = 0.25							Cycle Length, C = 90.0					

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted flow rate, v		669					261	401			208	739
Lane group capacity, c		667					702	954			438	1045
v/c ratio, X		1.00					0.37	0.42			0.47	0.71
Total green ratio, g/C		0.36					0.52	0.52			0.26	0.67
Uniform delay, d_1		29.0					10.8	9.7			28.5	3.8
Progression factor, PF		0.939					0.731	0.731			1.000	0.383
Delay calibration, k		0.50					0.04	0.50			0.50	0.50
Incremental delay, d_2		35.6					0.1	1.4			3.7	4.0

Initial queue delay, d_3		5.4					0.0	0.0			0.1	0.0
Control delay		70.0					10.9	11.1			32.2	7.8
Lane group LOS		E					B	B			C	A
Approach delay	70.0						11.0		13.2			
Approach LOS	E						B		B			
Intersection delay	29.2		$X_c = 0.00$				Intersection LOS		C			

HCS2000™

Copyright © 2000 University of Florida, All Rights Reserved

Version 4.1e

HCS2000™ DETAILED REPORT

General Information

Analyst *MW*
 Agency or Co. *Urban Engineers*
 Date Performed *8/3/05*
 Time Period *P.M. Peak Hour - Weekday*

Site Information

Intersection *Livingston Ave & How Lane*
 Area Type *All other areas*
 Jurisdiction *North Brunswick*
 Analysis Year *2005*
 Project ID *5087-00 North Brunswick*
Master Plan - Existing

Volume and Timing Input

			EB			WB			NB			SB		
			LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N_1			0	0	0	0	0	0	1	1	0	0	1	1
Lane group				LR					L	T			T	R
Volume, V (vph)			649		245				214	362			341	502
% Heavy vehicles, %HV			3		5				3	6			2	4
Peak-hour factor, PHF			0.90		0.88				0.82	0.88			0.87	0.93
Pretimed (P) or actuated (A)			A		A				A	P			P	P
Start-up lost time, I_1				2.0					2.0	2.0			2.0	2.0
Extension of effective green, e				2.0					2.0	2.0			2.0	2.0
Arrival type, AT				4					4	4			4	4
Unit extension, UE				2.0					2.0	2.0			2.0	2.0
Filtering/metering, I				1.000					1.000	1.000			1.000	1.000
Initial unmet demand, Q_b				1.0					1.0	1.0			1.0	1.0
Ped / Bike / RTOR volumes			0		0	0						0		0
Lane width				16.0					12.0	12.0			12.0	12.0
Parking / Grade / Parking			N	0	N	N		N	N	0	N	N	0	N
Parking maneuvers, N_m														
Buses stopping, N_B				0					0	0			0	0
Min. time for pedestrians, G_p			3.2			3.2						3.2		
Phasing	EB Only	02	03		04		NS Perm		NB Only		07		08	
Timing	G = 39.0	G =	G =		G =		G = 25.0		G = 9.0		G =		G =	
	Y = 5	Y =	Y =		Y =		Y = 6		Y = 6		Y =		Y =	
Duration of Analysis, T = 0.25									Cycle Length, C = 90.0					

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted flow rate, v		999					261	411			392	540
Lane group capacity, c		837					440	796			518	1191
v/c ratio, X		1.19					0.59	0.52			0.76	0.45
Total green ratio, g/C		0.43					0.44	0.44			0.28	0.77
Uniform delay, d_1		25.5					23.2	15.3			29.8	1.0
Progression factor, PF		0.857					0.843	0.843			1.000	0.246
Delay calibration, k		0.50					0.13	0.50			0.50	0.50
Incremental delay, d_2		98.8					1.5	2.4			9.9	1.2

Initial queue delay, d_3		4.3					0.1	0.0			0.1	0.0
Control delay		128.6					24.8	17.7			39.8	2.2
Lane group LOS		F					C	B			D	A
Approach delay	128.6						20.5		18.1			
Approach LOS	F						C		B			
Intersection delay	61.1		$X_c = 0.00$				Intersection LOS		E			

HCS2000™

Copyright © 2000 University of Florida, All Rights Reserved

Version 4.1e

HCS2000™ DETAILED REPORT

General Information		Site Information	
Analyst	MW	Intersection	Livingston Ave & How Lane
Agency or Co.	Urban Engineers	Area Type	All other areas
Date Performed	8/3/05	Jurisdiction	North Brunswick
Time Period	A.M. Peak Hour - Weekday	Analysis Year	2005
			5087-00 North Brunswick
		Project ID	Master Plan - RT Lane Add'l Storage

Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N_1	1	0	1	0	0	0	1	1	0	0	1	1
Lane group	L		R				L	T			T	R
Volume, V (vph)	460		144				230	317			177	613
% Heavy vehicles, %HV	6		10				8	4			11	3
Peak-hour factor, PHF	0.91		0.88				0.88	0.79			0.85	0.83
Pretimed (P) or actuated (A)	A		A				A	P			P	P
Start-up lost time, l_1	2.0		2.0				2.0	2.0			2.0	2.0
Extension of effective green, e	2.0		2.0				2.0	2.0			2.0	2.0
Arrival type, AT	3		3				4	4			4	4
Unit extension, UE	2.0		2.0				2.0	2.0			2.0	2.0
Filtering/metering, I	1.000	1.000	1.000				1.000	1.000			1.000	1.000
Initial unmet demand, Q_b	1.0		1.0				1.0	1.0			1.0	1.0
Ped / Bike / RTOR volumes	0		0	0						0		0
Lane width	12.0		12.0				12.0	12.0			12.0	12.0
Parking / Grade / Parking	N	0	N	N		N	N	0	N	N	0	N
Parking maneuvers, N_m												
Buses stopping, N_B	0		0				0	0			0	0
Min. time for pedestrians, G_p	3.2			3.2						3.2		
Phasing	EB Only	02	03	04	NS Perm		NB Only	07	08			
Timing	G = 32.0	G =	G =	G =	G = 23.0		G = 18.0	G =	G =			
	Y = 5	Y =	Y =	Y =	Y = 6		Y = 6	Y =	Y =			
Duration of Analysis, T = 0.25				Cycle Length, C = 90.0								

Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted flow rate, v	505		164				261	401			208	739
Lane group capacity, c	606		522				702	954			438	1045
v/c ratio, X	0.83		0.31				0.37	0.42			0.47	0.71
Total green ratio, g/C	0.36		0.36				0.52	0.52			0.26	0.67
Uniform delay, d_1	26.7		21.1				10.8	9.7			28.5	3.8
Progression factor, PF	1.000		1.000				0.731	0.731			1.000	0.383
Delay calibration, k	0.35		0.04				0.04	0.50			0.50	0.50
	9.2		0.1				0.1	1.4			3.7	4.0

Incremental delay, d_2												
Initial queue delay, d_3	0.1		0.0				0.0	0.0			0.1	0.0
Control delay	35.9		21.3				10.9	11.1			32.2	7.8
Lane group LOS	D		C				B	B			C	A
Approach delay	32.4						11.0			13.2		
Approach LOS	C						B			B		
Intersection delay	18.2			$X_c = 0.00$			Intersection LOS			B		

HCS2000™

Copyright © 2000 University of Florida, All Rights Reserved

Version 4.1c

HCS2000™ DETAILED REPORT

General Information		Site Information	
Analyst	MW	Intersection	Livingston Ave & How Lane
Agency or Co.	Urban Engineers	Area Type	All other areas
Date Performed	8/3/05	Jurisdiction	North Brunswick
Time Period	P.M. Peak Hour - Weekday	Analysis Year	2005
			5087-00 North Brunswick
		Project ID	Master Plan - RT Lane Add'l Storage

Volume and Timing Input

			EB			WB			NB			SB		
			LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N_i			1	0	1	0	0	0	1	1	0	0	1	1
Lane group			L		R				L	T			T	R
Volume, V (vph)			649		245				214	362			341	502
% Heavy vehicles, %HV			3		5				3	6			2	4
Peak-hour factor, PHF			0.90		0.88				0.82	0.88			0.87	0.93
Pretimed (P) or actuated (A)			A		A				A	P			P	P
Start-up lost time, I_i			2.0		2.0				2.0	2.0			2.0	2.0
Extension of effective green, e			2.0		2.0				2.0	2.0			2.0	2.0
Arrival type, AT			3		3				4	4			4	4
Unit extension, UE			2.0		2.0				2.0	2.0			2.0	2.0
Filtering/metering, I			1.000	1.000	1.000				1.000	1.000			1.000	1.000
Initial unmet demand, Q_b			1.0		1.0				1.0	1.0			1.0	1.0
Ped / Bike / RTOR volumes			0		0	0						0		0
Lane width			12.0		12.0				12.0	12.0			12.0	12.0
Parking / Grade / Parking			N	0	N	N		N	N	0	N	N	0	N
Parking maneuvers, N_m														
Buses stopping, N_B			0		0				0	0			0	0
Min. time for pedestrians, G_p			3.2			3.2						3.2		
Phasing	EB Only	02	03		04		NS Perm		NB Only		07		08	
Timing	G = 39.0	G =	G =		G =		G = 25.0		G = 9.0		G =		G =	
	Y = 5	Y =	Y =		Y =		Y = 6		Y = 6		Y =		Y =	
Duration of Analysis, T = 0.25									Cycle Length, C = 90.0					

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted flow rate, v	721		278				261	411			392	540
Lane group capacity, c	759		666				440	796			518	1191
v/c ratio, X	0.95		0.42				0.59	0.52			0.76	0.45
Total green ratio, g/C	0.43		0.43				0.44	0.44			0.28	0.77
Uniform delay, d_1	24.7		17.7				23.2	15.3			29.8	1.0
Progression factor, PF	1.000		1.000				0.843	0.843			1.000	0.246
Delay calibration, k	0.45		0.04				0.13	0.50			0.50	0.50
	21.1		0.2				1.5	2.4			9.9	1.2

Incremental delay, d_2												
Initial queue delay, d_3	0.2		0.0				0.1	0.0			0.1	0.0
Control delay	46.0		17.9				24.8	17.7			39.8	2.2
Lane group LOS	D		B				C	B			D	A
Approach delay	38.2						20.5			18.1		
Approach LOS	D						C			B		
Intersection delay	26.4			$X_c = 0.00$			Intersection LOS			C		

HCS2000™

Copyright © 2000 University of Florida, All Rights Reserved

Version 4.1c

HCS2000~ DETAILED REPORT

General Information		Site Information	
Analyst	MW	Intersection	Route 130 & Renaissance Blvd
Agency or Co.	Urban Engineers	Area Type	All other areas
Date Performed	8/2/05	Jurisdiction	North Brunswick
Time Period	A.M. Peak Hour - Weekday	Analysis Year	2005
		Project ID	5087-00 North Brunswick Master Plan

Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N _i	2	0	0	0	0	0	1	2	0	0	2	0
Lane group	L						L	T			T	
Volume, V (vph)	500						91	1495			1382	
% Heavy vehicles, %HV	1						11	9			8	
Peak-hour factor, PHF	0.87						0.91	0.95			0.87	
Prelimed (P) or actuated (A)	A						A	P			P	
Start-up lost time, I _s	2.0						2.0	2.0			2.0	
Extension of effective green, e	2.0						2.0	2.0			2.0	
Arrival type, AT	2						4	4			4	
Unit extension, UE	2.0						2.0	2.0			2.0	
Filtering/metering, I	1.000	1.000					1.000	1.000			1.000	
Initial unmet demand, Q _b	1.0						1.0	1.0			1.0	
Ped / Bike / RTOR volumes				0						0		
Lane width	12.0						12.0	12.0			12.0	
Parking / Grade / Parking	N	0	N	N		N	N	0	N	N	0	N
Parking maneuvers, N _m												
Buses stopping, N _B	0						0	0			0	
Min. time for pedestrians, G _p				3.2						3.2		
Phasing	EB Only	02	03		04		NB Only		Thru Only		07	08
Timing	G = 21.0	G =	G =		G =		G = 12.0		G = 38.0		G =	G =
	Y = 6	Y =	Y =		Y =		Y = 5		Y = 8		Y =	Y =
Duration of Analysis, T = 0.25							Cycle Length, C = 90.0					

Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted flow rate, v	572						100	1574			1589	
Lane group capacity, c	810						217	2028			1414	
v/c ratio, X	0.71						0.46	0.78			1.12	
Total green ratio, g/C	0.23						0.13	0.61			0.42	
Uniform delay, d ₁	32.5						36.1	7.2			26.0	
Progression factor, PF	1.024						1.000	0.548			0.870	
Delay calibration, k	0.23						0.04	0.50			0.50	
Incremental delay, d ₂	2.4						0.6	3.0			65.5	
Initial queue delay, d ₃	0.0						0.3	0.0			2.5	
Control delay	34.9						37.0	10.2			94.1	
Lane group LOS	C						D	B			F	
Approach delay	34.9						11.8			94.1		
Approach LOS	C						B			F		
Intersection delay	49.3			X _c = 0.89			Intersection LOS			D		

HCS2000- DETAILED REPORT

General Information

Analyst MW
Agency or Co. Urban Engineers
Date Performed 8/2/05
Time Period P.M. Peak Hour - Weekday

Site Information

Intersection Route 130 & Renaissance Blvd
Area Type All other areas
Jurisdiction North Brunswick
Analysis Year 2005
Project ID 5087-00 North Brunswick Master Plan

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N _i	2	0	0	0	0	0	1	2	0	0	2	0
Lane group	L						L	T			T	
Volume, V (vph)	296						232	1504			1603	
% Heavy vehicles, %HV	1						1	4			3	
Peak-hour factor, PHF	0.93						0.85	0.90			0.96	
Pretimed (P) or actuated (A)	A						A	P			P	
Start-up lost time, I _i	2.0						2.0	2.0			2.0	
Extension of effective green, e	2.0						2.0	2.0			2.0	
Arrival type, AT	2						4	4			4	
Unit extension, UE	2.0						2.0	2.0			2.0	
Filtering/metering, I	1.000	1.000					1.000	1.000			1.000	
Initial unmet demand, Q _b	1.0						1.0	1.0			1.0	
Ped / Bike / RTOR volumes				0						0		
Lane width	12.0						12.0	12.0			12.0	
Parking / Grade / Parking	N	0	N	N		N	N	0	N	N	0	N
Parking maneuvers, N _m												
Buses stopping, N _B	0						0	0			0	
Min. time for pedestrians, G _p						3.2						3.2
Phasing	EB Only	02	03	04		NB Only	Thru Only	07	08			
Timing	G = 21.0	G =	G =	G =		G = 12.0	G = 38.0	G =	G =			
	Y = 6	Y =	Y =	Y =		Y = 5	Y = 8	Y =	Y =			
Duration of Analysis, T = 0.25				Cycle Length, C = 90.0								

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted flow rate, v	320						273	1671			1672	
Lane group capacity, c	810						238	2125			1483	
v/c ratio, X	0.40						1.15	0.79			1.13	
Total green ratio, g/C	0.23						0.13	0.61			0.42	
Uniform delay, d ₁	29.9						39.0	7.3			26.0	
Progression factor, PF	1.024						1.000	0.548			0.870	
Delay calibration, k	0.04						0.50	0.50			0.50	
Incremental delay, d ₂	0.1						103.8	3.0			66.6	
Initial queue delay, d ₃	0.0						15.1	0.0			2.4	
Control delay	30.0						157.9	10.3			95.0	
Lane group LOS	C						F	B			F	
Approach delay	30.0						31.0			95.0		
Approach LOS	C						C			F		
Intersection delay	58.1			X _c = 0.91			Intersection LOS			E		

HCS2000™ DETAILED REPORT

General Information		Site Information	
Analyst	MW	Intersection	Route 130 & Renaissance Blvd
Agency or Co.	Urban Engineers	Area Type	All other areas
Date Performed	8/2/05	Jurisdiction	North Brunswick
Time Period	A.M. Peak Hour - Weekday	Analysis Year	2005 - Timing Mod.
		Project ID	5087-00 North Brunswick Master Plan

Volume and Timing Input

			EB			WB			NB			SB		
			LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N_i			2	0	0	0	0	0	1	2	0	0	2	0
Lane group			L						L	T			T	
Volume, V (vph)			500						91	1495			1382	
% Heavy vehicles, %HV			1						11	9			8	
Peak-hour factor, PHF			0.87						0.91	0.95			0.87	
Pretimed (P) or actuated (A)			A						A	P			P	
Start-up lost time, I_i			2.0						2.0	2.0			2.0	
Extension of effective green, e			2.0						2.0	2.0			2.0	
Arrival type, AT			2						4	4			4	
Unit extension, UE			2.0						2.0	2.0			2.0	
Filtering/metering, I			1.000	1.000					1.000	1.000			1.000	
Initial unmet demand, Q_b			1.0						1.0	1.0			1.0	
Ped / Bike / RTOR volumes						0						0		
Lane width			12.0						12.0	12.0			12.0	
Parking / Grade / Parking			N	0	N	N		N	N	0	N	N	0	N
Parking maneuvers, N_m														
Buses stopping, N_B			0						0	0			0	
Min. time for pedestrians, G_p						3.2						3.2		
Phasing	EB Only	02	03		04		NB Only		Thru Only		07		08	
Timing	G = 17.0	G =	G =		G =		G = 10.0		G = 46.0		G =		G =	
	Y = 6	Y =	Y =		Y =		Y = 3		Y = 8		Y =		Y =	
Duration of Analysis, T = 0.25									Cycle Length, C = 90.0					

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted flow rate, v	572						100	1574			1589	
Lane group capacity, c	656						181	2176			1712	
v/c ratio, X	0.87						0.55	0.72			0.93	
Total green ratio, g/C	0.19						0.11	0.66			0.51	
Uniform delay, d_i	35.6						38.0	4.3			15.5	
Progression factor, PF	1.002						1.000	0.420			0.749	
Delay calibration, k	0.38						0.09	0.50			0.50	
	11.8						2.1	2.1			10.3	

Incremental delay, d_2												
Initial queue delay, d_3	0.1						0.5	0.0			0.0	
Control delay	47.5						40.6	6.5			25.9	
Lane group LOS	D						D	A			C	
Approach delay	47.5					8.5					25.9	
Approach LOS	D					A					C	
Intersection delay	21.5					$X_c = 0.86$					Intersection LOS	
											C	

HCS2000™

Copyright © 2000 University of Florida, All Rights Reserved

Version 4.1c

HCS2000™ DETAILED REPORT

General Information		Site Information	
Analyst	MW	Intersection	Route 130 & Renaissance Blvd
Agency or Co.	Urban Engineers	Area Type	All other areas
Date Performed	8/2/05	Jurisdiction	North Brunswick
Time Period	P.M. Peak Hour - Weekday	Analysis Year	2005 - Timing Mod.
		Project ID	5087-00 North Brunswick Master Plan

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N_i	2	0	0	0	0	0	1	2	0	0	2	0
Lane group	L						L	T			T	
Volume, V (vph)	296						232	1504			1603	
% Heavy vehicles, %HV	1						1	4			3	
Peak-hour factor, PHF	0.93						0.85	0.90			0.96	
Pretimed (P) or actuated (A)	A						A	P			P	
Start-up lost time, I_i	2.0						2.0	2.0			2.0	
Extension of effective green, e	2.0						2.0	2.0			2.0	
Arrival type, AT	2						4	4			4	
Unit extension, UE	2.0						2.0	2.0			2.0	
Filtering/metering, I	1.000	1.000					1.000	1.000			1.000	
Initial unmet demand, Q_b	1.0						1.0	1.0			1.0	
Ped / Bike / RTOR volumes				0						0		
Lane width	12.0						12.0	12.0			12.0	
Parking / Grade / Parking	N	0	N	N		N	N	0	N	N	0	N
Parking maneuvers, N_m												
Buses stopping, N_B	0						0	0			0	
Min. time for pedestrians, G_p				3.2						3.2		
Phasing	EB Only	02	03	04	NB Only		Thru Only		07	08		
Timing	G = 11.0	G =	G =	G =	G = 17.0		G = 45.0		G =	G =		
	Y = 6	Y =	Y =	Y =	Y = 3		Y = 8		Y =	Y =		
Duration of Analysis, T = 0.25							Cycle Length, C = 90.0					

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted flow rate, v	320						273	1671			1672	
Lane group capacity, c	424						338	2512			1756	
v/c ratio, X	0.75						0.81	0.67			0.95	
Total green ratio, g/C	0.12						0.19	0.72			0.50	
Uniform delay, d_i	38.2						35.0	1.4			16.7	
Progression factor, PF	1.000						1.000	0.207			0.767	
Delay calibration, k	0.27						0.32	0.50			0.50	
	6.8						12.6	1.4			12.8	

Incremental delay, d_2												
Initial queue delay, d_3	0.2						0.3	0.0			0.0	
Control delay	45.2						48.0	2.9			29.6	
Lane group LOS	D						D	A			C	
Approach delay	45.2						9.2		29.6			
Approach LOS	D						A		C			
Intersection delay	20.8		$X_c = 0.89$				Intersection LOS		C			

HCS2000™

Copyright © 2000 University of Florida, All Rights Reserved

Version 4.1e

HCS2000- DETAILED REPORT													
General Information						Site Information							
Analyst	MW					Intersection	Route 130 & Washington Place						
Agency or Co.	Urban Engineers					Area Type	All other areas						
Date Performed	8/2/05					Jurisdiction	North Brunswick						
Time Period	A.M. Peak Hour - Weekday					Analysis Year	2005						
						Project ID	5087-00 North Brunswick Master Plan						
Volume and Timing Input													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Number of lanes, N _i	0	0	0	0	0	0	0	2	0	1	2	0	
Lane group					LR			TR		L	T		
Volume, V (vph)				154		110		1893	58	105	1277		
% Heavy vehicles, %HV				4		4		6	3	3	8		
Peak-hour factor, PHF				0.84		0.89		0.94	0.75	0.75	0.92		
Pretimed (P) or actuated (A)				A		A		P	P	A	P		
Start-up lost time, l _i					2.0			2.0		2.0	2.0		
Extension of effective green, e					2.0			2.0		2.0	2.0		
Arrival type, AT					2			4		4	4		
Unit extension, UE					2.0			2.0		2.0	2.0		
Filtering/metering, I					1.000			1.000		1.000	1.000		
Initial unmet demand, Q _b					1.0			1.0		1.0	1.0		
Ped / Bike / RTOR volumes	0			0		0	0		0				
Lane width					12.0			12.0		12.0	12.0		
Parking / Grade / Parking	N		N	N	0	N	N	0	N	N	0	N	
Parking maneuvers, N _m													
Buses stopping, N _B					0			0		0	0		
Min. time for pedestrians, G _p	3.2			3.2			3.2						
Phasing	WB Only	02	03	04	SB Only	Thru & RT	07	08					
Timing	G = 20.0	G =	G =	G =	G = 22.0	G = 60.0	G =	G =					
	Y = 5	Y =	Y =	Y =	Y = 5	Y = 8	Y =	Y =					
Duration of Analysis, T = 0.25						Cycle Length, C = 120.0							
Lane Group Capacity, Control Delay, and LOS Determination													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Adjusted flow rate, v					307			2080		140	1393		
Lane group capacity, c					280			1699		321	2429		
v/c ratio, X					1.10			1.22		0.44	0.57		
Total green ratio, g/C					0.17			0.50		0.18	0.73		
Uniform delay, d ₁					50.0			30.0		43.6	1.7		
Progression factor, PF					1.000			0.767		1.000	0.209		
Delay calibration, k					0.50			0.50		0.04	0.50		
Incremental delay, d ₂					82.0			106.4		0.3	1.0		
Initial queue delay, d ₃					12.9			2.1		0.1	0.0		
Control delay					144.9			138.5		44.1	2.7		
Lane group LOS					F			F		D	A		
Approach delay				144.9			138.5			6.5			
Approach LOS				F			F			A			
Intersection delay	87.4			X _c = 1.03			Intersection LOS			F			

HCS2000- DETAILED REPORT													
General Information						Site Information							
Analyst	MW					Intersection	Route 130 & Washington Place						
Agency or Co.	Urban Engineers					Area Type	All other areas						
Date Performed	8/2/05					Jurisdiction	North Brunswick						
Time Period	P.M. Peak Hour - Weekday					Analysis Year	2005						
						Project ID	5087-00 North Brunswick Master Plan						
Volume and Timing Input													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Number of lanes, N _i	0	0	0	0	0	0	0	2	0	1	2	0	
Lane group					LR			TR		L	T		
Volume, V (vph)				197		68		1519	201	174	1851		
% Heavy vehicles, %HV				1		7		3	0	1	3		
Peak-hour factor, PHF				0.82		0.94		0.92	0.88	0.85	0.95		
Pretimed (P) or actuated (A)				A		A		P	P	A	P		
Start-up lost time, I _i					2.0			2.0		2.0	2.0		
Extension of effective green, e					2.0			2.0		2.0	2.0		
Arrival type, AT					2			4		4	4		
Unit extension, UE					2.0			2.0		2.0	2.0		
Filtering/metering, I					1.000			1.000		1.000	1.000		
Initial unmet demand, Q _b					1.0			1.0		1.0	1.0		
Ped / Bike / RTOR volumes	0			0		0	0		0				
Lane width					12.0			12.0		12.0	12.0		
Parking / Grade / Parking	N		N	N	0	N	N	0	N	N	0	N	
Parking maneuvers, N _m													
Buses stopping, N _B					0			0		0	0		
Min. time for pedestrians, G _p	3.2			3.2			3.2						
Phasing	WB Only	02	03	04	SB Only	Thru & RT	07	08					
Timing	G = 20.0	G =	G =	G =	G = 22.0	G = 60.0	G =	G =					
	Y = 5	Y =	Y =	Y =	Y = 5	Y = 8	Y =	Y =					
Duration of Analysis, T = 0.25						Cycle Length, C = 120.0							
Lane Group Capacity, Control Delay, and LOS Determination													
	EB			WB			NB			SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Adjusted flow rate, v					312			1876		204	1940		
Lane group capacity, c					289			1730		328	2546		
v/c ratio, X					1.08			1.08		0.62	0.76		
Total green ratio, g/C					0.17			0.50		0.18	0.73		
Uniform delay, d ₁					50.0			30.0		45.3	2.2		
Progression factor, PF					1.000			0.767		1.000	0.209		
Delay calibration, k					0.50			0.50		0.15	0.50		
Incremental delay, d ₂					75.8			48.5		2.7	2.2		
Initial queue delay, d ₃					12.5			2.1		0.2	0.0		
Control delay					138.2			80.5		48.2	4.4		
Lane group LOS					F			F		D	A		
Approach delay				138.2			80.5			8.6			
Approach LOS				F			F			A			
Intersection delay	49.1			X _c = 0.98			Intersection LOS			D			

HCS2000™ DETAILED REPORT

General Information		Site Information	
Analyst	MW	Intersection	Route 130 & Washington Place
Agency or Co.	Urban Engineers	Area Type	All other areas
Date Performed	8/2/05	Jurisdiction	North Brunswick
Time Period	A.M. Peak Hour - Weekday	Analysis Year	2005 - WB L+R
		Project ID	5087-00 North Brunswick Master Plan

Volume and Timing Input

			EB			WB			NB			SB		
			LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N_i			0	0	0	1	0	1	0	2	0	1	2	0
Lane group						L		R		TR		L	T	
Volume, V (vph)						154		110		1893	58	105	1277	
% Heavy vehicles, %HV						4		4		6	3	3	8	
Peak-hour factor, PHF						0.84		0.89		0.94	0.75	0.75	0.92	
Pretimed (P) or actuated (A)						A		A		P	P	A	P	
Start-up lost time, l_i						2.0		2.0		2.0		2.0	2.0	
Extension of effective green, e						2.0		2.0		2.0		2.0	2.0	
Arrival type, AT						3		3		4		4	4	
Unit extension, UE						3.0		3.0		2.0		2.0	2.0	
Filtering/metering, I						1.000	1.000	1.000		1.000		1.000	1.000	
Initial unmet demand, Q_b						0.0		0.0		1.0		1.0	1.0	
Ped / Bike / RTOR volumes			0			0		0	0		0			
Lane width						12.0		12.0		12.0		12.0	12.0	
Parking / Grade / Parking			N		N	N	0	N	N	0	N	N	0	N
Parking maneuvers, N_m														
Buses stopping, N_B						0		0		0		0	0	
Min. time for pedestrians, G_p			3.2			3.2			3.2					
Phasing	WB Only	02	03		04		SB Only		Thru & RT		07		08	
Timing	G = 17.0	G =	G =		G =		G = 16.0		G = 71.0		G =		G =	
	Y = 5	Y =	Y =		Y =		Y = 3		Y = 8		Y =		Y =	
Duration of Analysis, T = 0.25									Cycle Length, C = 120.0					

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted flow rate, v				183		124		2080		140	1393	
Lane group capacity, c				246		220		2010		234	2513	
v/c ratio, X				0.74		0.56		1.03		0.60	0.55	
Total green ratio, g/C				0.14		0.14		0.59		0.13	0.75	
Uniform delay, d_i				49.4		48.0		24.5		49.1	1.5	
Progression factor, PF				1.000		1.000		0.595		1.000	0.230	
Delay calibration, k				0.30		0.16		0.50		0.13	0.50	
				11.6		3.3		29.7		2.9	0.9	

Incremental delay, d_2												
Initial queue delay, d_3								1.8		0.3	0.0	
Control delay				61.0		51.4		56.0		52.4	2.4	
Lane group LOS				E		D		E		D	A	
Approach delay				57.1			56.0			7.0		
Approach LOS				E			E			A		
Intersection delay	36.9			$X_c = 0.92$			Intersection LOS			D		

HCS2000™

Copyright © 2000 University of Florida, All Rights Reserved

Version 4.1e

HCS2000™ DETAILED REPORT

General Information		Site Information	
Analyst	MW	Intersection	Route 130 & Washington Place
Agency or Co.	Urban Engineers	Area Type	All other areas
Date Performed	8/2/05	Jurisdiction	North Brunswick
Time Period	P.M. Peak Hour - Weekday	Analysis Year	2005 - WB L+R
		Project ID	5087-00 North Brunswick Master Plan

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N_i	0	0	0	1	0	1	0	2	0	1	2	0
Lane group				L		R		TR		L	T	
Volume, V (vph)				197		68		1519	201	174	1851	
% Heavy vehicles, %HV				1		7		3	0	1	3	
Peak-hour factor, PHF				0.82		0.94		0.92	0.88	0.85	0.95	
Pretimed (P) or actuated (A)				A		A		P	P	A	P	
Start-up lost time, l_i				2.0		2.0		2.0		2.0	2.0	
Extension of effective green, e				2.0		2.0		2.0		2.0	2.0	
Arrival type, AT				3		3		4		4	4	
Unit extension, UE				3.0		3.0		2.0		2.0	2.0	
Filtering/metering, I				1.000	1.000	1.000		1.000		1.000	1.000	
Initial unmet demand, Q_b				0.0		0.0		1.0		1.0	1.0	
Ped / Bike / RTOR volumes	0			0		0	0		0			
Lane width				12.0		12.0		12.0		12.0	12.0	
Parking / Grade / Parking	N		N	N	0	N	N	0	N	N	0	N
Parking maneuvers, N_m												
Buses stopping, N_B				0		0		0		0	0	
Min. time for pedestrians, G_p	3.2			3.2			3.2					
Phasing	WB Only	02	03	04		SB Only	Thru & RT		07		08	
Timing	G = 19.0	G =	G =	G =		G = 20.0	G = 65.0		G =		G =	
	Y = 5	Y =	Y =	Y =		Y = 3	Y = 8		Y =		Y =	
Duration of Analysis, T = 0.25								Cycle Length, C = 120.0				

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted flow rate, v				240		72		1876		204	1940	
Lane group capacity, c				283		239		1874		298	2575	
v/c ratio, X				0.85		0.30		1.00		0.68	0.75	
Total green ratio, g/C				0.16		0.16		0.54		0.17	0.73	
Uniform delay, d_1				49.1		44.6		27.5		47.2	2.1	
Progression factor, PF				1.000		1.000		0.697		1.000	0.216	
Delay calibration, k				0.38		0.11		0.50		0.21	0.50	
				20.8		0.7		21.0		5.3	2.1	

Incremental delay, d_2												
Initial queue delay, d_3								1.9		0.3	0.0	
Control delay				69.9		45.3		50.5		52.7	4.2	
Lane group LOS				E		D		D		D	A	
Approach delay				64.2			50.5			8.9		
Approach LOS				E			D			A		
Intersection delay	30.9			$X_c = 0.91$			Intersection LOS			C		

HCS2000™

Copyright © 2000 University of Florida, All Rights Reserved

Version 4.1e

HCS2000™ DETAILED REPORT

General Information		Site Information	
Analyst	MW	Intersection	Route 130 & Davidson's Mill Rd
Agency or Co.	Urban Engineers	Area Type	All other areas
Date Performed	3/2/2006	Jurisdiction	North Brunswick
Time Period	A.M. Peak Hour	Analysis Year	2006
		Project ID	5087-00 North Brunswick Master Plan

Volume and Timing Input

			EB			WB			NB			SB		
			LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N_i			0	1	1	0	1	0	1	2	0	1	2	0
Lane group				LT	R		LTR		L	TR		L	TR	
Volume, V (vph)			89	29	9	180	14	72	7	1586	74	63	1469	24
% Heavy vehicles, %HV			11	0	13	5	0	1	0	5	6	1	5	19
Peak-hour factor, PHF			0.80	0.75	0.75	0.76	0.75	0.82	0.75	0.88	0.84	0.88	0.87	0.75
Pretimed (P) or actuated (A)			A	A	A	A	A	A	A	P	P	A	P	P
Start-up lost time, l_i				2.0	2.0		2.0		2.0	2.0		2.0	2.0	
Extension of effective green, e				2.0	2.0		2.0		2.0	2.0		2.0	2.0	
Arrival type, AT				3	3		3		4	4		4	4	
Unit extension, UE				2.0	2.0		2.0		2.0	2.0		2.0	2.0	
Filtering/metering, I				1.000	1.000		1.000		1.000	1.000		1.000	1.000	
Initial unmet demand, Q_b				1.0	1.0		1.0		1.0	1.0		1.0	1.0	
Ped / Bike / RTOR volumes			0		0	0		0	0		0	0		0
Lane width				12.0	12.0		12.0		12.0	12.0		12.0	12.0	
Parking / Grade / Parking			N	0	N	N	0	N	N	0	N	N	0	N
Parking maneuvers, N_m														
Buses stopping, N_B				0	0		0		0	0		0	0	
Min. time for pedestrians, G_p			3.2			3.2			3.2			3.2		
Phasing	EW Perm	02	03		04		Excl. Left		Thru & RT		07		08	
Timing	G = 20.0	G =	G =		G =		G = 18.0		G = 35.0		G =		G =	
	Y = 6	Y =	Y =		Y =		Y = 3		Y = 8		Y =		Y =	
Duration of Analysis, T = 0.25									Cycle Length, C = 90.0					

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted flow rate, v		150	12		344		9	1890		72	1721	
Lane group capacity, c		272	318		216		361	1330		357	1333	
v/c ratio, X		0.55	0.04		1.59		0.02	1.42		0.20	1.29	
Total green ratio, g/C		0.22	0.22		0.22		0.20	0.39		0.20	0.39	
Uniform delay, d_i		31.2	27.6		35.0		29.0	27.5		30.1	27.5	
Progression factor, PF		1.000	1.000		1.000		1.000	0.906		1.000	0.906	
Delay calibration, k		0.09	0.04		0.50		0.04	0.50		0.04	0.50	
		1.4	0.0		287.4		0.0	193.9		0.1	136.7	

Incremental delay, d_2												
Initial queue delay, d_3		0.2	0.1		16.7		0.1	2.7		0.1	2.7	
Control delay		32.8	27.6		339.1		29.1	224.1		30.3	166.9	
Lane group LOS		C	C		F		C	F		C	F	
Approach delay	32.4			339.1			223.2			161.4		
Approach LOS	C			F			F			F		
Intersection delay	199.0			$X_c = 1.17$			Intersection LOS			F		

HCS2000™

Copyright © 2000 University of Florida, All Rights Reserved

Version 4.1e

HCS2000™ DETAILED REPORT

General Information		Site Information	
Analyst	MW	Intersection	Route 130 & Davidson's Mill Rd
Agency or Co.	Urban Engineers	Area Type	All other areas
Date Performed	3/2/2006	Jurisdiction	North Brunswick
Time Period	P.M. Peak Hour	Analysis Year	2006
		Project ID	5087-00 North Brunswick Master Plan

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N_i	0	1	1	0	1	0	1	2	0	1	2	0
Lane group		LT	R		LTR		L	TR		L	TR	
Volume, V (vph)	70	21	9	91	25	55	4	1535	153	72	1453	62
% Heavy vehicles, %HV	11	0	13	5	0	1	0	5	6	1	5	19
Peak-hour factor, PHF	0.76	0.75	0.75	0.78	0.75	0.75	0.75	0.86	0.75	0.86	0.94	0.75
Pretimed (P) or actuated (A)	A	A	A	A	A	A	A	P	P	A	P	P
Start-up lost time, I_i		2.0	2.0		2.0		2.0	2.0		2.0	2.0	
Extension of effective green, e		2.0	2.0		2.0		2.0	2.0		2.0	2.0	
Arrival type, AT		3	3		3		4	4		4	4	
Unit extension, UE		2.0	2.0		2.0		2.0	2.0		2.0	2.0	
Filtering/metering, I		1.000	1.000		1.000		1.000	1.000		1.000	1.000	
Initial unmet demand, Q_b		1.0	1.0		1.0		1.0	1.0		1.0	1.0	
Ped / Bike / RTOR volumes	0		0	0		0	0		0	0		0
Lane width		12.0	12.0		12.0		12.0	12.0		12.0	12.0	
Parking / Grade / Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking maneuvers, N_m												
Buses stopping, N_B		0	0		0		0	0		0	0	
Min. time for pedestrians, G_p	3.2			3.2			3.2			3.2		
Phasing	EW Perm	02	03	04	Excl. Left	Thru & RT	07	08				
Timing	G = 20.0	G =	G =	G =	G = 18.0	G = 35.0	G =	G =				
	Y = 6	Y =	Y =	Y =	Y = 3	Y = 8	Y =	Y =				
Duration of Analysis, T = 0.25							Cycle Length, C = 90.0					

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted flow rate, v		120	12		223		5	1989		84	1629	
Lane group capacity, c		245	318		261		361	1318		357	1321	
v/c ratio, X		0.49	0.04		0.85		0.01	1.51		0.24	1.23	
Total green ratio, g/C		0.22	0.22		0.22		0.20	0.39		0.20	0.39	
Uniform delay, d_i		30.7	27.6		33.7		29.0	27.5		30.3	27.5	
Progression factor, PF		1.000	1.000		1.000		1.000	0.906		1.000	0.906	
Delay calibration, k		0.04	0.04		0.37		0.04	0.50		0.04	0.50	
		0.6	0.0		22.1		0.0	233.1		0.1	111.7	

Incremental delay, d_2												
Initial queue delay, d_3		0.2	0.1		0.7		0.1	2.7		0.1	2.7	
Control delay		31.5	27.6		56.6		29.0	263.3		30.5	141.9	
Lane group LOS		C	C		E		C	F		C	F	
Approach delay	31.1			56.6			262.7			136.5		
Approach LOS	C			E			F			F		
Intersection delay	190.6			$X_c = 1.02$			Intersection LOS			F		

HCS2000™

Copyright © 2000 University of Florida, All Rights Reserved

Version 4.1e

HCS2000™ DETAILED REPORT

General Information

Analyst MW
 Agency or Co. Urban Engineers
 Date Performed 3/2/2006
 Time Period A.M. Peak Hour

Site Information

Intersection Route 130 & Davidson's Mill Rd
 Area Type All other areas
 Jurisdiction North Brunswick
 Analysis Year 2006
 Project ID 5087-00 120 second cycle, Route 130 RT Lanes, EB L,TR

Volume and Timing Input

			EB			WB			NB			SB		
			LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N ₁			1	1	0	0	1	0	1	2	1	1	2	1
Lane group			L	TR			LTR		L	T	R	L	T	R
Volume, V (vph)			89	29	9	180	14	72	7	1586	74	63	1469	24
% Heavy vehicles, %HV			11	0	13	5	0	1	0	5	6	1	5	19
Peak-hour factor, PHF			0.80	0.75	0.75	0.76	0.75	0.82	0.75	0.88	0.84	0.88	0.87	0.75
Pretimed (P) or actuated (A)			A	A	A	A	A	A	A	P	P	A	P	P
Start-up lost time, I ₁			2.0	2.0			2.0		2.0	2.0	2.0	2.0	2.0	2.0
Extension of effective green, e			2.0	2.0			2.0		2.0	2.0	2.0	2.0	2.0	2.0
Arrival type, AT			3	3			3		4	4	3	4	4	3
Unit extension, UE			3.0	2.0			2.0		2.0	2.0	3.0	2.0	2.0	3.0
Filtering/metering, I			1.000	1.000			1.000		1.000	1.000	1.000	1.000	1.000	1.000
Initial unmet demand, Q _b			0.0	1.0			1.0		1.0	1.0	0.0	1.0	1.0	0.0
Ped / Bike / RTOR volumes			0		0	0		0	0		0	0		0
Lane width			12.0	12.0			12.0		12.0	12.0	12.0	12.0	12.0	12.0
Parking / Grade / Parking			N	0	N	N	0	N	N	0	N	N	0	N
Parking maneuvers, N _m														
Buses stopping, N _B			0	0			0		0	0	0	0	0	0
Min. time for pedestrians, G _p			3.2			3.2			3.2			3.2		
Phasing	EW Perm	02	03		04		Excl. Left		Thru & RT		07		08	
Timing	G = 33.0	G =	G =		G =		G = 10.0		G = 60.0		G =		G =	
	Y = 6	Y =	Y =		Y =		Y = 3		Y = 8		Y =		Y =	
Duration of Analysis, T = 0.25									Cycle Length, C = 120.0					

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted flow rate, v	111	51			344		9	1802	88	72	1689	32
Lane group capacity, c	293	489			371		150	1723	762	149	1723	679
v/c ratio, X	0.38	0.10			0.93		0.06	1.05	0.12	0.48	0.98	0.05
Total green ratio, g/C	0.28	0.28			0.28		0.08	0.50	0.50	0.08	0.50	0.50
Uniform delay, d _i	35.2	32.6			42.5		50.8	30.0	15.9	52.7	23.4	15.4
Progression factor, PF	1.000	1.000			1.000		1.000	0.767	1.000	1.000	0.767	1.000
Delay calibration, k	0.11	0.04			0.43		0.04	0.50	0.50	0.04	0.50	0.50

Incremental delay, d_2	0.8	0.0			28.6		0.1	34.8	0.3	0.9	17.5	0.1
Initial queue delay, d_3		0.0			0.7		0.3	2.1		0.6	0.1	
Control delay	36.0	32.6			71.8		51.2	66.9	16.2	54.2	41.0	15.5
Lane group LOS	D	C			E		D	E	B	D	D	B
Approach delay	35.0				71.8		64.4			41.1		
Approach LOS	C				E		E			D		
Intersection delay	53.9				$X_c = 0.95$		Intersection LOS			D		

HCS2000™

Copyright © 2000 University of Florida, All Rights Reserved

Version 4.1e

HCS2000™ DETAILED REPORT

General Information		Site Information	
Analyst	MW	Intersection	Route 130 & Davidson's Mill Rd
Agency or Co.	Urban Engineers	Area Type	All other areas
Date Performed	3/2/2006	Jurisdiction	North Brunswick
Time Period	P.M. Peak Hour	Analysis Year	2006
		Project ID	5087-00 120 sec cycle, Rte 130 RT Lanes, EB L,TR

Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N_i	1	1	0	0	1	0	1	2	1	1	2	1
Lane group	L	TR			LTR		L	T	R	L	T	R
Volume, V (vph)	70	21	9	91	25	55	4	1535	153	72	1453	62
% Heavy vehicles, %HV	11	0	13	5	0	1	0	5	6	1	5	19
Peak-hour factor, PHF	0.76	0.75	0.75	0.78	0.75	0.75	0.75	0.86	0.75	0.86	0.94	0.75
Pretimed (P) or actuated (A)	A	A	A	A	A	A	A	P	P	A	P	P
Start-up lost time, l_i	2.0	2.0			2.0		2.0	2.0	2.0	2.0	2.0	2.0
Extension of effective green, e	2.0	2.0			2.0		2.0	2.0	2.0	2.0	2.0	2.0
Arrival type, AT	3	3			3		4	4	3	4	4	3
Unit extension, UE	3.0	2.0			2.0		2.0	2.0	3.0	2.0	2.0	3.0
Filtering/metering, I	1.000	1.000			1.000		1.000	1.000	1.000	1.000	1.000	1.000
Initial unmet demand, Q_b	0.0	1.0			1.0		1.0	1.0	0.0	1.0	1.0	0.0
Ped / Bike / RTOR volumes	0		0	0		0	0		0	0		0
Lane width	12.0	12.0			12.0		12.0	12.0	12.0	12.0	12.0	12.0
Parking / Grade / Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking maneuvers, N_m												
Buses stopping, N_B	0	0			0		0	0	0	0	0	0
Min. time for pedestrians, G_p	3.2			3.2			3.2			3.2		
Phasing	EW Perm	02	03		04		Excl. Left	Thru & RT		07		08
Timing	G = 30.0	G =	G =		G =		G = 10.0	G = 63.0		G =		G =
	Y = 6	Y =	Y =		Y =		Y = 3	Y = 8		Y =		Y =
Duration of Analysis, T = 0.25								Cycle Length, C = 120.0				

Lane Group Capacity, Control Delay, and LOS Determination												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted flow rate, v	92	40			223		5	1785	204	84	1546	83
Lane group capacity, c	252	437			359		150	1809	800	149	1809	712
v/c ratio, X	0.37	0.09			0.62		0.03	0.99	0.25	0.56	0.85	0.12
Total green ratio, g/C	0.25	0.25			0.25		0.08	0.52	0.52	0.08	0.52	0.52
Uniform delay, d _i	37.1	34.6			40.1		50.7	21.8	15.6	53.0	18.0	14.4
Progression factor, PF	1.000	1.000			1.000		1.000	0.726	1.000	1.000	0.726	1.000
Delay calibration, k	0.11	0.04			0.15		0.04	0.50	0.50	0.10	0.50	0.50
	0.9	0.0			2.5		0.0	18.2	0.8	3.0	5.4	0.3

Incremental delay, d_2												
Initial queue delay, d_3		0.0			0.1		0.3	0.2		0.7	0.0	
Control delay	38.0	34.7			42.7		51.0	40.2	16.4	56.8	23.4	14.8
Lane group LOS	D	C			D		D	D	B	E	C	B
Approach delay	37.0			42.7			37.8			24.6		
Approach LOS	D			D			D			C		
Intersection delay	32.5			$X_c = 0.84$			Intersection LOS			C		

HCS2000™

Copyright © 2000 University of Florida, All Rights Reserved

Version 4.1e

HCS2000~ DETAILED REPORT

General Information

Analyst MW
Agency or Co. Urban Engineers
Date Performed 8/4/05
Time Period P.M. Peak Hour - Weekday

Site Information

Intersection Georges Road & Milltown Road
Area Type All other areas
Jurisdiction North Brunswick
Analysis Year 2005
Project ID 5087-00 North Brunswick Master Plan

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N_i	0	0	0	1	0	1	0	1	1	0	2	0
Lane group				L		R		T	R	DefL	T	
Volume, V (vph)				302		249		460	432	448	522	
% Heavy vehicles, %HV				0		0		0	0	0	0	
Peak-hour factor, PHF				0.91		0.81		0.78	0.82	0.91	0.93	
Pretimed (P) or actuated (A)				A		A		P	P	A	P	
Start-up lost time, I_i				2.0		2.0		2.0	2.0	2.0	2.0	
Extension of effective green, e				2.0		2.0		2.0	2.0	2.0	2.0	
Arrival type, AT				3		3		4	2	4	4	
Unit extension, UE				2.0		2.0		2.0	2.0	2.0	2.0	
Filtering/metering, I				1.000	1.000	1.000		1.000	1.000	1.000	1.000	
Initial unmet demand, Q_b				1.0		1.0		1.0	1.0	0.0	1.0	
Ped / Bike / RTOR volumes	0			0		0	0		0			
Lane width				12.0		12.0		12.0	12.0	12.0	12.0	
Parking / Grade / Parking	N		N	N	0	N	N	0	N	N	0	N
Parking maneuvers, N_m												
Buses stopping, N_B				0		0		0	0	0	0	
Min. time for pedestrians, G_p	3.2			3.2			3.2					
Phasing	WB Only	02	03	04	SB Only	NS Perm	07	08				
Timing	G = 24.0	G =	G =	G =	G = 12.0	G = 38.0	G =	G =				
	Y = 6	Y =	Y =	Y =	Y = 4	Y = 6	Y =	Y =				
Duration of Analysis, T = 0.25								Cycle Length, C = 90.0				

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted flow rate, v				332		307		590	527	492	561	
Lane group capacity, c				481		754		802	682	419	1140	
v/c ratio, X				0.69		0.41		0.74	0.77	1.17	0.49	
Total green ratio, g/C				0.27		0.47		0.42	0.42	0.60	0.60	
Uniform delay, d_1				29.7		15.9		19.1	25.8	17.1	6.0	
Progression factor, PF				1.000		1.000		0.870	1.157	0.575	0.575	
Delay calibration, k				0.22		0.04		0.50	0.50	0.50	0.50	
Incremental delay, d_2				3.5		0.1		5.9	8.3	100.9	1.5	
Initial queue delay, d_3				0.1		0.0		0.0	0.1		0.0	
Control delay				33.3		16.0		25.1	34.2	110.7	7.5	
Lane group LOS				C		B		C	C	F	A	
Approach delay				25.0			29.4			55.7		
Approach LOS				C			C			E		
Intersection delay	38.3			$X_c = 1.31$			Intersection LOS			D		

HCS2000™

Copyright © 2000 University of Florida, All Rights Reserved

Version 4.1e

HCS2000- DETAILED REPORT

General Information		Site Information	
Analyst	MW	Intersection	Georges Road & Milltown Road
Agency or Co.	Urban Engineers	Area Type	All other areas
Date Performed	8/4/05	Jurisdiction	North Brunswick
Time Period	P.M. Peak Hour - Weekday	Analysis Year	2005 - Timing Mod.
		Project ID	5087-00 North Brunswick Master Plan

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N _i	0	0	0	1	0	1	0	1	1	0	2	0
Lane group				L		R		T	R	DefL	T	
Volume, V (vph)				302		249		460	432	448	522	
% Heavy vehicles, %HV				0		0		0	0	0	0	
Peak-hour factor, PHF				0.91		0.81		0.78	0.82	0.91	0.93	
Pretimed (P) or actuated (A)				A		A		P	P	A	P	
Start-up lost time, I _i				2.0		2.0		2.0	2.0	2.0	2.0	
Extension of effective green, e				2.0		2.0		2.0	2.0	2.0	2.0	
Arrival type, AT				3		3		4	2	4	4	
Unit extension, UE				2.0		2.0		2.0	2.0	2.0	2.0	
Filtering/metering, I				1.000	1.000	1.000		1.000	1.000	1.000	1.000	
Initial unmet demand, Q _b				1.0		1.0		1.0	1.0	0.0	1.0	
Ped / Bike / RTOR volumes	0			0		0	0		0			
Lane width				12.0		12.0		12.0	12.0	12.0	12.0	
Parking / Grade / Parking	N		N	N	0	N	N	0	N	N	0	N
Parking maneuvers, N _m												
Buses stopping, N _B				0		0		0	0	0	0	
Min. time for pedestrians, G _p	3.2			3.2			3.2					
Phasing	WB Only	02	03	04	SB Only	NS Perm	07	08				
Timing	G = 19.0	G =	G =	G =	G = 19.0	G = 36.0	G =	G =				
	Y = 6	Y =	Y =	Y =	Y = 4	Y = 6	Y =	Y =				
Duration of Analysis, T = 0.25							Cycle Length, C = 90.0					

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted flow rate, v				332		307		590	527	492	561	
Lane group capacity, c				381		790		760	646	526	1246	
v/c ratio, X				0.87		0.39		0.78	0.82	0.94	0.45	
Total green ratio, g/C				0.21		0.49		0.40	0.40	0.66	0.66	
Uniform delay, d ₁				34.4		14.6		21.2	27.3	20.7	3.3	
Progression factor, PF				1.000		1.000		0.894	1.137	0.420	0.420	
Delay calibration, k				0.38		0.04		0.50	0.50	0.44	0.50	
Incremental delay, d ₂				18.5		0.1		7.6	10.9	23.9	1.2	
Initial queue delay, d ₃				0.4		0.0		0.1	0.1		0.0	
Control delay				53.3		14.7		28.9	38.3	32.6	4.4	
Lane group LOS				D		B		C	D	C	A	
Approach delay				34.8			33.3			17.6		
Approach LOS				C			C			B		
Intersection delay	27.8			X _c = 0.95			Intersection LOS			C		

HCS2000- DETAILED REPORT

General Information

Analyst MW
Agency or Co. Urban Engineers, Inc.
Date Performed 8/17/05
Time Period P.M. Peak Hour - Weekday

Site Information

Intersection Jersey Avenue & How Lane
Area Type All other areas
Jurisdiction North Brunswick
Analysis Year 2005
Project ID 5087-00 North Brunswick Master Plan

Volume and Timing Input

			EB			WB			NB			SB		
			LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N_i			1	1	1	1	1	1	1	1	1	1	1	
Lane group			L	T	R	L	T	R	L	T	R	L	T	R
Volume, V (vph)			64	492	238	129	492	106	136	181	93	336	460	39
% Heavy vehicles, %HV			5	3	21	3	3	3	19	7	2	2	8	12
Peak-hour factor, PHF			0.84	0.93	0.93	0.83	0.93	0.83	0.89	0.79	0.86	0.83	0.83	0.75
Pretimed (P) or actuated (A)			A	A	A	A	A	A	A	P	P	P	P	P
Start-up lost time, I_i			2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Extension of effective green, e			2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Arrival type, AT			3	3	3	3	3	3	3	3	3	3	3	3
Unit extension, UE			2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Filtering/metering, I			1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Initial unmet demand, Q_b			1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Ped / Bike / RTOR volumes			0		0	0		0	0		0	0		0
Lane width			12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Parking / Grade / Parking			N	0	N	N	0	N	N	0	N	N	0	N
Parking maneuvers, N_m														
Buses stopping, N_B			0	0	0	0	0	0	0	0	0	0	0	0
Min. time for pedestrians, G_p			3.2			3.2			3.2			3.2		
Phasing	EB Only	EW Perm	03		04		NB Only		NS Perm		07		08	
Timing	G = 7.0	G = 45.0	G =		G =		G = 7.0		G = 45.0		G =		G =	
	Y = 3	Y = 7	Y =		Y =		Y = 3		Y = 7		Y =		Y =	
Duration of Analysis, T = 0.25									Cycle Length, C = 124.0					

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted flow rate, v	76	529	256	155	529	128	153	229	108	405	554	52
Lane group capacity, c	200	818	592	232	670	569	162	788	702	416	638	523
v/c ratio, X	0.38	0.65	0.43	0.67	0.79	0.22	0.94	0.29	0.15	0.97	0.87	0.10
Total green ratio, g/C	0.44	0.44	0.44	0.36	0.36	0.36	0.44	0.44	0.44	0.36	0.36	0.36
Uniform delay, d_1	24.2	27.0	23.9	33.5	35.4	27.5	37.8	22.1	20.7	39.1	36.9	26.2
Progression factor, PF	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Delay calibration, k	0.04	0.17	0.04	0.19	0.31	0.04	0.45	0.50	0.50	0.50	0.50	0.50
Incremental delay, d_2	0.4	1.4	0.2	5.9	5.8	0.1	53.8	0.9	0.5	38.0	14.9	0.4
Initial queue delay, d_3	0.3	0.0	0.0	0.4	0.1	0.0	4.9	0.0	0.0	1.6	0.1	0.0
Control delay	24.9	28.5	24.1	39.8	41.3	27.6	96.6	23.1	21.2	78.7	51.9	26.6
Lane group LOS	C	C	C	D	D	C	F	C	C	E	D	C
Approach delay	26.8			38.8			45.6			61.3		
Approach LOS	C			D			D			E		
Intersection delay	43.8			$X_c = 0.96$			Intersection LOS			D		

HCS2000m

Copyright © 2000 University of Florida, All Rights Reserved

Version 4.1c

HCS2000- DETAILED REPORT

General Information				Site Information			
Analyst	MW			Intersection	Jersey Avenue & How Lane		
Agency or Co.	Urban Engineers, Inc.			Area Type	All other areas		
Date Performed	8/17/05			Jurisdiction	North Brunswick		
Time Period	P.M. Peak Hour - Weekday			Analysis Year	2005		
				Project ID	5087-00 North Brunswick Master Plan - Timing Mod.		

Volume and Timing Input												
	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N_i	1	1	1	1	1	1	1	1	1	1	1	1
Lane group	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V (vph)	64	492	238	129	492	106	136	181	93	336	460	39
% Heavy vehicles, %HV	5	3	21	3	3	3	19	7	2	2	8	12
Peak-hour factor, PHF	0.84	0.93	0.93	0.83	0.93	0.83	0.89	0.79	0.86	0.83	0.83	0.75
Pretimed (P) or actuated (A)	A	A	A	A	A	A	A	P	P	P	P	P
Start-up lost time, I_i	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Extension of effective green, e	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Arrival type, AT	3	3	3	3	3	3	3	3	3	3	3	3
Unit extension, UE	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Filtering/metering, I	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Initial unmet demand, Q_b	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Ped / Bike / RTOR volumes	0		0	0		0	0		0	0		0
Lane width	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Parking / Grade / Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking maneuvers, N_m												
Buses stopping, N_B	0	0	0	0	0	0	0	0	0	0	0	0
Min. time for pedestrians, G_p	3.2			3.2			3.2			3.2		
Phasing	EB Only	EW Perm	03	04		NB Only		NS Perm		07		08
Timing	G = 7.0	G = 44.0	G =	G =		G = 8.0		G = 45.0		G =		G =
	Y = 3	Y = 7	Y =	Y =		Y = 3		Y = 7		Y =		Y =
Duration of Analysis, $T = 0.25$								Cycle Length, $C = 124.0$				

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted flow rate, v	76	529	256	155	529	128	153	229	108	405	554	52
Lane group capacity, c	191	803	581	222	655	556	174	802	715	416	638	523
v/c ratio, X	0.40	0.66	0.44	0.70	0.81	0.23	0.88	0.29	0.15	0.97	0.87	0.10
Total green ratio, g/C	0.44	0.44	0.44	0.35	0.35	0.35	0.45	0.45	0.45	0.36	0.36	0.36
Uniform delay, d_1	24.8	27.8	24.6	34.6	36.3	28.2	25.0	21.5	20.1	39.1	36.9	26.2
Progression factor, PF	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Delay calibration, k	0.04	0.19	0.04	0.22	0.32	0.04	0.39	0.50	0.50	0.50	0.50	0.50
Incremental delay, d_2	0.5	1.6	0.2	7.9	6.9	0.1	35.5	0.9	0.4	38.0	14.9	0.4
Initial queue delay, d_3	0.3	0.0	0.0	0.5	0.1	0.0	2.0	0.0	0.0	1.6	0.1	0.0
Control delay	25.6	29.4	24.8	43.0	43.3	28.3	62.4	22.4	20.6	78.7	51.9	26.6
Lane group LOS	C	C	C	D	D	C	E	C	C	E	D	C
Approach delay	27.7			40.9			34.5			61.3		
Approach LOS	C			D			C			E		
Intersection delay	42.8			$X_c = 0.97$			Intersection LOS			D		



APPENDIX C: FINNEGAN'S LANE REPORT



I. FINNEGAN'S LANE CONNECTION

1. Introduction

The Finnegan's Lane Connection is a proposed project to re-connect Finnegan's Lane between Route 1 and Route 130 to provide an additional east-west connecting route within North Brunswick Township. Currently, Adams Lane (CR608) is the only east-west connecting link in the current network in the area south of the junction of Routes 1 and 130. The next opportunity to travel between Route 1 and 130 is Dean's Lane (CR610) in South Brunswick, a distance of three miles south of Adam's Lane. East-west network connectivity is limited throughout North Brunswick, in part due to the barrier formed by AMTRAK's Northeast Corridor line. Establishing a new east-west route will provide an alternative roadway for local and regional travel, relieve congestion at existing intersections, and potentially influence development patterns in the vicinity of the project.

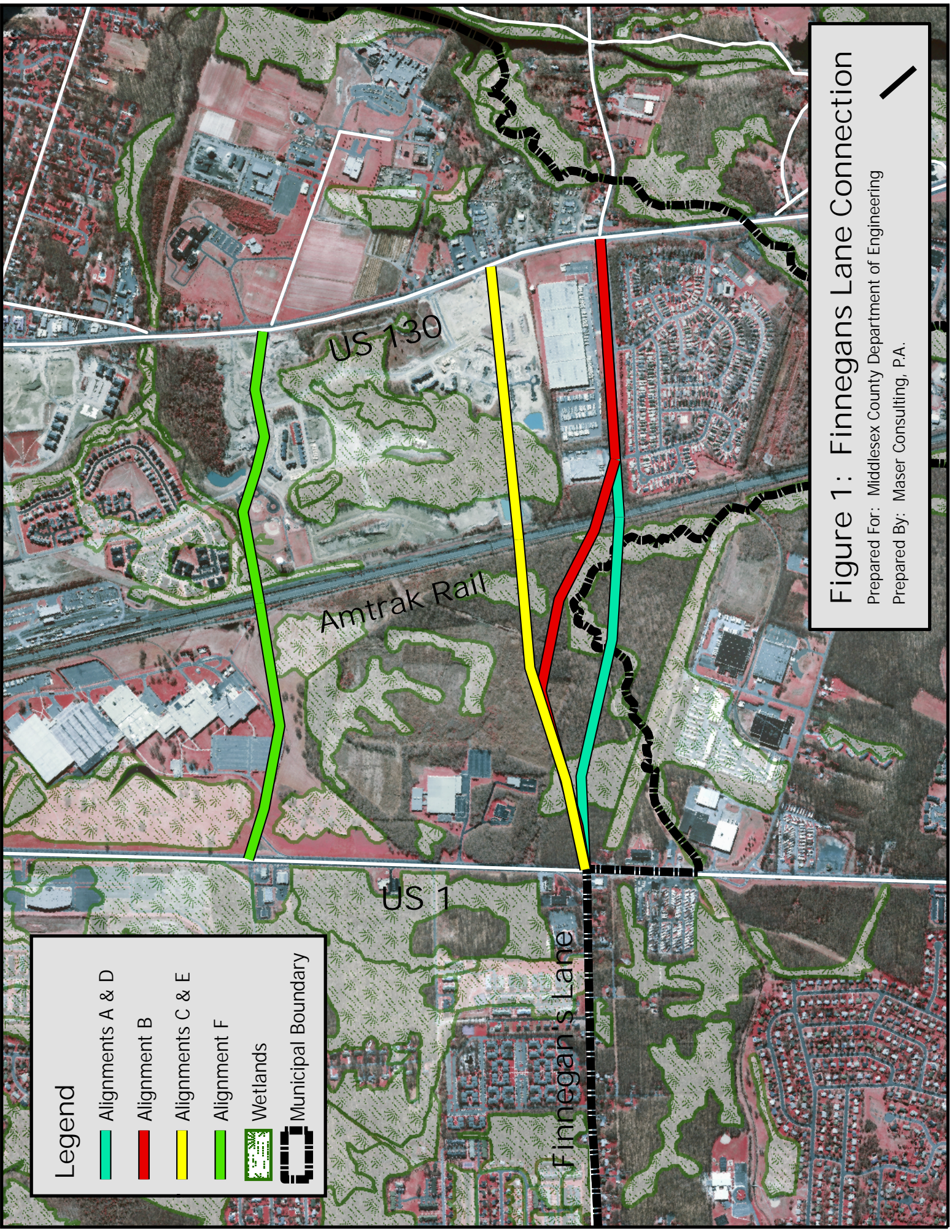
The Finnegan's Lane Connection project is included in the current Master Plan for North Brunswick. South Brunswick Township recommended the project for further study in the Central Jersey Transportation Forum, Transportation Needs Document, July 23, 2004. While the project was also included in the 1985 Middlesex County Comprehensive Plan, it does not appear in the current 1999 version.

Finnegan's Lane (CR682) is included in the Federal Aid System and therefore eligible for federal funding for project development, design and construction. The Connector would require Federal system designation to be eligible for federal dollars.

2. Feasibility Assessment Study

The Feasibility Assessment Study prepared by Maser Consulting investigated six separate alternatives on new alignments for project cost and wetland impacts. The six alternatives are shown in Figure 1. Two existing routes, Adam's Lane and Dean's Lane, were also studied. All new alignment alternatives connect Route 1 to Route 130 on a four-lane section, with bridges that will carry Finnegan's Lane over Route 1, Route 130 and the Northeast Rail Corridor. The alternatives also include interchanges for movements onto and off of Routes 1 and 130. Each movement will be controlled by a traffic signal.

Three alternatives with alignments that intersect Route 1 and Route 130 at the existing intersection with Finnegan's Lane were determined to be feasible. Alternative "D" included a viaduct over the wetland areas, and does not provide local access from the connection between Route 1 and Route 130. Alternative D was preferred, generally due to the reduced impact to right-of-way (ROW) and wetlands, and the value placed on its ability to connect directly to Finnegan's Lane on both sides of the NEC, and not connect to the existing network.



Legend

- Alignments A & D
- Alignment B
- Alignments C & E
- Alignment F
- Wetlands
- Municipal Boundary

Figure 1: Finnegans Lane Connection

Prepared For: Middlesex County Department of Engineering

Prepared By: Maser Consulting, P.A.



The estimated construction cost in 2002 for the preferred alternative was approximately \$90 million. Potential wetland impact was estimated at 5.7 acres, which at that level would trigger a federal review of the permit. An assessment of Alternative D further identified the following required permits: Individual Freshwater Wetlands Permit, Major Stream Encroachment Permit and New Jersey Soil Erosion and Sediment Control Permit.

The wetlands permitting process requires a sound demonstration of project purpose and need, and a thorough study of potential prudent alternatives to avoid or minimize impacts to existing wetlands and protected cultural resources. Neither the Maser Study report nor the study performed in 1988 by Fellows, Read and Associates clearly indicate whether all prudent alternatives were identified and evaluated. The Adam's Lane (CR 608) and Dean's Lane (CR610) alternatives did not appear to be as thoroughly developed as other new possible alignments between Adam's Lane and Dean's Lane. An additional concern is the need to address newly revised NJDEP stormwater management runoff requirements. Meeting these requirements may have the potential to increase the scope and potential impacts of the project.

The Maser study cited the current Emergency Service response time deficiency brought on by the limited network as a project need. While this is important, an evaluation of cost-effectiveness of the No Build alternative means of providing acceptable system-wide response time should also be performed to support the need position.

Regional traffic modeling studies have not been performed and are normally considered important in projects of regional significance and substantial cost. Modeling can be an important asset in developing a project needs statement, setting a project scope, testing alternatives and supporting the development of forecasted volumes for design purposes. Preliminary investigation of the existing conditions indicates that a two-lane roadway may be sufficient cross-section to carry the traffic in the segment between Route 1 and 130. If a reduced section is feasible, it could have significant consequences on the project cost, impact to wetlands, and other considerations. Modeling would provide the proper data to make these kinds of determinations.

3. Traffic Analysis – Existing Condition

Adam's Lane (CR608) is the only roadway in the North Brunswick network south of the junction of Route 1 and 130 to provide east-west connection. The intersection with Route 1 is the primary constraining point in the system. Volume to capacity ratios exceed 1.0 in the AM and 1.2 in the PM peak periods. The ratios mean that there are more vehicles in today's traffic conditions than the intersection can process.

The performance of the proposed connection and potential impacts on the performance of the surrounding network was evaluated by estimating the potential for the existing traffic to divert to the new facility. The peak period traffic count data collected at three (3) locations — Route 1 and Finnegan's Lane, Route 1 and Adam's Lane, and Route 27 and



Cozzen's Lane — formed the basis for the analysis. These three intersections are part of the existing east-west network. These three locations are expected to be most impacted by the proposed improvement, along with Route 27 and Finnegan's Lane, Route 130 and Adam's Lane, and the intersections associated with Dean's Lane (CR610) and Old Georges Road (CR697) in South Brunswick. Revised patterns of traffic were developed based on the Build condition, and traffic volume was diverted and reassigned. A Level of Service analysis was then performed. The "Highway Capacity Manual" (HCM2000) summarizes level of service (LOS) as a qualitative measure used to characterize operational conditions within a traffic stream at an intersection as perceived by motorists and passengers. Six levels of service are defined and identified with a letter designation that corresponds to the operating condition. Levels of service range from an A, which is the best operating condition, to F, which is the worst.

The results are shown in **Tables 1 and 2**. Table 1 addresses the new intersections of Finnegan's Lane connection with Routes 1 and 130. Table 2 addresses the impact on LOS at three adjacent intersections.

Table 1
Finnegan's Lane Connection LOS

Intersection	Level of Service (AM/PM)
Finnegan's Lane & Route 1 SB Ramp	B/C
Finnegan's Lane & Route 1 NB Ramp	B/B
Finnegan's Lane & Route 130 SB Ramp	B/B
Finnegan's Lane & Route 130 NB Ramp	B/B

The proposed Alternative D intersections along Finnegan's Lane will all operate at LOS C or better, the majority of which will operate at LOS B. No approach will operate under LOS C.

The storage lengths may not be sufficient in the current Alternative D concept to handle expected traffic volumes. High volume approaches, such as the eastbound left turn from Finnegan's Lane onto the Route 1 northbound ramp, could fail due to excessive queue formation. If adequate storage is not provided, queues for the left turn movement can impede the through movement, and thus decrease the level of service and increase congestion. Also, there may be sufficient separation between the interchange intersections to allow for efficient operation and storage. If the required space is not met, turning lane queues will back-up into upstream and downstream intersections.

The intersections of Route 1 and Adam's Lane/Cozzens Lane and Route 27 and Cozzens Lane were analyzed using the reduced volumes that would occur as a result of the Finnegan's Lane Connection. Volumes that were shifted to Finnegan's Lane were removed from the above mentioned intersections and a LOS analysis was performed. A comparison of the existing LOS and the proposed LOS with the Finnegan's Lane Connection is shown below in **Table 2**.



Table 2
Finnegan's Lane Connection LOS – Comparison

Intersection	Level of Service (AM/PM)		
	Existing	Finnegan's Connection	Finnegan's Connection with Modifications
Route 1 & Adams/Cozzens	E/F	D/D	C/C
Route 27 & Cozzens	F/F	F/F	C/C

The intersections of Route 27 and Cozzens Lane and Route 1 and Adam's Lane/Cozzens Lane will both improve operation with the Finnegan's Lane Connection. The LOS category remains "F" at Cozzens and Route 27; however, intersection delay will decrease 30% from 126.9 seconds to 84.3 seconds in the A.M. peak hour, and 45% from 305.5 seconds to 172.4 seconds in the P.M. peak hour.

Geometric changes and timing modifications are also proposed to improve the level of service. Adding separate southbound through and left turn lanes, and permitting a protected westbound right turn during the southbound lead phase, will increase the LOS to C at Route 27 and Cozzens Lane. The Connection, as proposed, will improve the performance of the local system.

The improved LOS at Adam's Lane is achieved by widening the northbound, eastbound and westbound approaches by a single lane. The northbound approach would widen from three to four lanes. The eastbound approach would be widened from two lanes to three lanes to include one dedicated left turn lane, one dedicated through lane, and one shared through/right lane. The westbound approach would be widened from two lanes to three lanes to include one dedicated left turn lane, one dedicated through lane, and one dedicated right turn lane.

An estimated 450-600 additional peak period vehicles will use Finnegan's Lane between Route 1 and 27. Much of the traffic will appear at the Finnegan's Lane and Route 27 intersection as a result of the proposed connection. Traffic volumes are unavailable at that intersection, so a determination on the overall impact and performance cannot be made at this time. Specific improvement measures at Finnegan's Lane and Route 27 if made necessary by building the project should be reviewed for their potential effects on regulated resources.

The Central Jersey Transportation Forum and Regional Planning

The Central Jersey Transportation Forum is comprised of municipal, county, state officials and regional agencies that convene quarterly to discuss and address issues affecting the region. Early focus has been on transportation and land use issues. The Forum determined that east-west access was its highest priority, citing congestion,



impacts on local communities and motorists, “hot spots” and concerns regarding specific improvements. (See Attachment 1, p. 15)

While North Brunswick Township is outside of the adopted Forum area, the Forum program has important relevance on decisions to advance the Finnegan’s Lane project:

- The Route 1 Bus Rapid Transit Study is investigating a high level bus system aimed at providing rapid transit alternatives for the region and modifying auto travel patterns and characteristics. This is a multi-year task.
- The Route 1 Smart Growth Study, sponsored by NJDOT, is investigating the regional economy, land use and the transportation framework, with the objective of developing a balanced plan and guide for land use and transportation decision-making. This study is in the first year of a multi-year effort. Major investment in transportation projects, particularly along Route 1, will likely not advance until this study is complete, and NJDOT projects on Route 1 in South Brunswick Township are deferred until this time. The study took a collective review of the economic structure and transportation systems, and reconfirmed the poor east-west access conditions through North and South Brunswick. (See Attachment 2)

A potential new rail station in South Brunswick Township serving the Northeast Corridor and more recently an opportunity in the North Brunswick area have been discussed. A new rail station will have the potential to attract regional transportation investment to improve access to the station. A station located in either North Brunswick Township or South Brunswick Township would direct interest to a major east-west project serving the station area.

Although outside the adopted Forum area, North Brunswick Township is eligible for invited guest status. The Township should monitor activities, maintain active participation, voice opinions on “east-west” issues and advocate for Finnegan’s Lane project initiation.

Determination of Project Need

The following resources, analysis and previous efforts support the need for the Finnegan’s Lane Connector:

- The 1985 Middlesex County Comprehensive Plan identified the need for the Finnegan’s Lane Connector and included the project in the Plan.
- The 1999 Middlesex County Comprehensive Plan dropped the Finnegan’s Lane project because of concern regarding anticipated wetland impacts, not due to the absence of project need.



- The Central Jersey Transportation Forum (CJTF) identified east-west access as the forum's highest priority planning issue. (Attachment 2)
- The NJDOT Route 1 Regional Growth Strategy – Corridor Working Group Briefing Note #11, Regional Economic & Transportation Development Framework states; "There is also poor east-west access in the southern portion of this sub-market (.eg. North and South Brunswick Townships) as the highway system is highly fragmented and does not connect from the Turnpike to the arterial system west of Route 1.

The only existing east-west connecting roadway in North Brunswick, Adams Lane, cannot absorb additional traffic in its current configuration. East and west approaches to the Route 1 intersection are over capacity during AM and PM peak periods.

Network modeling and analysis performed by the URS for the CJTF determine that the roadway network between Route 1 and 130 service east-west access through out the study area including the South Brunswick areas was at 90% capacity in 1997 and will grow to over 140% by 2020 if improvements are not made to the local network. The analysis also observed "All major east-west roads between US 1 and US 130 are expected to exceeds available capacity on critical sections in 2020 "Do Nothing" Scenario".

- The Maser study determined that Emergency Management Service response time from the Volunteer Engine Co #2 areas south and east of the unit station is compromised. (Attachment 3)

Recommendation

A study of alternative east-west connections serving the North Brunswick and South Brunswick areas should be initiated and included in the NJTAP Regional Program for Study and Development. The following should be contemplated in developing the report:

- The study should re-focus on a project needs statement, re-establish project scope and develop and test a broad range of alternatives north and south of Finnegan's Lane.
- The study should build on the findings of the Route 1 Bus Rapid Transit Study and the Route 1 Regional Growth Strategy Study.
- The potential for a new station location on the AMTRAK's Northeast Corridor adds tremendously to the project need and should be considered.
- The previously developed \$90 million estimated cost for the Connector reflects the high design of the current project scope. A project at that level of cost will likely be difficult to program.
- Important objectives of the study effort are 1) the project scoping should attempt to reduce overall project cost and 2) integrate the project into the local network.