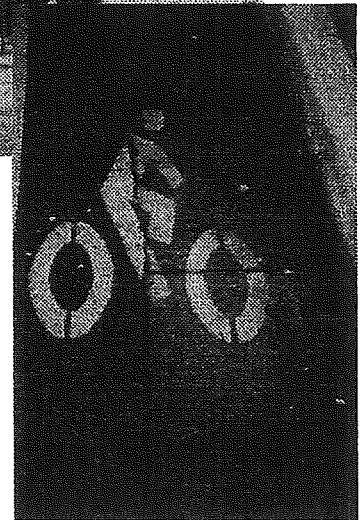
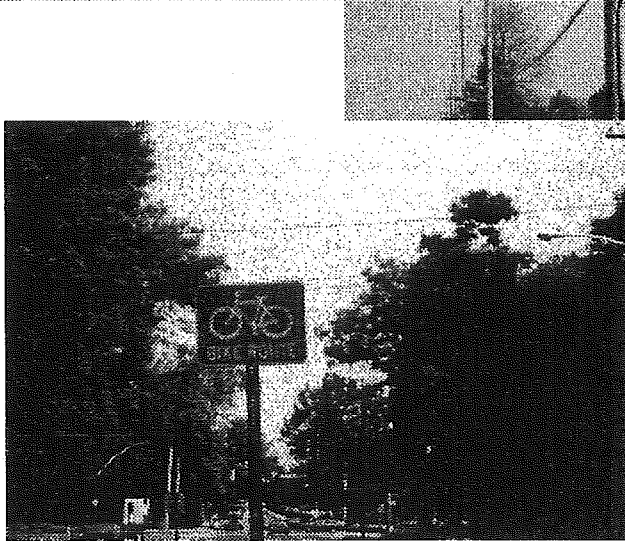


Newark Area Bicycle Interim Report



November 1996



WILMAPCO

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Newark Area Bicycle Interim Report

Prepared for



The Delaware Department of Transportation

&

The Wilmington Area Planning Council

Prepared by



*Parsons Brinckerhoff Quade & Douglas, Inc.
Baltimore, Maryland*

November 1996

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EXECUTIVE SUMMARY

This Interim Report provides background information on the state of bicycling and bicycle planning, details existing conditions and a preliminary inventory of bicycle facilities in the City of Newark, proposes preliminary recommendations for improving infrastructure and the overall cycling experience, and finally raises issues that must be resolved in order to develop a final Bicycle Facility Needs Plan from this interim report. This report covers the greater Newark City area as generalized by the map shown on Figure 1. The report recommends courses of action for the implementation of the proposed improvements to each of the corridors identified by this plan. At a minimum, each of the corridors identified in the plan should be upgraded to conform to currently acceptable standards for pavement markings, signing, widths, etc. Additional upgrades are prescribed for existing facilities/corridors currently dominated by motorized vehicles. These additional improvements are designed to remove barriers/pinch points at key locations, enhance the overall cycling experience, make cycling safer on the existing network, and better accommodate more experienced riders while providing enhancements and infrastructure for less experienced riders.

Corridors studied in this plan include:

- Route 896/New London Road
- Route 273/Nottingham Road
- Route 2/Elkton Road
- Barksdale Road (including Hillside)
- Casho Mill Road
- Main Street
- Delaware Avenue
- Cleveland Avenue
- Park Place
- Academy Street
- Chapel Street
- Route 4/Christina Parkway
- Route 896/College Avenue
- Route 72/Library Avenue
- Route 2/Capitol Trail
- Route 273/Ogletown Road
- Route 72/Possum Park Road
- North College Avenue
- Paper Mill Road
- Salem Church Road
- Amstel Avenue
- Pomeroy Branch
- Central Campus Connector

General Recommendations

The recommendations for each corridor are specific to existing conditions found in the limits of that corridor and were developed to address specific deficiencies that currently exist. Recommendations were framed around the "4-Es" of bicycle planning, namely: Engineering, Education, Enforcement and Encouragement. Specific recommendations for corridors can be found further into the body of this document. In general, engineering recommendations address the need to develop a comprehensive bicycle signage and pavement marking program aimed at upgrading all the current infrastructure throughout the City to standards prescribed by the most recent versions of both the Federal Highway Administration's Manual on Uniform Traffic Control Devices (MUTCD) and the American Association of State



Highway and Transportation Officials' (AASHTO) Guide for the Development of Bicycle Facilities. Secondly, a concerted effort needs to be undertaken to aggressively improve the maintenance and resurfacing programs. Specifically, this initiative would target routine road/pavement maintenance operations, practices and schedules, requiring more frequent sweeping and resurfacing of shoulder areas and other facilities used by bicycles. Lastly, a comprehensive compatible program to the engineering recommendations needs to be developed that: educates the public to safely use bicycles, enforces motor vehicle and bicycle laws to promote safe conditions on the transportation network for all users, and encourages the use of bicycles, especially as an alternative to the single occupant vehicle (SOV).

The following is a summary of engineering and non-infrastructure recommendations:

Barrier & Hazard Removal:

- replacing or retrofitting drainage grates so that cyclists can ride over them without trapping a wheel in the grate
- retrofitting railroad crossings with flangeway filler strips
- selectively restricting and/or removing on-street parking

Signing & Pavement Marking:

- installing new signage and pavement markings to accommodate through-movement of bicycles where there are designated right-turn lanes for vehicles
- installing new signage communicating rights-of-way, speed limits, etc., (especially on campus), installing additional signs and signals at crosswalks
- installing new or upgraded signs and pavement markings indicating dedicated bicycle facility space on the roadway

Maintenance:

- improving routine maintenance practices as part of existing programs aimed at clearing shoulders, gutter pans and bridge decks of accumulated debris and vegetation, as well as maintaining off-road facilities, railroad crossings and consistent shoulder pavement quality throughout the greater Newark area



Non-Infrastructure Recommendations:

- establishing a comprehensive program to educate Newark area residents about the benefits of safe cycling, enforce motor vehicle and bicycle laws, and generally promote bicycle transportation as an alternative to the SOV in the Newark area.



Bicycle Plan Study Area

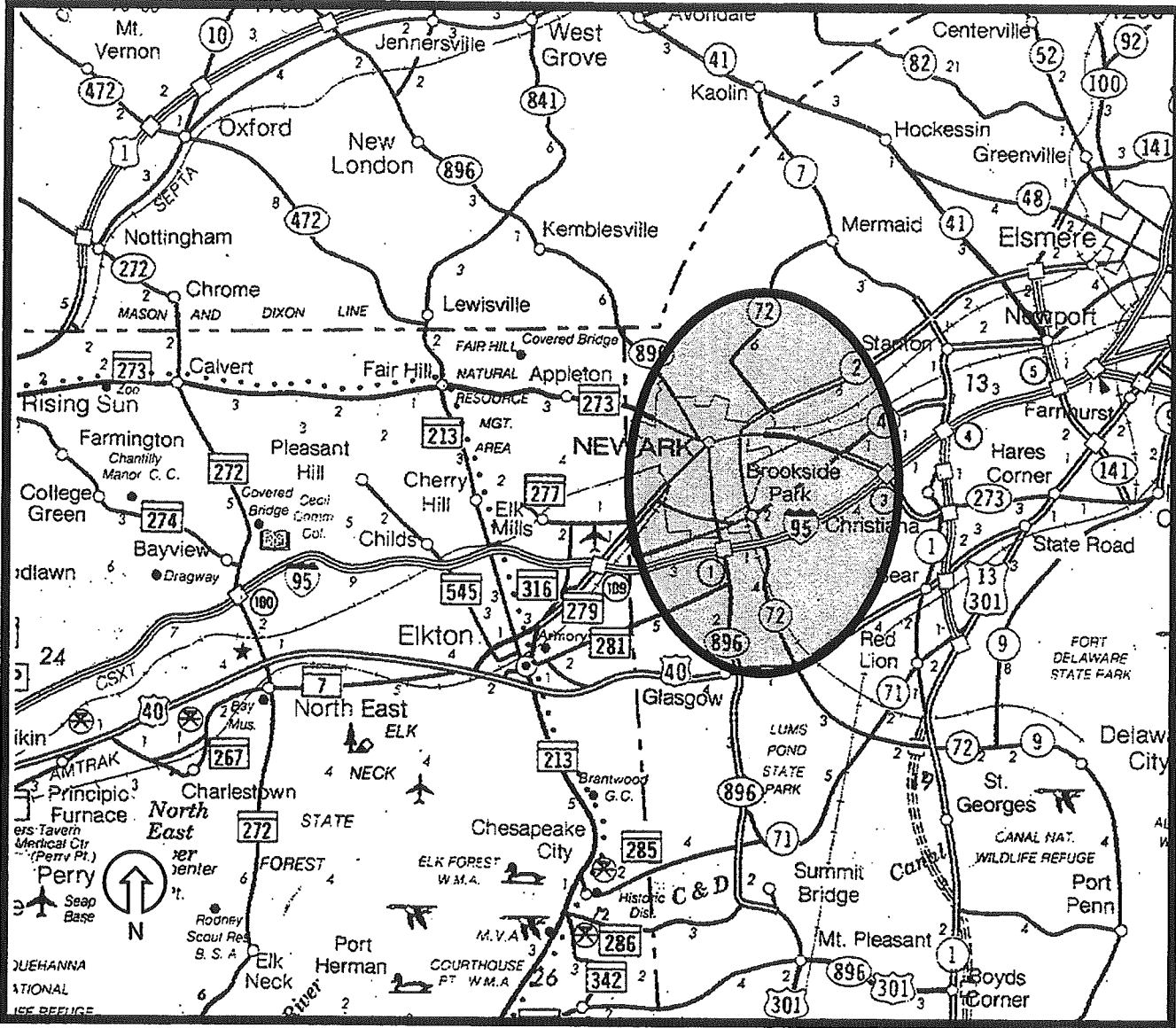


Figure #1



CHAPTER 1

INTRODUCTION

This interim report is being prepared in conjunction with other ongoing statewide and regional planning activities undertaken by the Delaware Department of Transportation (DelDOT) and the Wilmington Area Planning Council (WILMAPCO). This report is part of a larger multimodal planning effort being conducted by WILMAPCO (the metropolitan planning organization or MPO for the area) focusing on transportation issues in the Newark area and is being coordinated with both the State and MPO Long Range Plans. This report is intended to be a foundation of a plan that updates the Newark Urban Route Bicycle System Master Plan of 1973. It proposes an updated set of recommendations on a corridor specific basis and communicates state-of-the-art ideas, practices, and developments in bicycle transportation planning.

Although the scope of the report covers the City of Newark proper, some mention of broader connections to the outlying region is made to bridge the gap between similar planning documents discussing non-motorized multimodal travel, and to address primary commuter routes into the City from outlying developed areas. It should be noted that this document does not provide detailed cost estimates, or estimations of impacts, nor does it identify specific funding sources for recommended elements of subsequent improvement projects, although broad categories of funding are discussed. The recommendations and conclusions of this report are intended to be used in a master planning context to produce a Facility Needs Plan for adoption or inclusion by the City, WILMAPCO, and/or DelDOT in relevant local and regional planning studies or documents. Agencies contacted who have contributed valuable input and/or resources include: WILMAPCO, DelDOT, University of Delaware, City of Newark Planning Department, City of Newark Police Department, New Castle County Parks and Recreation Department, State Division of Parks and Recreation, and DART First State.

In addition, critical input was gathered in an initial day-long Plan Development Public Workshop held in early November, 1995. Over 40 participants attended, representing WILMAPCO's Bicycle/Pedestrian/Greenway Subcommittee, local elected officials, local planning staffs, members of the University community, members of local bicycle clubs, environmental groups, other advocates and members of the general public. A follow-up "open house" type workshop was also held in early December, 1995 to present a first draft of the plan.



Goal Statement:

To develop a complete bicycle system that recognizes bicycling as an important transportation mode; and provides for safe and efficient bicycle access throughout the community emphasizing those community areas that have the greatest potential to generate bicycle trips.

Objectives:

- Promote a sustainable transportation system by encouraging bicycling as an alternative to single occupant vehicles
- Provide bicycle access between residential, commercial, employment, recreational and university locations
- Provide safe bicycle facilities that meet or exceed accepted design practices
- Provide connections between bicycling and other transportation modes such as buses, carpools, vanpools, and trains
- Include encouragement, education (both motorist and bicyclist), and licensing/registration programs as part of the overall plan and recommendations
- Provide bicycle facility maintenance particularly by removing debris and overgrown vegetation
- Provide for traffic law enforcement affecting bicycle transportation

BACKGROUND ON BICYCLING IN THE UNITED STATES

Since the publication of the first Newark bicycle plan in 1973, bicycling's popularity and its image as a recreational and commuter mode of travel has increased in the US. Today, bicycling has grown to be one of the predominant modes of non-motorized transportation in the United States. Available data from the United States Census Journey to Work Survey and the Nationwide Personal Transportation Survey (NPTS) suggest that bicycle usage for work trips, school, recreation and personal purposes is a fairly significant component of those trips. According to the NPTS, bicycling makes up 9.9% of work trips, 14.1% of school trips, 55.4% of social/recreational trips, and 19.7% of personal/family business trips. Further, the Bicycle Institute of America estimates that there are 800,000 bicycle commuters on any given day in the United States.

These facts account for why the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991, is encouraging the expansion of facilities for bicycles as a means of multimodal transportation. As bicycles facilities become more widespread and their use is more feasible as a means of every day transportation, bicycling's importance is likely to increase. However, bicycling's full potential can only be achieved by linking integrated, strategically developed infrastructure and planning projects with education, encouragement and enforcement programs for cycling in conjunction with similar endeavors for complementary transportation modes.



Although many reasons are given for not bicycling or walking, a number of public opinion surveys and research studies indicate that the public wants to engage more in bicycling activities. A recent Harris Poll concluded that a ten fold increase in adult bicyclists, from three to 35 million, would result if better bicycle facilities were available. Even without these facilities, people are bicycling more. According to recent data collected by the bicycle industry, the number of adults regularly riding bicycles nearly doubled from 1985 to 1989 -- increasing from 12 to 23 million riders. Regular usage of bicycles is not necessarily correlated to areas with more temperate climates or more level terrain. High rates of bicycle usage have been achieved in many communities across the US and the world that experience frequent cold winter weather. Madison, Wisconsin for example is a community that has high rates of bicycle usage despite often severe winter weather. Recent studies have indicated that although climate may be important, it is not the single driving force behind bicycle usage. Other factors like length of trip, provision of bicycle facilities (on/off road bicycle lane/path, lockers, parking, etc.), age of population, and enjoyment of cycling for health or recreational benefits were more influential factors relating to the propensity to participate in bicycling. It was also found that university towns, like Newark, often enjoy some of the highest levels of bicycling.

As a result of increased exposure and use of bicycles, cities and regions across the nation are taking steps to facilitate bicycle transportation through enhancements and integration within their urban transportation systems. In communities all across the nation, bicycling has been integrated into the transportation system, and now comprises a sizable portion of all trips in many areas. The City of Newark, with its concentrated nucleus of destinations amidst a university setting, is an ideal environment to foster the integration of bicycling with the existing transportation system as an alternative transportation mode.

A growing national network is now available for disseminating information and encouraging bicycling activities at all levels nationwide. Numerous Federal, State, local and private organizations exist to provide information and promote bicycling. The FTA and FHWA promote multimodal planning through various programs and offices. In keeping with recent federal requirements, all state DOTs a Bicycle and Pedestrian Coordinator and many local communities have voluntarily established a comparable position. Private groups like the Bicycle Federation of America (BFA), which acts as the national clearing-house for bicycle information and resources, the League of American Bicyclists (LAB), and Rails-To-Trails Conservancy along with local organizations like the White Clay Bicycle Club are also valuable resources. All these groups should be contacted for their involvement and input during the planning process.

BENEFITS OF BICYCLING IN THE UNITED STATES

The benefits of bicycling and other non-motorized forms of transportation in the United States are readily apparent and can basically be quantified in three categories:

- health/well being
- environmental
- sustainable transportation.

Health/Well Being

Epidemiological studies started in the 1950s suggested a link between physical activity and decreased incidence of heart disease and sudden death. More recent investigations suggest



that beneficial, adaptive responses to exercise, in particular walking and bicycling, can be obtained by exercising for at least 30 minutes, 3 times per week. Individuals who regularly participate in some form of physical activity can reduce the risks of cardiovascular diseases, including hypertension, effectively lose weight, improve their mental health, ameliorate the chronic affects of aging and osteoporosis, lower total cholesterol and increases the level of high-density lipoprotein (HDL) cholesterol, and generally improve their overall health combating other diseases like diabetes, cancer and arthritis.

Walking and bicycling in particular have been shown to be excellent low-impact, weight bearing aerobic activities. Bicycling has been shown to be highly enjoyable by individuals not only for physical health benefits, but because it gave them a sense of mental health, independence and enjoyment as well as a means of transportation in spite of the perceived dangers of riding on the road. The National Bicycling and Walking Study cited a recent British Transport and Research Board survey that pointed to the fact that individuals engaged in cycling because they associated it with economy, cleanliness, freedom, and "doing your own thing".

Bicycling has also shown positive results for older Americans in preventing/combating the affects of osteoporosis, and decreasing hypertension and improving the overall health of all participants. In addition to personal benefits, environmental benefits can be gained from usage and participation in cycling as well.

Environmental

Bicycle riding is a clean, non-polluting form of transportation that does not contribute to environmental damage inherent in extracting, transporting, processing and burning of fossil fuels such as gasoline and diesel fuel. Bicycling, as a major mode of renewable, sustainable transportation has the capability to displace some vehicular travel, thus contributing to improvements in local and regional air quality. Research has suggested that bicycling has the potential to displace ten to 50 miles of vehicle travel per person per year. As such bicycling has the potential to help displace by the year 2000:

- between 7.3 and 49.8 million tons of carbon dioxide per year
- between 310,000 and 2.1 million tons of carbon monoxide per year
- between 8,700 and 59,300 tons of nitrogen oxides per year
- between 38,900 and 254,100 tons of volatile organic compounds per year.

(Source: National Bicycling and Walking Study, Case Study 15,1994)

Bicycling is a key component in helping the city, region and nation meet air quality goals and in complying with Federal air quality regulations like the Clean Air Act Amendments (CAAA). Section 108 of the CAAA lists 16 transportation control measures (TCMs), which have unique status within the act. When a non-attainment area such as New Castle County, fails to achieve compliance, Federal Transportation funds will be frozen for all activities save safety programs or TCMs. Section 176(d) mandates that certain TCMs be given priority consideration. Three specifically deal with bicycling:

- "ix) programs to limit portions of road surfaces or certain sections of the metropolitan area to the use of nonmotorized vehicles or pedestrian use, both as to time and place;



x) programs for secure bicycle storage facilities and other facilities including lanes, for the convenience and protection of bicyclist, in both public and private areas;

xv) programs for new construction and major reconstruction of paths, tracks or areas solely for use by pedestrian or other nonmotorized means of transportation when commercially feasible and in the public interest."

(Source: National Bicycling and Walking Study, Case Study 21, 1994)

ISTEA also lists bicycle programs as being important for air quality benefits directly through the Congestion Mitigation and Air Quality (CMAQ) Program. As part of CMAQ, five activities are specifically listed as TCMs because they so clearly provide air quality benefits. These activities are specifically noted for their worthwhile economic benefits and are:

- trip reduction ordinances
- programs to limit or restrict vehicle use in the downtown areas
- programs for the provision of high occupancy vehicles
- programs to control extended idling of vehicles
- programs to facilitate non-automobile travel

Clearly, bicycling fits into the latter TCM mentioned above, and has tremendous potential to help the county and state deal with air quality issues.

Sustainable Transportation

Perhaps bicycling's greatest benefit is that it is a low-cost, affordable, environmentally friendly and sustainable **transportation** alternative to the single occupant vehicle (SOV). Bicycles are flexible in use and are very efficient for short, discretionary or recreational trips. In addition, bicycling can be shown to have the following positive environmental, social and economic effects:

- Trail Facilities provide recreational as well as transportation opportunities. A Chicago area study indicated that on average, 15.6% of commuter trips are by bicycle when trails are located near residential areas. Surveys on the Pinellas Trail (Florida) revealed that 35% of trail users were using the trail for transportation purposes.

(Eubanks, 1986, & Guttenplan, 1995)



- Bicycle miles traveled replace vehicle miles traveled for a savings in fuel for the household and reduced oil import reliance. In New Castle County, 33% of county residents work within 5 miles of where they live, a very realistic cycling distance. Research has shown that bicycling to work only 1.25 miles per week could totally eliminate the need for imported Middle East oil, saving 3.45 gallons of gasoline per week per household. More importantly, bicycling, as a transportation mode, has the potential to displace as much as 4.3% of total vehicle miles traveled (VMT). in this country by the year 2000.

(Bicycling, 1990, & National Bicycling and Walking Study, Case Study 15, 1994)

- Bicycling can reduce the need for second car ownership, freeing up significant resources. This savings of forgoing a second car could free up approximately \$250 per month, translating into \$24,295 in additional home buying power. The American Automobile Association estimated that the typical suburban family spends 25% of its after-tax income to support two-car ownership.

(Bicycling, 1990, Popular Science, 1996)

- Bicycling promotes efficient use of urban land and other resources and generally improves conditions for all roadway users: Use of bicycles can reduce or delay the need for roadway expansions. Many improvements made for bicyclists, such as paved shoulders, access management, and designated bicycle lanes also improve safety and operating conditions for motorists. For example, a roadway with two 8' parking lanes and two 9.5' foot travel lanes can be restriped to include only one 8' parking lane, two 5' bicycle lanes (one adjacent to parking) and two 9' travel lanes. This treatment effectively increases the travel lane profile for emergency vehicles from 19' to 28', or a net increase of 9'. Bicycle parking is more compact --10 bicycles can park in the space of one car. On average, 100 bicycles can be produced for the energy and resources it would take to build one medium-sized car.

(Bicycling, 1990, FDOT, 1995)

- Bicycling can be used for a variety of trip purposes and is often more amenable to trips that are somewhat flexible such as some work trips, shopping, recreation and personal business trips. Currently, bicycling makes up a significant portion of all trips, accounting for 9.9% of work trips, 14.1% of school trips, 55.4% of social/recreational trips, and 19.7% of personal/family business trips.

(National Personal Transportation Survey, 1994)

- High rates of bicycling have been achieved in many communities, even those with cold winters and steep terrain. College and university towns have achieved the highest share of bicycle usage. In college towns, bicycle commuting averages almost 11% of all trips and 40% of trips to class. In many instances, people have demonstrated a willingness to utilize bicycles for a variety of trip purposes if infrastructure (bicycle lanes) is provided and if that infrastructure is safe, well maintained, convenient and accessible to their trip origins and destinations.

(National Bicycling and Walking Study, Case Study 1, 1994)



CHAPTER 2

BACKGROUND OF THIS PLAN

This study developed as a complimentary component of the Newark/Elkton Intermodal Transportation Plan. The purpose of which was to investigate short and long term transportation solutions that address the Newark area's transportation problems. Specific issues focused on included:

- Population & Employment Growth
- Traffic Congestion
- Trucks
- Bicycle/Pedestrians
- Park-and-ride/Transit Connections

One goal of the Newark/Elkton Study was to provide better facilities and connections for non-motorized modes such as walking and bicycling, which was the driving force behind this study.

Assistance and encouragement for the development of this plan have come from WILMAPCO's Bicycle/Pedestrian/Greenway Subcommittee which has been involved in bicycle and pedestrian elements for the MPO Long Range Plan. Additional support and technical assistance has come from the Delaware Department of Transportation (DelDOT), WILMAPCO, City of Newark, the University of Delaware, DART First State and participants in the day-long Plan Development Workshop.

The project team reviewed the 1973 plan, conducted numerous field visits, talked to and interviewed key officials to determine the primary issues. Additionally, a public workshop was held on Wednesday, November 8, 1995 on the campus of the University of Delaware for the purpose of soliciting additional input and to confirm the team's understanding of Newark-specific issues. The workshop introduced the public to the initial analysis of existing conditions and a proposed set of preliminary recommendations addressing deficiencies and pinchpoints in a comprehensive manner. Participants were invited to the workshop via an invitation letter sent on WILMAPCO's letter head, flyers posted in bicycle shops and at other public meetings and a newspaper article. Potential participant's names and addresses were gathered from various committee/sub-committee mailing lists and the entire mailing list was jointly developed between WILMAPCO, DelDOT, the City of Newark and the project team. Participants who were invited to the workshop included individuals representing WILMAPCO's Bicycle/Pedestrian/Greenway Subcommittee, locally elected officials, local planning staffs, members of the University Community, including faculty, staff and students, members of local bicycle clubs, environmental groups, other advocates and members of the general public.

The workshop was a mixture of displays and presentations, with two sessions: a morning training component and an afternoon goals/recommendations session. (See agenda on following page). Participants had an opportunity to learn about planning and funding as well as design from local and nationally recognized sources. They were given opportunities



to comment on each of the 24 corridors and to participate in small-group discussions aimed at defining goals and issues unique to the community of Newark.



Today's Agenda

- 8:00 Registration
- 8:30 Welcome
Alex Taft, WILMAPCO
- 8:40 Introduction
George Walton, Parsons Brinckerhoff
- 9:00 Planning & Funding Processes
Alex Taft, WILMAPCO
Michael Angelo & Liz Holloway, DelDOT
- 9:30 Bicycle Facility Planning & Design
Andy Clarke, Bicycle Federation of America
- 10:00 Bicycle Crash Causation & Safety Programs
Alex Von Koch, Newark Police Department
- 10:15 Break
- 10:30 Bicycle Facility Planning & Design
Andy Clarke, Bicycle Federation of America
- 11:45 Encouragement Programs
Denise Verderosa, New Castle CO. Transportation Mgt. Assoc.
- 12:00 Lunch
- 1:00 Current Bicycling Conditions in Newark
Steve Plano & Shawn Dikes, Parsons Brinckerhoff
- 1:15 Goals & Objectives Development
- 2:00 Break
- 2:15 Focus Group Sessions
- 3:30 Focus Group Presentations
George Walton, Parsons Brinckerhoff (Facilitator)
- 4:00 Adjourn



The workshop was jointly conducted by WILMAPCO, DelDOT, the Transportation Management Association (TMA) of New Castle County, the City of Newark, the University of Delaware, and the project team. Recommendations and suggestions gathered as a result of the workshop and discussions appear in the Appendix at the end of this document and are incorporated throughout the Interim Report.

Additional public input was received at an open house on December 4, 1995. The open house, held in the Newark City Council Chamber's was designed to introduce the public to more specific recommendations incorporated into the plan as a result of the first workshop. The council chambers housed displays showing existing conditions and recommendations for the 24 corridors, an aerial photograph of the city outlining on-campus recommendations, results from the bicycle level of service analysis, the "4-Es" matrix of non-infrastructure recommendations and copies of the draft plan for public distribution. The three hour open house was attended by approximately 25 individuals who were given information and explanations about the plan in small groups and in informal discussions with the consultant team and client staff members from WILMAPCO and DelDOT.

NEWARK BICYCLE PLANNING PROBLEM STATEMENT

The City of Newark, like many university towns, experiences high levels of bicycling. Generally, bicycle transportation is practical and economical for many students. This use by the student population and the facilities that are provided to support them, create a momentum whereby many people in the community realize the benefits of bicycling. This high participation in bicycling creates community benefits in terms of reduced congestion, air pollution, and auto parking needs. Bicycling is seen by many people in the community as part of the solution to complex urban transportation issues. However, in encouraging bicycling, many new problems are created regarding roadway safety and the compatibility of bicycles with motor vehicles and pedestrians.

In 1973, the city first addressed bicycle needs in the Urban Route Bicycle System Master Plan, which articulates a bicycle route system to be implemented in five stages. Although many of today's bicycle facilities in Newark undoubtedly owe their existence to this plan, all five stages were never fully implemented. In the intervening twenty-three years, much has changed - both physically and philosophically. The city has grown, with development patterns that are more low density and dispersed than before. The University has also grown, and new campus buildings are continuing to be erected. These new destinations and residential developments have changed the primary trip patterns in some parts of the city.

The practice of bicycle planning and design has also matured over this period through research and testing of various design standards. Sidewalk bicycle paths, which comprised most of the 1973 plan recommendations, are no longer the preferred design for facilities serving adult bicyclists. Sidewalks are designed for slow walking speeds and thus, provide inadequate operating space and intersection design for adult cyclists who reach speeds of 12-24 miles per hour. Driveways, utility poles, and sign posts create hazards for bicyclists, and intersections with streets or driveways do not provide the visibility and stopping distance required for bicyclists. Also, bicyclists and pedestrians do not coexist well on sidewalks, as each will experience a safety threat from the presence of the other. For these reasons, bicycle facilities within the roadway are preferred designs for adult cyclists. Off-



street paths and trails, that are designed specifically for bicycle usage, are most appropriate for youths and novice or recreational adult cyclists.

The City of Newark provides a variety of bicycle facility types, including bike lanes, paths, routes, and shared roadways. However, the location of these facilities does not always provide direct connections to desired destinations. Currently, the design and designation of these facilities creates confusion and inappropriate or unsafe behavior. Roadway congestion and safety issues continue to be very real problems for both bicyclists and motorists. The current roadway environment is much more complex than it was in 1973, and bicyclists of all ages require the knowledge, skill, and accommodations to safely operate under modern conditions. The recommendations of the Newark Bicycle Plan Interim Report, and its forthcoming Bicycle Facility Needs Plan, will create the uniformity, connectivity, and predictability necessary to make bicycling a safe and attractive means of travel in the City of Newark and its surrounding urban area.



CHAPTER 3

DESCRIPTION AND ANALYSIS OF EXISTING NEWARK FACILITIES

This section focuses on the description of the existing bicycle facilities in the Newark area. Specific descriptions, advantages and disadvantages of each type of bicycle facility, along with appropriate design standards are found in a separate section in Appendix A.

Existing facilities are detailed on the accompanying pages along with specific recommendations. The generalized maps shows the various corridors in the City of Newark where bicycle facilities are provided.

The determination of existing conditions began with an initial review of the plan developed for the City of Newark in 1973. Determinations were made as to what extent the recommendations of the plan were carried out (i.e. what elements were constructed and present today). Next, updating and re-identification of corridors and limits of the new project/study were established based on the 1973 plan and the context of the city today. The project team in conjunction with WILMAPCO and DeIDOT staffs determined corridors and routes that cyclists currently use and ones that they would potentially use. This was done through numerous field visits and by examining a map of the area along with the Delaware Maps for Bicycle Users (New Castle County Edition) published by DeIDOT and compiled by local bicycle clubs and through the workshop.

Next, the project team contacted WILMAPCO, DeIDOT, the City and the University and began to gather field information, maps, diagrams etc., about the corridors and facilities. Numerous field tours were then arranged along with a series of site visits. The site visits and field tours were conducted at various times over the summer and early fall and included an on-bicycle tour of the city and local facilities lead by DeIDOT's Pedestrian and Bicycle Coordinator, a level of service analysis also lead by DeIDOT, and a campus facilities tour/visit. The level of service (LOS) analysis for bicycles, unlike LOS for motor vehicles, is based on a supply rather than demand or usage. The LOS analysis consisted of a windshield survey of all the 24 corridors identified in the plan. The analysis results in a rating system of A-F that accounts for differences in bicyclist skill levels and describes, generally, how well a corridor accommodates bicyclists. A score of A or B reflects a facility that is comfortably accommodates skilled and less-skilled cyclists. A rating of C is still an acceptable facility, but may be less attractive to unskilled cyclists. A D rating corresponds with a roadway that is acceptable to experienced cyclists, but will not be acceptable to novice cyclists. An E rating indicates a roadway that is somewhat intimidating to experienced cyclists, while an F-rated facility does not safely accommodate even the most skilled cyclists. In this analysis, unskilled cyclists are children and novice adults, which include a majority of the University student cyclists. The project team analyzed key factors in each corridor that would affect cyclists. Roadways were assigned a rank for the entire corridor and for each segment within a corridor. The following table displays the criteria and scoring for the roadways analyzed in Newark.



Factors examined for each corridor focused on friction, stress and conflict points and included:

- type of bicycle facility provided
- whether or not there is a comparable parallel facility
- driveway conflicts
- on-street parking
- intersection accommodations
- presence of medians
- restricted/unrestricted sight distance
- bicycle/car speed differential
- motor vehicle LOS
- presence of barriers or pinchpoints
- multimodal or other support systems
- levels of maintenance

Six major categories were used for scoring each category. Maximum scores ranged from 10 to 1 depending upon category. Corridors were broken down by segments when those segments differed in design or facility accommodation. Corridors were scored by aggregating weighted segment scores based upon the overall length of the corridor. The maximum score possible for any one corridor is 21 total points. Corridor scores ranged from a low of 4.0 (LOS E) to a high of 15.6 (LOS B).

A summary of the LOS analysis for each of the roadway corridors is shown on the following table and map. The site visits included walking tours of the downtown area and of the University of Delaware campuses and its facilities, as well as "windshield surveys" of existing facilities, picture taking, and an "in-the-saddle" on-bicycle tour of the area.



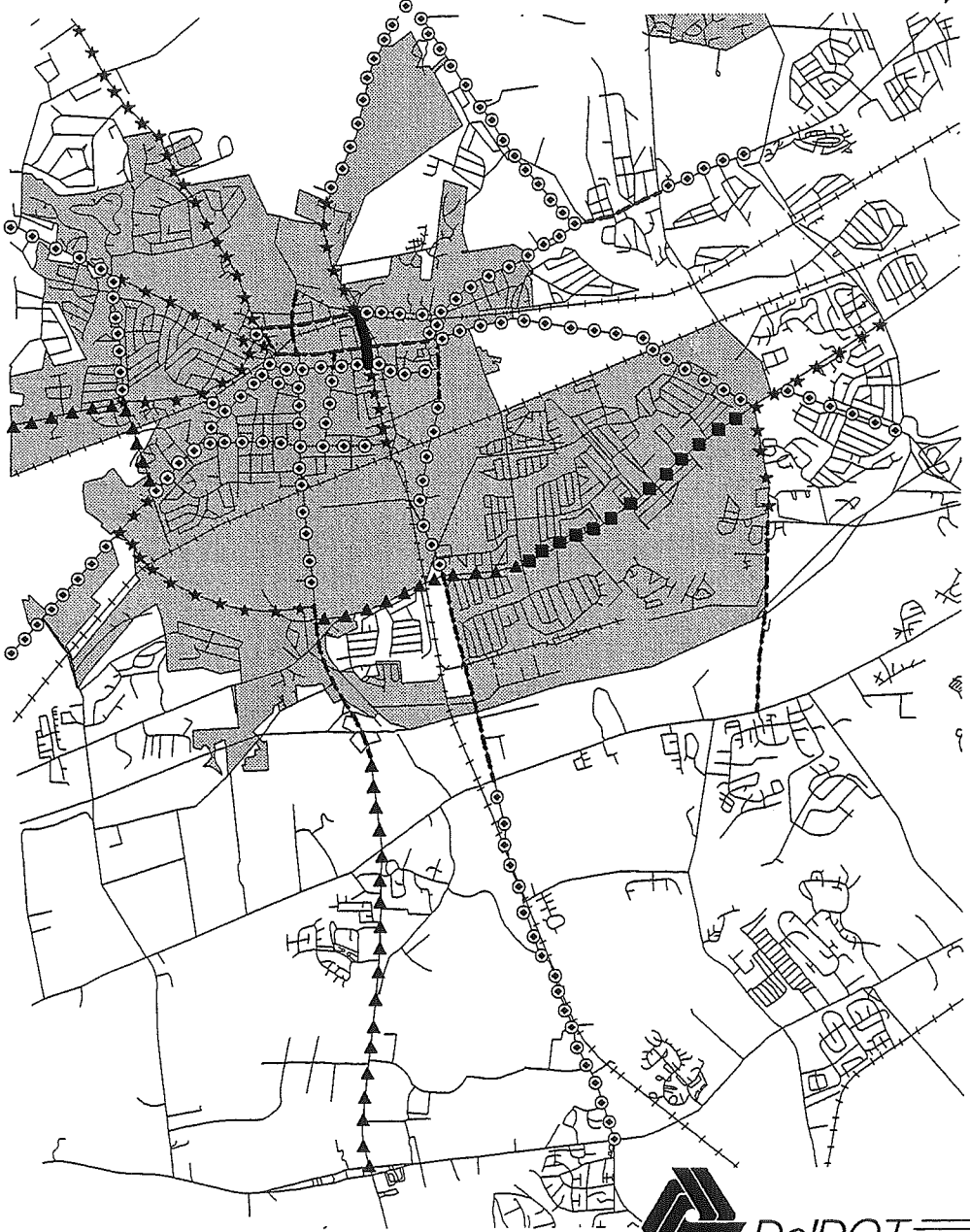
Newark Bicycle Interim Report
Bicycle Level Of Service Performance Measures


CORRIDOR			SEGMENT				BICYCLE FACILITY PROVIDED Max. Value = 10				CONFLICTS Max. Value = 4					SPEED DIFFERENTIAL Max. Value = 2			MOTOR VEHICLE LOS Max. Value = 2			MAINTENANCE Max. Value = 2		TDM / M-M Max. Value = 1							
CORRIDOR NAME	CORRIDOR LOS	CORRIDOR SCORE****	SEGMENT NAME	SEGMENT LOS	SEGMENT SCORE*	SEGMENT WEIGHT**	ADJUSTED SEGMENT SCORE***	12' or LESS (Width of Outside Lane)	>12' - 14' (Width of Outside Lane)	>14' (Width of Outside Lane)	OFF-STREET/ PARALLEL ALTERNATE FACILITY	BARRIER FREE	DRIVEWAYS & SIDE STREETS <22MI.	NO ON-STREET PARKING	MEDIANS PRESENT	UNRESTRICTED SIGHT DISTANCE	INTERSECTION IMPLEMENTATIONS	> 30 MPH (posted >45 MPH)	25-30 MPH (posted 40-45 MPH)	15-20 MPH (posted 30-35 MPH)	LOS = E, F, OR 6 or more travel lanes	LOS = D and < 6 travel lanes	LOS = A, B, C and < 6 travel lanes	MAJOR OR FREQUENT PROBLEMS EXIST	MINOR OR INFREQUENT PROBLEMS EXIST	NO PROBLEMS EXIST	NO SUPPORT	SUPPORT EXISTS			
ROADWAY NAME	A-F	21	POINT VALUES	A-F	21	1	21	0	5	6	4	0.5	1	1	0.5	0.5	0.5	0	1	2	0	1	2	-1	0	2	0	1			
Route 4	B	15.6	Elkton Road - College Avenue	C	14	0.253	3.5	0	0	0	4	0	1	1	0	0.5	0.5	0	0	0	0	1	2	-1	0	0	0	0			
			College Avenue - Marrows Road	B	14.5	0.249	3.6	0	0	0	4	0	1	1	0.5	0	0	0	0	0	0	0	2	-1	0	0	0	0			
			Marrows Road - Route 273	A	18.5	0.322	6.0	0	0	0	4	0	1	1	0.5	0.5	0.5	0	0	0	0	0	2	0	0	0	0	0			
			Route 273 - Harmony Road	C	14	0.176	2.5	0	0	0	0	0	1	1	0.5	0.5	0	0	0	0	0	0	2	0	0	0	0	1			
Elkton Road	D	10.2	State Line - Route 4	D	11	0.4	4.4	0	0	0	0	0	1	1	0.5	0.5	0	0	0	0	0	0	2	0	0	0	0	1			
			Route 4 - Casho Mill Road	C	11.5	0.164	1.9	0	0	0	0	0.5	1	1	0.5	0.5	0	0	0	0	0	0	0	2	0	0	0	0	0		
			Casho Mill Road - Delaware Avenue	D	9	0.436	3.9	0	5	0	0	0	0	1	0.5	0.5	0	0	0	0	2	0	0	0	0	0	0	0	0		
Delaware Avenue	D	8.0	Elkton Road - Library Avenue	D	8	1	8.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Main Street	E	4.0	Elkton Road - Capitol Trail	E	4	1	4.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
New London Road	C	11.6	State Line - Country Club Road	C	12.5	0.724	9.1	0	0	0	0	0	1	1	0	0	0.5	0	0	0	0	0	2	0	0	0	0	0	0		
			Country Club Road - Cleveland Avenue	C	14	0.164	2.3	0	0	0	0	0.5	0	1	0	0.5	0	0	0	0	0	0	0	2	0	0	0	0	0		
			Cleveland Avenue - Nottingham Road	E	4	0.064	0.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Nottingham Road	C	11.7	Elkton Road - Briar Lane	C	12	0.356	4.3	0	0	0	0	0	0	1	0	0.5	0.5	0	0	0	0	0	0	0	0	0	0	0	0		
			Briar Lane - Casho Mill Road	C	12.5	0.262	3.3	0	0	0	0	0.5	1	1	0	0.5	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Casho Mill Road - State Line	D	11	0.382	4.2	0	0	0	0	0	0	1	0	0.5	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	
Cleveland Avenue	E	6.2	New London Road - Paper Mill Road	E	5	0.529	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
			Paper Mill Road - Capitol Trail	D	7.5	0.471	3.5	0	0	0	0	0	0	1	0	0	0.5	0	0	0	0	0	1	0	0	0	0	0	0	0	
Ogletown Road	D	11.0	Harmony Road - Route 4	D	11	0.312	3.4	0	0	0	0	0	1	1	0.5	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Route 4 - Library Avenue	D	11	0.688	7.6	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
S. College Avenue	C	13.0	Main Street - Park Place	D	10	0.109	1.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Park Place - Chrysler Plant	D	11	0.105	1.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Chrysler Plant - Route 4	D	9	0.102	0.9	0	0	0	0	0	0	1	0.5	0.5	0	0	0	0	0	0	0	2	0	0	0	0	1	0	
			Route 4 - W. Chestnut Hill Road	E	6	0.044	0.3	0	0	0	0	0	0	1	0.5	0.5	0	0	0	0	0	0	0	2	0	0	0	0	0	1	
			W. Chestnut Hill Road - I-95	E	6	0.122	0.7	0	0	0	0	0	0	1	0.5	0.5	0	0	0	0	0	0	0	2	0	0	0	0	0	0	
			I-95 - Route 40	B	17	0.520	8.8	0	0	0	4	0	1	1	0.5	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Casho Mill Road	C	12.5	Elkton Road - Barksdale Road	B	14.5	0.434	6.3	0	0	0	0	0	1	1	0	0.5	0	0	0	0	0	0	0	2	0	0	0	0	0	0	
			Barksdale Road - Nottingham Road	D	11	0.566	6.2	0	0	0	0	0.5	0	0	0	0.5	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
Hillside Road	C	11.3	Apple Road - Nottingham Road	C	11.5	0.842	9.7	0	0	0	0	0	0	1	0	0	0.5	0	0	0	0	0	0	2	0	0	0	0	0	0	
			Nottingham Road - Cleveland Avenue	D	10.5	0.158	1.7	0	0	0	0	0.5	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Barksdale Road	B	15.0	State Line - Casho Mill Road	B	16	0.507	8.1	0	0	0	0	0	1	1	0	0.5	0.5	0	0	0	0	0	1	0	0	0	0	0	0	0	
			Casho Mill Road - Apple Road	C	14	0.493	6.9	0	0	0	0	0	0	1	0	0.5	0.5	0	0	0	0	0	0	2	0	0	0	0	1	0	
Apple Road	D	9.0	Barksdale Road - Elkton Road	D	9	1	9.0	0	0	0	0	0	1	1	0	0.5	0.5	0	0	0	0	0	0	2	0	0	0	0	0	0	
Park Place	D	9.6	Elkton Road - College Avenue	D	9	0.369	3.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	-1	0	0	0	0	0	
			College Avenue - Chapel Street	D	10	0.631	6.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
Chapel Street	D	7.7	Cleveland Avenue - Delaware Avenue	F	2.5	0.423	1.1	0	0	0	0	0	0	0	0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			Delaware Avenue - Wyoming Avenue	C	11.5	0.438	5.0	0	0	0	0	0	0	1	0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Wyoming Avenue - Park Place	C	11.5	0.14	1.6	0	0	0	0	0	0	1	0	0.5	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
Paper Mill	D	10.5	Possum Park Road - City Limit	D	10	0.656	6.6	0	0	0	0	0.5	1	1	0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			City Limit - Cleveland Avenue	C	11.5	0.344	4.0	0	0	0	0	0	0	1	0	0	0.5	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Library Road	D	9.0	Main Street - Wyoming Avenue	E	6	0.071	0.4	0	0	0	0	0	1	1	0.5	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Wyoming Avenue - Route 4	D	9	0.225	2.0	0	0	0	0	0	1	1	0.5	0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Route 4 - Old Baltimore Pike	E	6	0.251	1.5	0	0	0	0	0	1	1	0	0.5	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Old Baltimore Pike - Route 40	D	11	0.454	5.0	0	0	0	0	0.5	1	1	0	0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Salem Church Road	D	7.8	Route 4 - Chapman Road	C	11.5	0.388	4.5	0	0	0	0	0	0	1	0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Chapman Road - Old Baltimore Pike	E	5.5	0.612	3.4	0	0	0	0	0	1	1	0	0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Capitol Trail	D	7.4	Harmony Road - Polly Drummond Road	E	9	0.230	2.1	0	0	0	0	0	0	1	0.5	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Polly Drummond Road - Route 72	D	4	0.218	0.9	0	0	0	0	0	0	1	0.5	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Route 72 - Main Street	D	8	0.552	4.4	0	0	0	0	0	0	1	0.5	0.5	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
Possum Park	D	11.0	Route 2 - Paper Mill Road	D	11	1	11.0	0	0	0	0	0	1	1	0	0.5															

Newark Area Bicycle Interim Report

Existing Bicycle Level of Service (LOS)

- ■ ■ ■ ■ A
- ▲ ▲ ▲ ▲ ▲ B
- ★ ★ ★ ★ ★ C
- ○ ○ ○ ○ D
- E
- F



 **DeIDOT**
DIVISION OF PLANNING
July, 1996



Field notes, pictures, maps, and the level of service information was then synthesized into a summary of existing conditions which appears in this report. Summaries of each corridor appear on the following pages detailing Existing Conditions and Recommendations. Additionally, existing conditions on a city-wide, general basis are summarized below.

Overall, the following conditions exist on bicycle facilities for the greater Newark area:

- Bicycle on shoulder and shared use are predominant facilities
- Signage is inadequate and inconsistent (encourages wrong way riding in some instances)
- Markings on pavement and shoulders are inadequate and inconsistent
- Bicycle lane widths are inadequate and inconsistent
- Parking conflicts impede travel for cyclists
- Debris and/or vegetation encroaches on shoulders
- Grates are not always "bicycle-safe" or level with pavement surfaces on shoulders, often intruding into shared shoulder areas rather than being in gutter pan (bicycle safe is defined as grates with openings that are perpendicular or parallel to the path of bicycle tires so as to not create a hazard) *See Design Criteria section in Appendix for examples of bicycle-safe grates.*
- Numerous curbcuts, signalized intersections and right turn lanes pose hazards for cyclists
- Crosswalks only provide minimal protection for pedestrians and cyclists
- Inadequate maintenance and/or design of shoulders, curbs, gutter pans, ditches and grates pose hazards for cyclists
- Overpass on Route 896/South College Avenue over Northeast Corridor is too narrow to accommodate cyclists; some ride illegally on pedestrian path to avoid traffic conflicts
- Parking conflicts on Route 896/South College Avenue just south of Academy cause bicycle lane to abruptly end on the northbound side
- Underpass on Casho Mill Road is too narrow and cars do not yield to cyclists or each other
- Underpass on Paper Mill Road is narrow and bicycles are forced to stay in street very close to traffic
- Separated facility on Christina Parkway dips behind roadway, out of sight, creating a security problem

The following conditions were observed on the campus of the University of Delaware:



- Numerous types of bicycle racks currently exist, although recent campus policy recommends ribbon racks for new installations:
 - hitching posts
 - hitching posts with concrete well
 - concrete well with "U" hook for lock
 - steel "U" with cable
 - new ribbon racks
 - trough racks

- Over 1,700 bicycle rack spaces on campus

Laird Campus	653
Central Campus	949
East Campus	754
West Campus	1,086
South Campus	134

- Bicycle racks overflow in spots and cyclists often use fences and other posts for securing bicycles likely due to inadequacy in number, design or location of existing parking racks.

- Bicycles are prohibited from locking to or riding on ramps for the handicapped

- "Mall" area is wide, accommodates two-way traffic (bicycle and pedestrian) on both sides without directional signage

- Cross walks provide minimal safety

- Paths are wide and numerous, avoiding most pedestrian bicycle conflicts

- Bicycles steer clear of pedestrians using parallel paths

- Crosswalks and pedestrian holding areas are inadequate size

- Intersections of multiple pedestrian/bicycle paths and other such places where conflict occur lack directional signage or other design features to indicate proper movement

- Damaged and/or vandalized bicycles remain on racks

Conclusion

Analysis of existing facilities revealed that many existing facilities are insufficient for the majority of users in the area. Although shared-use and on road facilities as they currently exist may be adequate for experienced commuter cyclists, these same facilities are inadequate for novice cyclists such as the University student cyclists that predominate in Newark. Signing and pavement marking for bicycle facilities was determined to be frequently substandard and unsafe. These deficiencies included faded pavement markings or inconsistent marking throughout a corridor. Transitions between different types of facilities are often inadequate as well. Right turn lanes for motor vehicles cut off bicycle



facilities and create a hazard for cyclists traveling through intersections. Numerous conflicts result from curbcuts and access points for residential neighborhoods and local businesses due to cars exiting or entering into the path of bicyclists. Furthermore, the design, placement and maintenance of many drainage grates present hazards to bicyclists. In addition to drain grate designs that trap bicycle tires, these hazards were also sometimes the result of placement within narrow bicycle lanes or failure to adjust drain grate elevation in conjunction with resurfacing. Pavement in some instances was rough and broken or cracked presenting a hazard to cyclists. Debris and vegetation often encroached into the gutter pan and/or shoulders. Likewise, many bridges have narrow shoulders that force cyclists into traffic. Lighting is often poor throughout the facilities and is especially hazardous on the portion of the off-road bicycle trail on the Christina Parkway (Route 4) that is not visible from the roadway. The recommendations contained in this report and the design guidelines presented in its Appendix are aimed at remedying these inadequate conditions for bicyclists in Newark.



Off Road Facilities

There is one existing and four proposed off-road bicycle facilities located in the Newark area. The one existing facility is Route 4/Christina Parkway. This facility runs adjacent to the roadway between Elkton Road and Route 7. The Lewden Green Park runs generally along the Christina River from Churchman's Road boat ramp to the Route 7/Route 40 intersection. The Newark Spur connects Red Mill Road to Woodlawn Avenue.

The four proposed facilities consist of the Pomeroy Branch, running from North College Avenue near Kershaw Park to the Northeast Corridor (NEC) Tracks, and could extend to Lewis Park and Phillips Park on an alignment parallel to the NEC tracks. The Iron Hill Bikeway, which would connect the Iron Hill Park to Route 896/College Avenue. The Gender Road Connector which would serve as the link between the two segments of Gender Road in southeast Newark and provide connections from residential neighborhoods to the bicycle facilities along Route 4. Finally, the Newark Spur which would run in Windy Mill Park and local subdivision streets. This connection is part of a larger project to connect Delaware Route 1 with Cleveland Avenue, providing a more safe environment for local bicycle traffic that would otherwise have to travel on an already congested Cleveland Avenue.

These facilities can provide exclusive bicycle connections between desired destinations and concentrations of residential populations, providing in some cases, the "missing link" between other facilities. These proposed facilities also serve as recreational connections for less experienced riders. All of these projects are being considered for implementation and are at various planning stages. In many cases, difficult issues still need to be resolved concerning property ownership, street crossing designs, security, etc. However, these issues are typical of any off-road bicycle facility proposal and solutions can be found from communities that have successfully implemented such projects. Off road facilities such as these are important components in a comprehensive bicycle network because they afford the all groups of riders a more pleasant and safe cycling experience. Also important is the fact that child, young adult and novice cyclists are provided with a comfortable, recreational ride via these facilities. Figure 2 shows an illustration of existing and proposed off-road facilities.

Regional Connections

The Newark Area Bicycle Interim Report is focused on the bicycle issues unique to the City of Newark and the immediate surrounding areas. The recommendations are intended to provide safe and efficient connections for cyclists to use the facilities so that they can become an attractive alternative transportation mode. The report is concerned with improvements to corridors that are regional connectors, such as Route 2, Route 72, Route 273 and Route 896. It will become part of the regional transportation plan as its recommendations will be incorporated into the Newark/Elkton Intermodal Transportation Plan, the WILMAPCO Long Range Plan, and the DelDOT's Long Range Transportation Plan and result in a final Bicycle Facility Needs Plan. It is important that proper connections for non-motorized modes of travel be a focus of these plans and that they be integrated with other multimodal and intermodal improvements to form a seamless transportation network.



Newark Area Off-Road Bicycle Facilities

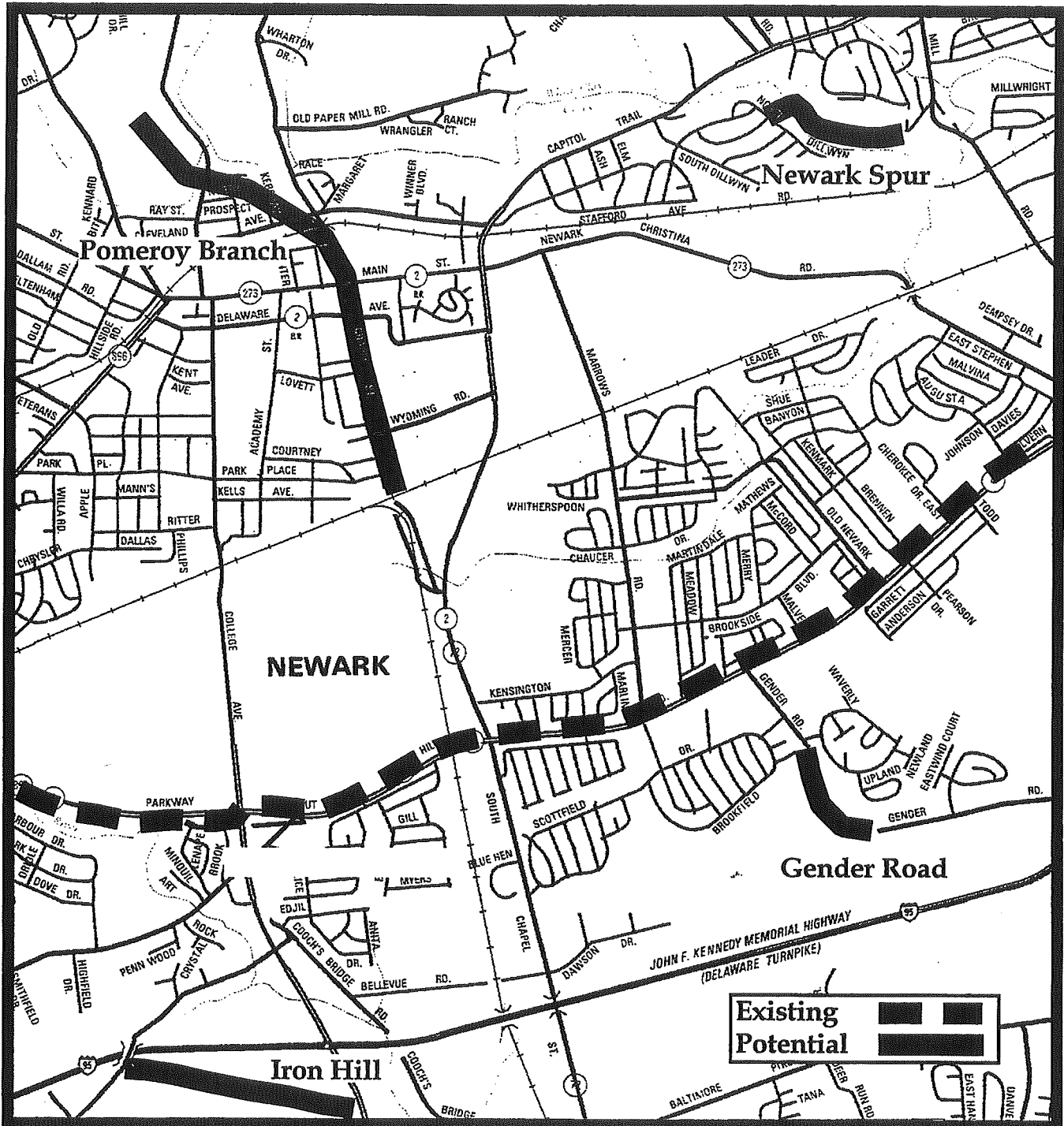


Figure #2



SURVEYS AND COUNTS OF TRIP-MAKING

No detailed information on bicycle patronage is available from the 1973 Plan or from existing statewide models. Statewide models are not sensitive enough to develop discrete mode choice models necessary to break out or estimate bicycle trips. Rather, these trips are usually aggregated into transit or other non-motorized categories. Estimates of bicycle traffic can be inferred from data available at the Combined Metropolitan Statistical Area (CMSA) available from the US Department of Commerce Bureau of the Census for the Newark City area. However, data available only indicates mode split for the work trip, and does not include other types of trips for which bicycles are also amenable. CMSA data available for Newark indicate that 7% of all workplace trips within the City (from a residence in Newark to work place in Newark) are done by bicycle. Data also indicate that 2% of all work trips into the city are done by bicycle. The high propensity of work trips by bicycle within Newark indicates a more compact and dense land use where housing and jobs are clustered together. This may indicate that there is a potential to increase the mode split of bicycle for all types of trips if better bicycle infrastructure can be provided.

In an effort to more fully understand bicycle volumes in downtown Newark, bicycle usage counts were completed. Counts were subsequently conducted in October 1995 on a single day between the hours of 7 - 10 AM, 11:30 AM - 1:30 PM and 4:00 PM - 7:00 PM. These hours were chosen because it was felt that this would capture the majority of users (commuters and students) and their trip making habits. Locations for counts were driven by the need for more generalized traffic data. However, data locations corresponded rather well to locations where cyclists typically would enter the downtown network. Counts showed that there are significant numbers of cyclists at the fringes of the University areas; specifically the Delaware Avenue/South College Avenue, Delaware Avenue/Chapel Street, Main Street/Chapel Street intersections, near the University's main campus.

Not surprisingly, these areas saw a large number of cyclists with almost 350 observations in one instance. The counts reinforced the hypothesis that University students are the primary users of the facilities in downtown Newark, and that the main destination points are indeed campus-oriented. Figure 3 shows a map detailing specific count locations and observations during the eight hour period when specific bicycle observations were conducted.

Additionally, the Transportation Management Association (TMA) of New Castle County conducted a survey of local employers and employees specifically on area-wide commute concerns. Focusing on questions related to bicycling, some very positive conclusions can be drawn from the survey. The survey asked a variety of questions about commuting and found that many respondents were concerned about safety and convenience. Asked if they would consider "a safe, convenient, economical alternative to your car?", more than half, (54%) either responded "Yes" or "Maybe". Approximately 9% responded that they would consider bicycling as an alternative mode of transportation. On the employer side, their concerns were mainly focused on safety. Although many responded that they would be in favor of bicycle encouragement programs and the provision of locker and shower facilities for their employees, they were concerned about liability issues should an incident arise. Clearly, there are opportunities to tap into the commuter market in the area.



ORIGINS AND DESTINATIONS FOR BICYCLE TRIPS

One way to analyze bicycle facility connections is to graphically depict where trips start (origins) and where trips end (destinations). Figures 4, 5, and 6, respectively, graphically depict example locations of origins and destinations for bicycle trips in the Newark area that would be most common given the City's demographics and character.

Generators are land uses which have the potential to generate large numbers of bicycle trips. These uses could be: dormitories, apartment complexes, large residential areas. Likewise, bicycle trip destinations can be thought of as attractors. These attractors draw bicycle traffic to them because the surrounding land uses are destinations for centers of activity people want/need to engage in. These land uses include university locations (class rooms and lecture halls, student centers, sports complexes), shopping centers, schools, parks, libraries, ball fields, etc.

For the most part, these maps show residential, university, and commercial locations which are origins and destinations respectively mentioned above. If a map of the corridors were to be overlaid on to any one of these maps, the resulting display would show a network of connections that links major trip origins and destinations via the existing network and its recommended expansion linkages. The proposed recommendations for each corridor have taken into account the connections needed to link origins with potential destinations. Where possible, treatments were prescribed for corridors that would enable them to link multiple origins and destinations, making the investment in infrastructure and related programs even more cost-effective.

Additionally, Figure 7, displays census data information regarding areas with high bicycle to work trip origins. This information was taken from the report, *Information for the WILMAPCO Region, May 1996*. This map confirms that bicycle trips are concentrated in the downtown areas adjacent to the University campus. Projects developed and given high priority within this report are concentrated around these high bicycle usage areas.



Trip Generators and Attractors Residential Locations

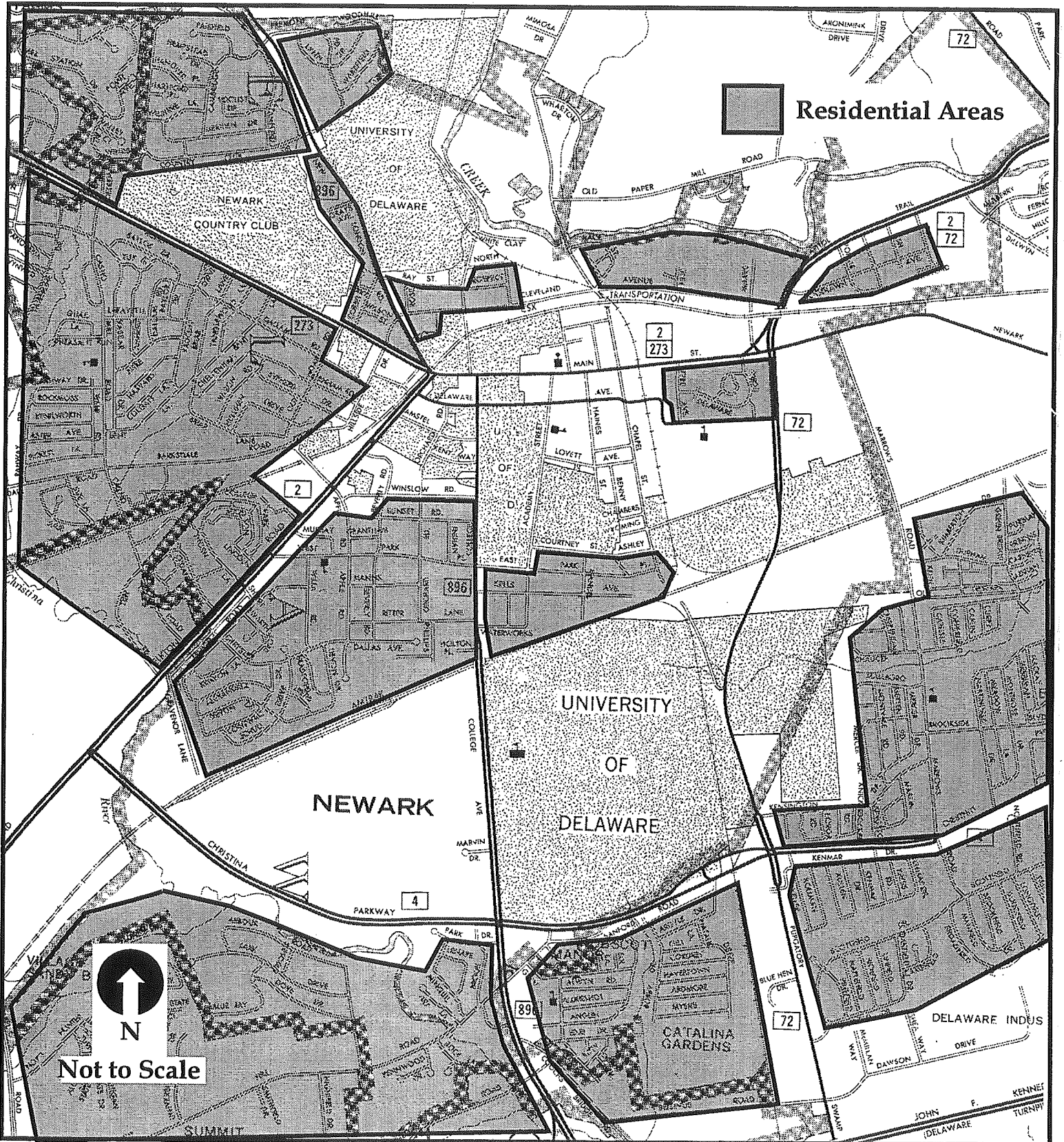


Figure #4

Trip Generators and Attractors Commercial Locations

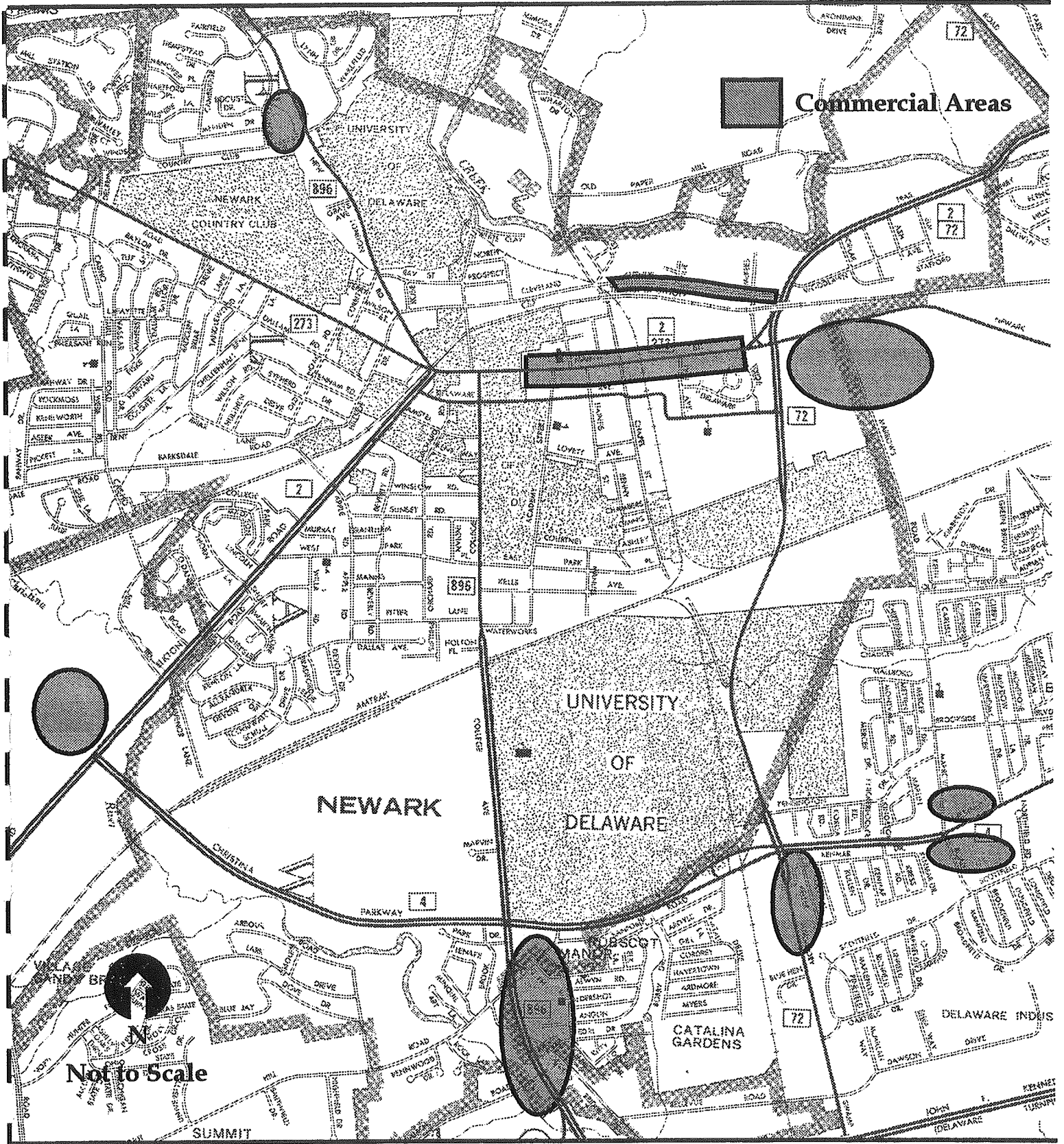


Figure #5

Trip Generators and Attractors University Locations

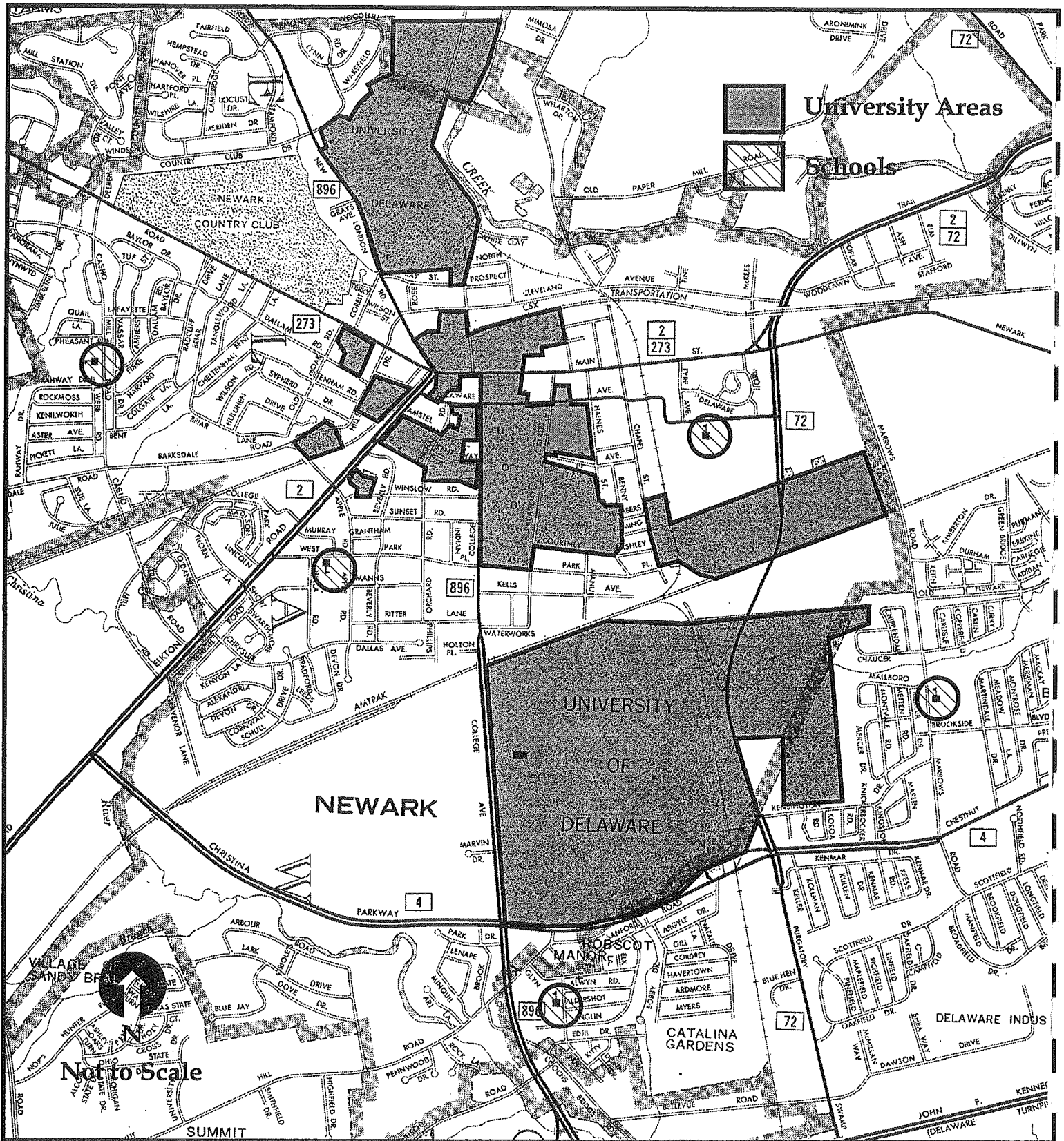


Figure #6

BICYCLE CRASH DATA

Basic bicycle crash statistics are available for the state and for the City of Newark. Overall, crash data available from the National Highway Traffic Safety Administration's Fatal Accident Reporting Services revealed that in 1994, the state of Delaware had a total of 5 fatal bicycle crashes. This translates to a fatality rate that is 2.3 times the national average for that year. The 5 fatal crashes yielded a bicycle fatality rate of 7.08 fatalities per million residents. This gave Delaware the second highest bicycle fatality rate in the US for the reported year, behind only Florida (8.60). These fatalities represent 4.5% of all Delaware traffic fatalities state-wide.

More specifically, the City of Newark experienced 42 bicycle crashes in 1994. Data obtained from the Newark Police Department revealed that bicycle crashes tended to concentrate in three key locations around the City: Main Street, Elkton Road, and College Avenue. These three locations represent 60% of all crashes in the City of Newark in 1994. Typically, crashes took place in the latter half of the year, with 31 occurring after June 31st. Almost half of all the crashes recorded occurred in September and October. The month of September alone had the same number of crashes (11) that occurred during the entire period of January to June. This indicates that the fall season, when the University traditionally starts its sessions, experiences a particularly disproportionate number of crashes. This could be due to the fact that a large segment of the population that is more inclined to use bicycles (students) are doing so, and that perhaps, these individuals are unfamiliar with the city (or have forgotten about certain areas) and may be using bicycles as transportation for the first time since they were children. The summer-time lull in campus activities may also give motorists and cyclists a false sense of security that may be a contributing factor to crashes in early fall. Simply put, cyclists and motorists may have forgotten about one another over the summer, and new and returning students are not as cognizant while cycling as they should be .

Typically crashes occur due to driver and/or cyclists error. Motorists often pull out into the path of cyclists, open doors without looking for cyclists, weave into turning lanes cutting off cyclists, or generally do not see cyclists because of speed, visibility, etc. However, the Newark Police department has also found that cyclists are increasingly at fault in crashes due to their negligence including: riding the wrong way, pulling out quickly from driveways or exits, not obeying traffic signs/signals, etc.

This report makes specific recommendations/improvements to infrastructure to alleviate some safety concerns, providing a safer bicycle system for all users. This report has specific suggestion for the high crash areas (College Avenue, Elkton Road, and Main Street), including improved signing, pavement markings, removal of parking, access management, bikes on transit, etc. Crash locations were also an overall consideration in the prioritization process. However, infrastructure improvements are not enough, and that is why the plan also recommends enforcement and education programs aimed at all cyclists and age groups. Specific recommendations that address the needs of educating University age cyclists, through programs centered around student orientation, and other activities are also recommended.

The following charts present available 1994 crash data for the City of Newark:



**Figure 8 Newark Bicycle Crash Data
1994**

Date	Address	Street	Street
1/14/94	99	College Square SC	
2/18/94		West Park Place	Apple Road
3/25/94	132	Elkton Road	
4/20/94		Casho Mill Road	Blair Court
4/20/94		Elkton Road	Casho Mill Road
4/24/94		South College Avenue	Park Place
5/10/94		North College Avenue	East Cleveland Avenue
5/13/94	59	East Main Street	South College Avenue
5/19/94		South College Avenue	West Park Place
6/06/94	134	East Main Street	Haines Street
6/26/94		Christina Parkway	Park Drive
7/19/94		Adeline Drive	Stafford Drive
7/23/94		Papermill Road	Cleveland Avenue
7/27/94	374	East Main Street	Cleveland Avenue
7/30/94		East Main Street	Tyre Avenue
8/05/94		East Main Street	South Chapel Street
8/08/94		Windsor Drive	Country Club Drive
8/15/94	25	North College Avenue	Cleveland Avenue
8/15/94	121	College Square SC	Library Avenue
8/28/94	6	Timber Ridge Court	
8/29/94		Elkton Road	Christina Parkway
9/01/94		Hillside Road	Forest Lane
9/01/94		South College Avenue	Kells Avenue
9/01/94		South College Avenue	Park Place
9/02/94		South College Avenue	Ritter Lane
9/07/94		Elkton Road	Casho Mill Road
9/12/94		Rahway	Barksdale Road
9/12/94	18	Haines Street	East Main Street
9/14/94		Hillside Road	Sypherd Drive
9/18/94		Elkton Road	Casho Mill Road
9/23/94		South College Avenue	Kells Avenue
9/26/94	60	North College Avenue	Cleveland Avenue
10/04/94	263	Elkton Road	
10/06/94		Kells Avenue	Academy Street
10/07/94		South College Avenue	Ritter Lane
10/14/94		Delaware Avenue	Bassett Place
10/14/94		South College Avenue	Holton Place
10/15/94	59	East Main Street	South College Avenue
10/17/94		East Main Street	South College Avenue
10/30/94	35	O'Daniel Avenue	Elkton Road
11/01/94	260	Elkton Road	Veterans Lane
11/11/94		Library Avenue	Ogletown Road

Source: Newark Police Department

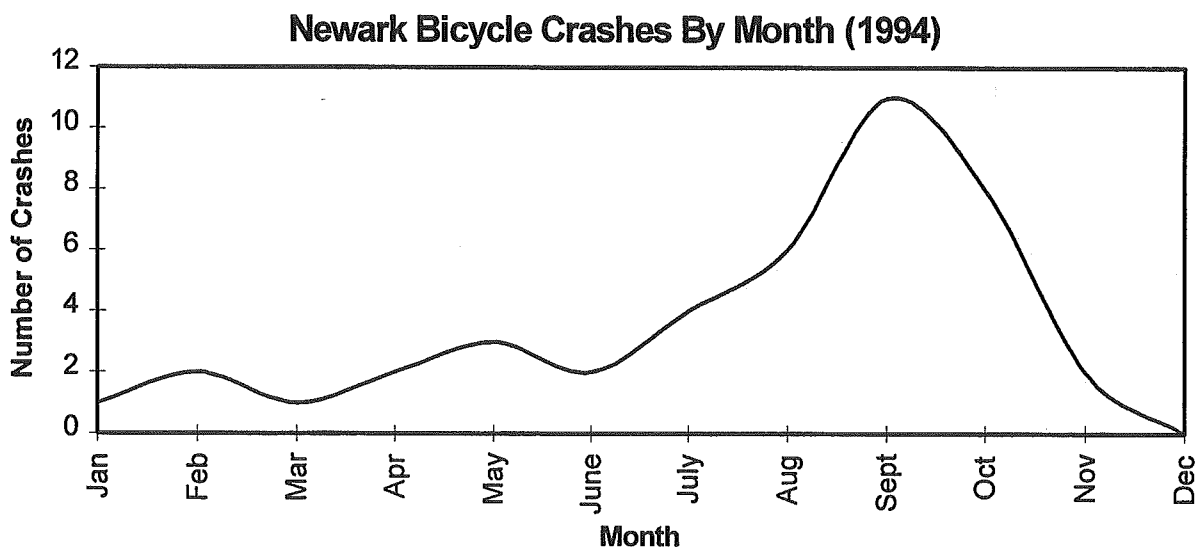


Figure 9 Newark Bicycle Crash Data
Locational Summary 1994

Location	Number of Crashes	% of Total
College Square SC	2	5%
East Main Street	7	17%
Elkton Road	7	17%
Hillside Road	2	5%
North College Avenue	3	7%
South College Avenue	8	19%
Total	29	69%

Source: Newark Police Department

Figure 10



Source: Newark Police Department



CHAPTER 4

PROJECT INVENTORY & RECOMMENDATIONS

This chapter details specific recommendations for each corridor. The following map and tables summarize detailed recommendations found later in the chapter. The tables contain data regarding each corridor's roadway characteristics, relative priority of the recommendation, agency responsibilities, estimated costs, potential funding sources, and a listing of any unresolved issues associated with the project. The unresolved issues will be addressed through the project development and prioritization processes. In some cases, these issues prevent the determination of a final preferred facility recommendation, and are listed as "select alternative". Agencies that should be involved in the implementation process are listed, although the type and level of involvement may vary from project to project. All of the projects will require a partnership between various levels and jurisdictions of government, as well as the private sector. Cost estimates are approximate, with accuracy that is only appropriate for conceptual planning and programming. More detailed cost estimates will be developed as the project proceeds through implementation phases.

The first table displays projects that were determined to be appropriate for short-range implementation. Projects may include a combination of capital and operational activities. The relative priority of a project indicates the degree to which the project advances critical objectives and serves critical needs. These priorities are arranged in broad categories of high, medium and low without any further distinction made within those ranges.

The second table displays those projects that were determined to be appropriate for intermediate implementation. The implementation time frame for these projects is longer because they have at least one of the following characteristics: 1). higher capital costs; 2). more complicated project development study requirements (location, environment, right-of-way, etc.); 3). unresolved issues that require policy or alternative selection decisions; or 4) locations that are not strategically critical to the service of highly developed areas or highly desired travel lines. Although, these projects are presented as intermediate-range solutions, their importance should not be overlooked and their programming should not necessarily be postponed. Rather, many of these projects serve critical desired travel lines and resolve critical safety issues. The fact that their implementation requires a longer time frame, may instead, necessitate early project initiation. The relative priority assigned to these projects indicates the urgency to resolve issues and advance project definition.

The final table complements the second table by providing details of recommended city-wide projects for access management, maintenance and sweeping, drainage grate replacement, and intersection improvements. Detailed locations and segment lengths provide an understanding of the scope and extent of the city-wide projects. These activities have been packaged into single projects for prioritization and programming in order to gain efficiency in operations and economics.

The remaining part of the chapter outlines specific recommendations to improve the physical conditions, levels of safety and overall facility services of each corridor examined. Recommendations were developed by examining existing conditions, bicycle level-of-service ratings, crash statistics and locations, as well as public comments and field observations. Recommendations generally seek to improve existing infrastructure by bringing them up to acceptable levels of good repair and standards. Each corridor is presented by a corridor map, a list of existing conditions, a photograph depicting typical conditions and a set of recommendations.

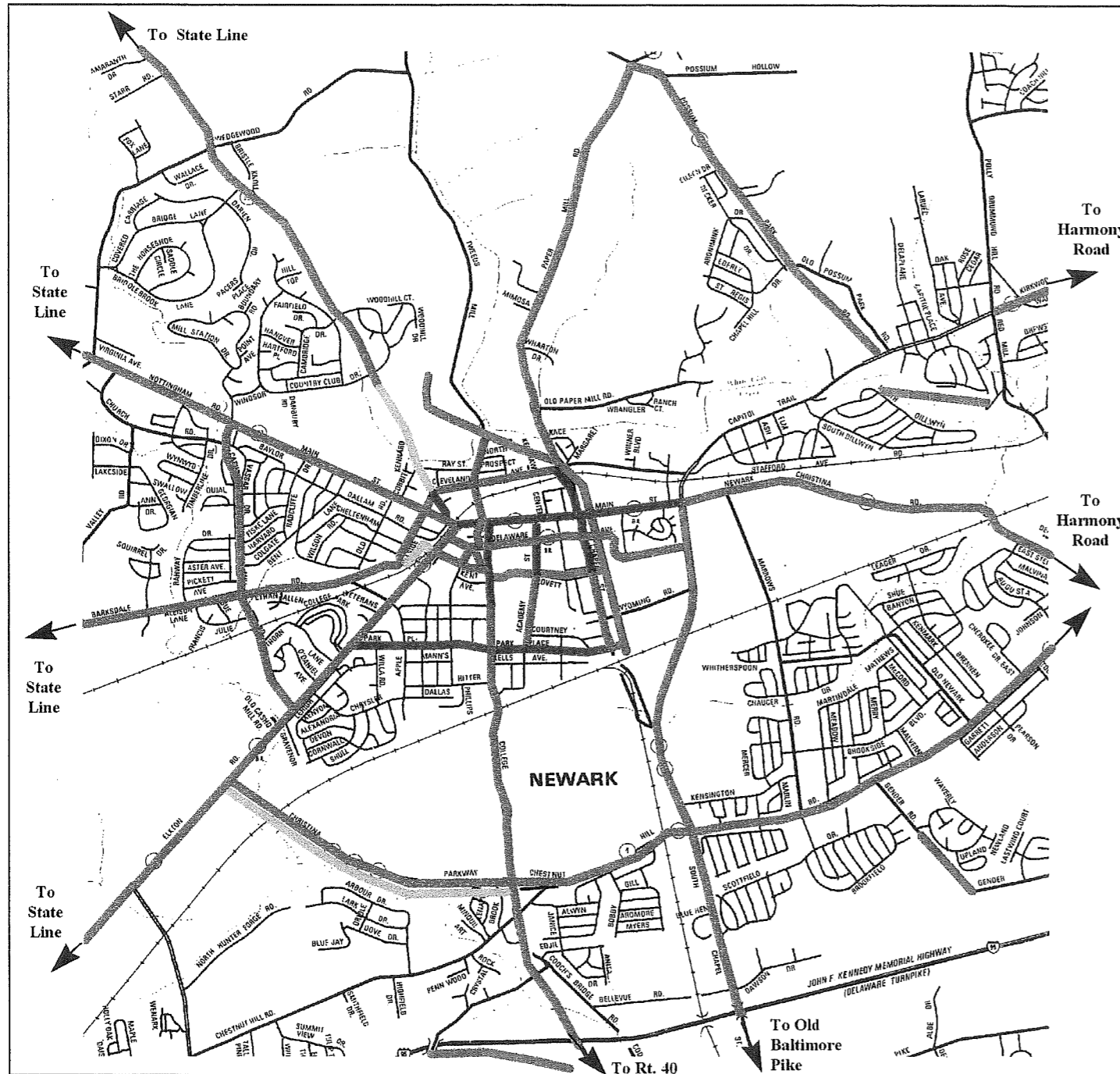


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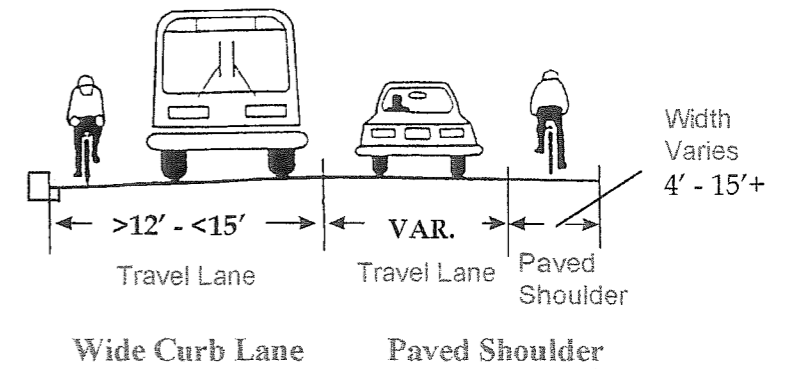
Newark Area Bicycle Interim Report

Recommended Composite Facilities Map & Typical Sections

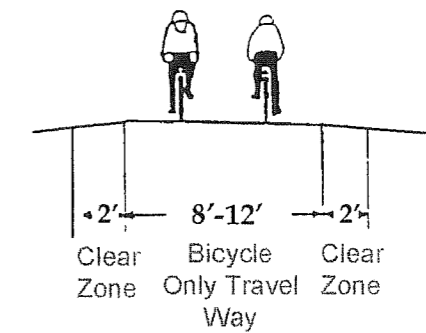


Not Shown On Map:
 Paved Shoulder on Library Road from Rt. 4 to Old Baltimore Pike
 Paved Shoulder on Salem Church Rd. from I-95 - Old Baltimore Pike
 Bike Lanes on Salem Church Rd. from Rt. 4 - I-95

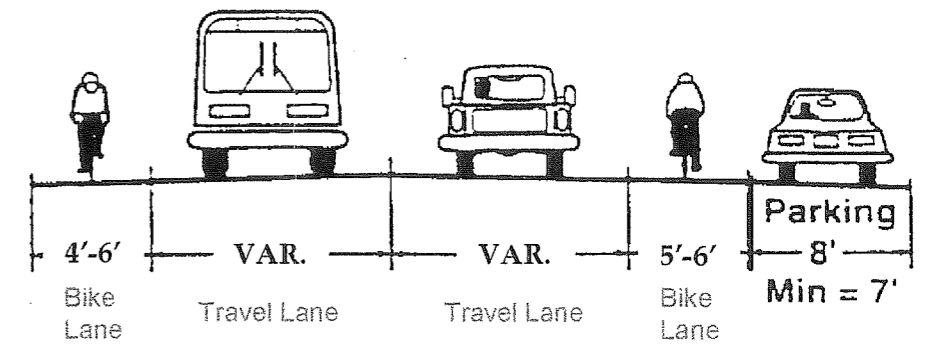
Shared Use
 • Wide Curb Lane
 • Paved Shoulder



Off-Road



Bicycle Lane



Note: Minimum width for a bike lane adjacent to parking is 5'

Legend

- Bicycle Lane
- Off Road
- Select Alternative
- Existing Facility
- Shared Use

Note: Some "Select Alternative" recommendations include shared use facility options



Newark Bicycle Interim Report
Short-Term Recommendations

	PRIORITY	CORRIDOR	ENDPOINTS	SEGMENT LOS	LENGTH (in miles)	ACTION	AGENCY	COMMENTS	EST. COST/NEAT CONST. COST	**TOTAL EST. COST/CONST. COST	ASSUMPTIONS
A	High	South College Avenue	Main Street - Chrysler Plant	D	1.2	improve intersection and signal at Route 896 and Chrysler/UD Stadium area	DelDOT, City of Newark	Accommodating bicycle vehicular-style left turns and pedestrian-style crossings may increase use of on-street facilities to cross NE Corridor bridge. In area with high bike to work trips.	\$109,000	\$158,000	2 signs, 10 stencils, 125' of markings, .5 mile of milling/paving, signal timing & loop detector
B	High	Route 4	Elkton Road - College Avenue	C	NA	improve signal at Route 4 and College Avenue	DelDOT, City of Newark	Realign signal heads and retime. In area with high bike to work trips.	\$5,000	\$7,000	labor to remount and retime ped signals
C	High	Elkton Road	Route 4 - Casho Mill Road	C	NA	bridge expansion joint	DelDOT, City of Newark		\$2,000	\$3,000	assumes no "invasive" treatment
D	High	Route 4	Elkton Road - College Avenue	C	1.5	provide trail lighting	DelDOT, City of Newark	Accommodating bicycle vehicular-style left turns and pedestrian-style crossings may increase use of on-street facilities to cross NE Corridor bridge. In area with high bike to work trips.	\$77,000	\$112,000	\$3.5k/pole, need 22 poles
E	High	Main Street	Elkton Road - Library Avenue	E	1.0	provide bicycle parking along curb-edge of sidewalk (approx. 2/block)	DelDOT, City of Newark	In area with high bike to work trips.	\$4,000	\$5,000	pilot project of 10 racks in downtown
F	High	Bicycle Parking	NA	NA	NA	In addition to specific recommendations contained herein, overall bicycle parking in the community, at transit stops, and on campus should be increased. One mechanism for implementation may be a bicycle parking	City of Newark, DTC, Private		\$20,000	\$29,000	from project nominations
G	High	Educational Programs	NA	NA	NA	Implement education programs and public information campaigns targeted at specific audiences (school age children, college students, commuters)	University, City of Newark - P.D., Local School Boards and Non-profit/service groups		\$50,000	\$73,000	assumes salary and minor equipment/materials costs
H	High	Encouragement Programs	NA	NA	NA	Assist in on-going efforts. Specific actions are listed in the plan, and additional activities may be developed over time.	TMA, University, Major Employers		\$50,000	\$73,000	part of overall 4-Es Strategy
I	High	Enforcement Programs	NA	NA	NA	In addition to specific target locations recommended herein, overall enforcement of laws to prevent bicyclist-motorist & bicyclist-pedestrian crashed is encouraged. Combine w/ education efforts (warnings, safety brochure distribution, etc.).	City of Newark - P.D., University P. D., Delaware State Police	Priority locations for bicyclist/motorist law enforcement are Delaware Ave. & Main Street. Park Place is targeted for motorist speed enforcement. A priority for enforcing no parking in bicycle lanes is New London Road from Country Club to Cleveland.	\$50,000	\$73,000	part of overall 4-Es Strategy
J	High	Paper Mill Road	City Limit - Cleveland Avenue	C	0.7	sign and mark existing WCL as BKL	DelDOT, City of Newark	Existing roadway width will accommodate 14 foot wide travel lanes and 5 foot bicycle lanes. Narrow bridge north of Cleveland may require warning and/or "bicycles Sharing Roadway" signs. In area with high bike to work trips.	\$11,000	\$15,000	4 stripes, new signs & pavement markings
K	High	Casho Mill Road	Elkton Road - Barksdale Road	C	0.6	remark and sign existing bicycle lane to bring up to standard	DelDOT, City of Newark	In area with high bike to work trips.	\$9,000	\$13,000	new markings and signs only
L	High	Chapel Street	Park Place - Delaware Avenue	D	0.5	sign and mark BKL on existing WCL	DelDOT, City of Newark	Some bicycle lanes exist on this segment, but are substandard width. Existing roadway width will accommodate 12 foot travel lanes and 4.5 foot bicycle lanes. In area with high bike to work trips.	\$8,000	\$11,000	4 stripes, new signs & pavement markings
M	High	Delaware Avenue	Elkton Road - Library Avenue	D	1.1	sign and mark one-way BKL on existing 15 foot + WCL	DelDOT, City of Newark	Provide facilities appropriate for one-way east bound bicycle flow including provisions for left-turning bicyclists at intersections. One way street. In area with high bike to work trips.	\$8,000	\$12,000	4 stripes, new signs & pavement markings
N	High	Delaware Avenue	Elkton Road - Library Avenue	D	1.1	supplemental "No Wrong-Way Bikes" signs	DelDOT, City of Newark	One-Way East Bound. In area with high bike to work trips.	\$300	\$435	2 new signs on new poles
O	High	Elkton Road	State Line - Delaware Avenue	C, D	2.5	sign and mark existing PVDSHLD as BKL	DelDOT, City of Newark	High Crash Location. Some portions of this corridor need bicycle lane markings to be brought up to standard. End bicycle lane markings at Otts Chapel Rd. Install "Share the Road" or other signs/markings to transition to unmarked facilities in Md.	\$38,000	\$55,000	new markings & signs only
P	High	Hillside Road	Apple Road - Cleveland Avenue	C, D	0.6	remark and sign existing bicycle lane to bring up to standard	DelDOT, City of Newark	High Crash Location. Existing bicycle lane is substandard width, although existing roadway width allows for restriping with 11 foot travel lanes and 4.5 foot bicycle lanes. In area with high bike to work trips.	\$9,000	\$13,000	new markings & signs only
Q	High	Hillside Road	Apple Road - Nottingham Road	C	0.1	provide directional signage to Elkton Road underpass and path behind dorms.	DelDOT, City of Newark	High Crash Location. In area with high bike to work trips.	\$300	\$435	2 new signs on new poles

**Newark Bicycle Interim Report
Short-Term Recommendations**

	PRIORITY	CORRIDOR	ENDPOINTS	SEGMENT LOS	LENGTH (in miles)	ACTION	AGENCY	COMMENTS	EST. COST/NEAT CONST. COST	**TOTAL EST. COST/CONST. COST	ASSUMPTIONS
R	High	Main Street	Elkton Road - Library Avenue	E	1.0	supplemental "No Wrong-Way Bikes" signs	DelDOT, City of Newark	High Crash Location. One-Way West Bound. In area with high bike to work trips.	\$1,800	\$2,610	12 new signs on new poles
S	High	Main Street	Elkton Road - Library Avenue	E	1.0	"No Bikes on Sidewalk" pavement markings on sidewalk ramps	DelDOT, City of Newark	In area with high bike to work trips.	\$1,200	\$1,740	24 new stencils
T	High	North College Avenue	Main Street - Cleveland Avenue	C	0.1	sign and mark existing WCL as BKL	DelDOT, City of Newark, UD	High Crash Location. Sign and mark with 11' travel lanes and 4' bicycle lanes within existing 30' cross section. In area with high bike to work trips.	\$500	\$2,000	new markings & signs only

This is a critical interface between campus and community. Bicyclists use this point to access campus paths. This location will become more critical with the opening of the new Student Center. In area with high bike to work trips.

High Priority Total \$454,100 \$659,220

U	Med.	Delaware Avenue	Elkton Road - Library Avenue	D	NA	Improve pedestrian crossing at UD Mall	DelDOT, City of Newark, UD		\$35,000	\$51,000	similar to Marsh Road project
V	Med.	Casho Mill Road	Elkton Road - Barksdale Road	B	0.6	resurface rough roadway section, particularly near RR underpass.	DelDOT, City of Newark	In area with high bike to work trips.	\$103,000	\$149,000	rotomill, stripes & hot mix only
W	Med.	Library Avenue	Wyoming Ave. - Route 4	D	1.2	remark and sign existing bicycle lane to bring up to standard	DelDOT, City of Newark	In area with high bike to work trips.	\$18,000	\$26,000	new markings & signs only
X	Med.	Nottingham Road	Casho Mill Road - State Line	D	1.0	sign and mark existing PVDSHLD as BKL	DelDOT, City of Newark	End bicycle lane markings at Wedgewood Road, and install "Share the Road" and other signs/markings to transition to unmarked facilities in Maryland.	\$15,000	\$22,000	new markings & signs only
Y	Med.	Ogletown Road/Rt.273	Harmony Road - Route 4	D	1.0	sign and mark existing PVDSHLD as BKL	DelDOT, City of Newark		\$15,000	\$22,000	new markings & signs only
Z	Med.	Paper Mill Road	Possum Park Road - City Limit	D	1.4	remark and sign existing bicycle lane to bring up to standard	DelDOT, City of Newark	MBNA, a partner in the TMA is located on this corridor.	\$21,000	\$31,000	new markings & signs only
AA	Med.	Casho Mill Road	RR Underpass	B	na	signalize railroad underpass	DelDOT, City of Newark, CSX	In area with high bike to work trips.	\$25,000	\$36,000	cost for A: no special work, signal, markings and signs only
BB	Med.	Salem Church Road	Chapman Road - I-95 Bridge	E	0.6	sign and mark existing PVDSHLD as BKL	DelDOT	Serves Christiana High School.	\$9,000	\$13,000	new markings & signs only

Medium Priority Total \$241,000 \$350,000

CC	Low	Barksdale Road	At State Line	B	NA	restripe and add warning signs at narrow state line bridge	DelDOT, City of Newark		\$2,000	\$3,000	4 signs & new poles and .5 mile of striping
DD	Low	Library Avenue	Old Baltimore Pike - Route 40	D	1.3	post "Bikes Sharing Roadway" along existing paved shoulder	DelDOT, City of Newark		\$300	\$435	2 signs on new poles
EE	Low	Orchard Road	Delaware Avenue - Amstel Avenue	D	0.1	sign and mark existing WCL as Bicycle lane with 11' wide travel lanes	DelDOT, City of Newark	In area with high bike to work trips.	\$1,500	\$2,000	new markings & signs only

Low Priority Total \$3,800 \$5,435

City-Wide Grand Total \$698,900 \$1,014,655

****Total Cost = Construction Costs Plus An Additional 10% For Maintenance of Traffic, 15% for Construction Engineering and 25% for Preliminary Engineering Where Applicable. Otherwise, Inflation Factor Is Equal To Project Contingency.**

Cost Estimates Are For Planning Purposes Only, And May Change Upon Additional Analysis And During Project Development

Newark Bicycle Interim Report
Intermediate Recommendations

PRIORITY	ACTIVITY TYPE	CORRIDOR	ENDPOINTS	SEGMENT LOS	LENGTH (In miles)	ACTION	AGENCY	ISSUES	COMMENTS	EST. COST/NEAT CONST. COST	TOTAL EST. COST/CONST. COST	ASSUMPTIONS	
A	High	Access Mngt.	City-Wide Access Management	NA	NA	Develop and implement access management plans to address access issues related to existing and future development.	DeiDOT, City of Newark	Evaluate desirability of a proactive Access Management Plan	See City-Wide Project Table for critical corridor segments	\$60,000	\$87,000		
B	High	Draingrates	City-Wide Drainage Grate Replacement	NA	NA	Replace non-safe drainage grates.	DeiDOT, City of Newark	Determine which grates are more easily replaced and which would require drainage reconstruction. Those that can not be replaced may be marked with standard pavement markings per MUTCD.	See City-Wide Project Table for critical corridor segments	\$20,000	\$29,000		
C	High	Intersection	South College Avenue	Amstel Avenue - Park Place	D	0.5	improve pedestrian crossings between Amstel and Kent Avenue	DeiDOT, City of Newark, UD	This is a critical interface between campus and community and is a high crash location. Bicyclists use this point to access campus paths. In area with high bike to work trips.	\$36,000	\$61,000	Marsh Road example	
D	High	Intersection	City-Wide Intersection Improvements	NA	NA	NA	DeiDOT, City of Newark	In addition to specific recommendation contained herein, consideration should be given to intersection design, signal timing, and signal actuation at various locations.	See City-Wide Project Table for critical corridor segments	\$300,000	\$436,000		
E	High	Path	North Campus Connector	Main Street - Delaware Avenue	E	0.1	intersection improvements and pathway across campus	DeiDOT, City of Newark, UD	UD and DeiDOT should coordinate to determine exact alignment and design details	Provides connection to UD's Laird Campus. Critical intersections are E. Main & N. College Ave; Delaware Avenue & Orchard Road; and S. College & Campus (at or near Amstel Avenue). In area with high bike to work trips.	\$67,000	\$97,000	multi-use path, no ROW, intersection improvements
F	High	Maintenance	City-Wide Maintenance / Sweeping	NA	NA	NA	DeiDOT, City of Newark, UD, Private	Provide routine maintenance (primarily sweeping and vegetation removal, but may include some patching).	Evaluate the capacity of agencies and their labor force to do this in-house or through contract. Also, evaluate liability issues associated with using volunteer labor.	See LOS Table for critical corridor segments. Focus should be on bridges and other non-self-sweeping locations. Private sector may be involved as in an adopt-a-highway or adopt-a-trail program.	\$5,000	\$7,000	
G	High	Parking	Main Street	Elkton Road - Capital Trail	E	1.0	increase times for a.m. parking restriction	DeiDOT, City of Newark	Evaluate the necessity of a.m. parking availability during morning peak hour traffic while most businesses are not open.	High Crash Location. In area with high bike to work trips.	\$8,000	\$11,000	50 new signs and poles
H	High	Path	Central Campus Connector	Amstel Avenue - Academy Street	NA	0.2	provide pathway across campus	University, City of Newark	UD and DeiDOT should coordinate to determine exact alignment and design details	Provides alternative route to Main St. & Delaware Ave. which have corridor LOS ratings of E & D, respectively. Design should be consistent with off-street facility standards to minimize bicyclist-pedestrian conflicts.	\$63,000	\$92,000	multi-use path, no ROW
I	High	Path	Chapel Street	Cleveland Avenue - Delaware Avenue	F	0.1	provide off-street path from south of RR bridge to Cleveland Avenue, approx. 350 feet	DeiDOT, City of Newark, CSX		In area with high bike to work trips.	\$20,000	\$28,000	multi-use path, no ROW
J	High	Path	Library Avenue	Main Street - Wyoming Avenue	E	0.4	provide bicycle path on west side	DeiDOT, City of Newark		High Crash Location. In area with high bike to work trips. Project may involve utility relocation	\$127,000	\$184,000	multi-use path, no ROW
K	High	Shoulder Paving	Nottingham Road	Elkton Road - Casho Mill Road	C	1.2	Widen shoulders as needed and sign/mark as bicycle lane	DeiDOT, City of Newark	Shoulder width narrows at some points	In area with high bike to work trips.	\$84,000	\$121,000	new hot mix selected shoulders only
L	High	Sign/stripe	South College Avenue	Main Street - Chrysler Plant	D	1.2	Select Alternative Treatment	DeiDOT, City of Newark	All A: Remove 17 auto & 4 motorcycle parking spaces. Sign and mark 5' BKL & 13' travel lanes. All B: Retain 8' parking lane, restripe centerline to provide 14' WCL. All C: Retain parking and sign/mark as 8' parking lane, 5' BKL adjacent to parking All C: Retain parking and sign and mark as 8' parking lane, 5' BKL adjacent to parking, two 9.5' travel lanes and a 4' BKL	High Crash Location. On-street parking may be accommodated off-street in public/campus parking lots. Newark Intermodal Study will be recommending strategies to divert truck traffic from this corridor.	\$126,000	\$183,000	cost for A: milling, hot mix, markings & signs
M	High	Sign/stripe	Academy Street	Park Place - Lovett Street	D	0.4	sign and mark existing WCL as BKL	DeiDOT, City of Newark	sign and mark existing WCL as BKL	Section needs resurfacing. In area with high bike to work trips.	\$72,000	\$106,000	cost for A: milling, hot mix, markings & signs
N	High	Sign/stripe	Academy Street	Lovett Street - Delaware Avenue	D	0.2	select alternative treatment		All A: remove 29 metered parking spaces and stripe with 5' BKLs and 12.5' travel lanes. All B: retain parking stripe 8' parking lane, a 5' BKL, two 9' travel lanes and a 4' BKL. All C: resurface and retain parking with 13.5' WCL	Park Place to Delaware Avenue is in need of resurfacing. Faded pavement markings seem to indicate a substandard bicycle lane on one side only. In area with high bike to work trips.	\$36,000	\$62,000	milling, hot mix, 4 stripes & signs
O	High	Sign/stripe	Academy Street	Delaware Avenue - Main Street	D	0.1	select alternative treatment		All A: remove 16 metered parking spaces and stripe with 5' BKLs and 12.5' travel lanes. All B: remove parking on one side (8 metered spaces) and stripe 8' parking lane, 5' BKL adjacent to parking, two 9' travel lanes and 4' BKL	The fire station is located in this segment. Either of these alternatives will increase the effective travel spaces for the operation of emergency vehicles from the existing 19' width. In area with high bike to work trips.	\$18,000	\$26,000	milling, hot mix, 4 stripes & signs
P	High	Sign/stripe	Amstel Avenue	Elkton Road - South College Avenue	D	0.3	remove 46 parking spaces, resurface and mark with 5' bicycle lane and 12' travel lanes	DeiDOT, City of Newark		Provides link to Elkton Road underpass and UD dormitories. In area with high bike to work trips.	\$5,000	\$7,000	4 stripes, markings & signs
Q	High	Sign/stripe	Casho Mill Road	Barksdale Road - Nottingham Road	D	0.8	remove parking and sign/mark bicycle lanes	DeiDOT, City of Newark	Requires removal of 35 total parking spaces located on both sides of the street.	On-street parking may be accommodated off-street in residential driveways. In area with high bike to work trips.	\$163,000	\$221,000	milling, hot mix, 1 stripe, symbols & signs
R	High	Sign/stripe	Main Street	Elkton Road - Capital Trail	E	1.0	sign and mark at intersections to direct left-turning bicyclists	DeiDOT, City of Newark		High Crash Location, particularly at Main and South College. In area with high bike to work trips. One-Way West Bound	\$96,000	\$138,000	selected milling, hot mix, 4 stripes & signs
S	High	Sign/stripe	Main Street	Elkton Road - Capital Trail	E	1.0	Select Alternative Treatment	DeiDOT, City of Newark	All A: Remove 53 south side parking spaces & sign/mark roadway w/ BKL. All B: Provide traffic calming (chicanes & curb extensions) to reduce speeds so bicycles fit in the traffic stream. This should be done along w/ Alternate routing for through trips All C: Stripe separate bicycle and pedestrian facilities on sidewalks with direction markings, may involve some street sign or landscaping removal	High Crash Location. In area with high bike to work trips. One-Way West Bound. On-street parking may be accommodated off-street in public/campus parking lots.	\$187,000	\$271,000	cost for A: signs & markings only
T	High	Sign/stripe	New London Road	Cleveland Avenue - Elkton Road	C	0.2	Select Alternative Short-Term Treatment. Incorporate long-term solution into 2-way designs recommended in the Intermodal Study and listed in the current TIP.	DeiDOT, City of Newark	All A: Remove 10 permit parking spaces and sign/mark roadway with BKL. All B: Make no change to New London Road, and direct bicyclists to Hillside and the Elkton Road underpass by the dorms.	On-street parking may be accommodated off-street in residential driveways.	\$37,000	\$64,000	cost for A: milling, hot mix, markings & signs
U	High	Sign/stripe	Park Place	Elkton Road - Orchard Road	D	0.5	Select alternative Treatment	DeiDOT, City of Newark	All A: Remove approx. 33 parking spaces on one side and sign and mark with 8' parking lane and 5' BKL adjacent to parking, two 9.5' travel lanes and a 4' BKL. All B: Mark parking lane & center line (with 2 10' lanes) and provide traffic calming.	Section is in need of resurfacing. On-street parking may be accommodated off-street in residential driveways. Cross section changes at Orchard Road. In area with high bike to work trips.	\$22,000	\$32,000	cost for A: milling & hot mix, markings & signs, traffic calming
V	High	Sign/stripe	Park Place	Orchard Road - South College Avenue	D	0.2	Select Alternative Treatment	DeiDOT, City of Newark	All A: Sign & mark existing WCL with 4' BKL and 11' travel lanes. All B: Retain existing WCL and provide neighborhood traffic calming	This section is in need of repaving. In area with high bike to work trips.	\$18,000	\$26,000	cost for A: milling & hot mix, markings & signs, traffic calming
W	High	Sign/stripe	Park Place	College Avenue - Chapel Street	D	1.1	Select Alternative Treatment	DeiDOT, City of Newark	All A: Remove 76 parking spaces & sign/mark roadway with 4' BKL and two 11' travel lanes. All B: Mark centerline (two 11' lanes) & parking lanes, and provide neighborhood traffic calming to reduce speeds so bicycles fit into traffic stream.	Parking is by permit. On-street parking may be accommodated off-street in residential driveways. In area with high bike to work trips.	\$32,000	\$46,000	cost for A: milling & hot mix, markings & signs, traffic calming

Newark Bicycle Interim Report
Intermediate Recommendations

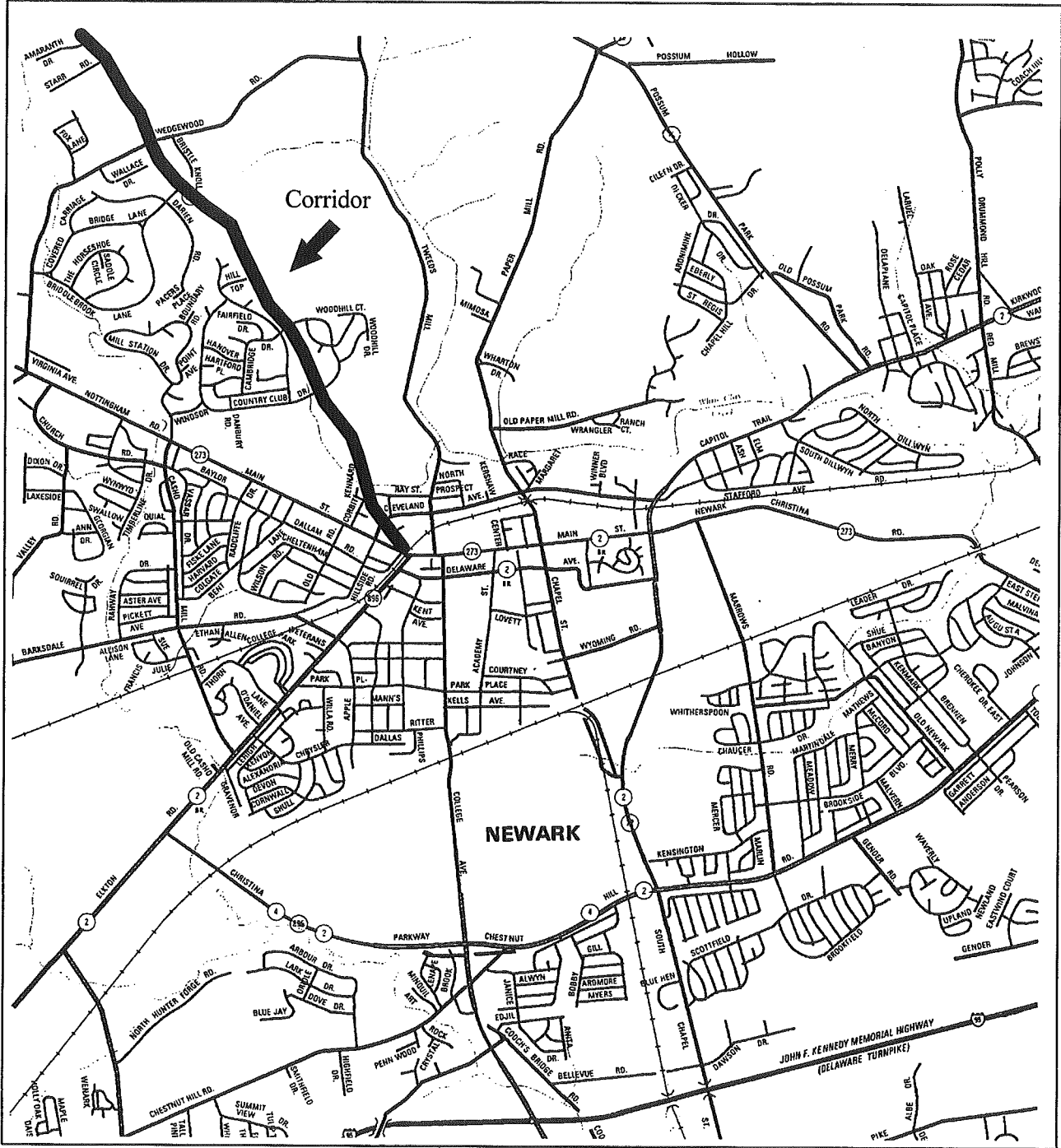
PRIORITY	ACTIVITY TYPE	CORRIDOR	ENDPOINTS	SEGMENT LOS	LENGTH (In miles)	ACTION	AGENCY	ISSUES	COMMENTS	EST. COST/NEAT CONST. COST	**TOTAL EST. COST/CONST. COST	ASSUMPTIONS	
High Priority Total										\$1,590,000	\$2,303,000		
X	Medium	Bicycles On Bus	Bicycle Racks on Buses	NA	NA	In addition to specific route recommendations contained herein, consideration should be given to system-wide opportunities and service on other providers.	DTC, City of Newark University	Contingent upon outcome of the bicycle-racks-on-buses demonstration project at the beach resorts in summer of 1996 and continuing on Dart First State service in south district.		\$6,000	\$8,000	10 racks for pilot project	
Y	Medium	Bicycles On Bus	Ekton Road	State Line - Delaware Avenue	C, D	bicycle racks on buses and access to Park & Ride	DeIDOT, DTC	build on pilot project and adding connections to other park-and-ride lots	Portions are in areas with high bike to work trips.	\$7,000	\$11,000	10 vehicle racks, 8 stationary racks	
Z	Medium	Path	Pomeroy Branch Multi-use Trail	Coverdale Park - NE Corridor tracks	NA	Select Alternative Treatment	DeIDOT, City of Newark	Alt. A: Develop Trail. Alt. B: Develop road (Wyoming-Cleveland), per the Intermodal Study, w/ bike facilities appropriate to a 1-way street, & trail north of Cleveland. Both Alts. require resolution of acquisition, funding, & development/design issue	The Multi-use Trail provides alternative route to Chapel Street, which has a corridor LOS rating of D. The roadway alternative will require special treatments for bicycles on both Pomeroy & Chapel as one-way streets. I area with high bike to work trips.	\$476,000	\$689,000	cost for A: multi-use path, no ROW	
AA	Medium	Path	Capitol Trail / Route2	Polly Drummond Road - Main Street	D, E	provide alternate route via Newark Spur	DeIDOT, City of Newark	Consideration should be given to hiring a local bicycle/pedestrian coordinator to aid in plan implementation. Also, any actions to increase the influence of new (city level) or existing (WILMAPCO) bicycle advisory committees is important.	greenway linkage	\$671,000	\$827,000	multi-use path, no ROW	
BB	Medium	Program	Bicycle Advocacy	NA	NA	NA	WILMAPCO, City of Newark, University, TMA			\$30,000	\$44,000	annual coordinator's salary and minor equipment & other costs	
CC	Medium	Shoulder Paving	Salem Church Road	I-95 Bridge - Old Ball Pike	E	0.5	DeIDOT	add paved shoulder and mark as BKL		\$70,000	\$101,000	hot mix, pavement markings & signs	
DD	Medium	Sign/stripe	Barksdale Road	State Line - Apple Road	B, C	1.4	DeIDOT, City of Newark	Continuous right turn lanes encroach in the existing paved shoulder. The provision of BKLs may require selective road widening, lane narrowing, or turn-lane elimination.	End bicycle lane markings at Country Hills Dr./Abbotsford La. and install "Share the Road" or other signs to transition to unmarked facilities in Maryland. Portions are in areas with high bike to work trips.	\$98,000	\$142,000	hot mix shoulder, signs & markings	
EE	Medium	Sign/stripe	Capitol Trail / Route2	Harmony Road - Polly Drummond Road	D	0.6	DeIDOT, City of Newark	Continuous right turn lanes encroach in the existing paved shoulder. The provision of BKLs may require selective road widening, lane narrowing, or turn-lane elimination.		\$42,000	\$61,000	selective shoulder paving, stripes & signs	
FF	Medium	Sign/stripe	New London Road	State Line - Country Club	C	2.2	DeIDOT	Existing left and right turn lanes encroach into paved shoulder. The provision of BKLs may require selective road widening, lane narrowing, or turn-lane elimination.	End bicycle lane markings at Terrapin Lane/Harvest Lane and install "Share the Road" or other signs to transition to unmarked facilities in Maryland.	\$163,000	\$222,000	selective shoulder paving, stripes & signs	
GG	Medium	Sign/stripe	Ogletown Road / Route273	Route 4 - Library Avenue (old alignment)	D	2.2	DeIDOT, City of Newark	Continuous right turn lanes and narrow bridge encroach in the existing paved shoulder. The provision of BKLs may require selective road widening, lane narrowing, or turn lane elimination.		\$163,000	\$222,000	selective shoulder paving, stripes & signs	
HH	Medium	shld paving	Possum Park Road Route 72	Route 2 - Paper Mill Road	D	2.0	DeIDOT, City of Newark	Continuous right turn lanes encroach in the existing paved shoulder. The provision of BKLs may require selective road widening, lane narrowing, or turn-lane elimination.	Shoulder surface is new from the creek bridge to Route 2, eliminating a short segment (0.1 mile) of resurfacing need. MBNA, a partner in the TMA is located on this corridor.	\$279,000	\$404,000	full shoulder treatment: rotomill, new hot mix, stripes & signs	
II	Medium	Sign/stripe	Route 4	Ekton Road - Harmony Road	A, B, C	5.7	DeIDOT, City of Newark	Continuous right turn lanes encroach in the existing paved shoulder. The provision of BKLs may require selective road widening, lane narrowing, or turn-lane elimination.	Western portions are in areas with high bike to work trips. MBNA, a partner in the TMA is located on this corridor.	\$397,000	\$576,000	selective shoulder paving, stripes & signs	
JJ	Medium	Sign/stripe	Salem Church Road	Route 4 - Chapman Road	C	0.8	DeIDOT	Two continuous right turn lanes & one drainage grate encroach in the existing paved shoulder. The provision of BKLs may require selective road widening, lane narrowing, or turn-lane elimination and drain grate replacement.	Serves Christiana High School. May involve utility relocation. However, utility relocation may be avoided by adding pavement to west side of roadway, resurfacing & restriping the entire segment.	\$66,000	\$81,000	selective shoulder paving, stripes & signs	
Medium Priority Total										\$2,337,000	\$3,388,000		
KK	Low	Bicycles On Bus	South College Avenue	Main Street - Route 40	B, D, E	5.5	DeIDOT, DTC	Expand transit service with bicycle access and bicycle racks on buses	Chrysler, a partner in the TMA is located on this corridor.	\$27,000	\$39,000	new annual 12 hour 15 headway service with 10 vehicle racks, 4 stationary racks	
LL	Low	Intersection	Academy Street	Park Place - Main Street	E	NA	DeIDOT, City of Newark	Improve midblock crossing from UD campus at Lovett Street.	The need for this project is contingent upon development of a bicycle facility along the Pomeroy Branch rail line.	\$36,000	\$61,000	Marsh Road example	
MM	Low	Maintenance	Route 4	College Avenue - Marrows Road	B	NA	DeIDOT, City of Newark	improve RR crossing with flangeway filler strip	In area with high bike to work trips. MBNA, a partner in the TMA is located on this corridor.	\$300,000	\$435,000	unit cost plus installation	
NN	Low	Pathway	South College Avenue	I-95 - Route 40	B	2.9	DeIDOT, City of Newark	provide connection via Iron Hill Park	greenway linkage	\$907,000	\$1,315,000	multi-use path, no ROW	
OO	Low	Pathway	East Campus Connector	Academy Street - Chapel Street	NA	0.3		provide pathway across campus	The need for this project is contingent upon development of a bicycle facility along the Pomeroy Branch rail line. Also, requires coordination of design between UD and DeIDOT.	\$936,000	\$1,366,000	multi-use path, no ROW	
PP	Low	Pathway	Route 4	Ekton Road - Route 273	A, B, C	4.7	DeIDOT, City of Newark	link to Salem Church w/ Gender Road Connector	MBNA, a partner in the TMA is located on this corridor. Greenway linkage.	\$1,490,000	\$2,160,000	multi-use path, no ROW	
QQ	Low	Shoulder Paving	Library Avenue	Route 4 - Old Baltimore Pike	E	1.4	DeIDOT	add paved shoulder and sign/mark as a bicycle lane	Recently resurfaced. May involve stormwater management, utility relocation and maintenance of traffic issues.	\$196,000	\$283,000	milling, hot mix, pavement markings & signs	
RR	Low	Sign/stripe	South College Avenue	Chrysler Plant - Plymouth Drive	D	0.5	DeIDOT, City of Newark	Restripe with consistent 11' wide travel lanes & sign/mark 4' BKL.	Chrysler, a partner in the TMA is located on this corridor.	\$94,000	\$136,000	milling, hot mix, pavement markings & signs	
SS	Low	Sign/stripe	South College Avenue	Plymouth Dr. - I-95	D	1.0	DeIDOT, City of Newark	Sign/mark existing paved shoulder as BKL	Chrysler, a partner in the TMA is located on this corridor.	\$16,000	\$22,000	pavement markings & signs	
TT	Low	Sign/stripe	South College Avenue	Park Pl - Chrysler Plant	D	0.6	DeIDOT, City of Newark, UD	utilize traffic calming and enforcement to reduce speeds, particularly at the northbound approach to the RR bridge	In area with high bike to work trips.	\$70,000	\$102,000	"gateway treatment": similar to Marsh Road but at 2 spots, landscaping, raised pavement sections	
UU	Low	Sign/stripe	Chapel Street	Cleveland Avenue - Delaware Avenue	F	0.4	DeIDOT, City of Newark	Select alternative Treatment	Alt. A: Remove 17 parking spaces & sign/mark roadway w/ BKL. Alt. B: Make no changes to existing roadway. Support Pomeroy Branch Trail as an Alternative travel corridor.	On-street parking may be accommodated off-street in residential driveways. In area with high bike to work trips.	\$42,000	\$61,000	cost for A: milling, hot mix, markings & signs
VV	Low	Sign/stripe	Cleveland Avenue	New London - Paper Mill Rd	E	0.6	DeIDOT, City of Newark	remove parking and sign/mark as bicycle lane	Requires removal of 30 parking spaces that may be accommodated off-street.	On-street parking may be accommodated off-street in residential driveways. In area with high bike to work trips.	\$114,000	\$166,000	milling, hot mix, 4 stripes, & signs
Total Low Priority										\$4,224,000	\$6,126,000		
City-Wide Grand Total										\$8,151,000	\$11,817,000		

**Total Cost = Construction Costs Plus An Additional 10% For Maintenance of Traffic, 15% for Construction Engineering and 25% for Preliminary Engineering Where Applicable. Otherwise, Inflation Factor Is Equal To Project Contingency.

Cost Estimates Are For Planning Purposes Only, And May Change Upon Additional Analysis And During Project Development

**Newark Bicycle Interim Report
City-Wide Project Recommendations**

ACTION	CORRIDOR	SEGMENT	SEGMENT LOS	LENGTH	ESTIMATED COST	COMMENTS			
City-Wide Access Management	New London Road	State Line - Nottingham Road	C, E	3.1					
	Nottingham Road	Elkton Road - State Line	C, D	2.2					
	Cleveland Avenue	Paper Mill Road - Capitol Trail	D, E	1.2					
	Paper Mill Road	City Limit - Cleveland Avenue	C	0.7					
	Salem Church Road	Route 4 - Chapman Road	C	0.8					
	Capitol Trail / Route 2	Polly Drummond Road - Main Street	D, E	1.8					
ACTION TOTAL				9.8	\$60,000				
City-Wide Sweeping	Park Place	Elkton Road - Library Avenue	D	1.8		Bicycle Path			
	Academy Street	Park Place - Main Street							
	Route 4	Elkton Road - Route 273	A, B, C	4.7					
	Elkton Road	State Line - Delaware Ave.	C, D	2.5					
	Nottingham Road	Elkton Road - Casho Mill Road	C	1.2					
	Ogletown Road/ Route273	Harmony Road - Library Avenue	D	3.2					
	Paper Mill Road	Possum Park Road - City Limit	D	1.4					
	Library Avenue	Main Street - Route 4	D, E	1.6					
	Salem Church Road	Chapman Road - Old Balt Pike	E	1.2					
	Capitol Trail/Route 2	Harmony Road - Main Street	D, E	2.4					
	North College Avenue	Main Street - Pomeroy Branch	C	0.1					
	Route 4	Elkton Road - Harmony Road	A, B, C	5.7					
ACTION TOTAL				24	\$5,000	MBNA, a partner in the TMA is located in this corridor.			
City-Wide Drainage Grate Replacement	Delaware Avenue	Elkton Road - Library Avenue	D	1.1		One-Way East Bound High Crash Location			
	Main Street	Elkton Road - Capital Trail	E	1.0					
	Cleveland Avenue	New London Road - Capitol Trail	E	0.6					
	Ogletown Road/ Route 273	Route 4 - Library Avenue	D	2.2					
	College Avenue	Main Street - Chrysler Plant	D	1.2					
	Park Place	Elkton Road - Library Avenue	D	1.8					
	Paper Mill Road	City Limit - Cleveland Avenue	C	0.7					
	Library Avenue	Main Street - Wyoming Avenue	E	0.4					
	Capitol Trail / Route 2	Polly Drummond Road - Main Street	D, E	1.8					
ACTION TOTAL				10.8	\$20,000	High Crash Location. Chrysler, a partner in the TMA is located in this corridor.			
City-Wide Intersection Improvements	Casho Mill Road	Elkton Road - Nottingham Road	B, C	NA		Most critical at intersection with South College Avenue			
	Hillside Road	Nottingham Road - Cleveland Avenue	D	NA					
	Park Place	Elkton Road - Chapel Street	D	NA					
	Chapel Street	Cleveland Avenue - Park Place	C, F	NA					
	Paper Mill Road	Possum Park Road - City Limit	D	NA					
	Library Road	Main Street - Wyoming Avenue	E	NA					
	Salem Church Road	Route 4 - Chapman Road	C	NA					
	Capital Trail	Harmony Road - Main Street	D, E	NA					
	Route 4	South College Avenue - Marrows Road	B	NA					
	Route 4	Route 273 - Harmony Road	C	NA					
	Elkton Road	State Line - Delaware Avenue	C, D	NA					
	Delaware Avenue	Elkton Road - Library Avenue	D	NA					
	Main Street	Elkton Road - Capital Trail	E	NA					
	New London Road	Country Club Road - Nottingham Road	C, E	NA					
	Cleveland Avenue	New London Road - Capital Trail	D, E	NA					
	Ogletown Road	Harmony Road - Library Avenue	D	NA					
	South College Avenue	Main Street - Route 40	B, D, E	NA					
	North College Avenue	Main Street - Pomeroy Branch	C	NA					
	ACTION TOTAL							\$300,000	Most critical at the intersection with Chrysler & UD Stadium Most critical for north-south bicycle access onto campus at East Main Street; and for east-west bicycle access onto campus at Pomeroy Branch



Corridor Recommendations

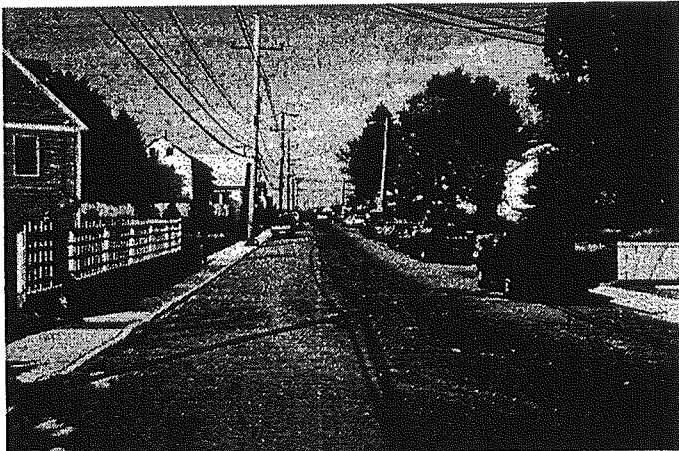
Route 896/New London Road

Limits: State Line to Nottingham Road

LOS Analysis: C

Existing Conditions:

- has 42 foot wide roadway with 12 foot travel lanes and 9 foot shoulders
- combination of bicycle facilities
- well marked bicycle lanes - Country Club to Cleveland
- wide shoulder north of Cleveland
- signed for No Parking on shoulder - not enforced
- street parking leaves minimal room for cycling south of Cleveland Avenue
- driveways not available so residents park in street

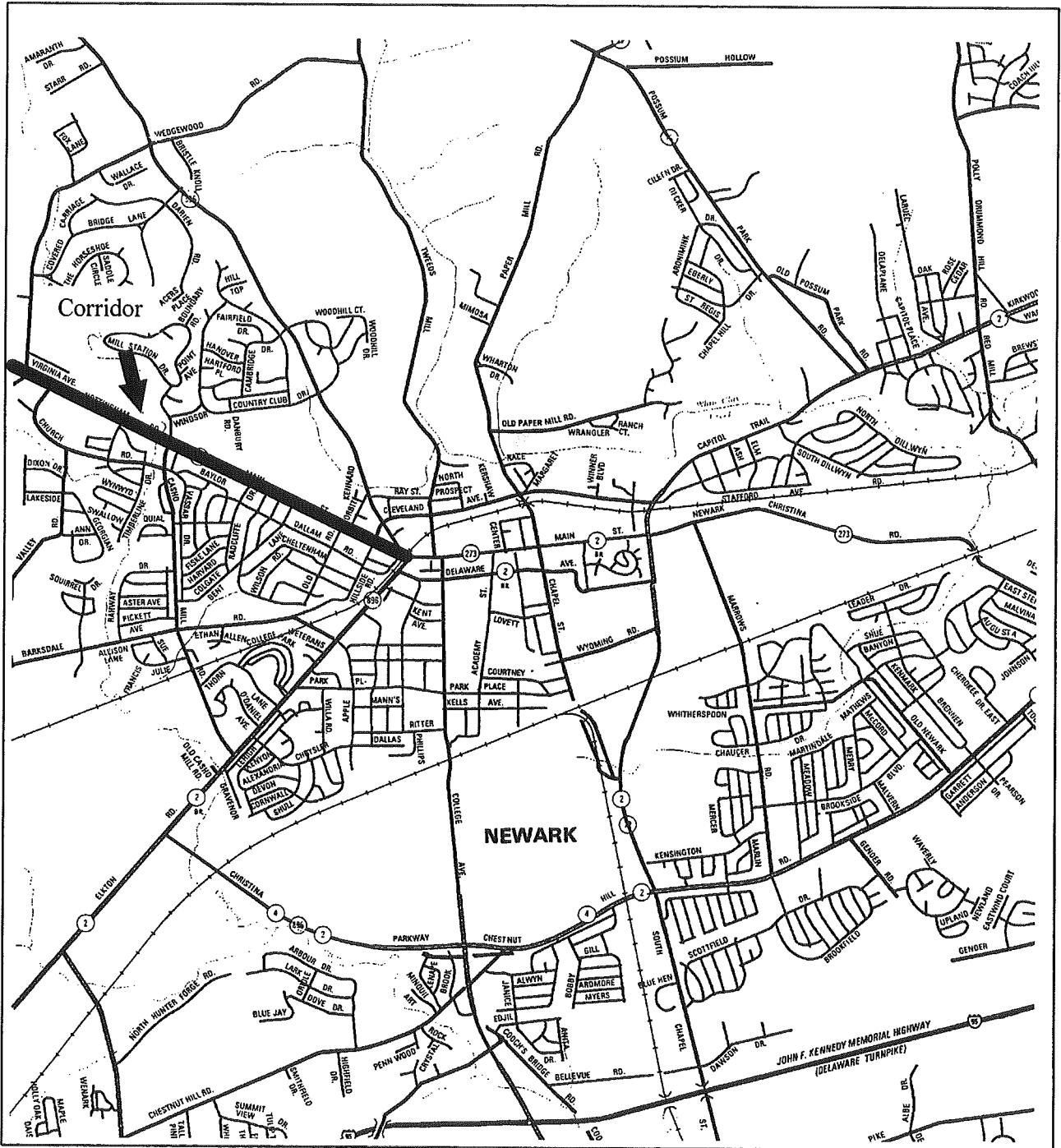


New London Road looking northbound

Recommendations:

- install signage and pavement markings per MUTCD/AAHSTO standards on existing paved shoulder to accommodate a bicycle lane
- enforce No Parking areas and/or limit on street parking to one side of street
- remove parking, approximately 10 spaces, install signage and pavement markings per MUTCD/AASHTO standards to accommodate a bicycle lane from Cleveland Avenue to Elkton Road
- adopt shoulder maintenance program
- investigate access management especially from Country Club to Nottingham
- end bicycle lane markings at Terrapin Lane/Harvest Lane and install "Share The Road" and other signs as needed to transition into unmarked facilities in Maryland





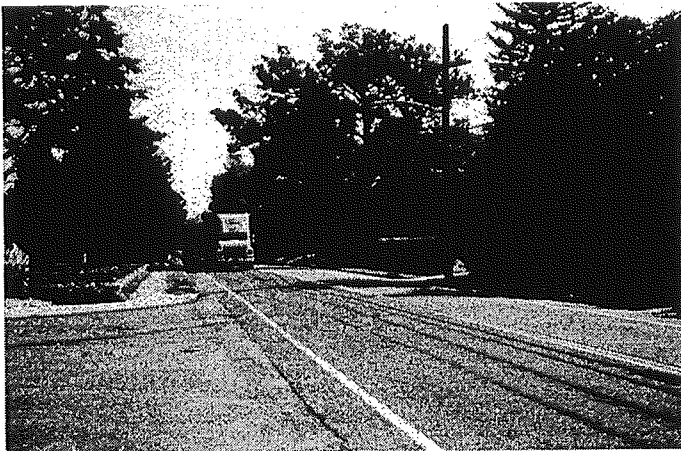
Route 273/Nottingham Road

Limits: State Line to Elkton Road

LOS Analysis: C

Existing Conditions:

- shared-use facility with narrow vehicle travel lanes
- open ditches near pavement edges pose a hazard for cyclists
- debris often accumulates on shoulders
- all bicycle signs and pavement markings are inadequate

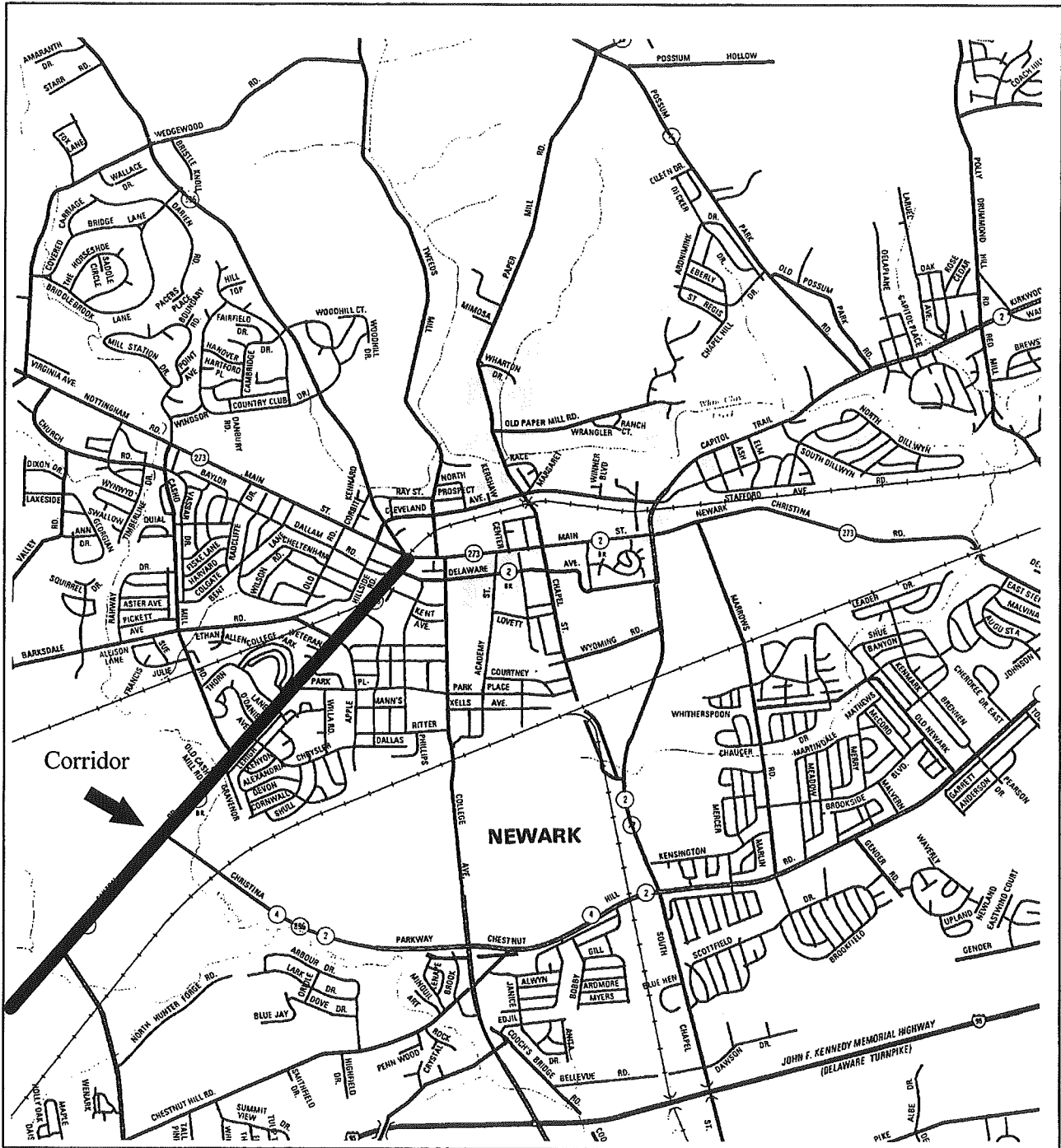


Nottingham Road looking northbound

Recommendations:

- install signage and pavement marking per MUTCD/AASHTO standards and add paved shoulders where needed to accommodate a bicycle lane throughout the corridor
- end bicycle lane markings at Wedgewood Road/J. H. School Road and install “Share The Road” and other signs as needed to transition into unmarked facilities in Maryland
- provide routine maintenance and sweeping, particularly of roadway edges and shoulders
- explore access management
- install a closed drainage system from Elkton Road to Casho Mill Road





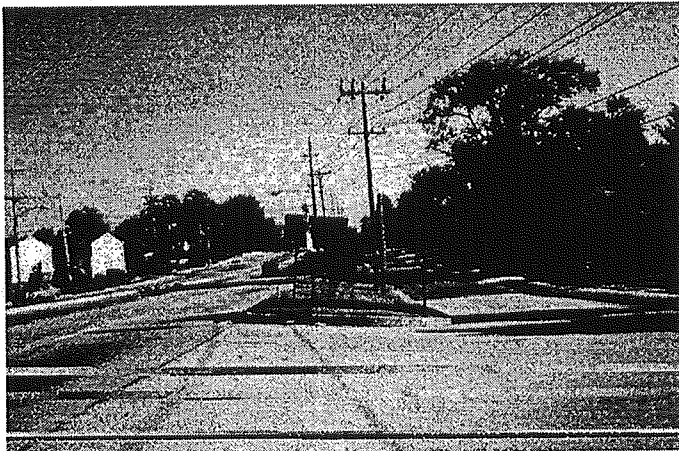
Route 2/Elkton Road

Limits: State Line to Delaware Avenue

LOS Analysis: D

Existing Conditions:

- wide paved shoulders from state line to Casho Mill Road
- wide curb lane from Casho Mill Road to Delaware Avenue
- numerous access points along corridor
- inconsistent signing
- frequent signalized intersections
- poor transitions from one type of facility to the next
- local streets in conjunction with Park Place and other local streets serve as better alternative route to campus

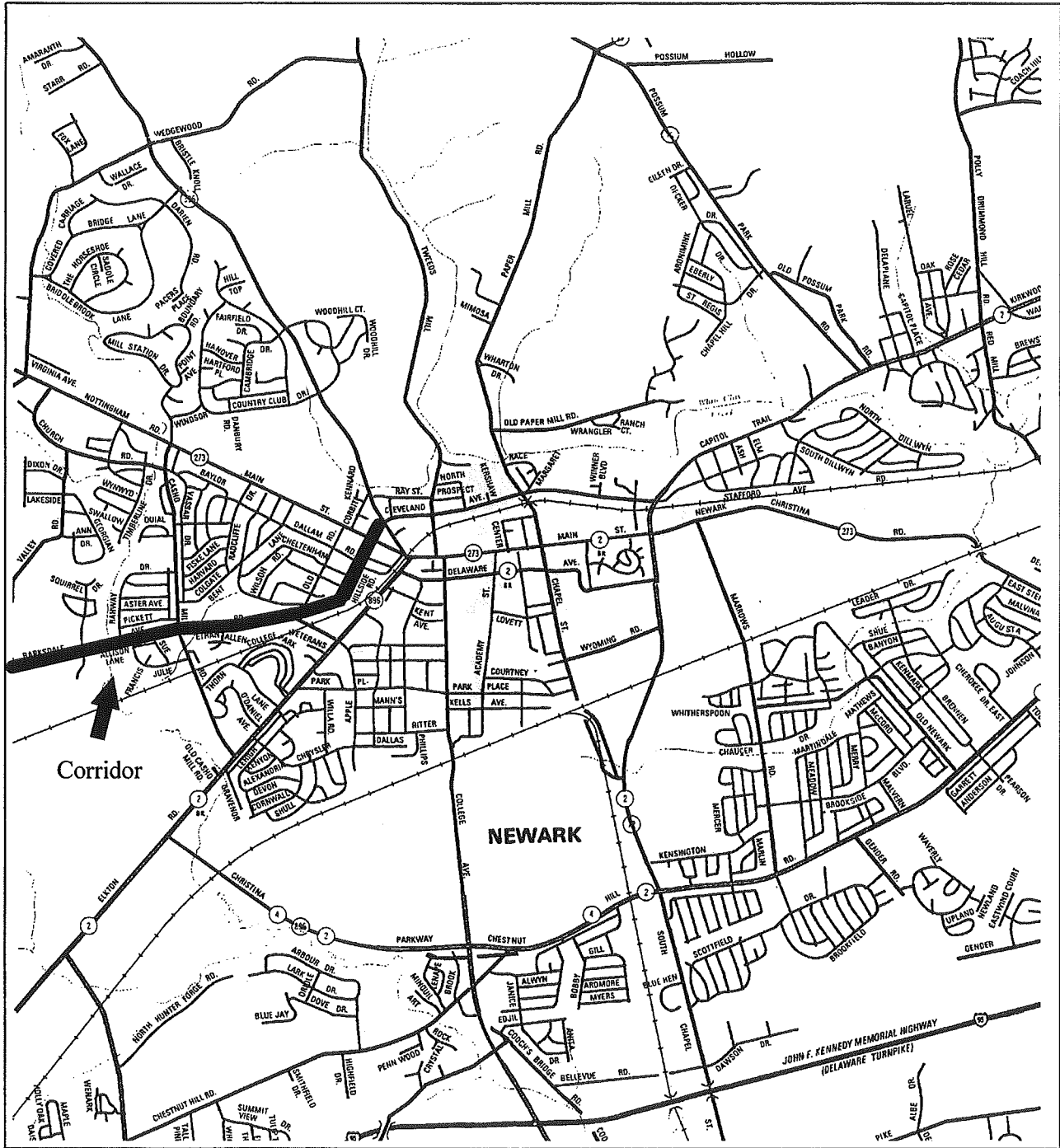


Elkton Road looking northbound

Recommendations:

- install signage and pavement marking per MUTCD/AASHTO standards on existing paved shoulder to accommodate bicycle lanes
- correct pavement markings at intersections and right turn lanes
- replace bridge expansion joint between Route 4 and Casho Mill Road
- explore access management from Casho Mill Road to Delaware Avenue
- provide bicycle access, parking and bicycle-bus connections (including vehicle-mounted and stationary racks) at the Suburban Plaza Shopping Center park-and-ride lot
- end bicycle lane markings at Otts Chapel Road and install "Share The Road" and other signs as needed to transition into unmarked facilities in Maryland





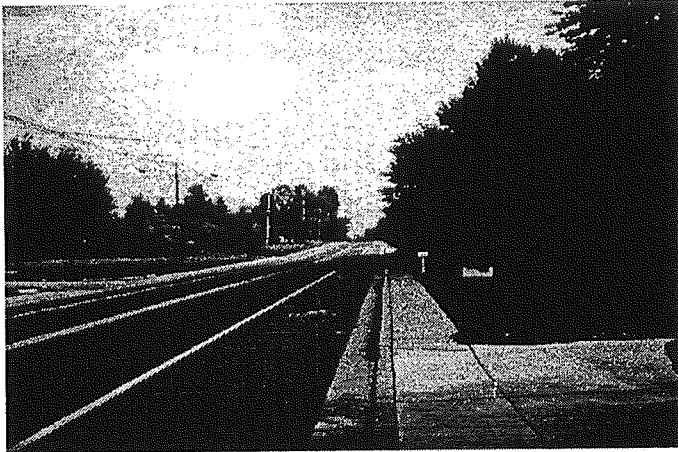
Barksdale Road/Hillside Road

Limits: State Line to Cleveland Avenue

LOS Analysis: B

Existing Conditions:

- has wide shoulders from student housing complex eastward and is well maintained
- existing signs and markings are substandard
- intersection at Casho Mill Road is dangerous for less skilled cyclists
- the corridor where Barksdale turns into Hillside is inadequate, lacking proper space for cyclists and signs/markings
- poor transitions from one type of facility to the next

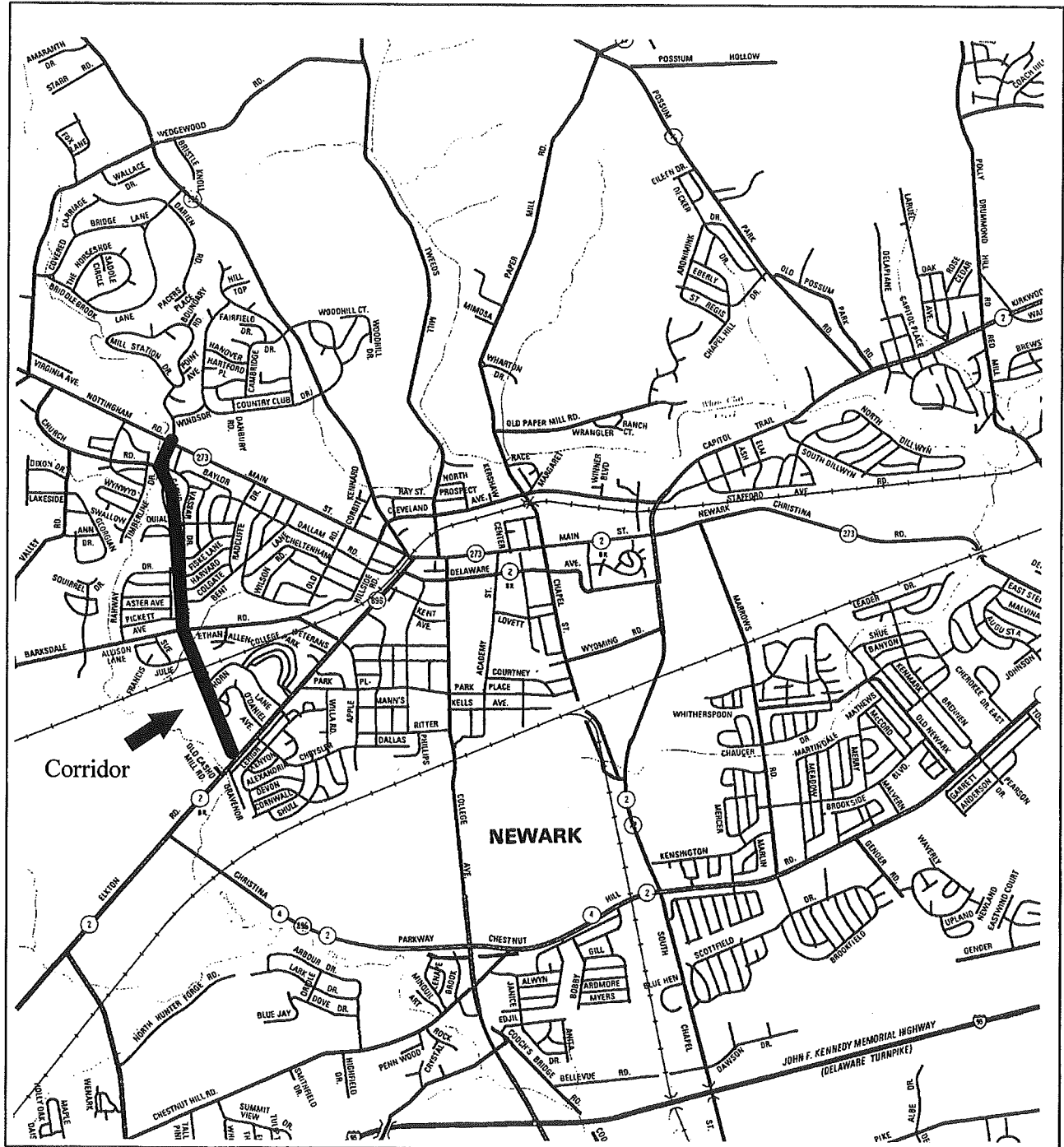


Barksdale Road looking eastbound

Recommendations:

- install signage and pavement marking per MUTCD/AASHTO standards to accommodate bicycle lanes with particular attention to the Hillside Road portion and the intersection of Hillside Rd. and Main St.
- restripe existing bicycle lane per MUTCD/AASHTO standards to match throughout corridor
- restripe narrow bridge between Casho Mill Road and state line
- provide directional signage “To Bicycle Paths & Elkton Road Underpass” at housing complex
- restripe for narrower travel lanes or widen pavement to accommodate through bicycle lanes i.e. Casho Mill Road intersection
- explore access management from Casho Mill Road to Cleveland Avenue
- end bicycle lane markings at Country Hills Drive/Abbotsford Lane and install “Share The Road” and other signs as needed to transition into unmarked facilities in Maryland





Casho Mill Road

Limits: Nottingham Road to Elkton Road

LOS Analysis: C

Existing Conditions:

- has paved shoulders that are marked bicycle lanes from Elkton Road to Barksdale Road
- good signage and pavement marking north of Barksdale Road
- some sections of pavement are not smooth and are hazardous to cyclists
- the railroad underpass is very dangerous

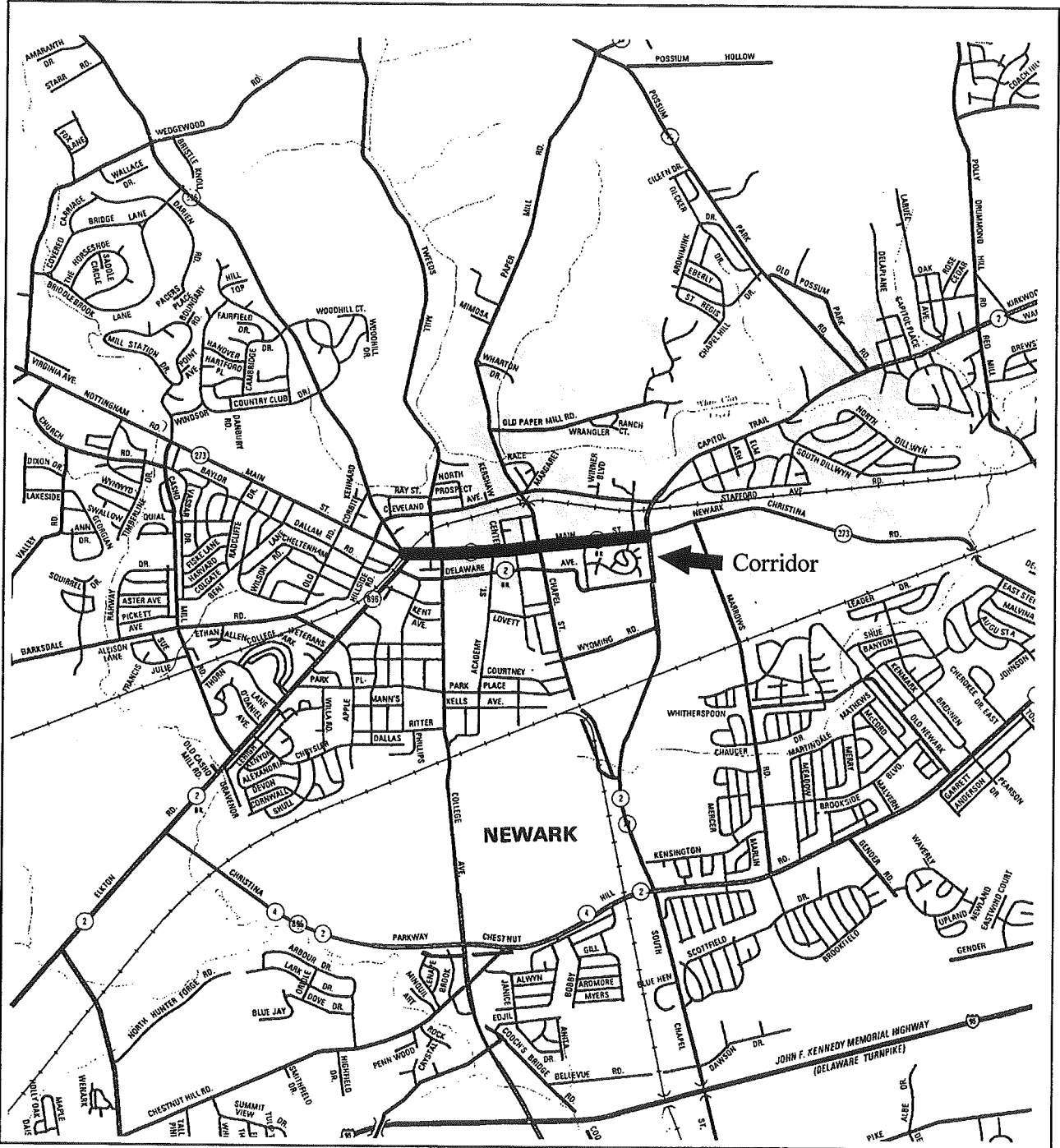


Casho Mill Road looking southbound

Recommendations:

- install signage and pavement marking to MUTCD/AASHTO standards on existing bicycle lanes from Elkton Road to Barksdale Road
- utilize existing paved shoulders for bicycle lanes with proper signs and pavement markings
- resurface roadway and add pavement markings for through bicycle movements with a loop detector at the intersection of Casho Mill and Barksdale Roads
- install a traffic signal at the underpass
- resurface roadway near underpass
- remove parking (approximately 35 spaces) and install signs and pavement markings to accommodate bicycle lanes from Barksdale Road to Nottingham Road





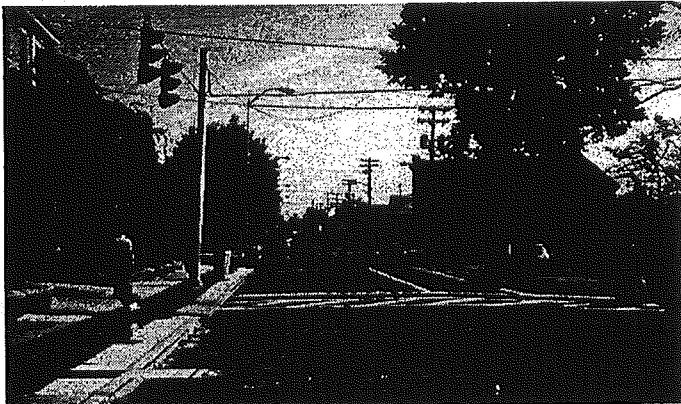
Main Street

Limits: Elkton Road to Capitol Trail

LOS Analysis: E

Existing Conditions:

- heavily traveled corridor
- one-way westbound accommodating shared-use bicycle facilities
- 40 feet wide two 12 foot travel lanes, two 8 foot parking lanes
- parking on both sides of street, although restricted from late evening to early morning
- bicycle riding on sidewalk prohibited
- inadequate signs for bicycles
- some drain grates non bicycle safe

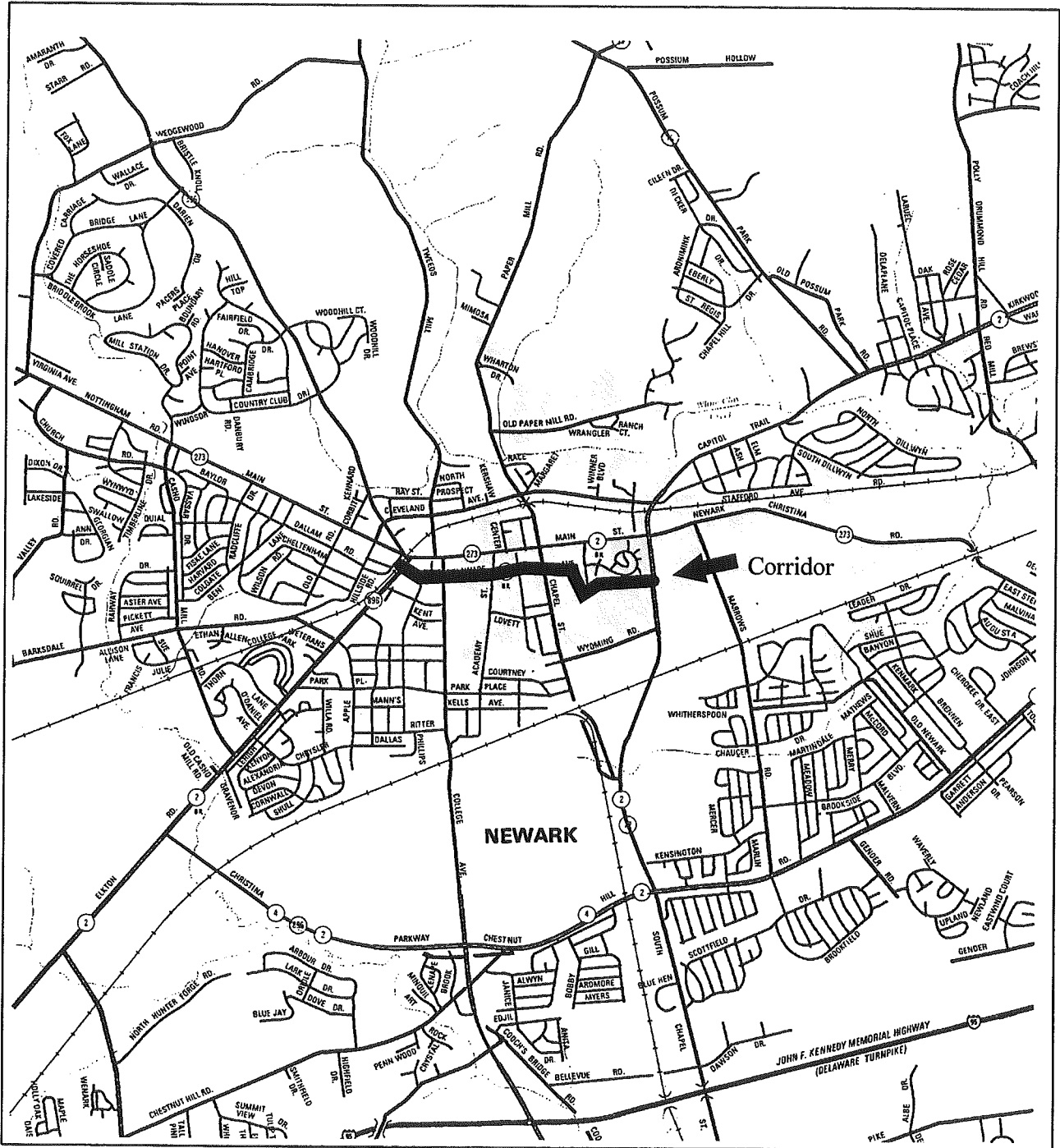


Main Street looking eastbound

Recommendations:

- install signage and pavement marking per MUTCD/AASHTO standards to accommodate left-turning bicycles
- extend hours of parking restrictions from existing evening hours to 10 AM the following morning to better accommodate bicycle commuters during the AM peak period (affects 53 spaces)
- paint "No Bicycles On Sidewalk" on curb ramps to enhance existing signs if on-road riding is preferred
- install "No Wrong Way Bicycles" signs
- vigorously enforce all traffic regulations including one-way riding and prohibitions against sidewalk riding
- install bicycle parking along outer edges of sidewalks near business entrances (at least 2 racks per block on each side of the street, or more to meet the demand), and encourage private property owners to install racks on rear and side lots where possible
- consider installation of traffic calming devices such as bulb outs, neckdowns, etc
- explore access management
- replace drain grates with bicycle safe ones
- select alternative facility treatment which may be wide curb lanes, bicycle lanes, or designated directional sidewalk markings





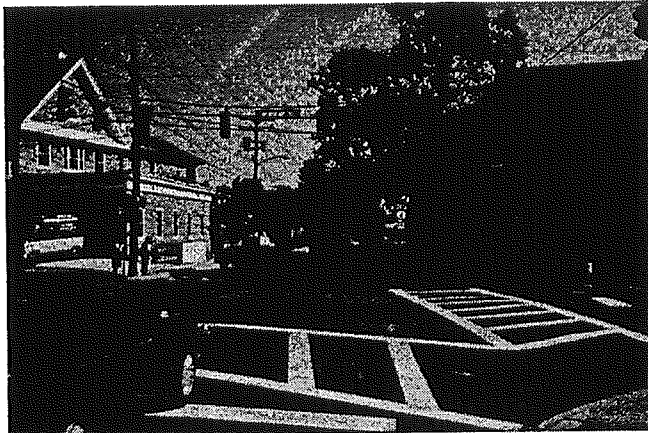
Delaware Avenue

Limits: Elkton Road to Library Avenue

LOS Analysis: D

Existing Conditions:

- one-way pair to Main Street
- shared use facility with wide travel lanes
- crossing near the “Mall” area provides minimal protection for pedestrians and cyclists
- 31 feet wide near “Mall”
- drain grates are non bicycle safe
- wrong-way riding occurs in corridor



Delaware Avenue looking eastbound

Recommendations:

- install signage and pavement marking per MUTCD/AASHTO standards on existing wide curb lane to accommodate a one-way bicycle lane
- paint “No Bicycles On Sidewalk” on curb ramps and install “No Wrong Way Bicycles” signs
- vigorously enforce all traffic regulations including one-way riding and prohibitions against sidewalk riding
- consider installation of traffic calming devices such as bulb outs, neckdowns, etc
- explore access management
- replace drain grates with bicycle safe ones
- improve bicycle and pedestrian crossing at the “Mall” with better signage, pavement markings, textured pavement at cross walk or similar devices



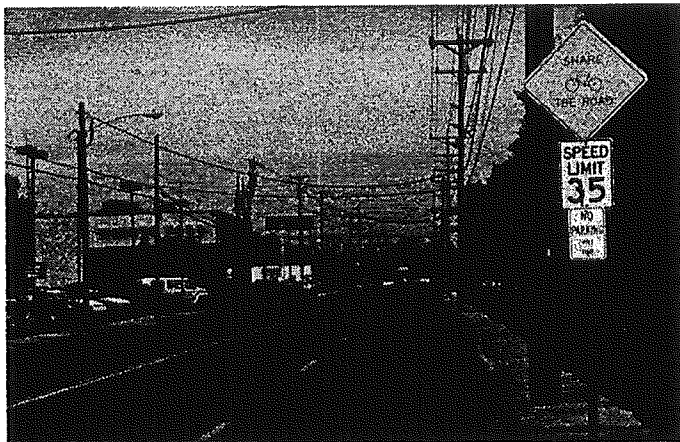
Cleveland Avenue

Limits: New London Road to Capitol Trail

LOS Analysis: E

Existing Conditions:

- shared-use facility
- heavily commercialized
- numerous access points and curbcuts in more developed sections
- narrow travel lanes
- on-street parking between Route 896 and Paper Mill Road constrains travel area for cyclists
- approximately 30 parking spaces from Paper Mill Road to North College Avenue on South side
- some drain grates are not bicycle safe

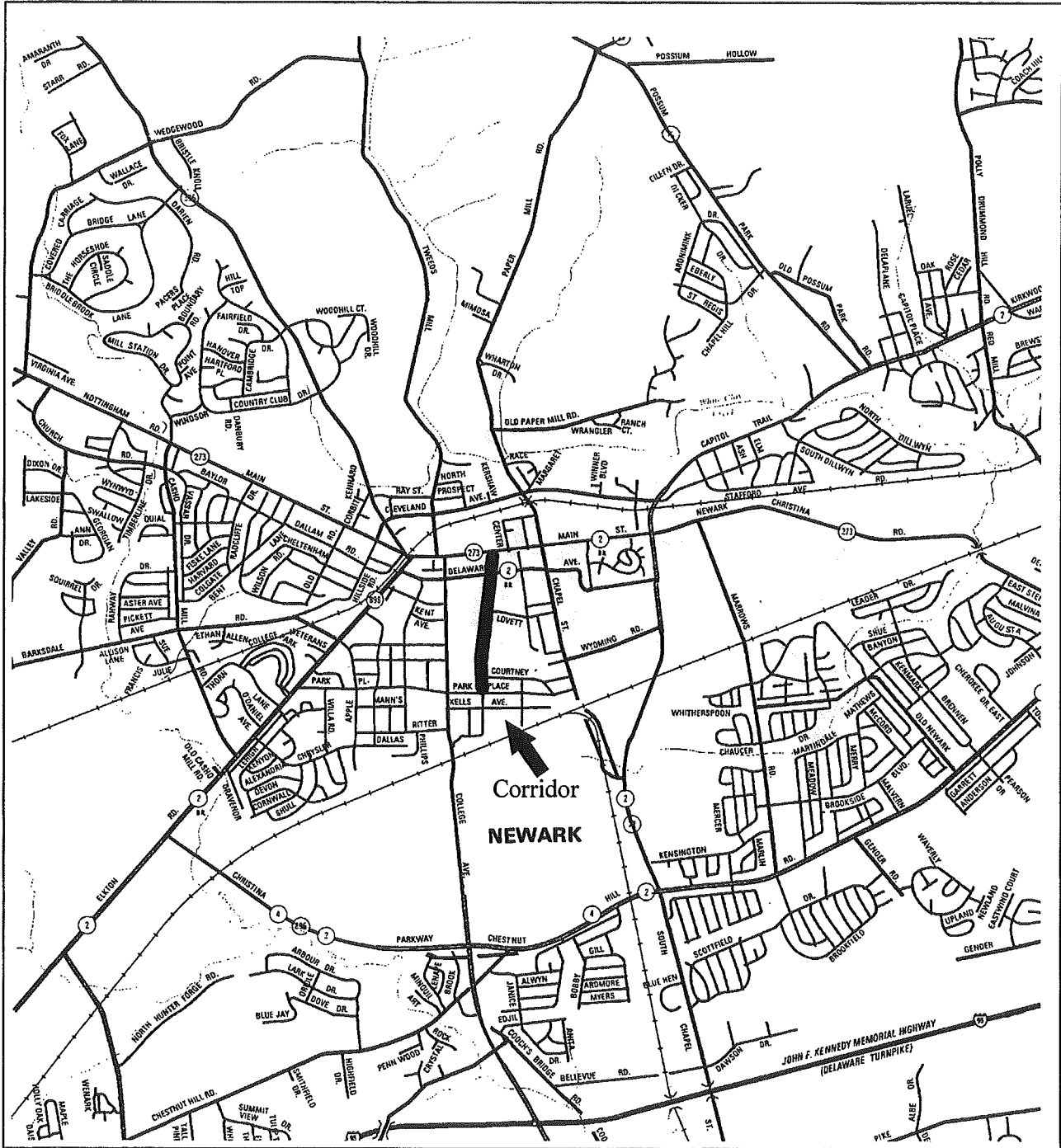


Cleveland Avenue looking eastbound

Recommendations:

- install signage per MUTCD/AASHTO standards for shared-use bicycle facility
- provide routine maintenance and sweeping
- replace non bicycle safe drain grates
- explore access management
- remove parking (30 spaces) and install signs and pavement markings per MUTCD/AASHTO standards to accommodate bicycle lanes from New London Road to Paper Mill Road
- Pomeroy Branch could be used as an alternate parallel facility





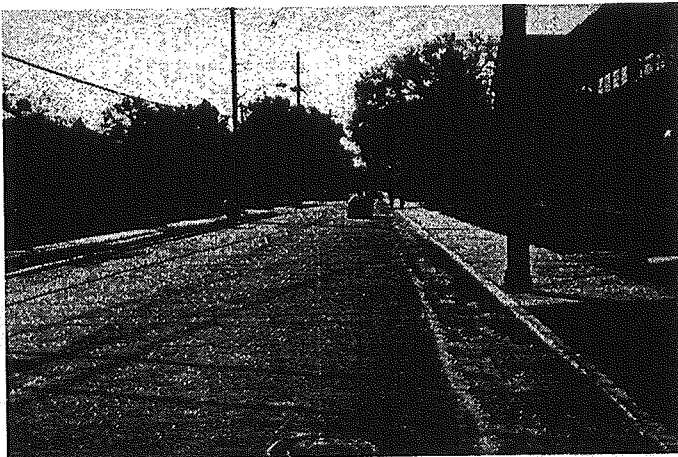
Academy Street

Limits: Park Place to Main Street

LOS Analysis: E

Existing Conditions:

- two-way connector providing north/south access
- 35 feet wide (Park Place to Lovett Avenue with no parking), 35 feet wide with 29 parking spaces east side only (Lovett Avenue to Delaware Avenue), 35 feet wide with 8 parking spaces on both sides for a total of 16 spaces (Delaware Avenue to Main Street)
- residual pavement marking from old bicycle facility exists
- debris along pavement edges
- inadequate crosswalk by student center

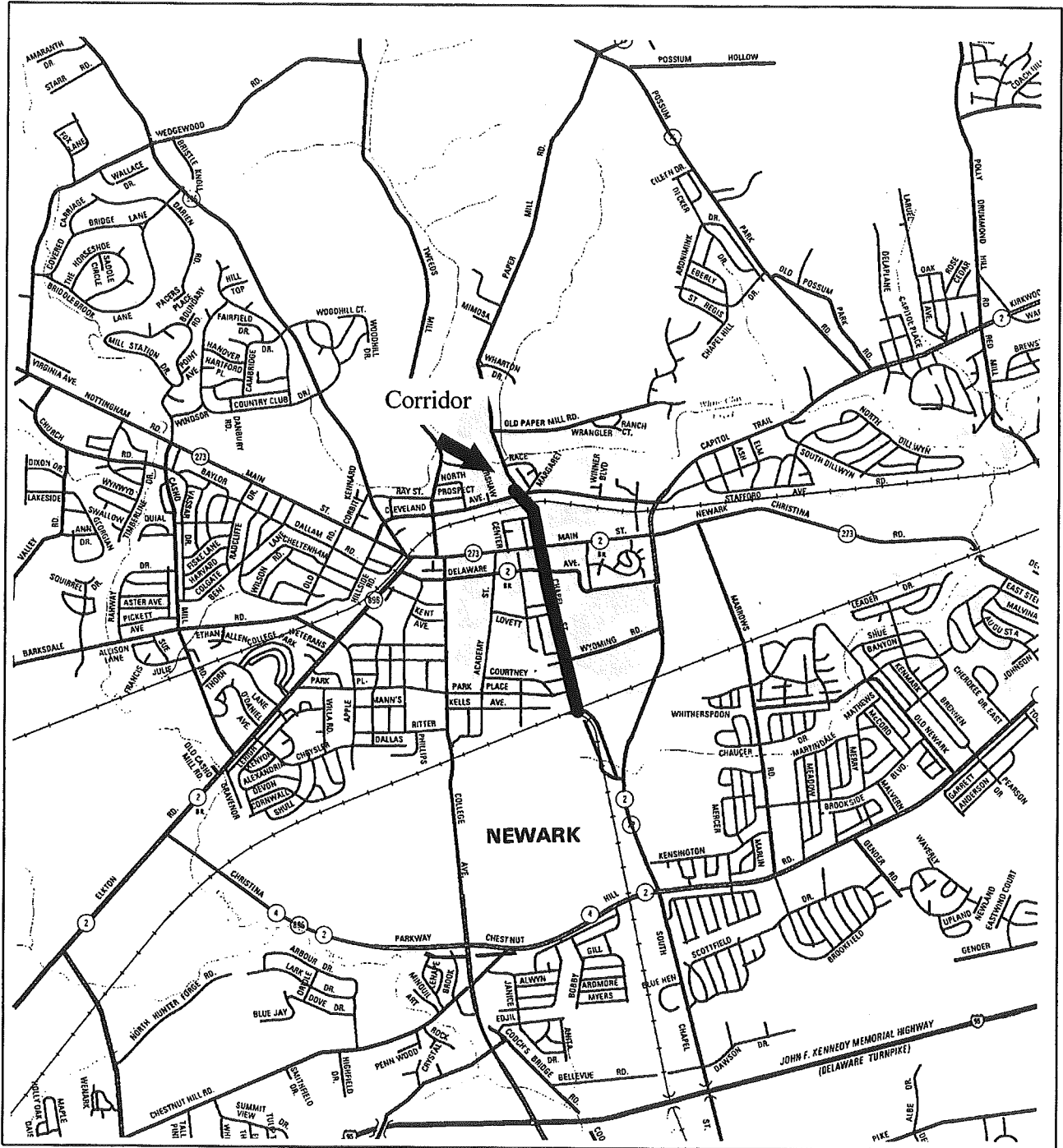


Academy Street looking southbound

Recommendations:

- select alternative treatment for the Lovett St. - Main St. section which may include installing signage and pavement markings per MUTCD/AASHTO standards to accommodate a bicycle lane with some removal of parking.
- install signs and markings per MUTCD/AASHTO for bicycle lanes from Park Place to Lovett St.
- Repave sections from Park Place to Delaware Ave. to improve riding surface
- provide routine maintenance
- upgrade crosswalk at student center with textured pavement, additional signs, pavement markings, flashing lights, etc.





Chapel Street

Limits: Park Place to Cleveland Avenue

LOS Analysis: D

Existing Conditions:

- relatively wide except for portion between Delaware and Cleveland
- Delaware to Cleveland 11 foot northbound and 17+ foot southbound lanes, including an unstriped parking lane accommodating approximately 17 parking spaces
- Delaware to Wyoming 14+ foot wide lanes, including a 2 foot wide bicycle lane
- Wyoming to Park Place 14+ foot wide lanes
- railroad overpass creates a barrier
- inadequate bicycle signage
- non-safe drain grates, grates and roadway not on same grade

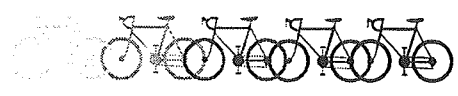
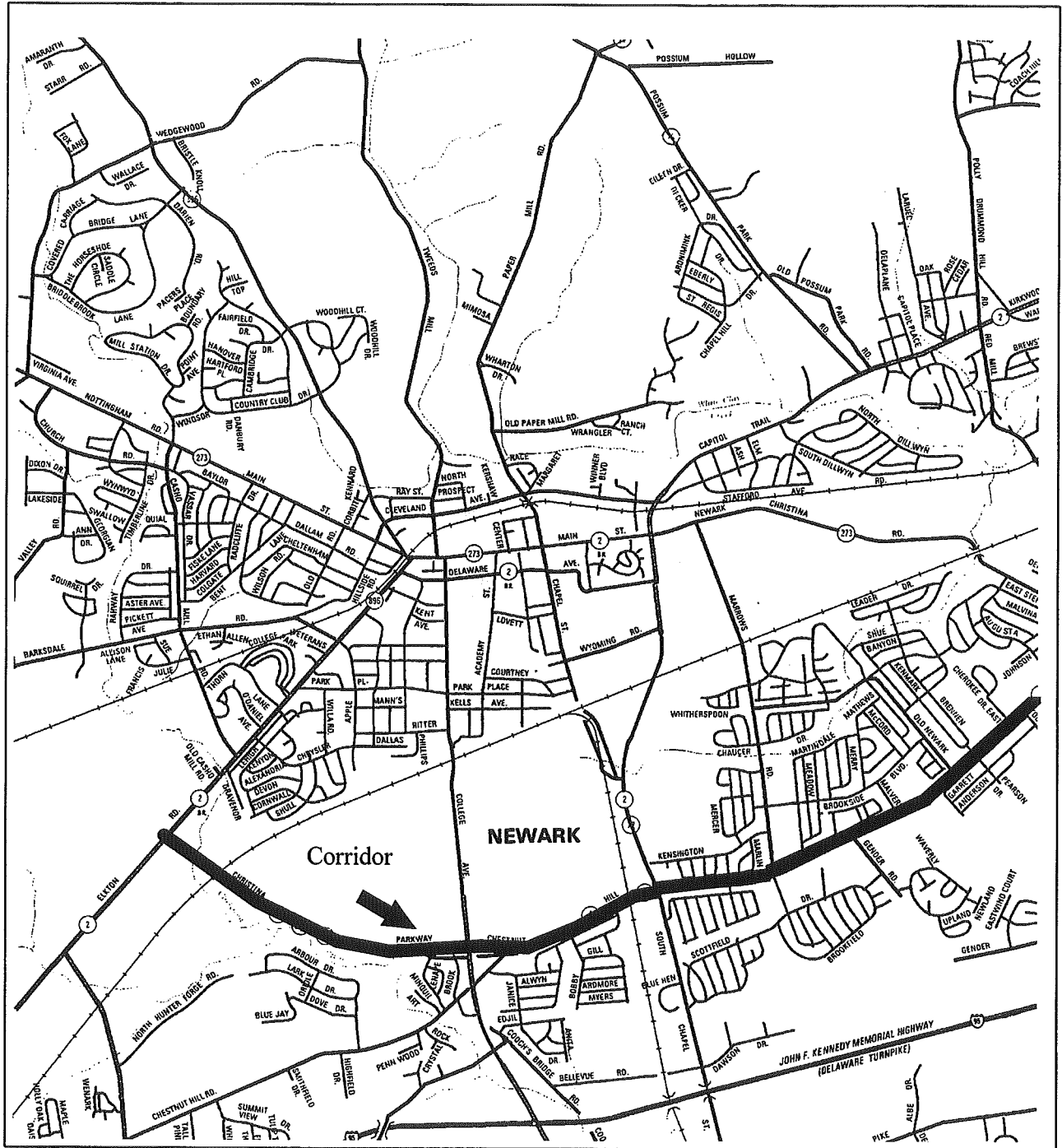


Chapel Street looking northbound

Recommendations:

- remove parking (approximately 17 spaces) and install signage and pavement markings per MUTCD/AASHTO standards on existing wide curb lane to accommodate bicycle lanes
- install bicycle safe drain grates
- provide for bicycle through movements at railroad overpass via off-street path to Cleveland Avenue
- resurface areas near drain grates or recess grates into curb areas
- consider the proposed Pomeroy Branch as an alternate route





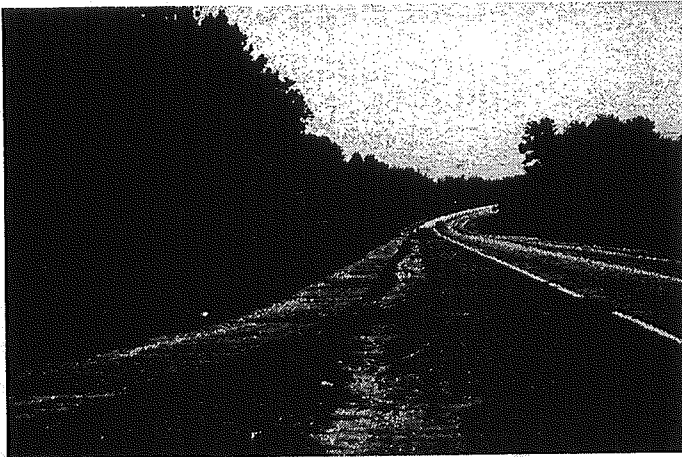
Route 4/Christina Parkway

Limits: Elkton Road to Harmony Road

LOS Analysis: B

Existing Conditions:

- exclusive bicycle facility in the form of an off-road path
- located along south side of roadway between Elkton Road and South College Avenue
- path shifts to north side for duration of corridor limits
- debris, silt and trash obstruct path
- path is usually wide and has good sight distance
- portion west of College Avenue dips out of sight creating a hazard
- intersection at College Avenue is poorly marked
- railroad crossing is rough

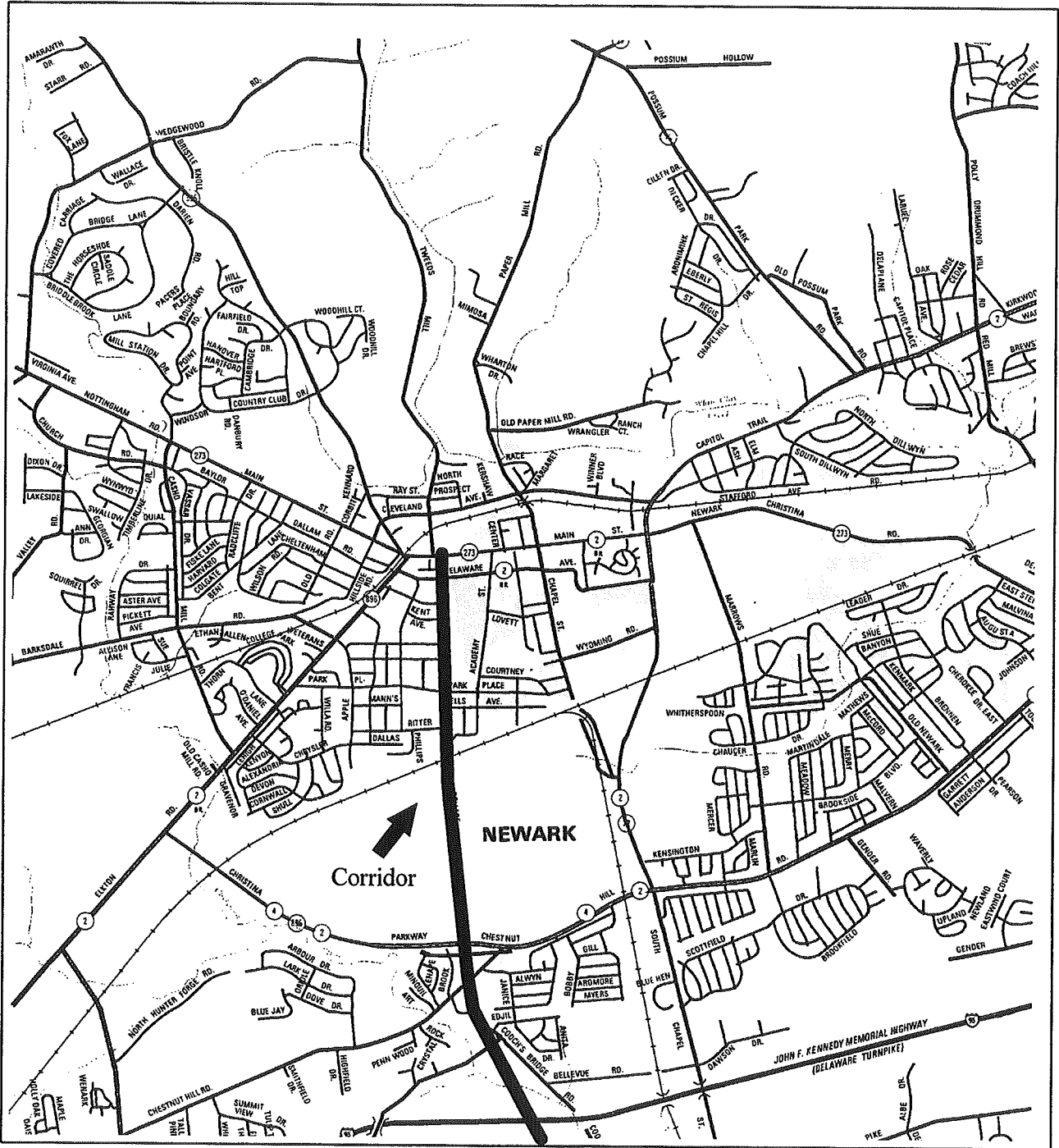


Christina Parkway looking westbound

Recommendations:

- install signage and pavement markings per MUTCD/AASHTO standards on paved shoulder to accommodate bicycle lane from Elkton Road to Harmony Road
- provide better maintenance and sweeping especially of path and shoulders
- upgrade signs and signals, and provide pedestrian refuge island at College Avenue intersection to improve the existing crossing
- utilize compressionable flangeway fillers at railroad crossing for a smoother ride
- provide access to this corridor via the Gender Road connector
- install lights along the bike path between Elkton Road and College Avenue particularly in the short section that is secluded due to changes in topography
- provide through lanes at intersections where vehicle right turn lanes intrude into bicycle lanes





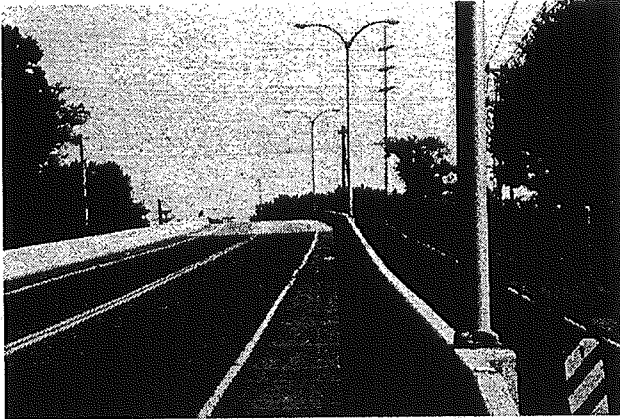
Route 896/South College Avenue

Limits: Route 40 to Main Street

LOS Analysis: C

Existing Conditions:

- this corridor is the primary connection between Newark and I-95 and is heavily traveled
- has discontinuous bicycle lane running between the travel lane and the curb
- the bicycle lane is interrupted by parking
- improper sign placement encourages wrong-way riding
- the bridge over the northeast corridor tracks acts as a pinchpoint forcing cyclists into the narrow travel lane on the bridge or onto the pedestrian way often against the flow of traffic
- some drain grates are not bicycle-safe
- roadway width varies from 2 to 8 lanes with curb & gutter, shoulders, right turn lanes, etc.
- lanes widths are typically from 12 - 13 feet wide

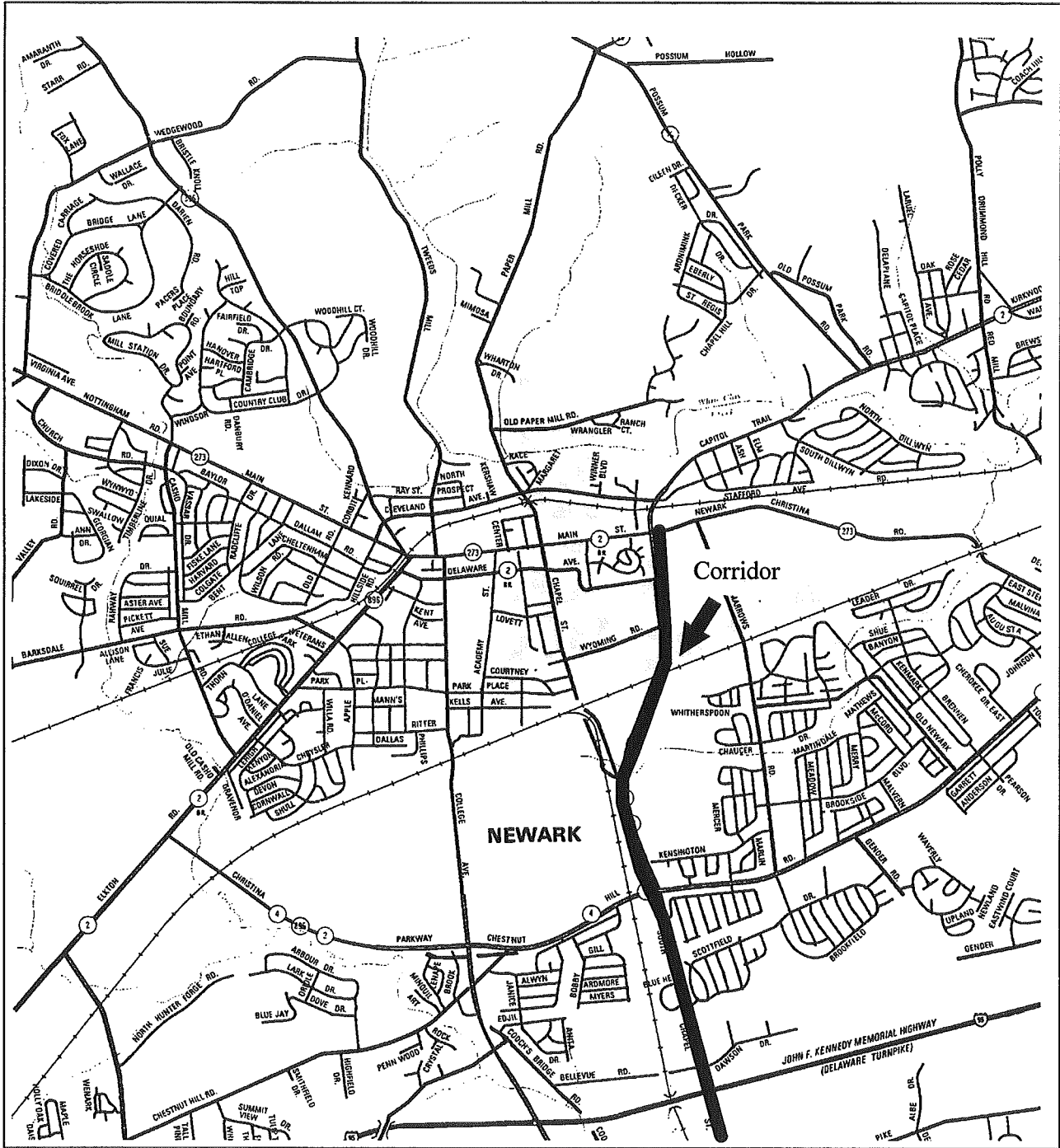


College Avenue Bridge looking northbound

Recommendations:

- install signage, pavement markings per MUTCD/AASHTO, and add to existing paved shoulder or narrow travel/turn lanes/medians as necessary to accommodate bicycle lanes (Chrysler Plant to I-95)
- install signage and pavement markings per MUTCD/AASHTO standards to upgrade existing bicycle lane (Chrysler Plant to Main Street)
- remove on-street parking near the University (approximately 17 spaces)
- install bicycle-safe draingrates
- improve pedestrian crossing between Amstel Avenue and Kent Avenue
- explore the use of traffic-calming techniques, traffic enforcement and intersection improvements at the northbound bridge approach and the Chrysler plant entrance
- expand opportunities to utilize bicycle-on-bus programs to traverse pinchpoints such as the bridges over I-95 and the NE corridor tracks
- incorporate links to existing and proposed greenway/trail projects and adjacent off-road facilities (i.e. Iron Hill Park, etc.)





Route 72/Library Avenue

Limits: Route 40 to Main Street

LOS Analysis: D

Existing Conditions:

- four lane roadway from Main Street to Wyoming with additional turning lanes
- narrow travel lanes
- south of Wyoming Road to Christina Parkway the roadway consists of 2-lane road with open shoulders marked as bicycle lanes
- shoulders are littered with debris
- non bicycle safe draingrates exist
- expansion joints on bridge cause unsafe conditions

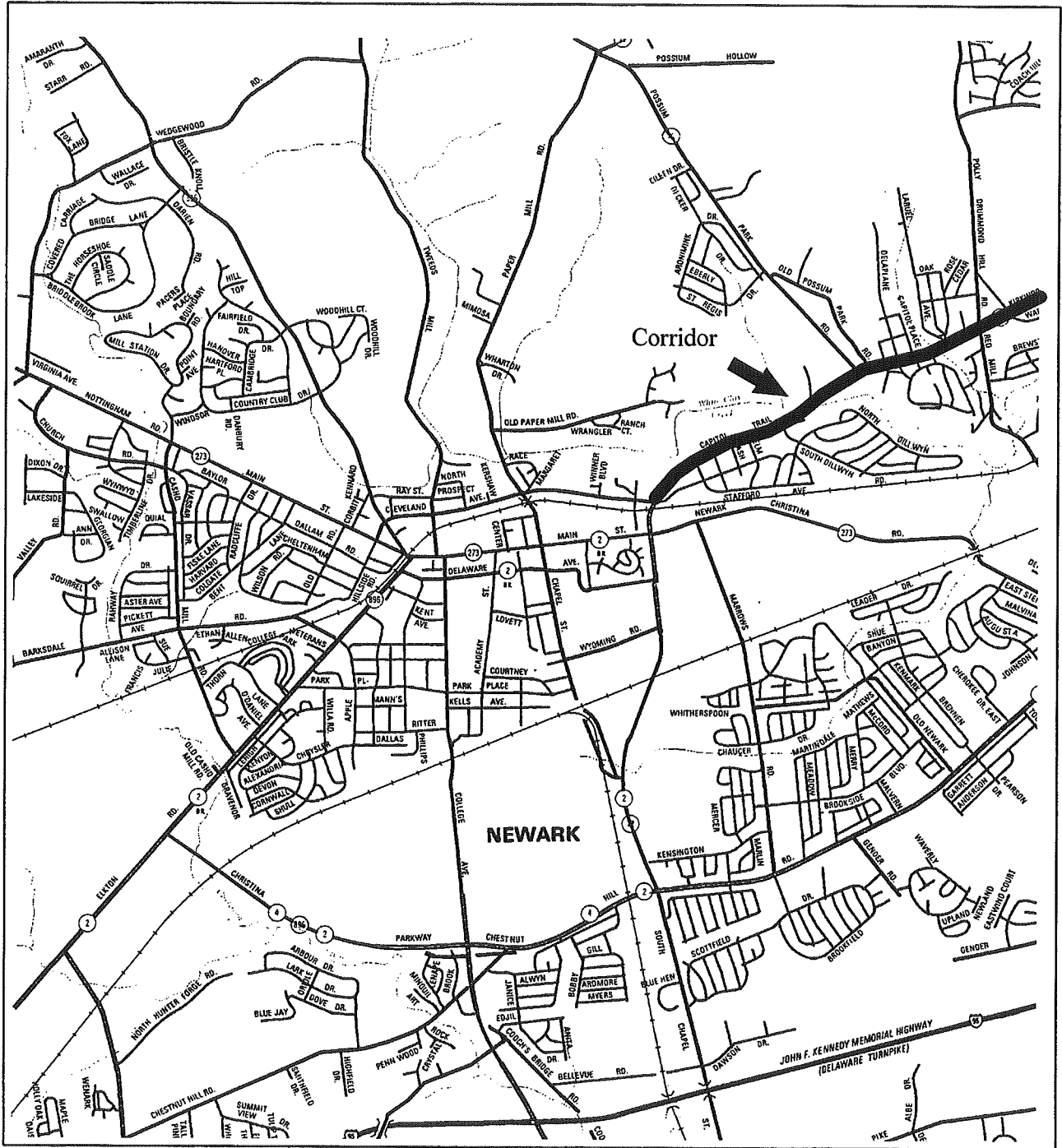


Library Avenue looking southbound

Recommendations:

- install signage and pavement markings per MUTCD/AASHTO standards on existing bicycle lane (Wyoming Avenue to Route 4)
- install signage and pavement markings per MUTCD/AASHTO standards and add paved shoulders as needed to accommodate a bicycle lane (Route 4 to Old Baltimore Pike)
- provide better maintenance and sweeping program
- add "Bikes Sharing Road" signs
- provide routine maintenance and sweeping
- install bicycle-safe draingrates
- add off-road path between on west side (Main Street to Wyoming Avenue)
- provide safe crossing over I-95 via future bicycle-on-bus programs or through bicycle lanes on bridge shoulders





Route 2/Capitol Trail

Limits: Main Street to Harmony Road

LOS Analysis: D

Existing Conditions:

- existing cross-section does not provide any bicycle facility
- rough pavement cluttered with debris in some sections
- numerous access points
- non-safe draingrates

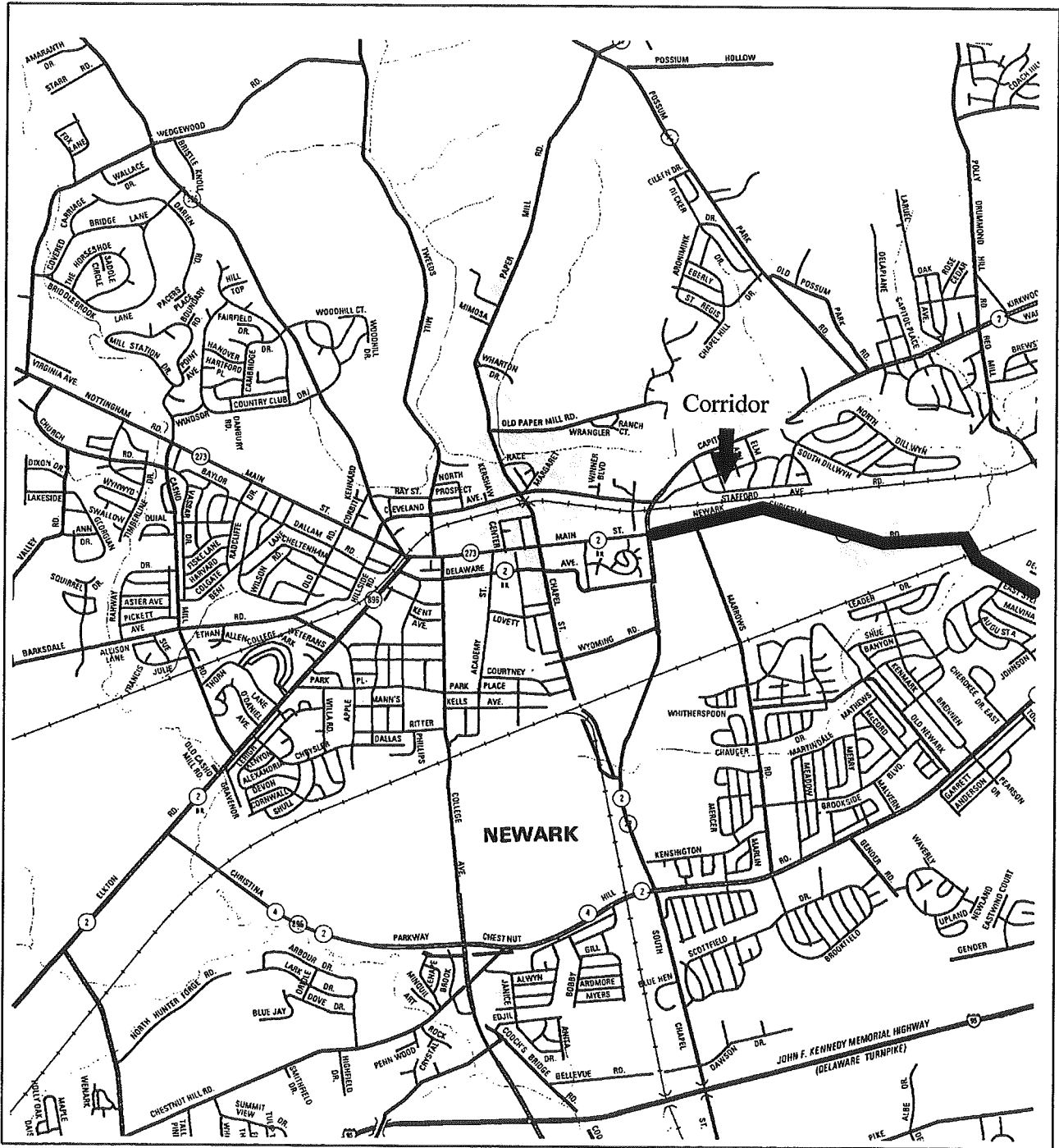


Capitol Trail looking northbound

Recommendations:

- install signage and pavement marking per MUTCD/AASHTO standards on existing paved shoulder for use as a bicycle lane (Harmony Road to Polly Drummond Road)
- provide better maintenance and sweeping program
- install bicycle-safe draingrates
- explore access management
- provide bicycle through movements to the left of vehicle right turn lanes
- develop and sign an alternative route for bicycles through Woodlawn Drive, crossing the creek with the Newark Spur linking to Red Mill Road
- intersection improvements should be considered such as bicycle loop detectors on side streets and additional signal cycle time and/or marked facilities to accommodate bicycle turning and through movements
- explore access management
- repave rough sections and install bicycle safe draingrates





Route 273/Ogletown Road

Limits: Library Avenue to Harmony Road

LOS Analysis: D

Existing Conditions:

- two-lane road with wide shoulders
- numerous access points
- shoulders are utilized for right turn lanes and encroach on path for bicycles
- shoulders are cluttered with debris
- no bicycle signs are present
- drain grates are not bicycle safe

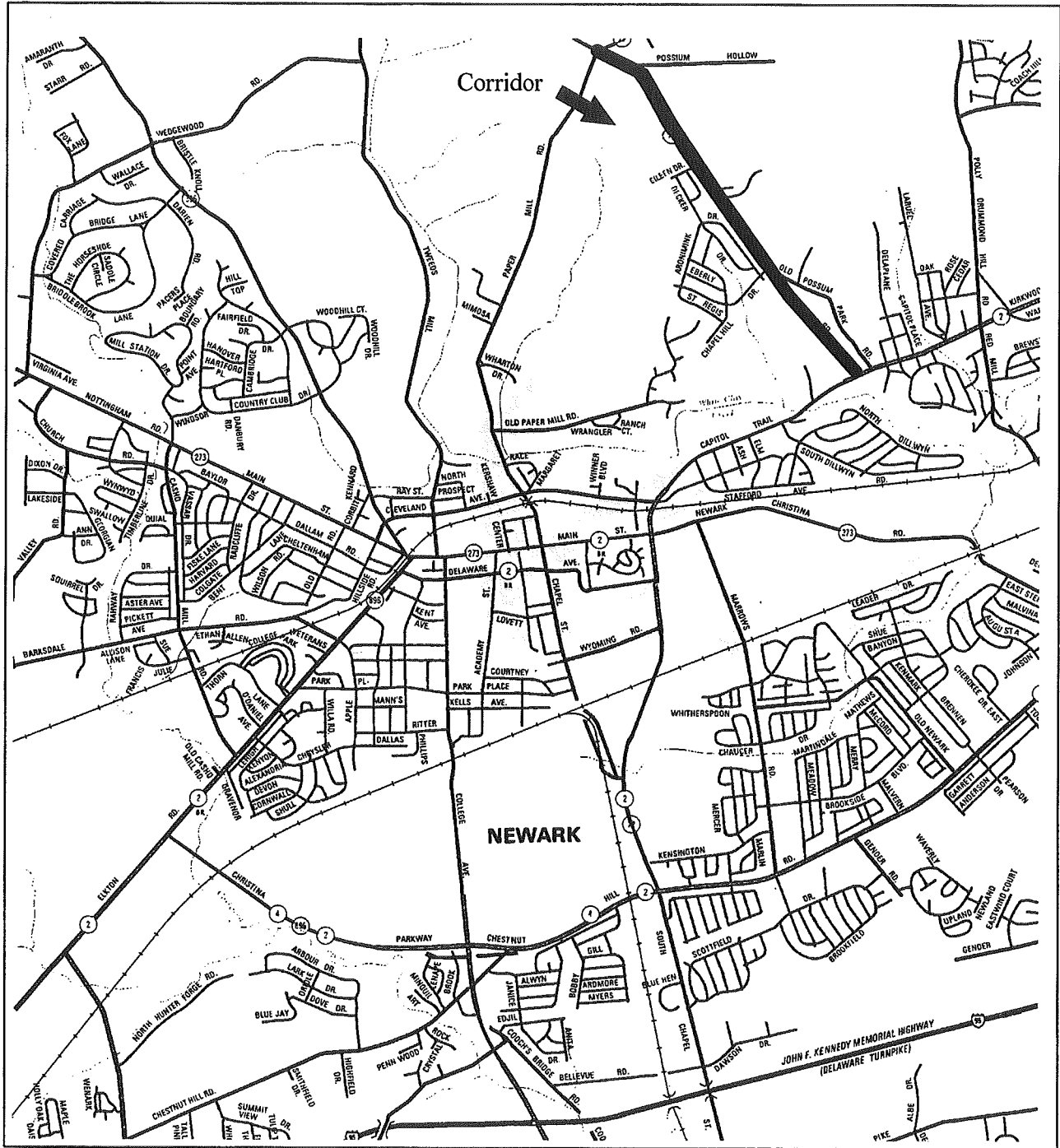


Ogletown Road looking westbound

Recommendations:

- install signage and pavement marking per MUTCD/AASHTO standards to accommodate bicycle lanes on existing paved shoulders (Route 4 to Library Avenue)
- provide better maintenance and sweeping program
- replace draingrates with bicycle safe ones
- provide for bicycle through movements at intersections where vehicle right turn lanes encroach into bicycle lanes
- explore access management





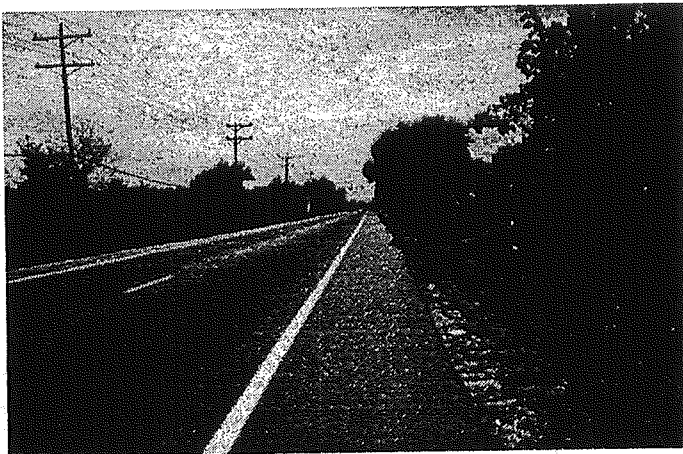
Route 72/Possum Park Road

Limits: Route 2 to Paper Mill Road

LOS Analysis: D

Existing Conditions:

- wide shoulders
- open drainage ditch along south-west side creates hazardous conditions
- shoulders serve as vehicle right turn lanes
- debris and overgrown vegetation on shoulders
- no bicycle signs exist

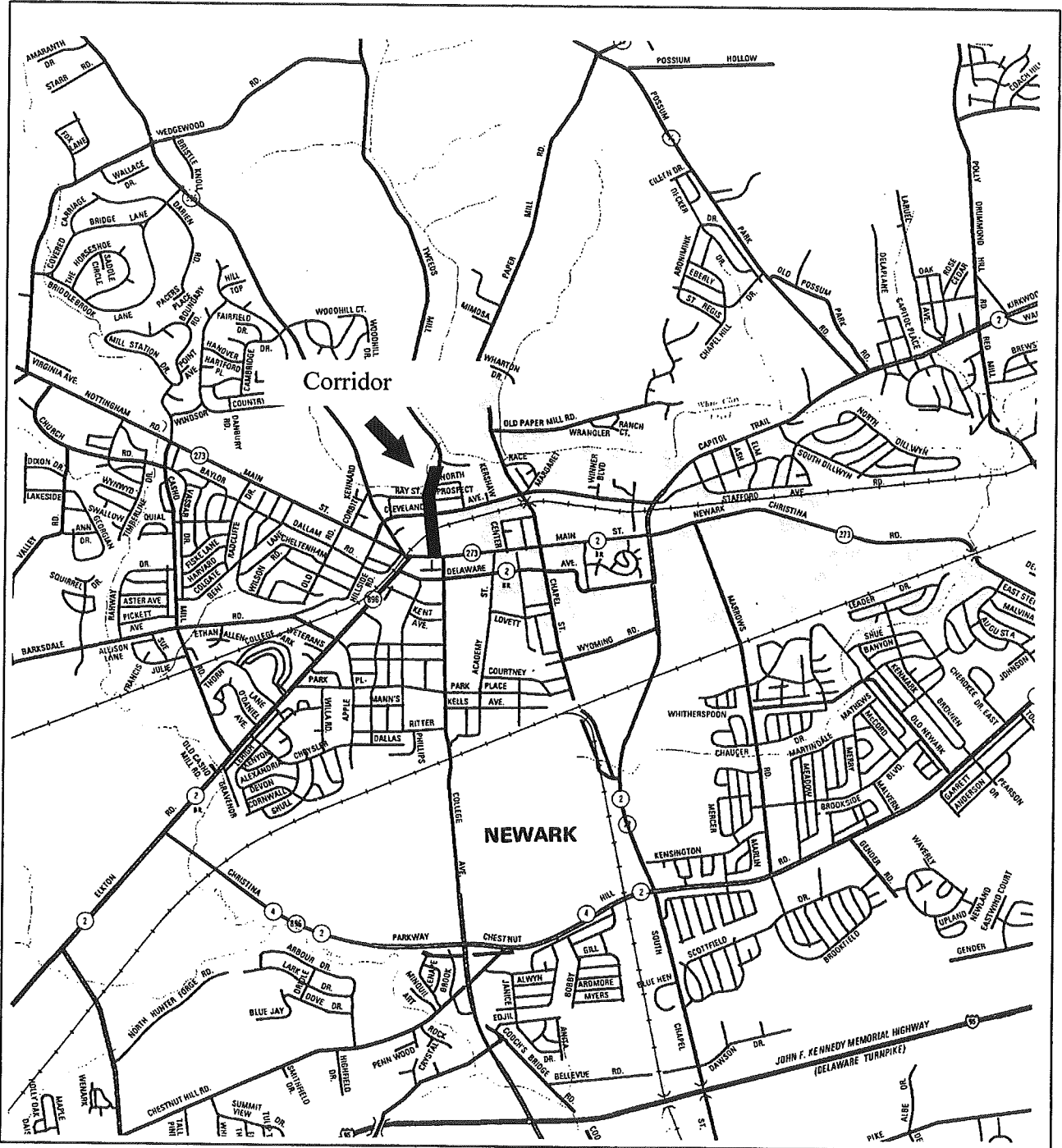


Possum Park Road looking northbound

Recommendations:

- install signage and pavement markings per MUTCD/AASHTO standards and resurface as needed to accommodate a bicycle lane on the existing paved shoulder
- provide better maintenance and sweeping programs
- provide closed drainage system
- provide for bicycle through movements to the left of vehicle right turn lanes





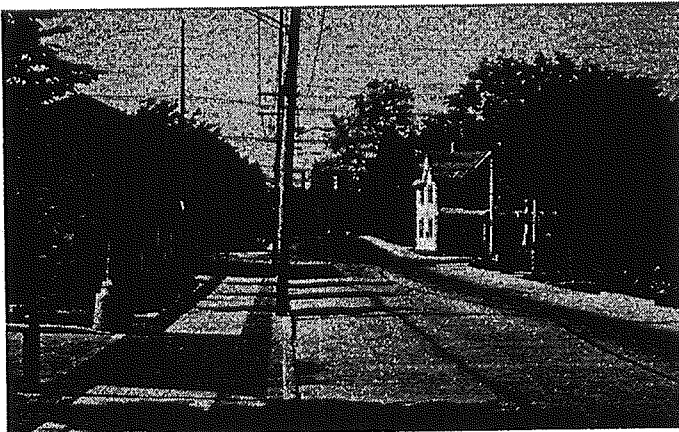
North College Avenue/North Campus Connector

Limits: Pomeroy Branch to Main Street

LOS Analysis: E

Existing Conditions

- links Laird Campus with Central Campus
- two-lane roadway
- parking by permit, approximately 7 spaces on west side between Prospect Avenue and Cleveland Avenue
- approximately 30 feet wide from Main Street to Prospect Avenue
- has no designated bicycle facility
- crosses active railroad line
- some debris on roadway/shoulder
- few entrances, fairly low speed
- draingrate at Main Street intersection is below grade

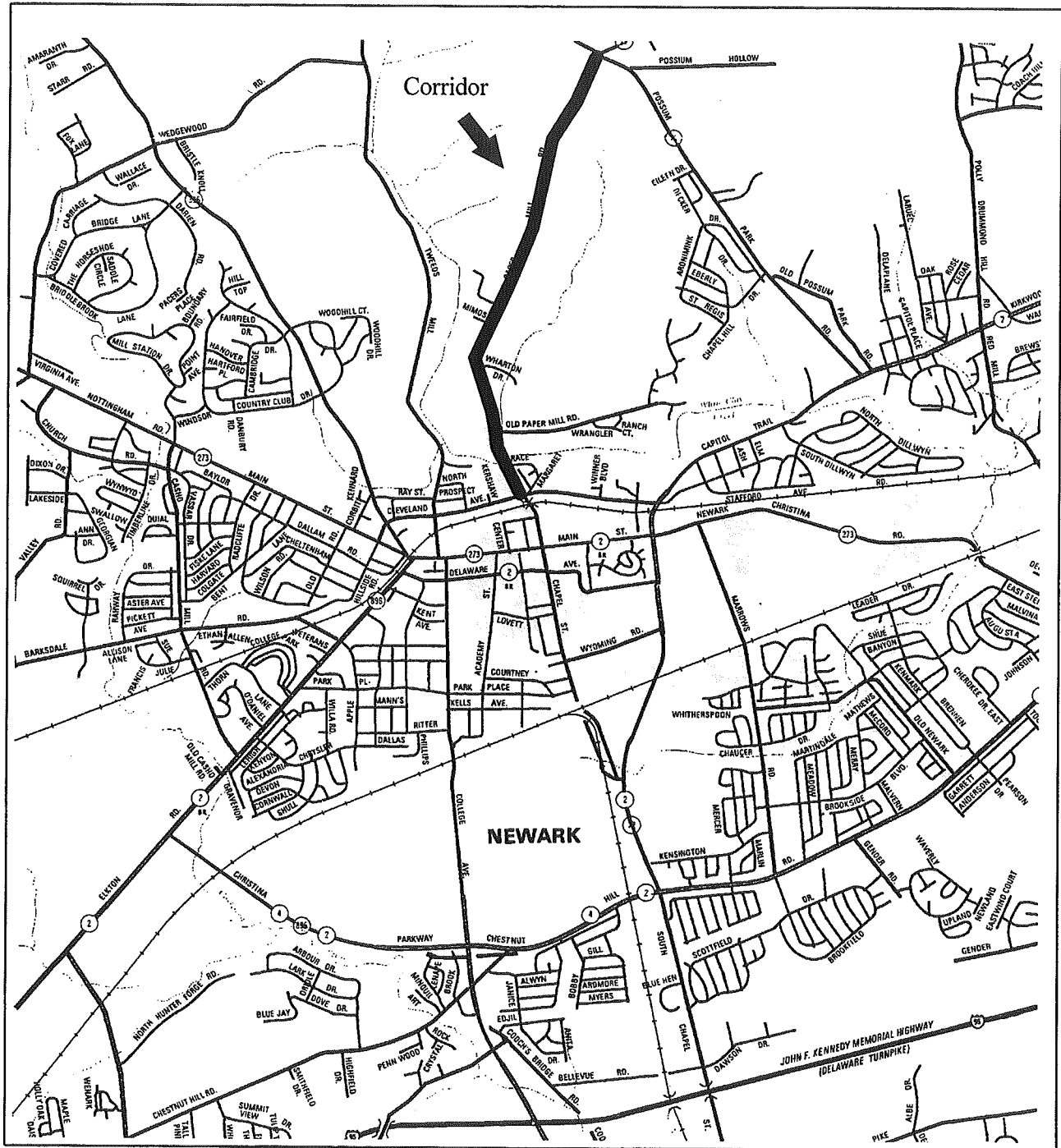


North College Avenue looking northbound

Recommendations:

- reduce travel lanes to 10.75 feet wide and install signs/pavement markings per MUTCD/AASHTO standards to accommodate a bicycle lanes from Main Street to Cleveland Avenue
- provide for improved through movement of bicycles at intersections with Cleveland Avenue and Main Street
- provide direct connections between Laird Campus (South College Avenue) and North Campus (North College Avenue) via Trabant Student Center grounds, bicycle facilities on Orchard Road and Amstel Avenue and/or additional campus property on South College Avenue for north/southbound cyclists.
- retain parking and existing wide curb lanes from Cleveland Avenue to Pomeroy Branch





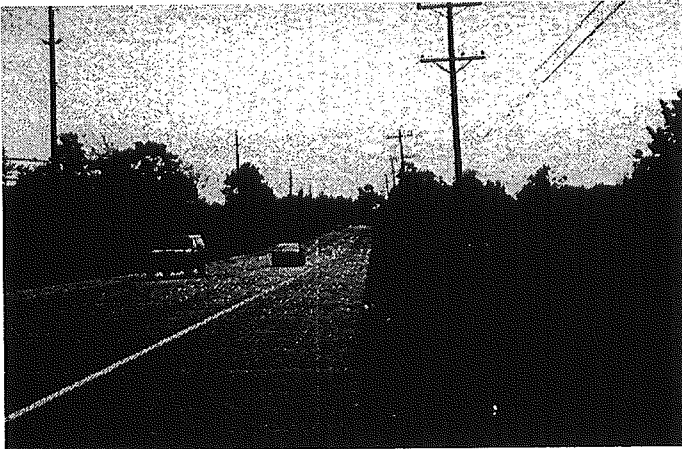
Paper Mill Road

Limits: Possum Park Road to Cleveland Avenue

LOS Analysis: D

Existing Conditions:

- wide shoulders along northern portions
- shoulder is narrow and includes a curb in southern section
- numerous access
- vehicle right turn lanes encroach into shoulder areas
- accumulated debris on shoulders; especially from Possum Park Road to City limits
- substandard bicycle lane signs and pavement markings
- non-safe draingrates

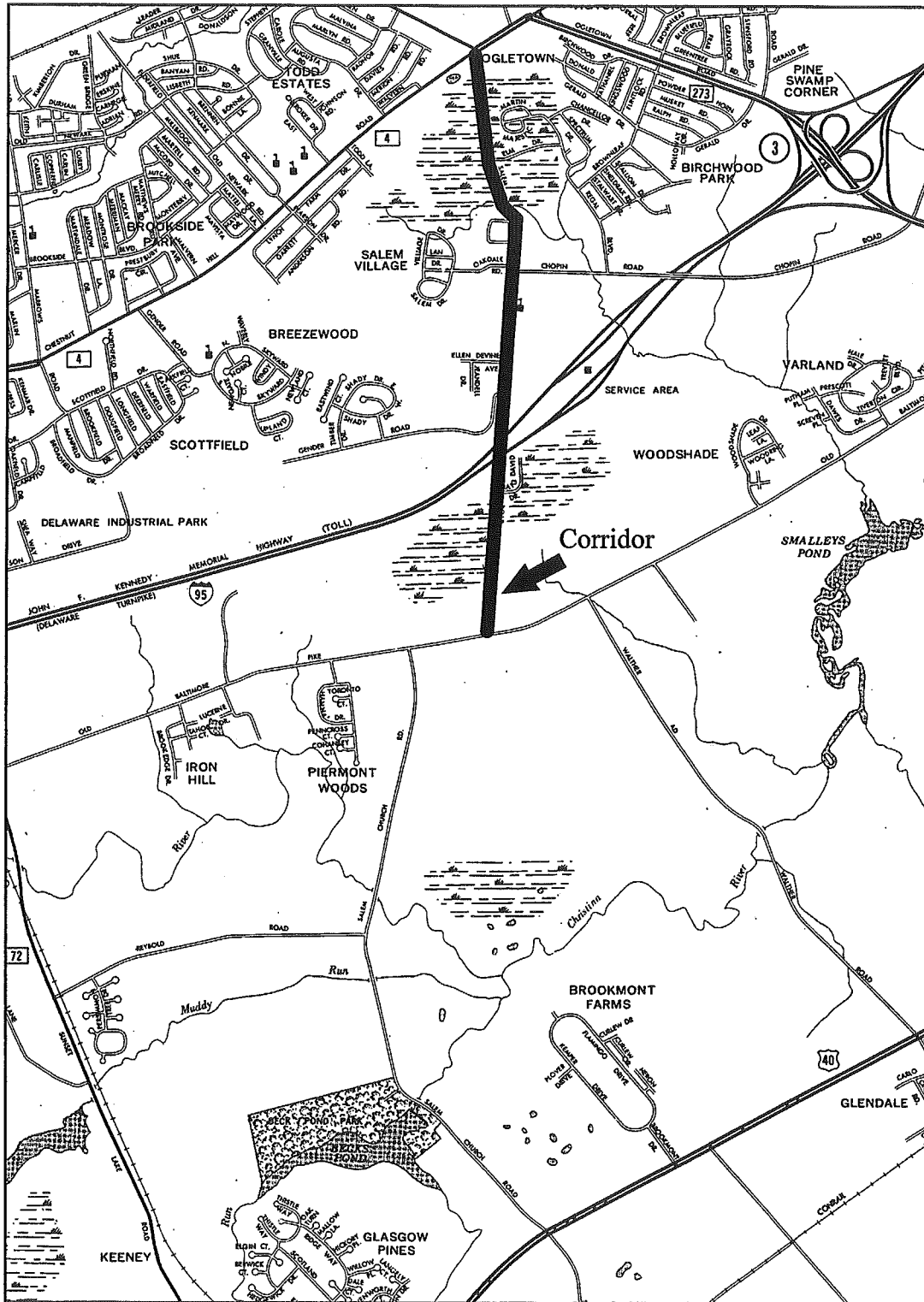


Paper Mill Road looking southbound

Recommendations:

- install signage and pavement markings per MUTCD/AASHTO standards on existing wide curb lanes to accommodate bicycle lanes (Cleveland Avenue to City Limit) - providing 14' travel lanes and 5' bicycle lanes
- install signage and pavement markings per MUTCD/AASHTO standards on existing bicycle lane (Possum Park Road to City Limit)
- provide better maintenance and sweeping programs
- provide for through movement of bicycles to the left of vehicle right turn lanes
- replace non-safe draingrates





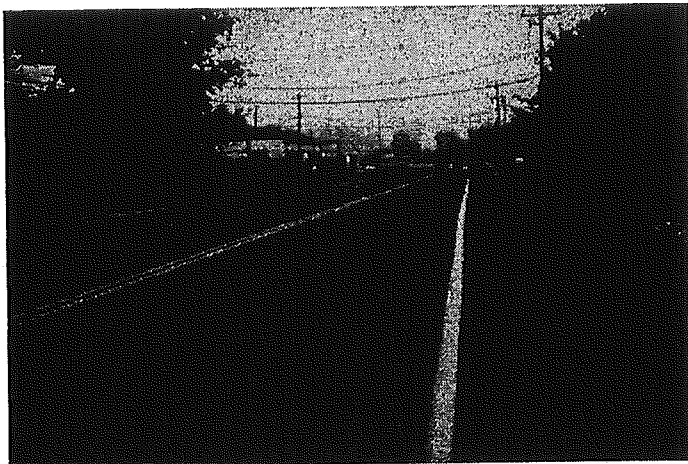
Salem Church Road

Limits: Route 4 to Old Baltimore Pike

LOS Analysis: D

Existing Conditions:

- two-lane road way
- has minimal shoulder areas
- debris on shoulders

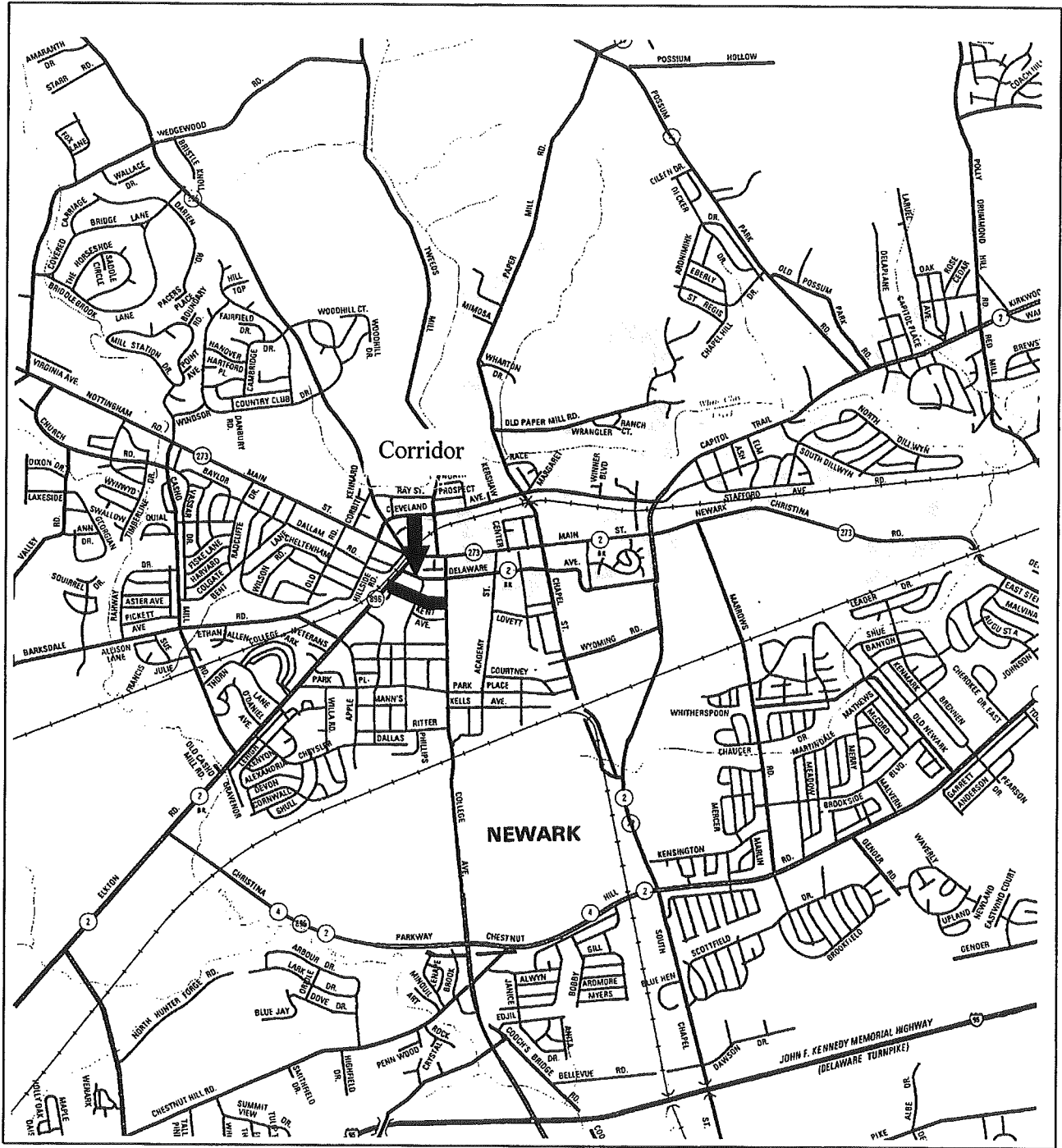


Salem Church Road looking northbound

Recommendations:

- install signage and pavement markings per MUTCD/AASHTO standards to accommodate bicycle lanes on existing paved shoulders (Chapman Road to I-95)
- provide better maintenance and sweeping programs
- provide for bicycle through movements to the left of vehicle right turn lanes
- explore access management; especially on sections from Route 4 to Chapman Road





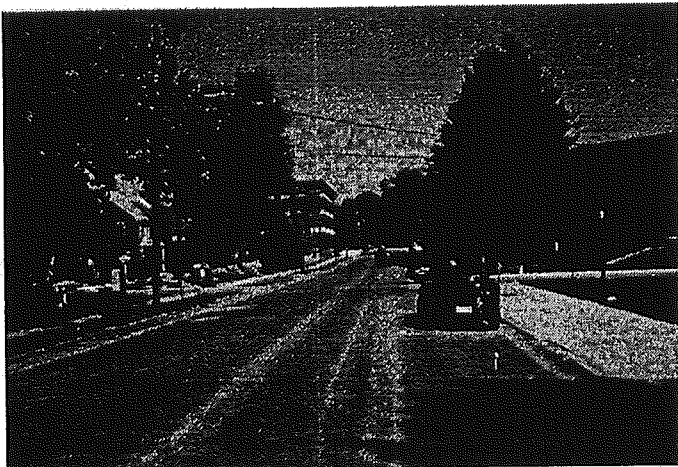
Amstel Avenue

Limits: Elkton Road to Route 896/South College Avenue

LOS Analysis: D

Existing Conditions:

- vehicular left turns prohibited from northbound South College Avenue onto Amstel Ave.
- parking on southside approximately 21 spaces from Elkton Road to Orchard, approximately 25 spaces north side from Orchard to South College
- links dorm housing on Hillside Road via the railroad underpass at Elkton Road
- existing bicycle lane on one side only opposite parking
- rough, broken and buckled pavement and debris especially near curb face
- non-safe grates

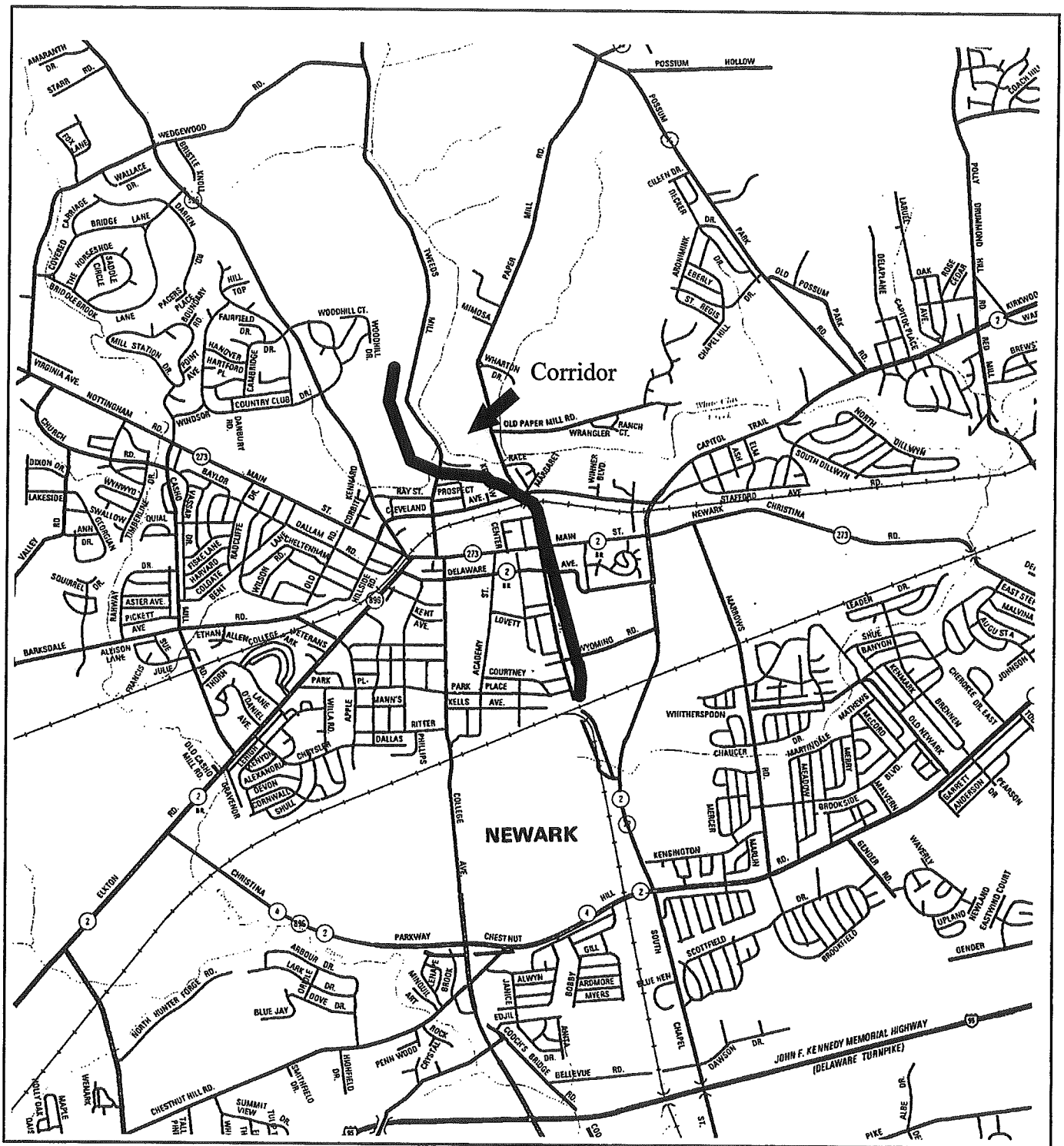


Amstel Avenue looking eastbound

Recommendations:

- remove on-street parking
- install signs and pavement markings per MUTCD/AASHTO standard to accommodate bicycle lanes
- install traffic calming devices such as roundabout, landscaping, bulb-outs, etc. at Orchard Road
- make connections into North College Avenue/North Campus Connector (possibly on Orchard Road and/or on campus property) and Central Campus connector





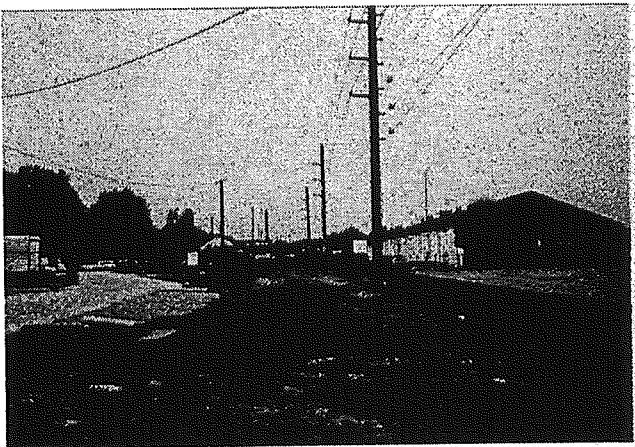
Pomeroy Branch

Limits: Coverdale Park to NE Corridor Tracks

LOS Analysis: Not Applicable

Existing Conditions:

- former railway corridor now abandoned
- corridor is largely undeveloped in the northern portions and is overgrown with vegetation
- development encroaches into the right-of-way in the southern portions
- ad-hoc trails can be found in the northern portions near the White Clay Creek area



Pomeroy Branch looking north

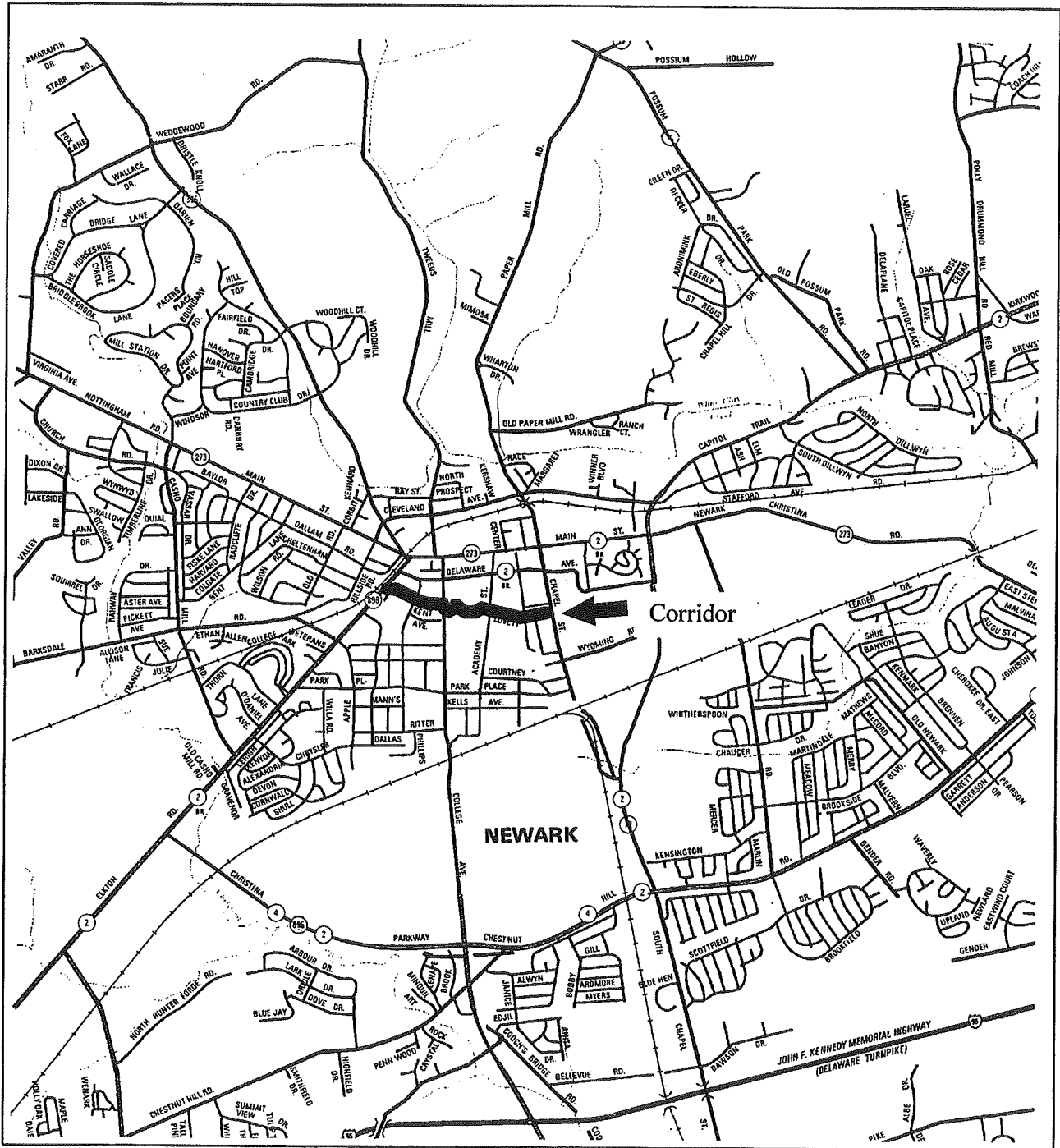
Recommendations:

- acquire right-of-way for entire corridor
- develop the entire corridor as a paved multi-use path
- sign and stripe as prescribed by MUTCD/AASHTO standards
- install additional signs for directions and wayfinding to local destinations such as downtown, the University, etc.
- determine the best designs for all major roadway crossings which may include loop detectors, signs, signals, crosswalks, bollards, and warning devices for both trail and roadway approaches with special attention given to the intersection at Chapel Street and Cleveland Avenue
- provide water fountains, restroom facilities, and bicycle parking areas as needed along the corridor, preferably within parkland and other public property adjacent to the trail



Central Campus Connector

Limits: West Campus to Pomeroy Branch



Note: Exact route TBD



Central Campus Connector

Limits: West Campus to Pomeroy Branch

LOS Analysis: Not Applicable

Existing Conditions:

- the area is in the central portion of the University of Delaware and extends to portions of central Newark
- the corridor has existing pedestrian paths, sidewalks, and fire lanes
- no specific route is currently identified



Central Campus looking east

Recommendations:

- establish corridor as bicycle/pedestrian path utilizing existing pathways, sidewalks, firelanes, etc.
- designate certain paths as “Bicycle Only” and “Pedestrian Only”
- install signage and pavement marking to MUTCD/AASHTO standards
- provide maintenance and sweeping programs
- install additional signs for directions and wayfinding to local destinations such as downtown, other University locations, etc., including North Campus Connector
- provide additional standardized bicycle parking facilities



DISCUSSION OF POTENTIAL USE OF CSX RIGHT-OF-WAY

Using abandoned and active railroad rights-of-way for bicycle or mixed-use trails has been successfully undertaken in many parts of the US. A recent study by the Rails-to-Trails Conservancy pointed out key characteristics of successful instances where trails exist within active railroad rights-of-way. Of the 37 trails studied, the following key characteristics were observed:

- Most (67% or 25) were 61 - 100 feet long, the average was 139 feet
- Most separations between center line of the railroad track and the trail itself (58.3% or 21) was 21 feet or greater, the average was 55 feet
- Most trails (62.1% or 23) had rail lines other than main lines running near them
- Most trails (62.2% or 27) had low frequencies of trains, between 9-16 trains per day and 1 - 2 trains per month.

From this analysis it is clear that most successful programs were short segments, not near main line railroads, had sufficient horizontal separation, and had low speeds and low frequencies of trains passing by. It is also interesting to note that most trails were obtained as abandoned rights-of-way, or were already owned by the state.

The workshops used to develop this report generated some discussion about the potential use of the active CSX line in Newark as a Rails-With-Trails corridor to satisfy the need for bicycle facilities that supply east-west access. However, the CSX line does not currently have these same characteristics as the successful programs noted by the study above. Because of this and more specific problems associated with acquisition, costs and liability, this report has not recommended that this particular corridor be utilized for an off-street facility for a number of reasons.

First, this facility was determined too be to far north and west to be of practical use for the majority of the users of the bicycle network. The CSX right-of-way does not connect the eastern portions of the City with the main University complex or downtown in the most direct fashion. Utilizing the CSX right-of-way puts commuters and recreational cyclists on a facility that strays from many destinations centered around the Main Street commercial corridor as well as the academic campus of the University.

Secondly, and probably the biggest deterrent to the utilization of this corridor, is the fact that this is an active freight/intermodal rail line. CSX currently uses this as its main connection from the Port of Philadelphia to the Port of Baltimore carrying portions of its eastcoast intermodal and freight operations. Field observations showed low-speed intermodal trains (flatcars carrying conventional truck trailers) and moderate-speed general freight trains stretching over the segment of the corridor in the downtown area. However, as this is the main-line, trains are permitted to travel up to 60 m.p.h. in some instances. Train volumes are significant at between 20 - 24 trains per day.

Given the operational characteristics of this line, considerable negotiations with CSX would be needed to persuade them to scale back their operations to such a degree to safely accommodate cyclists or other users within the right-of-way. The wide right-of-way profile near North College Avenue gives CSX increased operational flexibility to completely double-track the line or place pocket tracks/sidings at strategic locations throughout the corridor. Because the corridor profile is wide and has steep slopes holding ballast (especially near



central Newark), safe vertical or horizontal separation is prevented without extensive sitework. Perhaps the single biggest issue associated with the use of this corridor is the question of liability. Adequate safeguards and indemnities would have to be negotiated with CSX before they would allow a use such as a bicycles or a mixed-use facility near its operations.

Implementing this option would require negotiation with CSX for the use of the right-of-way. Purchasing right-of-way would be considerably costly even if CSX were a willing seller, given the degree of profitability of its intermodal and freight businesses and the expected growth of such operations in the future. This is especially true given new initiatives to accommodate double-stack containers recently completed in Pennsylvania and currently being studied in Maryland. Even if the right-of-way were commercially available, its cost would be significant when compared with a comparable amount of infrastructure or other treatments that price would buy for other local facilities. If in the future conditions change to warrant more desirable acquisition and operating conditions, this alternative should be reconsidered.

BICYCLE ON TRANSIT FEASIBILITY

Communities across the country seeking to reduce reliance on single occupant vehicle (SOV) travel are looking for ways to realize the full potential of integrating bicycle and transit modes of travel. The benefits of bicycle-transit travel in comparison with automobile travel are readily recognized such as: lower air pollutant emissions, reduced highway congestion, lower capital costs for park-and-ride facilities, improved neighborhood environments, and health benefits.

There are additional benefits gained from merging bicycles with transit that each mode cannot provide alone:

- transit enables the cyclist to take extended trips
- bicycle access enlarges the transit system's catchment area
- transit enables cyclists to traverse topological barriers or hazards
- cyclists can increase transit ridership during surplus capacity periods such as weekends, midday, and off-peak times.

Many transit agencies have recognized the potential of integrating their services and bicycles and are promoting and offering a variety of services and facilities supporting this integration. Typically, these agencies have adopted bicycle promotion campaigns as part of their overall marketing strategy. The primary techniques include brochures, ads and flyers describing the agency's bicycle programs with text, diagrams, costs and actual photographs. Several display step-by-step directions, regulations, rules and availability of services. Some require registration of bicycles and mandatory training classes for cyclists covering safety and maneuvering around buses. Some agencies charge nominal fees for registering bicycles or rental of secured storage facilities. Many agencies have developed pilot programs to test the feasibility of incorporating bicycles on board transit vehicles, retaining those projects that proved to be successful as part of an integrated public transit system. Phoenix, Arizona was the first major city to fully integrate bicycles and transit. Now the system has an estimated 13,000 bicyclists boardings per month. In the first three months of Portland Oregon's Tri-Met bicycle-on-bus program, more than 700 bicyclists purchased permits to allow their bicycles on the system's buses and light rail vehicles.



A pilot project is now underway by the Dart First State system testing the viability of bicycles on buses at the beaches/resort area for the Summer of 1996. This program should provide valuable feedback and "lessons learned", and should be used as a model in determining operating procedures and techniques for use in a similar project for the Newark Area.

A Newark area program would be a similar program to that at the beaches, and would further test the feasibility of integrating bicycles and transit. The Newark bicycles on bus pilot program would enable bicyclists to temporarily store their bicycle on the outside front of the vehicle via a collapsible rack. Experience has proven that this method of utilizing forward mounting racks is the best approach, meeting the needs of both the transit operator and the cyclist. Front racks support safety and security concerns of both the cyclist and the bus operator, while providing easier maintenance procedures for garage and shop personnel who maintain and service the vehicles.

In the Newark area, transit services are provided primarily by the DART First State system. DART First State provides local and regional transit services in the greater Newark area helping to link Newark and its surrounding communities with the City of Wilmington and the rest of the state. Additional opportunities to take advantage of transit are available at existing and planned local park and ride lots.

The feasibility of bicycles on transit has been proven by numerous programs of transit operators nationwide. In fact, Seattle's Metro has outfitted over 1,000 of its vehicles with front-mounted racks. Capital investment in racks and the necessary mounting hardware is typically about \$365 - \$535 for each two-bicycle rack. These racks are commercially available and fit a wide variety of vehicle types.

Vehicle-mounted bicycle racks should be utilized in conjunction with secure bicycle parking at the park-and-ride lots and transit centers those vehicles serve. Bicycle lockers, offering greater security for longer-term bicycle storage are about \$1,000 for a four-bicycle unit. Racks on buses and lockers offer an attractive combination of storage and transportability, expanding the options for the bicycle/transit user. Less expensive, though somewhat less secure, free-standing bicycle racks can be installed for about \$100 per 2 bicycle spaces.

Most transit systems restrict the transport of bicycles in one form or another. Some have restrictions on the size and shape of the bicycle, not allowing oversized bicycles on the racks. Other systems restrict usage of the bicycles-on-transit option to off-peak services or certain routes and vehicles. As mentioned before, others charge a nominal fee to register the bicycle and/or for a bicycle on transit permit. Still others require a training seminar on bicycle safety procedures around the bus, complete with a test and a demonstration that the rider is capable of lifting the bicycle over a barrier simulating the effort required to affix and detach the bicycle from the rack. Currently, DART First State prohibits the transport of bicycles inside all of its vehicles.

Bicycles on transit and specifically a bicycle on bus program in the Newark area would be very beneficial. First, the combination of bicycles and transit would promote both modes of transportation. This would have positive benefits for air quality, relief congestion and generally improve travel conditions on the transportation network, especially if cyclists abandoned their single occupant vehicles (SOVs) for the bicycles on bus option of commuting. The bicycle on buses program also provides an alternative access mode through a route that is hazardous or impedes cycling. Such a route would contain pinch points, such as crossing a bridge, interstate, etc., or have high traffic volumes or other characteristics that effectively discourage cycling. Another instance where bikes on transit



can be successful is in the case where transit provides primary access to a destination where bicycles can then be used as a circulation mode (i.e. on campus).

A more specific and detailed example of a pilot project to integrate bicycles on transit is on the UNICITY Route N1, originating at the proposed park-and-ride lot at the Suburban Plaza Shopping Center along Elkton Road and terminating at White Chapel Drive. Intermediate points include downtown Newark and the Danemanns Park and Ride Lot. The N1 could serve the proposed park-and-ride lot at the Suburban Plaza Shopping Center, connecting the southwest and southeast portions of the area with destinations in the downtown area, the Suburban Plaza Shopping Center, and the rest of central Newark. This would aid bicyclists by providing a safer connection along Elkton Road especially along the portions near the downtown area which are congested with numerous curb-cuts and access points.

Another potential route would be DART's Route 5 that runs along DE Route 4 and on DE Route 896 (South College Avenue). This route connects to the existing Route DE 4/896 park-and-ride lot and provides another alternative for bicyclists over the northeast corridor railroad tracks. The location of a bicycle-to-transit connection in this area would also encourage increased patronage of university parking facilities in the south campus area.

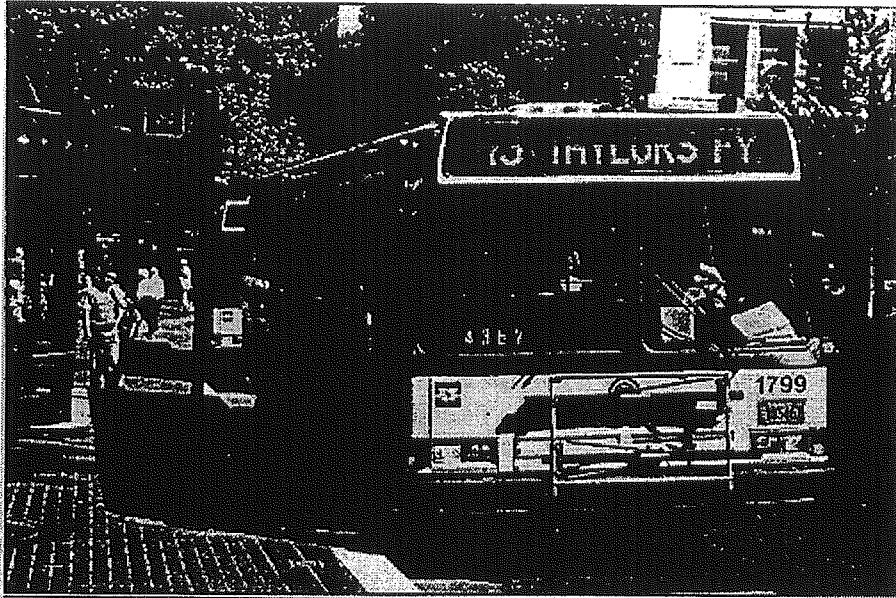
Both these routes would interface with park-and-ride facilities and afford transit patrons an opportunity to continue their journey into the City without having to traverse routes where constraints or pinch points inhibit safe bicycle movement. Both example routes offer greater connective opportunities between bicycle facilities, transit, and destinations in the city. These recommendations would require no significant rerouting of routes and would have only minor affects on running times due to increased vehicle wait times for the placement of bicycles in/on the storage racks. Capital and minor operating costs could be offset by increases in ridership from bicycle-to-bus patrons, making the pilot project potentially self-sustainable.

Successful initiation of a pilot program in Newark would require the cooperation of DART First State, the City of Newark, the University of Delaware, the transit riding public and local cyclists. Cooperation would be needed to design, test and evaluate the program fairly to access the usefulness of integrating the two modes to meet the commuting needs of the community. If the Newark pilot program is deemed successful, the bicycle on bus program can be implemented in other parts of the Newark area. Candidate routes for more widespread integration of the program include:

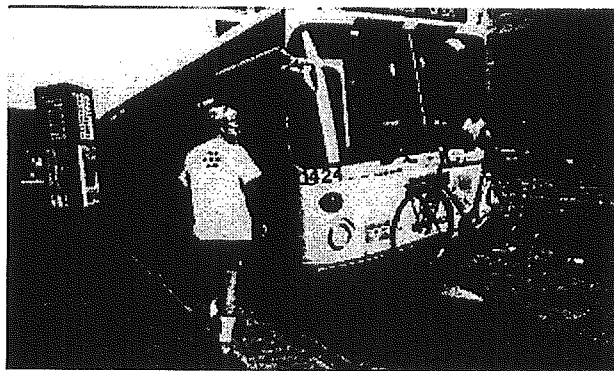
- UBUS routes for campus and city circulation
- Route 6 for access north of downtown and east of campus; and
- Routes serving the Glasgow area and routes south of I-95.



TYPICAL BICYCLE ON BUS FRONT-MOUNTED RACKS



Front-mounted rack on Portland Tri-Met Bus
(Transit Connections December, 1994)



Front-Mounted Bicycle Rack on Seattle Metro Bus
(Transit Connections, December 1994)



NON-INFRASTRUCTURE RECOMMENDATIONS

- ENGINEERING
- EDUCATION
- ENFORCEMENT
- ENCOURAGEMENT

Engineering

Engineering recommendations are aligned with the provision of bicycle infrastructure in transportation projects and programs. Recommendations seek to support bicycle usage through activities like pavement marking of existing roadways, provision of wide bicycle lanes through resurfacing and the inclusion of bicycle lanes or wide curb lanes on all new public and private roadway construction and reconstruction projects. Additionally, help in encouraging the use of bicycle facilities is needed through maintenance activities like sweeping programs and maintenance of signage.

These and other issues mentioned can be incorporated as part of the regular maintenance activities of the City and/or DeIDOT. Adoption of nationally accepted design, maintenance and signage standards, such as those published by the American Association of State Highway and Transportation Officials (AASHTO), or in the Manual on Uniform Traffic Control Devices (MUTCD), published by the Federal Highway Administration (FHWA), by the city, county and state agencies will ensure the provision of safe and effective bicycle facilities.

Engineering recommendations also encourage each jurisdiction to adopt standard street cross sections which include bicycle lanes. Other approaches seek to remove or mitigate conventional drainage gates with bicycle-safe grates, provide bicycle-safe railroad crossings, maintain and improve roadway edges and shoulders, and correct bottleneck or tapering-lane areas, signal timing and insure adequate clearance time for bicycles through intersections.

Specific engineering recommendations for the City of Newark are found in the Recommendations Section preceding this discussion.

Education

Bicycle education programs need to be implemented to educate all cyclists on traffic regulations, and on the benefits of cycling from a health and environmental standpoint. These programs should be developed for riders of all skill levels and ages and could become part of educational curriculums at the local elementary, middle, and high school levels. Additionally, programs that seek to address effective/safe riding of adult bicyclists are also needed. Specific programs could focus on specific sub-groups or populations at the University, or major employers, etc.

Programs focused exclusively towards university students should be developed and held annually as the student population turns over on a regular basis. It has been demonstrated that university students are the majority of riders in the Newark area. Programs that could



be developed for implementation during freshman/new-student orientation, in the early fall when crashes are most prevalent, would be most effective. New and returning students could be targeted through orientation materials and in mailings detailing schedules, bills, etc., before they return to campus. This material could include safety tips, regulations, etc., and emphasize high crash locations and crash avoidance techniques. Care must be taken to insure that bicycle safety materials designed for widespread use in early September actually reaches students and is not simply discarded or lost among the deluge of information new/transferring students typically receive.

Other campaigns can focus on drivers. More attention needs to be paid to educating drivers about cyclists and vice-versa. This can be done through driver's education programs and in the state driver's manual and licensing procedures. In addition, programs can be launched to educate motorists to always expect a cyclists. These programs can be modeled after national programs in place for railroad crossing safety. Instead of the slogan "Always expect a train", "Always expect a cyclist" could be adopted as the campaign slogan. Prepackaged programs are available for grade K - 6 and include on-bicycle skills development, safety workshops and in classroom training sessions. Classes focusing on bicycle safety, choosing safe routes and the use of helmets are presented with companion videos, workbooks, activity books, etc., and are very successful. Other campaigns aimed at safety can be developed and presented as public service announcements (PSAs), or developed through the Ad Council as print, radio or television commercials promoting bicycle safety and helmet use for all ages. Other programs specifically targeted to more specific audiences can be developed through a joint effort between DeIDOT, WILMAPCO, the City of Newark, The University of Delaware, local school districts (public and private) and the local communities. Each group is responsible for the safe and efficient operation of the bicycle system in their community and must be an active participant in education programs.

Prepackaged curriculums, information and brochures targeted for all age/skill levels are available from various sources including: the American Automobile Association (AAA), Bicycle Federation of America (BFA) and the National Highway Traffic Safety Administration (NHSTA), State Highway Safety Officers. An excellent source of bicycle safety information is available in Street Smarts Bicycling's Traffic Survival Guide, written by John S. Allen and published by Rodale Press. States that implemented model programs at the elementary school level include Florida, Montana, North Carolina and Texas. An additional listing of resources appears at the end of Appendix B.

Bicycle education programs operate in schools and are in the form of class room instruction and often include on-bike instruction in physical education classes. Presentations by local community relations police officer, assemblies, films, video tapes and classroom activities can all be part of the bicycle safety program. Some communities have elaborate programs, encompassing 10 hours of instruction and on-bicycle training stretched over a period of time. Other alternatives to the 10 hour program include: extended day or after school programs, inter-session programs throughout the school year (two or three weeks blocks throughout the term) or cooperative programs with a local YMCA, recreation department or other agency. Programs which offer repeated exposure to safety education and actual skills practice are more effective than one-time assemblies, films, or videos.

Successful programs utilize teacher training, equipment (bicycles, helmets, cones, etc.), facilities (grassy or paved areas for riding, storage space), and curriculum materials. Many states grant Highway Traffic Safety funds (402) for these activities. The resource agencies shown at the end of in Appendix B should be contacted for more information.



Education should also promote the awareness of the benefits of bicycle transportation to engineers and planning professionals engaged in the development of transportation projects. The local jurisdictions should be encouraged to hire, designate and support a bicycle coordinator position. This individual could work on a part-time or joint basis for the City and County and should work closely with their counterpart at the State level, the State Bicycle and Pedestrian Coordinator. In addition to project development and tracking, site plan review and other technical assistance, the local coordinators would encourage support for and increased availability of child and adult bicycle education and safety classes to improve operator proficiency, knowledge of traffic laws, and awareness of bicyclists' rights and responsibilities.

The following are specific education recommendations:

- develop a comprehensive bicycle education and safety program throughout the City aimed at all skill levels and age groups
- develop and implement cyclist and motorist improvement courses
- utilize PSAs and other media such as newspapers, community bulletins and/or a "bicycle fair" or other event to distribute education and safety information
- incorporate bicycle safety programs and information as part of new/transfer student orientation each fall at the University of Delaware
- develop and distribute updated bicycle maps, designating specific routes for different types of users; including commuter routes, recreational routes, school routes, etc.

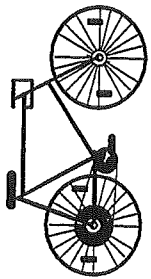
Enforcement

Enforcement recommendations seek to support the enforcement of traffic laws applicable to both motorists and bicyclists, improving traffic safety and enhancing courtesy among all roadway users. Stricter prosecution of traffic infractions to increase respect for riding privileges can increase awareness and safer behavior. Enforcement comes from increased citations for traffic infractions for all users of the transportation network: motorists, cyclists and pedestrians. One group should not be singled out or targeted over another.

The focus should be on high accident rate intersections/corridors, all violations; like wrong-way riding, running stop signs and signals, riding at night without proper lighting, enforcing no parking in bicycle lanes, etc. Compliance with mandatory or aggressively marketed voluntary bicycle registration requirements, when and where applicable should be enforced. Registration programs have been successful in other areas and can act as a device to educate cyclists through a test or other mechanism, insuring a minimum level of competence. Such a program can also aid in returning stolen bicycles to owners if the program includes recordation/ cataloging of serial numbers from bicycle frames and other components.

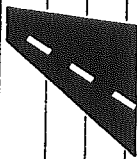

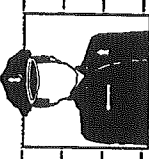

Enforcement and proper examples of how to follow rules and regulations with regard to cycling could come from a unit of city bicycle police officers. The University already utilizes a bicycle police unit. The city's unit, working together with its counterpart on campus, could enforce bicyclist and motorist compliance with traffic laws as well as perform normal duties, while having a high profile presence throughout the entire community. Many bicycle





Bicycle Planning Tool Box

“4-Es” Context

Existing		Proposed
	Inventory/description of facilities	Policy Project
Engineering		Actuated signals New facilities New signs/stripes Maintenance Programs Intersection improvements Bike safe grates
		
Education	Driver training School programs University extension	School education programs Bike orientation programs Design Training
		
Enforcement	Motorvehicle laws Helmet laws Bike Laws	Bike police (City & Univ.) Helmet programs Bike Registration Training/Safety Seminars
		
Encouragement	Incentives Disincentives Employer Programs Access	Employer mileage subsidies Employer provided facilities Bike fairs Bike to work days
		



CHAPTER 5

PROJECT DEVELOPMENT & IMPLEMENTATION PROCESSES

Implementation Issues and Legacy of this Report

This Newark Area Bicycle Interim Report and its resulting Bicycle Facility Needs Plan will be consistent with the Metropolitan Transportation Plan (MTP) and will be incorporated with the Transportation Improvement Plan (TIP). This report was developed as a companion part of the Newark-Elkton Intermodal Transportation Plan. The recommendations contained in this report will compliment the Intermodal Plan's intent to increase the efficiency and mobility of the region's transportation system. This interim report stands as an inventory of existing conditions and guidelines for future decision-making. It also raises several outstanding issues that must be resolved in order to clarify and advance these recommendations:

- parking on city streets
- local commitment, coordination and resource availability
- need for input from the general public and business community (specifically the Newark Business Association and downtown merchants) in further project development and prioritization.

Parking On City Streets

Parking is perhaps the singularly most controversial issue that this report raises. In order to be fully successful, this plan recommends courses of action that may result in parking reductions and/or restrictions. Time of day restrictions may need to be changed along certain corridors to provide cyclists with a clear lane for safer and more direct through movements during peak commuting hours. Other recommendations call for reductions in parking to eliminate site-specific hazards and abrupt ends to facilities that cause unsafe discontinuities.

It is important to realize that parking is an issue that is controversial by its very nature. Regardless of what is proposed by this or other plans, parking is likely to remain a sensitive local issue. Merchants see convenient, accessible vehicle parking as key to the success and profitability of their businesses, while often overlooking the benefits of bicycle access and parking. Homeowners with limited driveway or garage space, rely on the convenience of parking on the street in front of their house. However, location of this type of parking is often in direct conflict with the provision of safe, accessible bicycle facilities. In many instances, parking provision disregards the availability of on-site parking.

The WILMAPCO committees must realize this and must examine the net overall parking affects and outcomes of the recommendations. The results of this and other plans must be weighed against the overall costs and benefits the associated recommendations are likely to generate. A comprehensive parking analysis could guide decisions about the overall availability of parking in critical areas in relation to the safety needs of bicyclists. All those



involved in providing or using parking, including the business community, homeowners and the general public must be engaged in these debates.

Local Commitment, Coordination and Resources Available

This report recommends a series of responses to identified problems and includes projects that are not exclusively DeIDOT work program tasks. As such, the coordination between the various levels of government, public and non-profit agencies, and the public business sector must be sought to implement these recommendations. Ultimately, the recommendations of this report will benefit all users of the facilities who live, work, play or shop in Newark.

There are many programs and funding sources available not only for the provision of facilities or infrastructure, but also for education, enforcement and encouragement programs as well. Many of the recommendations of this report can be accomplished through partnering and joint-venture efforts, involving both private and public funds. WILMAPCO, the City of Newark, the University, DeIDOT, school districts, the businesses community, civic groups, etc., should all become allies/partners to work to solve funding issues. Different methods and procedures are available to fund capital and operating expenses alike.

General obligation bonds, special improvement districts, merchant groups or other sources of revenue can be used to provide infrastructure. General maintenance funds or community groups, in a program similar to adopt-a-highway can be utilized to maintain a corridor or group of facilities. Joint-use agreements can coordinate funding and provide for public use of facilities on public or semi-public property owned by other agencies. This plan points out many potential public and private sources of bicycle funds. Strong support and maximization of user benefits is a key ingredient in securing full and successful project funding.

Business Community and General Public Input

The business community and the general public in the City can become strong allies in realizing the benefits of this plan. The recommendations proposed are likely to make downtown more accessible and shopping experiences more enjoyable and convenient.

Involvement and subsequent support from the business community and public should be pro-active and should cover all issues: parking, accessibility and funding. The business community and public can be valuable resources in mobilizing civic support, generating sponsorship/endorsement of recommendations, developing project proposals and even a source of funding for corridor projects, select infrastructure elements, or other special bicycle events.

Businesses and merchants can enhance the overall city cycling experience by the provision of parking facilities for their customers in front of/beside their businesses and by providing lockers and shower facilities for their employees. Businesses can be utilized for sponsorship of bicycle fairs, Bicycle To Work Week or other events to promote safety/education and encouragement goals and objectives. Businesses and private industry can take advantage of Delaware's Public-Private Partnership Initiative Program, collectively joining forces with DeIDOT to deliver a unique transportation investment that can help the State achieve



multiple goals. Private investment in public infrastructure can more efficiently allocate scarce resources across a broad portfolio of public facilities, including those for bicycles. More specifically, private investments, in the case of bicycle transportation, can leverage an often limited pool of public funds, maximize benefits for more users.

It is important to see the business community's and general public's involvement as an additional opportunity to gain input and possible support, both politically and monetarily. This support is critical to the success of the recommendations of this community-based plan. Full plan implementation likely cannot be realized without their participation and endorsement.

As the recommendations of this report are advanced and outstanding issues are resolved, the public and business community will have opportunities for offering comments and negotiating partnerships. DeIDOT has a formalized process for public involvement through the development of MPO Transportation Improvement Program (TIP) and the DeIDOT Capital Improvement Program (CIP). Numerous opportunities for public involvement exist in the development phases of these documents and the development of the projects that result from them.

As outlined below, it is envisioned that this report will serve to stimulate subsequent discussion on the recommendations contained in Chapter 4 and the issues raised above. Once these issues have been resolved, and closure on project prioritization has been reached, WILMAPCO and DeIDOT can carry prioritized and approved projects forward so that they may be implemented and completed. A follow-up summary document will be created from the legacy of this report. Such a document will serve as a Facility Needs Plan and will embody the agreed to recommendations that will be taken forward in the following manner.

Implementation Process: What happens next?

WILMAPCO

Responsibilities and Mechanism for Accomplishing Work

The Wilmington Area Planning Council (WILMAPCO), is the metropolitan planning organization (MPO) for New Castle County, Delaware and Cecil County, Maryland. It is responsible for producing transportation plans, programs and projects that involve federal funding. WILMAPCO's Transportation Improvement Program (TIP), contains individual transportation projects, is reviewed annually and has a three-year scope. The plan is revised every three years due to air quality regulations and the region's status as a non-attainment area. All TIP projects must be consistent with the plan adopted by the WILMAPCO council. Of critical importance to WILMAPCO is: improving air quality and energy conservation; promoting regional economic development; improving mobility for people and goods; promoting land use and transportation goals; preserving and enhancing the transportation system; improving safety and user security; promoting multi-modalism and enhancing and preserving the region's quality of life.



Next Steps

WILMAPCO's next steps are to review and comment on this report, thus initiating a 30-day public review and comment period. Once public comments are received, WILMAPCO and DeIDOT will verify that all comments have been adequately addressed in a revised report. The final report will be adopted as a policy guide and a Facility Needs Plan will be created from review comments on the report. WILMAPCO will then incorporate these facility needs into their TIP by combining bicycle projects with larger highway and transit projects or adding the prioritized recommendations as independent projects. For example: It may be appropriate to add drainage grates (if inlets are being adjusted as part of the project) and pavement marking modifications to an existing resurfacing project; Or, to add drainage grates, pavement markings, signing, lighting and addition of cross walks to a rehabilitation or reconstruction project. Once added to the TIP, bicycle projects must then be prioritized with other projects in the region. The list of bicycle projects and existing highway or other projects is then adopted in the form of the TIP. The TIP then becomes part of the Capital Improvement Program (CIP) that is adopted by Delaware's Council on Transportation (COT). The COT is a council of citizens appointed by the governor representing a wide spectrum of Delawareans, who are responsible for advising on statewide transportation issues and approving the CIP. After CIP approval, DeIDOT will then be responsible for designing, constructing, and maintaining the facility. Another way of accomplishing the bicycle project(s) may be to recommend that the City of Newark, New Castle County Parks and Recreation or the University of Delaware participate in the design, construction, and maintenance of the new facility as appropriate. WILMAPCO may forward the report to these various agencies for their consideration.

Delaware Department of Transportation (DeIDOT)

Responsibilities and Mechanism for Accomplishing Work

DeIDOT is responsible for planning, designing, building and maintaining the State's transportation facilities and services. The Operating Budget and Capital Improvement Program are the two sources of funds that DeIDOT uses to accomplish its work.

Operating Budget: Operating and maintaining the State's existing transportation facilities and services requires annual, recurring short-term expenditures. DeIDOT must operate and maintain the state's existing transportation facilities and services. Operating expenses include snow plowing, pot-hole patching and maintaining traffic signals and signs, street sweeping, etc. Operating budgets remain approximately the same from year to year, making it difficult to "do everything". Priorities must be set on maintenance tasks. Operating activities are completed as soon as existing staff and equipment become available to work on such tasks. For bicycle projects, operating expenses may include: street sweeping, bicycle parking (racks), signal retiming or repair, etc.

Capital Budget: Preserving, managing and expanding the State's transportation facilities and services requires capital expenditures that support activities with a long useful life like construction projects. Capital expenses include activities such as street paving and bridge painting programs (System Preservation), intersection improvements (System Management), and new roads or buses (System Expansion). For bicycle projects, capital expenses may include: new specially treated cross walks (patterned and pigmented pavement), widening a roadway to add 4 foot shoulders, relocating pavement markings where milling or asphalt overlays may be required. Capital Projects must be programmed separately, are usually advertised for construction, and usually take many months or even years to accomplish,



depending on their complexity, environmental issues and funding. The Public is involved throughout the Capital Improvement Program development process. The project development phase will include a combination of open houses, workshops, stakeholder meetings and/or formal public meetings as appropriate.

The Capital Transportation Improvement Program, (CIP) DeIDOT's programming tool for implementing capital transportation projects, presents a 6-year list of statewide project priorities, with only the first year of the CIP being fully funded through legislative authorizations each year. The CIP incorporates all three regional TIP's and local needs into the context of the entire state while remaining responsive to fiscal and environmental constraints.

Next Steps

DeIDOT's next step, similar to WILMAPCO, is to review the current CIP for committed projects that could be amended to incorporate these bicycle needs. Project descriptions should be amended where appropriate and prudent. Priority recommendations should be grouped logically for ease of implementation and presented to the Pipeline Committee. The Pipeline Committee, consisting of Department Division Directors, sorts the identified needs, assigns an identification number, and directs the proposed project into a group of similar projects. Some projects such as street sweeping may be implemented most expediently through the Operations Division. Other projects may be approved for grouping into larger projects if the budget and schedule allow. For those projects which are large enough to stand on their own, the Project Development Committee reviews them to determine the class and level of the project. This in turn, defines the level of public involvement and environmental analysis required.

All transportation projects are prioritized within the context of the entire statewide transportation program. Projects in the system expansion category are prioritized using 14 points which will soon include some measure of a cost benefit ratio. The 14 point prioritization process is described in the 1997-2002 CIP. To give some idea of the types of categories used for prioritization, the following is a list of "dimensional factors" taken from the 1997-2002 CIP:

- Impact on the Environment
- Impact on Bicycle/Pedestrian travel
- Impact on System Continuity
- Impact on Sustainability
- Impact on Travel Time
- Impact on Air Quality
- Impact on Safety
- Impact on Seasonal/Regional Variations
- Impact on Transit Service
- Social Impacts
- Support for Existing Communities
- Supports DeIDOT & MPO LRPs

City of Newark, County Parks and Recreation, University of Delaware

Some projects may be important to Newark or a special interest group but when compared to statewide needs may carry a low priority. Other projects may be completed faster if they are implemented by a more local or regional agency. This may be true for projects on non-DeIDOT rights-of-way or for projects involving alternative funding sources. For these projects, the City of Newark or a special interest group, may want to be the **project sponsor**, to accomplish maintenance activities or pursue special funds called "Enhancement Funds" for new construction. Enhancement funds are not meant as a funding source for maintenance. These are funds set aside by the Federal Government for special needs



including pedestrian and bicycle facilities. To be considered eligible for such funds, the project sponsor must provide background information on the project, work with DeIDOT staff during development and provide matching funds (at least 20% as federal fund comprise up to 80% of the proposed project). A Technical Advisory Committee, consisting of six representatives of local governments, six citizens, and DeIDOT Staff shall determine eligibility. The project sponsor will also monitor the project through the five step process which includes: Identification, Planning, Programming, Preconstruction (design) ,and Construction. Projects for enhancements funding are screened and finally selected using the following criteria:

- benefit to the community/environment/ clean air compliance
- cost
- level of support for the project
- benefit to transportation
- ability to leverage additional funding from local governments, other state/federal agencies, private sources, organizations
- relationship to other plans and programs such as greenways and historic preservation

Local agencies, including the City of Newark, the University and New Castle County can participate with DeIDOT in the maintenance of existing bicycle facilities within their jurisdictions, particularly where those facilities exist outside of DeIDOT rights-of-way. Existing partnerships between DeIDOT and local agencies for roadway network maintenance activities can be expanded to increase the level of maintenance on bicycle facilities.

To aid in project maintenance or development, local governments may compete for federal funding through the Transportation Enhancement Program, request the use of Suburban Street Funds or use Municipal Street Aid. In addition, funding and technical assistance is available through the Office of Highway Safety the State Bicycle and Pedestrian Program, and the University of Delaware Cooperative Extension service for education and enforcement programs

Similarly, other initiatives recommended in this report requiring local jurisdiction support are non-infrastructure recommendations, such as those programs which are aimed at encouragement, education and enforcement. All three categories of programs are essential to insuring that the engineering recommendations maximize their attainable benefits. These programs may be funded in through special grants, through safety funds, via private sources or through public-private partnerships. Detailed resources, model programs and support are all available from a variety of private, industry and government sources. The funding section of this document and the appendix list these sources that can be respectively consulted for more information.

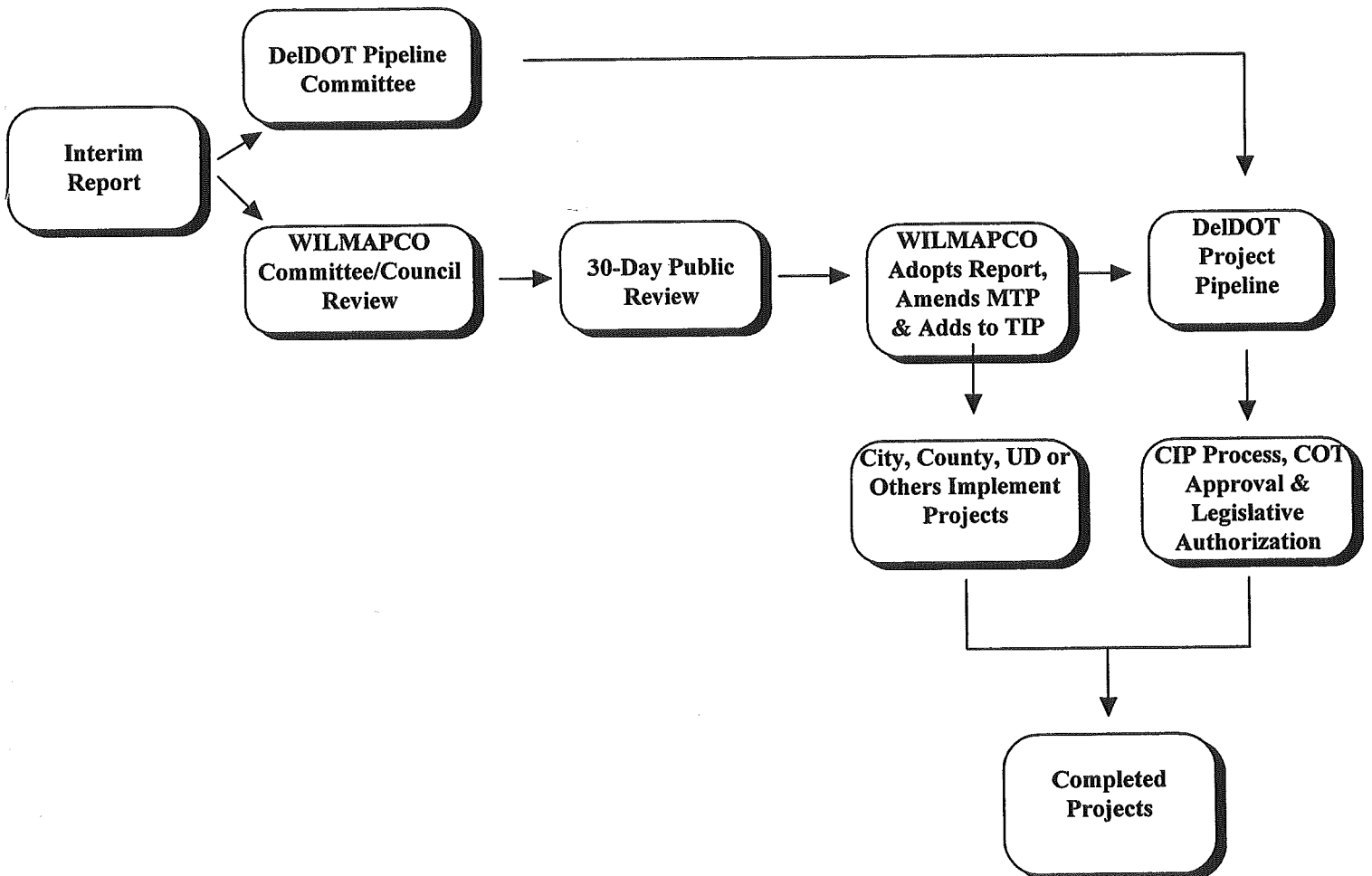


Next Steps

Identified bicycle projects which are low cost and uncomplicated may be easily implemented by jurisdictions or special interest groups, with the technical assistance of DeIDOT and WILMAPCO representatives. Local agencies should identify any projects that they would like to sponsor in order to expedite implementation. For the more costly projects, WILMAPCO and DeIDOT would place the projects in a priority listing with a concept level schedule and cost estimate to initiate development through the TIP and CIP.

The following diagram details the next steps in the project development and implementation phase.

Project Development Process



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