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In recent years, Wilmington has experienced an impressive rebirth of development along its two principal waterways, the Christina River and the Brandywine Creek, in its downtown Central Business District (CBD) and in its neighborhoods. The concept of improving access to Wilmington's CBD from Interstate 495 along 12th Street has been around for almost 20 years.

The purpose of this project is to develop and advance viable alternative options into project development, with supporting field work, traffic analyses, land use planning, environmental studies, conceptual design, impact analyses and a draft Capital Transportation Program cost estimate. The project area is served by six main roadways that provide regional access across the Brandywine Creek, entry into the Wilmington CBD and local service to adjacent residential communities and commercial uses – Northeast Boulevard, 12th Street, Thatcher Street, Vandever Avenue, Pine Street and Jessup Street.

To develop roadway alternatives, project coordination meetings were held between DelDOT and the City of Wilmington Departments of Public Works, Planning and Economic Development. These discussions, the City's *Visions for Wilmington* policy document (May 2004) and existing underlying waterfront zoning served as the basis for creating hypothetical development scenarios upon which to develop various roadway options. In general, the City favors a medium scale, mixed use development pattern which extends the existing street grid to the waterfront.

Two specific parcels were highlighted in discussions with the City. The EPA Superfund parcel, Diamond State Salvage, was the subject of a recent $18 million clean up effort. The remediated site can now be marketed for development, and efforts should be made to maximize its economic development potential. The City-owned parcel located south of 14th Street between Pine and Church Streets is desired for development, and efforts should be made to avoid impacting the marketability of this site. Roadway options were developed with these parcel concerns in mind.

In the project area along the waterfront, land is zoned W-2 on either side of Northeast Boulevard to a point approximately midway between Locust and Church Streets (extended). Land along the waterfront west of this location beyond the 16th Street Bridge is zoned W-4. The W-2 zone contains existing manufacturing uses that are well established, and future commercial development is considered suitable because of locations near arterial highways. The W-4 zone contains existing residential commercial areas are adjacent to the CBD and residential neighborhoods, and medium to high density residential, retail and office development is desired. New construction in each district is governed by development controls for floor area, building height and coverage, and setback from the waterfront edge. The setback controls, based on depth of property, are specifically designed to preserve public access to the waterfront.

Environmental Justice and Socio-Economic Considerations

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, was issued in 1994 to ensure that the US DOT addresses as appropriate the potential for disproportionately high and adverse human health or environmental effects that transportation projects may have on minority populations and low-income populations. An Environmental Justice focus area was defined to address these concerns, consisting of nine US Census Block Groups which encompass and surround the project area. This focus area has very high, concentrated populations of minority and low-income individuals. Over 90 percent of the individuals residing in the focus area qualify as a "minority," and nearly 29 percent qualify as "low-income."

Throughout the project, it will be important to consider the special needs of these individuals and include them in the planning process. In addition, the Census identified just over 100 individuals with little or no proficiency in English, with the majority of this population speaking Spanish. Although these individuals comprise only one percent of the focus area, they are concentrated in several block groups where the Hispanic population is as high as 12 percent. Effective communication with these individuals may require the use of an interpreter and the preparation of study materials in an alternative, bi-lingual format.

Pedestrian, Bicycle and Transit Considerations

Almost all of the project area roadways have sidewalks for pedestrian use, with the exception of Church Street's frontage of the Superfund site. Although a number of signalized and unsignalized intersections occur within the project area, there are very few clearly delineated pedestrian crossings. Of note within the project area is the currently proposed path of East Coast Greenway, which is to run alongside Northeast Boulevard, then along the path of 14th Street and over the Market Street Bridge.

Three DART First State bus routes serve the project area. These three routes accounted for about 11 percent of the total ridership in New Castle County in 2003. It is important to note that these three routes experienced a ten percent growth in ridership between 2001 and 2003, despite an overall two percent decline in ridership in New Castle County during the same time period.

Project Purpose and Need

Technical analysis yielded four needs for a 12th Street Connector:

- System linkage: The street system in the project area is incomplete and discontinuous. 14th Street is currently closed off through the Diamond State Salvage site, while 13th Street ends at Church Street. Access from the Interstate 495 interchange through the study is only possible via Vandever Avenue. Vandever Avenue is a residential street for most of its length, with parking on both sides of the roadway. In its current form and function, Vandever Avenue is a poor corridor for traffic destined for the CBD. A new 12th Street Connector would provide this link.

- Access to the City of Wilmington CBD: Approximately nine in ten trips between I-495 and the CBD of Wilmington using the 12th Street corridor, cross the 11th Street Bridge and travel through the Eastside neighborhood. There is essentially a single route serving the demand, which results in overburdening a residential community with through traffic, the underutilization of the 16th Street Bridge and deficient and disproportional vehicle access to the northern sections of the CBD. A new 12th Street Connector would provide CBD access and relieve the burden on the local, more residential neighborhood.

- Operational Conditions: The intersection of Northeast Boulevard and 12th Street currently operates with an overall Level of Service D and with the westbound approach failing (Level of Service F). A new roadway will help relieve congestion with or without future development.

- Economic Development: In the past few years, the City's waterfront along the Christina River has enjoyed enormous redevelopment success. Development of the waterfront properties along the Brandywine Creek is part of the City's vision. The properties in the project area are some of the last waterfront properties remaining in the City of Wilmington

and possess great market potential - not only are they well-served by existing the transit and highway network, but the have great views of downtown and Brandywine Creek.

Recent clean up efforts on the Diamond State Salvage site further support development objectives. Solving the site's ownership issues and completing the roadway network in the project area will position the site to realize its redevelopment potential.

Development of Options

Three main options were developed to address the defined Purpose and Need of the project. Each improvement option utilizes the intersection of 12th Street and Thatcher Avenue as the eastern terminus of the project while the western terminus for all options is the intersection of 16th Street, Jessup Street, and Pine Street. Option 1, with three variations, shows new alignment with partial re-use of existing streets. Option 2 and Option 3 are similar, with three variations each, and use as much of the existing City grid street system as possible

To assess the impacts of the various 12th Street Connector options, two future development conditions were advanced. The first, a No Build, envisions no new development and no 12th Street Connector. The second, a Build Condition, envisions approximately 185,000 square feet of commercial space in the W-2 portion of waterfront area, and one of two residential scenarios in the W-4 portion: an all residential apartment pattern, and a mixed use retail, office and residential pattern. A range use in W-4 from all residential to mixed use was selected to gauge the effect of different land use patterns on trip generation and trip assignments for future roadway conditions. Future No-Build traffic volumes estimates were developed for 2025 to be consistent with current planning initiatives in the region.

Impacts Analysis and Selection of Preferred Alternative

The impacts of the proposed improvements were analyzed with respect to right-of-way, utilities and environmental resources. Right-of-way impacts were further divided between displaced businesses, displaced parking spaces, waterfront redevelopment area and abandoned right-of-way. Option 2B was selected as the preferred alternative, as it impacts the least right-of-way (1.59 acres) and creates the most waterfront development area (8.5 acres). Option 2B has an estimated construction cost of approximately $2.5 million and a total project cost of approximately $4 million.

I. Introduction

Located along the Eastern Seaboard between Washington, D.C. and Philadelphia, Wilmington, Delaware is well-served by national (AMTRAK) and regional (SEPTA) passenger rail, direct access to Interstates 95 and 495, and a network of local roadways. In recent years, Wilmington has experienced an impressive rebirth, with development along its two principal waterways, the Christina River and the Brandywine Creek, in its downtown Central Business District (CBD) and in its neighborhoods.

The concept of improving access to the Wilmington CBD from Interstate 495 along 12th Street has been around for almost 20 years:

- In the mid 1980s, the Delaware Department of Transportation (DelDOT) prepared a Draft Environmental Impact Statement (DEIS) that examined several options for a more direct connection in a study area bounded by I-495 to the east, Orange Street to the west, 22nd/23rd Streets to the north, and 7th Street to the south. The DEIS, published in November 1987, discussed in detail five options: a No-Build alternative, a Transportation Systems Management alternative, and three build alternatives. One alternative included a new structure on the Brandywine Creek.

  The 1987 DEIS identified three primary needs for improving 12th Street: (1) system linkage, (2) separation of local and through traffic, and (3) improvement in traffic service.

- In late 2003, DelDOT programmed additional funding for a 12th Street Connector project. The 2004-2008 Capital Transportation Program, published in July 2003, outlined the 12th Street Connector project goals as:

  > "improving traffic flow into the downtown Business District and [to] beautify this major gateway into the city. This will be done by a combination of new roadway construction and modification of existing streets. This rebalancing of traffic will reduce congestion on several neighborhood streets."

  The project area for the 2003 study was smaller than that of the 1987 DEIS, focusing on the area west of Northeast Boulevard. A preferred alignment (shown in orange on Figure 1) was identified which began at 12th Street and intersected with Northeast Boulevard at a right angle, continued through city owned parcels to a point where it traversed across the intersection of 13th Street with Locust Street. The alignment then followed 13th Street to Church Street. At that point, the alignment was projected in a northwesterly direction and intersected 14th Street, following 14th Street to its terminus at the intersection of 16th Street, Jessup Street, and Pine Street. A portion of the alignment traversed an EPA-designated Superfund site, Diamond State Salvage, a gated and fenced former junkyard.

The purpose of this project is to develop and advance viable alternative options into project development, with supporting field work, traffic analyses, land use planning, environmental studies, conceptual design, impact analyses and a draft Capital Transportation Program cost estimate. A series of alternative alignments were developed linking 12th Street and the 16th Street Bridge. The project area is served by six main roadways that provide regional access across the Brandywine Creek, entry into the Wilmington CBD and local service to adjacent residential communities and commercial uses – Northeast Boulevard,

12th Street, Thatcher Street, Vandever Avenue, Pine Street and Jessup Street. This project developed optional alignments in the area generally bounded by Thatcher Street, Northeast Boulevard, 14th Street, and Brandywine Creek (Figure 2).

II. Project Coordination

To develop roadway alternatives, project coordination meetings were held between DelDOT, the City of Wilmington Departments of Public Works, Planning and Department of Economic Development, and the Environmental Protection Agency on September 17, 2003, March 8, 2004, July 15, 2004, August 20, 2004, and November 16, 2004. These meetings were held to update the City on project progress, coordinate with the City on potential waterfront development adjacent to any potential alternative options, and review and discuss alternatives developed. Summaries of these meetings are provided in Appendix A.

The City's *Visions for Wilmington* policy document (May 2004) and existing underlying waterfront zoning served as the basis for creating hypothetical development scenarios upon which to develop various roadway options. In general, the City favors a medium scale, mixed use development pattern that allows the existing street grid to be extended to the waterfront.

Two specific parcels were highlighted in discussions with the City as options were developed. The EPA Superfund parcel, Diamond State Salvage, was the subject of a recent $18 million clean up effort. The EPA has recently contacted the City and requested their assistance in marketing the site. They are aware of the 12th Street Connector project and seem to be in favor of it, provided that the roadway alignment does not severely reduce its value. Based on preliminary discussions the City seems willing to assist the EPA, however there are some legal issues that must be resolved first. The remediated site can now be marketed for development, and efforts should be made to maximize its economic development potential. The EPA is not averse to a roadway through a portion of the site, and noted that the site now contains clean fill material. The City-owned parcel located at the southwest corner of Northeast Boulevard and 13th Street is desired for development, and efforts should be made to avoid impacting the marketability of this site.

III. Policy, Zoning and Existing Land Use

In 2001, Mayor James M. Baker issued Executive Order 2001-2, which created a Citywide Planning & Development Advisory Council. Consisting of a broad cross section of public and private agencies supported by the City's Planning Department, the Council was charged with developing a citywide vision plan. In May of 2004, Mayor James M. Baker unveiled the City's *Visions for Wilmington*, the resulting vision document designed to spur discussion among the City's residents, businesses and government leaders for the Wilmington's long term development and growth.

The Vision Plan presents proposals for three key areas of the city: the Neighborhoods, the Central Business District, and the Riverfront Areas. Five distinct areas are identified as potential riverfront opportunities: (1) Old Asbury, (2) Buccini/Pollin Headquarters, (3) Christiana Landing, (4) Seventh Street Peninsula, and (5) Brandywine's Waterside Residential Community. (Figure 3)

The Brandywine Waterside residential community proposed in the *Vision* lies in the northern part of the project area. In this general location, the City envisions continuing the high rise scale of residential development which exists along the north bank of the Brandywine between Market Street and the 16th Street Bridge.

Existing Zoning

The City's policy through existing zoning is to promote high quality mixed use development along the waterfront. The City believes that existing nonconforming uses will voluntarily relocate at such time as waterfront redevelopment activity generates economic forces which induce redevelopment of parcels presently utilized for prohibited uses. The City intends to require the termination of existing nonconforming uses when it determines that the continuation of such uses is acting as an impediment to the fulfillment of high quality mixed use development objectives. As a matter of public policy, it is the City's view that the continuation of existing nonconforming uses acts as an impediment to the fulfillment of high quality mixed use development objectives and uses.

Waterfront Districts

The City Zoning Code contains four waterfront districts (Table 1) along the Christina River and Brandywine Creek with standards to encourage appropriate development while protecting and enhancing the significant resources found in these zoning districts. Each district is designed to build on existing land uses and capitalize on the transportation network components that complement those uses. The Zoning Code also creates a process for the review and approval of development proposals for land within those districts.

To assure that all existing and future development will be high quality, all development in the waterfront zoning districts must conform to the waterfront review standards recommended by the Department of Planning with the advice of the Planning Commission, and adopted by City Council after a public hearing. Such review standards must be part of the comprehensive development plan, as well as standards for the administration of the waterfront zoning districts.

Table 1: City of Wilmington Waterfront Districts

District	Characteristics and Purpose
W-1	Existing manufacturing and heavy industrial uses are well established and suitable sites exist for such uses served by rail, water and highway networks.
W-2	Existing manufacturing uses are well established and future commercial development is suitable because of locations near arterial highways.
W-3	Existing low intensity waterfront manufacturing/commercial recreation district where existing land conditions and the level of public utility and transportation services are available, and include areas with significant recreational and scenic resources.
W-4	Existing residential commercial areas are adjacent to the central business district and residential neighborhoods, and medium to high density residential, retail and office development is desired.

In the project area along the waterfront, land is zoned W-2 on either side of Northeast Boulevard to a point approximately midway between Locust and Church Streets (extended). Land along the waterfront west of this location beyond the 16th Street Bridge is zoned W-4. Figure 4)

Low density residential (R-3) and manufacturing (M-1) are also located within the project area, to the north of the waterfront districts.

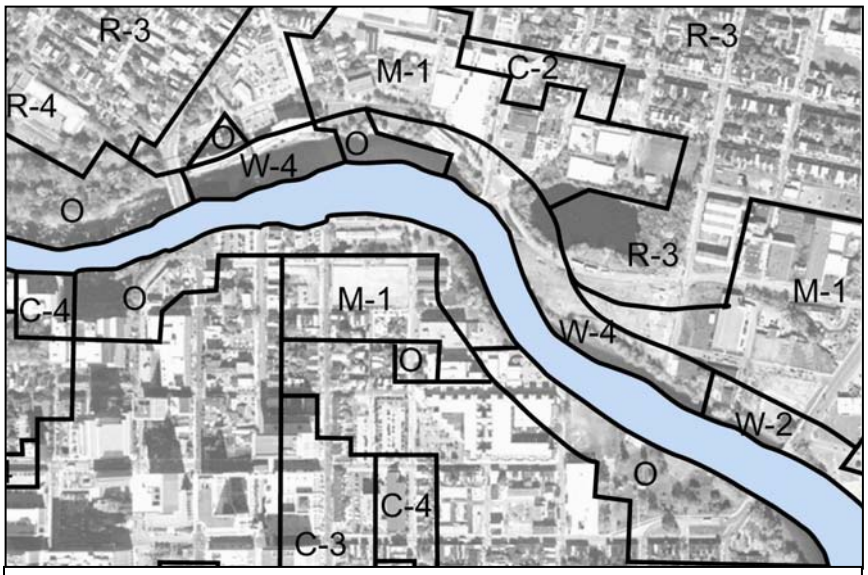

Figure 4: Existing Zoning

Development Controls in W-2 and W-4 Districts

New construction in each waterfront district is governed by development controls for floor area, building height and coverage, and setback from the waterfront edge. The setback controls, based on depth of property, are specifically designed to preserve public access to the waterfront.

For any subdivision which abuts a recommended public easement within the waterfront development districts, the Planning Department may require the dedication of, or provision for, a public access easement, the minimum depth of which would be 30 feet from the riverfront for the purpose of implementing a waterfront walkway system. To that end, any development plan and ensuing project that is city-owned or city-financed from and after April 1, 1997, that is located within a waterfront district must include provision for access to the city's waterfront by the general public.

Waterfront districts also contain landscaping and screening requirements which further define site plans for new development.

Table 2: Development Controls in Waterfront Districts W-2 and W-4

District	**Maximum Floor Area Ratio (FAR)**	**By use**	**Maximum Building Height**	**Maximum Building Coverage**	**By use**	**Required Minimum Building Setback Lines (from Waterfront) when depth of property is:**
W-2	2.0		6 stories (72 feet)	.60		Less than 200 feet: 30 feet Between 200-400 feet: 40 feet Greater than 400 feet: 50 feet
W-4	See below		6 stories (72 feet)	see below		Less than 200 feet: 30 feet Between 200-400 feet: 40 feet Greater than 400 feet: 50 feet
	Row houses	.80			0.4	
	Garden apartment developments	1.00			0.40	
	Walk-up apartments	1.50			0.50	
	Medium density elevator apartment houses	2.00			0.50	
	All other uses	2.00			0.50	

Existing Conditions

The blocks bounded by 14th, 16th, Church and Thatcher Streets contain several quasi-public institutions, as well as several abandoned industrial buildings (see Figure 5). A variety of auto-related businesses are scattered along Northeast Boulevard from 14th to 16th Street, including NAPA Auto Parts, a gas station, a fast food operation and an auto shop. There are also vacant buildings located at the northwest corner of 14th and Northeast Boulevard.

To the north of 12th Street and east of Northeast Boulevard is a small residential community known as "Lower Riverside," which has a mix of redeveloped and deteriorated units. This community extends up to about 14th Street. The homes along Claymont Street between 12th and 14th and several small clusters on 13th Street, Heald Street and Thatcher Street are occupied. North of 14th Street, the land uses become predominately industrial and heavy commercial or vacant land.

The Boys and Girls Club of Wilmington is located north of the 16th Street quarry Superfund site and can be accessed from Spruce Street. The Club's recreation field, an abandoned commercial building, and a parking lot are located along 17th Street between Pine Street and Church Street. An approximately 3.4 acre water filled quarry is located north of 14th Street.

South of Vandever Street, several mixed-use medical and governmental service buildings are located on the block between Jessup and Pine Streets. The Gateway Industrial complex is located in the block between Mabel and Jessup Streets.

Block Level Land Use

For purposes of this project, the blocks in the project area are numbered (Figure 6) and described in more detail below.

Block 1: North of 13th Street between Locust and Church Streets

The single building located on this block is a light industrial facility (approx. 30,000 SF) occupied by Ames Engineering. The block contains two parking lots (approx. 20,000 SF combined). The parking lot is accessed from Locust Street and serves both employee and loading functions. The second parking area which is accessed from 13th Street and is mostly under utilized, also serves employees. Approximately 30,000 SF of open land exists between the building and Church Street. Based on preliminary discussions with the property owner, it does not appear as though this area is crucial to their operations and may not be a hardship if portions of the property were necessary for the project.

Block 2: North of 13th Street between Locust and Northeast Boulevard

A large industrial facility (approx. 39,000 SF) fronting along 13th Street is occupied by Franklin Fibre-Lamitex Corporation. The only access route for Franklin Corporation's parking lot and loading bays is via Locust Street. A retail store occupied by Kaufman Glass (approx. 8,600 SF) is on the corner of 13th Street and Northeast Boulevard. The retail store customers use on-street parking along 13th Street or Northeast Boulevard. The corner of the block at 14th Street and Northeast Boulevard is occupied by an active storage yard and a small office building. All other buildings in the block are vacant.

Block 3: Waterfront Block South of 13th Street between Church and Locust Streets

There are three commercial buildings located on this block. The vacant Elks building is approximately 8,300 SF and is located closest to Church Street. Two other partially vacant mixed use, attached commercial buildings front on 13th and Locust Streets. A private ministry is located on the southeast corner at 13th and Locust. An auto salvage and repair shop occupies the build interior. The interior parking lot and storage area is accessed from Locust Street.

Block 4: Waterfront Block South of 13th Street between Locust and Northeast Boulevard

This entire block is owned by the City of Wilmington and is used as a construction materials storage yard.

Block 5: North of 12th Street between Northeast Boulevard and Thatcher Street

The western part of this triangular block contains a fully occupied L-shaped building (approx. 27,400 SF) which is occupied by the T. Charter Academy Middle School, Ray's Grocery & Deli, and a laundry store. There is a large parking lot (approx. 42,300 SF) at the corner of 12th Street and Northeast Boulevard serving these uses. A construction yard comprises the middle of this block, while the eastern part contains an auto repair shop (approx. 1,100 SF) and its parking lot (approx. 7,600 SF).

Block 6: Waterfront Block between Pine and Church Streets

The EPA Superfund site DE-281, formerly Diamond State Salvage, is approximately 6 acres and encompasses this entire block. The property has been remediated and is vacant with medium to high vegetation covering its entirety It is the largest contiguous parcel and posses the longest portion of waterfront along the Brandywine Creek in the study corridor. The property is a key element to any development efforts in this area.

IV. Environmental Justice

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, was issued in 1994 to ensure that the US DOT addresses as appropriate the potential for disproportionately high and adverse human health or environmental effects that transportation projects may have on minority populations and low-income populations. These effects include social and economic effects.

The term 'Environmental Justice' implies the full and fair participation by all potentially affected communities in the transportation decision-making process, and aims to prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority and low-income populations. Environmental Justice provides the community, including minority and low-income populations, with more access to information and opportunities for public participation in matters that may impact human health and the environment.

Therefore, it is important in the beginning of the planning process to determine if and where Environmental Justice issues exist. Within the terms of Environmental Justice, a "Minority" includes all race and ethnicity classes except for "White non-Hispanics." Similarly, "Low-Income" for the purposes of Environmental Justice is defined as "any persons whose household income is at or below the Department of Health and Human Services poverty guidelines."

Methodology

All of the tables in this report were compiled using US Census 2000 data at the Block Group level. The Environmental Justice focus area consists of nine US Census Block Groups which encompass and surround the project area. These groups were chosen because they represent areas that may be either directly or indirectly impacted by the proposed project. Figure 7 shows the extent of the focus area and the block group locations in relation to the project area.

Minority Population Distribution

Table 3 presents demographic data for race and ethnicity among the nine block groups that comprise the focus area. Over 90 percent of the focus area qualifies as a "minority," and two of the block groups have 100 percent minority populations. Furthermore, Blacks represent over 93 percent of the total minority population. Although Hispanics represent only four percent of the total focus area population, four of the ten blocks - CT6.01, BG2; CT6.01, BG3; CT8, BG1 and CT9, BG3 - have significantly higher concentrations of Hispanics (over 12 percent in Census Tract 6.01, Block Group 2).

Table 3
Minority Population Distribution

Census Tract / Block Group	Total	White	Black	American Indian	Asian	Pacific Islander	Other race	Two or more	Hispanic or Latino	% Minority
CT 6.01, BG 2	908	49	745	0	0	0	0	0	114	94.6
CT 6.01, BG 3	950	8	687	6	0	0	21	150	78	99.2
CT 6.02, BG 1	1,196	41	1129	0	0	0	0	4	22	96.6
CT 6.02, BG 2	943	7	896	0	0	0	0	0	40	99.3
CT 6.02, BG 3	1,028	148	864	0	10	0	0	6	0	85.6
CT 7, BG 2	889	0	889	0	0	0	0	0	0	100.0
CT 8, BG 1	2,433	664	1691	0	0	0	0	0	78	72.7
CT 9, BG 1	668	0	661	0	0	0	0	7	0	100.0
CT 9, BG 2	946	49	849	0	0	0	0	34	14	94.8
CT 9, BG 3	434	42	321	0	17	0	0	22	32	90.3
Project Area	**10,395**	**1,008**	**8,732**	**6**	**27**	**0**	**21**	**223**	**378**	**90.3%**

Source: US Census Bureau, Census 2000

Income and Poverty Distribution

Table 4 indicates the persons below poverty level in the focus area, along with median household income and per capita income. In general, low-income populations have lower rates of car ownership and are thus more dependent on alternate modes of transportation. Overall, 2,417 individuals (approximately 29 percent of the focus area) were identified as being below the poverty level.

Language Distribution

Table 5 illustrates language characteristics within the focus area. Numerous languages are spoken in the project area, including Spanish, Indo-European, Asian and Pacific Islander languages; however, the vast majority of individuals only speak English. In total, there are 514 individuals (5.3 percent of the focus area) that speak other languages, and 103 individuals (about one percent of the focus area) that do not speak English "well" or "at all." Spanish-speakers comprise the vast majority of the non-English speaking population.

Table 4
Income and Poverty Distribution

Census Tract / Block Group	Median Household Income	Per Capita Income	Total Considered Population	Total below Poverty Level	Percent below Poverty Level
CT 6.01, BG 2	$29,853	$13,132	896	210	23.4%
CT 6.01, BG 3	$35,962	$11,499	950	305	32.1%
CT 6.02, BG 1	$14,133	$13,525	1,196	419	35.0%
CT 6.02, BG 2	$27,697	$15,796	943	227	24.1%
CT 6.02, BG 3	$37,656	$13,862	1,028	171	16.6%
CT 7, BG 2	$15,458	$7,378	889	554	62.3%
CT 8, BG 1	$23,000	$10,973	490	194	39.6%
CT 9, BG 1	$26,000	$11,858	668	115	17.2%
CT 9, BG 2	$31,875	$11,489	938	184	19.6%
CT 9, BG 3	$28,409	$15,809	429	38	8.9%
Project area	**$27,004**	**$12,532**	**8,427**	**2,417**	**28.7%**

Source: US Census Bureau, Census 2000

Note: Considered population does not take into account persons living in group quarters (dormitories, nursing homes, or prisons – such as the Gander Hill Correctional Facility) or unrelated persons 15 years or younger.

Age Distribution

Table 6 shows the age demographics within the project area. It is important to note the presence of both the elderly population (65 years and over) and the population that is at or below the legal driving age (17 years and under). These groups may have special transportation and other social needs that are not characteristic of the rest of the population, i.e. an inability to drive and thus the necessity for alternate modes of transportation. Overall, just under ten percent of the project area is above age 65, while 26 percent is below age 17. Therefore, approximately 36 percent of the total project area population would fall into this category.

Table 5
Language Distribution

Category	T6.01, BG2	T6.01, BG3	T6.02, BG1	T6.02, BG2	T6.02, BG3	T7, BG2	T8, BG1	T9, BG1	T9, BG2	T9, BG3	Project area
Persons 5 years & older	824	869	1,151	900	923	746	2,370	603	872	412	**9,670**
Speak English only	717	777	1,110	812	888	731	2,329	569	861	362	**9,156**
Speak Spanish:	101	79	21	70	0	15	41	34	6	27	**394**
Speak English very well	54	51	10	50	0	8	17	11	6	9	**216**
Speak English well	12	28	0	14	0	0	17	0	0	9	**80**
Speak English not well	24	0	5	6	0	7	7	23	0	5	**77**
Speak English not at all	11	0	6	0	0	0	0	0	0	4	**21**
Speak other Indo-European languages:	6	13	13	18	19	0	0	0	5	6	**80**
Speak English very well	6	13	13	18	19	0	0	0	5	6	**80**
Speak English well	0	0	0	0	0	0	0	0	0	0	**0**
Speak English not well	0	0	0	0	0	0	0	0	0	0	**0**
Speak English not at all	0	0	0	0	0	0	0	0	0	0	**0**
Speak Asian and Pacific Island languages:	0	0	0	0	16	0	0	0	0	17	**33**
Speak English very well	0	0	0	0	5	0	0	0	0	17	**22**
Speak English well	0	0	0	0	6	0	0	0	0	0	**6**
Speak English not well	0	0	0	0	5	0	0	0	0	0	**5**
Speak English not at all	0	0	0	0	0	0	0	0	0	0	**0**
Speak other languages:	0	0	7	0	0	0	0	0	0	0	**7**
Speak English very well	0	0	7	0	0	0	0	0	0	0	**7**
Speak English well	0	0	0	0	0	0	0	0	0	0	**0**
Speak English not well	0	0	0	0	0	0	0	0	0	0	**0**
Speak English not at all	0	0	0	0	0	0	0	0	0	0	**0**
Speak non-English languages (totals):	107	92	41	88	35	15	41	34	11	50	**514**
Speak English very well	60	64	30	68	24	8	17	11	11	32	**325**
Speak English well	12	28	0	14	6	0	17	0	0	9	**86**
Speak English not well	24	0	5	6	5	7	7	23	0	5	**82**
Speak English not at all	11	0	6	0	0	0	0	0	0	4	**21**

Source: US Census Bureau, Census 2000

Table 6
Age Distribution

Census Tract / Block Group	Total	By year								
		5 & under	5-17	18-21	22-29	30-39	40-49	50-64	65 & over	% above 65
CT 6.01, BG 2	870	70	182	41	71	135	136	110	125	14.4
CT 6.01, BG 3	887	70	263	54	82	112	93	115	98	11.0
CT 6.02, BG 1	1,190	62	235	52	91	169	185	190	206	17.3
CT 6.02, BG 2	985	61	208	59	81	143	137	150	146	14.8
CT 6.02, BG 3	954	74	187	58	90	127	165	133	120	12.6
CT 7, BG 2	861	124	285	56	79	109	95	60	53	6.2
CT 8, BG 1	2,425	60	122	378	652	677	368	124	44	1.8
CT 9, BG 1	708	49	183	52	77	108	112	59	68	9.6
CT 9, BG 2	997	69	254	56	109	153	160	99	97	9.7
CT 9, BG 3	493	31	116	30	47	100	76	57	36	7.3
Project area	**10,370**	**670**	**2035**	**836**	**1,379**	**1,833**	**1,527**	**1,097**	**993**	**9.6%**

Source: US Census Bureau, Census 2000

Findings

The Environmental Justice focus area has very high, concentrated populations of minority and low-income individuals. Over 90 percent of the individuals residing in the focus area qualify as a "minority," and nearly 29 percent qualify as "low-income." Throughout the project, it will be important to consider the special needs of these individuals and include them in the planning process.

The Census identified just over 100 individuals with little or no proficiency in English, with the majority of this population speaking Spanish. Although these individuals comprise only one percent of the focus area, they are concentrated in several block groups **(**Tract 6.01, BG2; Tract 6.01, BG3, Tract 6.02, BG2**)** where the Hispanic population is as high as 12 percent. Effective communication with these individuals may require the use of an interpreter and the preparation of study materials in an alternative, bi-lingual format.

V. Roadway Characteristics

The project area is served by six main roadways that provide regional access across the Brandywine Creek, entry into the Wilmington CBD and local service to adjacent residential communities and commercial uses – Northeast Boulevard, 12th Street, Thatcher Street, Vandever Avenue, Pine Street and Jessup Street.

At the east end of the project area, Northeast Boulevard serves as a major route for traffic bound for the Wilmington CBD from northeast Wilmington and the Interstate 495/12th Street Interchange, crossing the Brandywine Creek over the 11th Street Bridge. Wilmington CBD-bound traffic travels from Spruce Street onto 10th and 8th Streets westbound and passes through densely populated residential streets in the upper Eastside neighborhood. Traffic exiting the Wilmington CBD eastbound bound for 12th Street and I-495 uses 11th Street. Northeast Boulevard is a four lane facility throughout the project area. In addition to the signal at 12th Street, Vandever Street is also signalized. Northeast Boulevard was recently re-constructed through the project area to include re-surfacing, median treatments, landscape and pedestrian elements. The median prevents northbound through movements on Thatcher Avenue and left turns from both 14th Street approaches.

As it enters the project area from the AMTRAK Northeast Corridor rail bridge to Northeast Boulevard, 12th Street is a 2 lane roadway with shoulders for parking where permitted. The intersection of 12th Street and Heald Avenue is signalized, with all approaches having a single lane. 12th Street terminates at the signalized intersection with Northeast Boulevard, where all traffic westbound on 12th Street must make a right or left turn.

At the western end of the project area, Jessup Street and Pine Street form a one-way pair and connect to downtown Wilmington over the 16th Street Bridge. The intersection of 16th, Pine and Jessup Streets is unsignalized. A fourth leg, 14th Street, no longer serves as a roadway and is gated where is enters the Superfund site. Site distance is limited by the bridge structure for southbound left turning vehicles on Jessup Street.

On the northern edge of the study area, Vandever Street is a two lane roadway with parking in a residential environment and the first opportunity to travel the north side of the Brandywine Creek between the 12th Street, Northeast Boulevard area and 16th Street and Market Streets.

The remainder of the system is generally low volume roadway and local in function - 13th, 14th, 16th and 17th Streets are discontinuous and only partially connected to the major roadway system. Church and Locust Streets provide north-south access for local circulation only.

VI. Existing Traffic Volumes and Levels of Service

Manual turning movement counts were conducted on a typical weekday (Tuesday, Wednesday, or Thursday) during December 2003 and July 2004. The counts were performed from 7:00 AM to 9:00 AM and from 4:00 PM to 6:00 PM at several locations within the project area. Table 7 lists the locations where turning movement counts were conducted:

Table 7
Manual Turning Movement Counts

Location	Date
Spruce Street and 10th Street	Thursday December 11, 2003
Spruce Street and 11th Street	Wednesday December 10, 2003
11th Street and Church Street	Wednesday December 10, 2003
12th Street and Northeast Boulevard	Tuesday December 9, 2003
Northeast Boulevard and Vandever Avenue	Tuesday December 9, 2003
Vandever Avenue and Jessup Street	Tuesday July 14, 2004
16th Street Bridge/Jessup Street/Pine Street	Tuesday July 14, 2004

Table 8 summarizes the total intersection volumes during the morning and evening peak hours. Figure 8 shows the morning and evening peak hour turning volumes.

Table 8
Peak Hour Intersection Volume

Location	Morning Peak Hour	Evening Peak Hour
Spruce Street and 10th Street	1,222	764
Spruce Street and 11th Street	1,426	1,438
11th Street and Church Street	1,673	1,754
12th Street and Northeast Boulevard	1,802	1,797
Northeast Boulevard and Vandever Avenue	1,406	1,426
Vandever Avenue and Jessup Street	576	779
16th Street Bridge/Jessup Street/Pine Street	392	546

Automatic Traffic Recorder (ATR) data was collected for a typical weekday concurrent with the manual periods and is summarized in Table 9.

Table 9
Average Daily Traffic (ADT) Volumes

Location	Average Daily Traffic	Percent Trucks
11th Street, west of Spruce Street	5,841	4.4%
Church Street, south of 11th Street	5,639	4.6%
12th Street, east of Northeast Boulevard	5,056	5.1%
Northeast Boulevard, north of 12th Street	29,286	2.1%
Vandever Avenue, west of 12th Street	3,581	4.6%
16th Street Bridge	13,396	9.2%

Origin-Destination Survey

A license plate based origin-destination (O-D) survey was conducted in December 2003 during both the morning and evening peak hours. Figure 9 summarizes the O-D survey. The objective of the survey was to understand the distribution of traffic from 12th Street to the downtown area and how that traffic might be affected by a 12th Street Connector. The survey recorded license plates at three locations within the project area.

- The 12th Street approach to Northeast Boulevard (vehicle making left and right turns were noted separately).
- The northbound Northeast Boulevard approach to Vandever Avenue.
- The southbound Spruce Street approach to 10th Street.

The license plate data from the three locations was reviewed and notations were made where the same license plate appeared at more than one O-D station. The survey showed that 219 of the 422 vehicles (over 50 percent) making a left-hand turn from 12th Street to Northeast Boulevard ultimately make a right turn from Spruce Street onto 10th Street during the morning peak hour. The evening peak hour showed 48 of 142 vehicles (34 percent) making the same movement. This indicates a strong desire for vehicles on 12th Street to access downtown Wilmington locations.

Of the vehicles making right turns from 12th Street onto Northeast Boulevard, 31 of 82 vehicles (38 percent) during the morning peak hour and 12 of 60 vehicles (20 percent) during the evening peak hour make left hand turns onto Vandever Avenue. Vehicles in this travel group are candidates to enter the Wilmington CBD via the 16th or Market Street Bridges.

Existing Levels of Service

As summarized in the Highway Capacity Manual 2000 (HCM2000), the level of service (LOS) is a quality measure describing operational conditions within a traffic stream, generally in terms of such service measures as speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience. Six levels of service are defined and identified with a letter designation that corresponds to the operating condition. Levels of Service range from "A", which is the best operating condition, to "F", which is the worst.

At signalized intersections, the factors that affect the approach capacities include: traffic volume, traffic movements, traffic composition, geometric characteristics, arrival patterns, traffic signal timing, and human factors. A descriptive mechanism has been developed which indicates, on the basis of control delay per vehicle, the relative smoothness of intersection operation (described as level of service). The various levels of service and delays are summarized in Table 10.

Delays cannot be related to capacity in a simple one-to-one fashion. It is possible to have delays in the LOS "F" range without exceeding roadway capacity. High delays can exist without exceeding capacity if one or more of the following conditions exist:

- long signal lengths;
- the particular traffic movement experiences a long red time; or,
- the progressive movement for a particular lane group is poor.

Table 10
Signalized Intersection LOS Criteria

Level of Service	Expected Delay	Average Control Delay per Vehicle (sec)
A	Very low delay, good signal progression; most vehicles do not stop at intersection.	≤ 10
B	Good signal progression; more vehicles stop at intersection than Level of Service A.	>10 and ≤ 20
C	Fair progression; significant numbers of vehicles stop at intersection.	>20 and ≤ 35
D	Unfavorable progression; congestion and cycle failures become noticeable; longer delays; high v/c ratios; most vehicles stop at intersection.	>35 and ≤ 55
E	Considered the limit of acceptable delay; poor progression; high v/c ratio; frequent cycle failures.	>55 and ≤ 80
F	Unacceptable delay; poor progression; oversaturation; many cycle failures; v/c ratios ≥ 1	> 80

Analysis of the project area intersections where traffic counts were conducted is summarized in Table 11 and on Figure 8.

Table 11
Peak Hour Levels of Service

Location	Morning Peak Hour	Evening Peak Hour
Spruce Street and 10th Street	A (7.2)	A (6.9)
Spruce Street and 11th Street	B (15.6)	B (16.2)
11th Street and Church Street	A (5.8)	B (11.8)
12th Street and Northeast Boulevard	D(39.8)	C(22.7)
Northeast Boulevard and Vandever Avenue	B (16.1)	B (17.3)
Vandever Avenue and Jessup Street	B (10.0)	B (10.7)
16th Street Bridge/Jessup Street/Pine Street	n/a	n/a

Overall, the intersections within the study area all perform in desirable levels of service (LOS D or better) for both the morning and evening peak hours. The intersection of Northeast Boulevard and 12th Street is the only intersection that has poor levels of service on individual approaches. During the morning peak hour, the intersection operates at an overall Level of Service D, but the westbound 12th Street approach operates at Level of Service F with 81.9 seconds of delay. A heavy flow of vehicles turning left from 12th Street to Northeast Boulevard is the cause of this poor level of service.

VII. Crash Analysis

A crash analysis of select project area intersections was completed for a three-year period between January 1, 2001 and December 31, 2003. At the intersection of Thatcher Street and 12th Street, a total of three accidents occurred. These included one in 2002 and two in 2003. All three accidents were different types: one rear-end, one angle, and one involving a bicycle. Of the three accidents, one occurred during daylight hours, and the other two occurred at night with the streetlights on. All three accidents occurred on dry pavement. No fatalities were involved in these accidents, although two injuries were noted. There are no apparent accident patterns within the 2001 - 2003 time period. Appendix B contains a summary of the accidents at this intersection.

The intersection of 12th Street and Northeast Boulevard experienced a total of 24 accidents occurred during the three year study period (10 in 2001, nine in 2002, and five in 2003). The frequency of occurrence by collision type showed that there were a total of eight (34 percent) rear-end type collisions, six (25percent) left-turn type collisions, four (17 percent) angle collisions, two (eight percent) passing type collisions, two (eight percent) fixed-object type collisions, one (four percent) sideswipe type collision, and one (four percent) collision with a bicycle. There were seventeen injuries and no fatalities as a result of these accidents. Appendix B includes a summary of the accidents at this intersection, by year.

Based on the accident analysis, there is a rear-end and left-turn/angle type accident pattern. Contributing factors may include a lack of enough signal heads, the need for separate left turn phase on Northeast Boulevard and inadequate clearance times. Additional investigation is needed before specific actions can be recommended.

Between January 1, 2001 and December 31, 20003, three accidents occurred in the vicinity of the intersection of 16th Street Bridge, Pine Street, and Jessup Street. All three accidents occurred in 2002. Two occurred north of the intersection on Pine St. and one occurred north of the intersection on Jessup Street. All three accidents involved vehicles striking parked cars while in the process of parking. Since none of these accidents occurred at the intersection, there appears to be no accident pattern at this intersection. Appendix B contains a summary of accidents at this intersection.

VIII. Pedestrian, Bicycle and Transit Usage

Pedestrians

Almost all of the project area roadways have sidewalks for pedestrian use. The only segment of roadway that does not is the western side of Church Street south of 14th Street. The missing sidewalk coincides with Church Street's frontage of the Superfund site.

Although a number of signalized and unsignalized intersections occur within the project area, there are very few clearly delineated pedestrian crossings. All existing delineated pedestrian crossings occur along Northeast Boulevard. At the intersection of Northeast Boulevard and 12th Street, a pedestrian crossing is located on the southbound approach, although neither of the other two approaches has them. A mid-block pedestrian crossing is also located along Northeast Boulevard between Thatcher Avenue and 16th Street. Lastly, the intersection of Northeast Boulevard and Vandever Avenue has pedestrian crossings marked on all four approaches to the intersection.

Pedestrian traffic was observed during the performance of traffic counts and appeared to be consistent with an urban environment. During the peak traffic hours up to 25 pedestrians were noted at each intersection, with no more than 15 pedestrians on any single approach. It should be noted that these observations were made in December and pedestrian activity may have been minimized due to weather conditions.

The Marion T. Academy School occupies two buildings on 12th Street between Northeast Boulevard and Thatcher Street. The elementary school building is in the south west quadrant of 12th and Thatcher Streets. The middle school uses approximately 60-70% of the Northeast shopping center in the northwest quadrant. Information gathered from the school indicates that students walking to school is not the normal condition. Typically ninety percent of the students arrive by school provided bus and the balance arrive by car.

Bicycles

The project area does not contain any off-road bicycle trails. Bicycles, however, are allowed on all city streets. DelDOT's 2002 New Castle County Bicycle Map designates various roadways according to bicycle conditions. The cycling conditions displayed on the map are the result of a nationally recognized method of evaluation to determine the bicycle suitability of roadways. The method used is the Bicycle Level of Service Evaluation, or BLOS. This method is centered upon a cyclist's perceived level of comfort and is based on several key factors, including:

- presence of a bike lane or paved shoulder
- proximity of bicyclist to motorized traffic
- vehicle speed, volume, and type
- pavement condition
- percentage of on-street parking

The BLOS methodology evaluates the conditions of a roadway segment and does not take into account intersection conditions, sudden obstacles, sunken manhole covers, railroad crossings, or other localized obstacles that may cause problems for cyclists.

The BLOS evaluation identifies six categories of suitability, ranging from "A" to "F" levels of service. "A" level represents the most suitable for cycling while "F" represents roadways least suitable for cycling. "A" also equates to "Above Average" designation, while "B" equates to an "Average" designation. "Below Average" designation derives from a "C" or lower level of service.

The Map designates Northeast Boulevard as a "Below Average" roadway for bicycle use. This designation indicates that only cyclists experienced with riding in traffic would feel comfortable using Northeast Boulevard. 12th Street also is classified as "Below Average" for most of its length. The 16th Street Bridge, 11th Street and Church Street are also classified as "Below Average" for cycling conditions.

The entire length of Jessup Street within the project area is designated as "Above Average" as its low volumes and geometrics are more favorable to cyclists of all skill ranges. At the time of this study, no other roadways within the project area have bicycle usage classifications.

East Coast Greenway

In June of 1999, the U.S. Department of Transportation and the White House Millennium Council announced that the National Millennium trails would create and improve more than 2,000 trails across the country. The East Coast Greenway (ECG) is one of sixteen National Millennium Trails and is scheduled to be completed by 2010. Currently, over 200 miles of the overall 2600 miles have been completed and designated. Reaching from Key West, Florida to Calais, Maine, the East Coast Greenway will be the nation's first long-distance, city to city, multi-use trail. Linking together cities, towns and villages, it will enhance opportunities for recreation, transportation, and exercise and provide residents and visitors with a new means of exploring the heritage of the nation's most historic region. The route will be at least 80 percent off-road using waterfront esplanades, park paths, abandoned railroads, canal towpaths and parkway corridors.

The East Coast Greenway is being constructed by connecting existing trails (canal towpaths, rail-trails, park pathways, waterfront esplanades, bikeways) with new trail sections being developed to complete the linkages. When completed in 2010, it will join Interstate 95, US Route 1 and Amtrak as an eastern seaboard transportation corridor. Like the Appalachian Trail, it will accommodate walkers, but it will also serve cyclists, those in wheelchairs, skaters, equestrians and skiers.

The currently proposed path of East Coast Greenway through the City of Wilmington brings it alongside Northeast Boulevard, then ,along the path of 14th Street and over to the Market Street Bridge over Brandywine Creek. Consideration of how to incorporate East Coast Greenway into the improvement concepts should be made. Figure 10 shows a generalized, local alignment for East Coast Greenway through the project area.

Transit Usage

Public transit in Delaware is provided by DART First State. Figure 11 shows the transit routes that through the project area. While there are many DART transit routes that provide service to downtown Wilmington, only three routes pass through the project area, and of those, only one route uses the 16th Street Bridge:

- Route 3 (26th Street/Lea Boulevard) begins on Lea Boulevard at 26th Street, heads east on Lea Boulevard to Northeast Boulevard, then south to 26th Street. Traveling west on 26th Street, the route then turns south onto Jessup Street and across the 16th Street Bridge to access downtown Wilmington. The reverse trip utilizes the same roadways, except that Pine Street is used instead of Jessup Street. This route averaged about 12,000 riders per month in 2003, or about 30 percent of its total monthly capacity.

- Route 9 (Boxwood Road/Vandever Avenue) traverses only a small part of the project area along Vandever Avenue, passing through the Vandever Avenue intersections with Jessup and Pine Streets. In 2003, Route 9 carried approximately 21,000 riders each month; about 42 percent of its capacity.

- Route 24 (Governor Printz Boulevard) passes through the eastern portion of the project area along Northeast Boulevard and, specifically, the intersection of Northeast Boulevard and 12th Street. This route utilized slightly more than 50 percent of its total monthly capacity in 2003, carrying about 38,000 riders per month.

These three routes accounted for about 11 percent of the total ridership in New Castle County in 2003. It is important to note that these three routes experienced a ten percent growth in ridership between 2001 and 2003, despite an overall two percent decline in ridership in New Castle County during the same time period.

There are also a number of routes that access downtown Wilmington via Interstate 95 and Interstate 495. Many of these routes loop through downtown, entering via I-95 and exiting via I-495. Some of these routes have the potential to be re-routed after the 12th Street Connector is complete:

- Route 33, Christiana Mall/Newark
- Route 34, Marrows Road/Christiana Mall
- Route 39, Chestnut Hill Road Express
- Route 41, US Route 40 Limited
- Route 42, Glasgow Express
- Route 54, Christiana Mall/Wilton

IX. Future Development Scenarios

Opportunities and Constraints

The project area contains several opportunities and constraints which must be factored into any future development scenarios.

- *Floodplain:* Most of the project area is within the 100 year floodplain (Figure 12). While this may not present development hardship, it will direct decisions regarding building elevation and the location of active floor space. Further investigation into regulatory requirements and environmental constraints will be needed to assess development potential.

- *Zoning Controls:* Approximately 2.15 acres are zoned W-2 between the new roadway and the waterfront area, and approximately 6.35 acres are zoned W-4, for a total of approximately 8.5 developable acres. These totals are also controlled by setback requirements within the zoning, designed to preserve access to the waterfront. Most of the developable area within the new roadway and waterfront falls within the 200 foot setback (Figure 13)

- *Quarry development*: In discussions with the City's Economic Development Department, the potential filling of the quarry to create additional development area was suggested. The quarry area is approximately 3.4 acres, with an unknown depth and bottom condition. The quarry is fed by groundwater sources and likely also from surface runoff. The site may be a regulated wetland if the reservoir outfall is a tributary to the Brandywine Creek.

  For development to occur, the quarry would need to be drained and dewatered to accommodate fill materials. Depending on fill material chosen, groundwater movement into and through the site would need to either be prevented, or handled in a prepared base for the movement of the water. The site would not be a candidate for dredge spoils (a possible resource from the Christiana River) because the fill would not stabilize sufficiently for either passive (park) or structural uses. Fill material would need to be compacted. Pilings or deep foundations secured to base rock would need to be provided to stabilize all structures.

  Preliminary review of the possible site hydrology, geology and soil conditions indicates a potentially expensive and difficult process to satisfactorily prepare the site for development.

  Development of the Diamond State Salvage Site: The on-site contamination has been mitigated by the EPA and the property is available for redevelopment. However, Deed of ownership of the property is privately held by the Diamond State Salvage Company, a defunct business entity and controlled by heirs of the principal owner. The EPA has first lien on the property for the expense of site remediation. Any future purchasers of the property including DelDOT as purchaser of ROW would need to resolve these issues prior to obtaining complete ownership or contract control. The EPA has initiated discussions with the City to actively market and develop this site. The EPA would then need to provide a consent decree stating that the site has been cleaned up and also process the lien.

Development Scenarios

To assess the impacts of the various 12th Street Connector options, two future development conditions were advanced.

Future No Build

Under the Future No Build condition, no new development would take place, and no 12th Street Connector road would be built.

- ### *Future Build*

Under the Future Build condition, development takes place in the following manner:

Under the portion of the waterfront zoned W-2, approximately 185,000 square feet of new commercial space is proposed.

Under the portion of the site zoned W-4, one of two potential development scenarios is proposed:

Scenario 1: An all-residential, medium density apartment development. Two ranges of dwelling types were considered: 400 walk-up apartments, and 550 elevator apartments.

Scenario 2: A mixed use, medium density development, consisting of approximately 20,000 square feet local/neighborhood retail, 60,000 square feet of office space, and 390 elevator apartment dwelling units

A range use in W-4 from all residential to mixed use was selected to gauge the effect of different land use patterns on trip generation and trip assignments for future roadway conditions.

X. Future No-Build Traffic Conditions and Levels of Service

Future No-Build traffic volumes estimates were developed for 2025 to be consistent with current planning initiatives in the region. Two variations in the estimation of No-Build volumes were developed:

- Without Development – A true "do nothing" condition in which no development occurs along the riverfront and the 12th Street Connector is not constructed, and;
- With Development – A condition in which the 12th Street Connector is not constructed, but development is allowed to occur along the riverfront.

Background Growth

Background growth is growth in traffic associated with development outside of a target project area. The project area for the 12th Street Connector Project is relatively compact, with large amounts of housing to the north and employment opportunities in downtown Wilmington. Based upon an analysis of forecast employment for the downtown area, a growth rate of 0.55 percent compounded annually (12.2 percent overall) was applied to all of the base year traffic volumes.

The application of background growth to existing traffic volumes produced No-Build Without Development. Table 12 summarizes the total peak hour traffic volumes of the study intersections for this No-Build scenario while Figure 14 shows the turning movements volumes at study area intersections.

Table 12
2025 No-Build Without Development Peak Hour Intersection Volume

Location	Morning Peak Hour	Evening Peak Hour
Spruce Street and 10th Street	1,360	856
Spruce Street and 11th Street	1,600	1,613
11th Street and Church Street	1,877	1,968
12th Street and Northeast Boulevard	2,022	2,128
Northeast Boulevard and Vandever Avenue	1,577	1,601
Vandever Avenue and Jessup Street	646	876
16th Street Bridge/Jessup Street/Pine Street	440	612

Development Traffic

Traffic generated by the potential waterfront development was estimated using the procedures outlined in the Institute of Transportation Engineer's publication, Trip Generation 7th Edition. Table 13 summarizes the peak hour traffic generated by the new development.

Table 13
Waterfront Development Trip Making

	Am Peak Hour			PM Peak Hour			Daily
Land Use	**In**	**Out**	**Total**	**In**	**Out**	**Total**	
Scenario 1							
185, 000 sq ft commercial[1]	152	164	316	102	130	232	3,976
550 condo units	34	168	202	163	80	243	2,734
Scenario 1 Total	**186**	**332**	**518**	**265**	**210**	**475**	**6,710**
Scenario 2							
185, 000 sq ft commercial[1]	152	164	316	102	130	232	3,976
390 condo units	26	127	153	123	61	184	2,041
60,000 sq ft office	110	15	125	21	104	125	900
20,000 sq ft commercial[1]	51	55	106	15	19	34	446
Scenario 2 Total	**339**	**361**	**700**	**261**	**314**	**575**	**7,363**

[1] *Commercial land uses were given a 50 percent reduction in vehicle trip making for anticipated pedestrian traffic due to neighborhood aspect of commercial businesses.*

Distribution of the new trips associated with proposed waterfront development was estimated based upon an examination of employment and residential centers within the City and regional travel patterns that currently exist. These examinations resulted in a distribution of 35 percent of traffic to/from 12th Street, five percent via Church and Spruce Streets, 15 percent to/from Northeast Boulevard (north of Vandever Avenue), 30 percent to/from the 16th Street Bridge and 15 percent from Vandever Avenue (west of Jessup Street).

Table 14 summarizes the No-Build traffic volumes, including traffic associated with development along the waterfront. Turning movement volumes are show on Figure 15.

Table 14
2025 No-Build With Development Peak Hour Intersection Volume

Location	Morning Peak Hour	Evening Peak Hour
Spruce Street and 10th Street	1,486	966
Spruce Street and 11th Street	1,828	1,801
11th Street and Church Street	2,122	2,169
12th Street and Northeast Boulevard	2,512	2,530
Northeast Boulevard and Vandever Avenue	1,787	1,601
Vandever Avenue and Jessup Street	751	876
16th Street Bridge/Jessup Street/Pine Street	440	612

Levels of Service

Analysis of both the No-Build conditions was conducted following the same procedures utilized for the operational assessment of existing conditions. Levels of service for both No-Build conditions are summarized on Figure 14 and Figure 15.

Table 15
2025 No-Build Without Development Peak Hour Levels of Service

Location	Morning Peak Hour	Evening Peak Hour
Spruce Street and 10th Street	A (7.8)	A (7.0)
Spruce Street and 11th Street	B (16.7)	B (17.5)
11th Street and Church Street	A (5.9)	B (12.5)
12th Street and Northeast Boulevard	D (54.7)	D (40.3)
Northeast Boulevard and Vandever Avenue	B (16.5)	B (17.7)
Vandever Avenue and Jessup Street	B (10.3)	B (11.1)
16th Street Bridge/Jessup Street/Pine Street	n/a	n/a

Table 16
2025 No-Build With Development Peak Hour Levels of Service

c

Location	Morning Peak Hour	Evening Peak Hour
Spruce Street and 10th Street	A (8.6)	A (6.9)
Spruce Street and 11th Street	B (18.5)	B (19.0)
11th Street and Church Street	A (6.3)	B (12.7)
12th Street and Northeast Boulevard	F (86.1)	E (79.3)
Northeast Boulevard and Vandever Avenue	B (16.7)	B (17.7)
Vandever Avenue and Jessup Street	B (9.9)	B (11.1)
16th Street Bridge/Jessup Street/Pine Street	n/a	n/a

In general, the levels of service for both of the No-Build conditions differ little from existing conditions. The majority of intersections are expected to operate with very good levels of service. The exception is the intersection of the Northeast Boulevard and 12th Street. Increasing delay is expected at this intersection for the No-Build Without Development condition, although the intersection continues to operate with overall intersection Level of Service D. The westbound 12th Street approach, failing in the existing condition, worsens. In the No-Build With Development condition, the intersection of Northeast Boulevard and 12th Street shows poor levels of service during both the morning peak hour (Level of Service F) and evening peak hour (Level of Service E). As before, the heavy volume of vehicles turning left from 12th Street is the primary factor in these operational problems.

XI. Project Purpose and Need

There are four primary needs for the 12th Street Connector project:

- System linkage: The street system in the project area is incomplete and discontinuous. 14th Street is currently closed off through the Diamond State Salvage site, while 13th Street ends at Church Street. Access from the Interstate 495 interchange through the study is only possible via Vandever Avenue. Vandever Avenue is a residential street for most of its length, with parking on both sides of the roadway. In its current form and function, Vandever Avenue is a poor corridor for traffic destined for the CBD. A new 12th Street Connector would provide this link.

- Access to the City of Wilmington CBD: Approximately nine in ten trips between I-495 and the CBD of Wilmington using the 12th Street corridor, cross the 11th Street Bridge and travel through the Eastside neighborhood. There is essentially a single route serving the demand which results in overburdening a residential community with through traffic, the underutilization of the 16th Street Bridge and deficient and disproportional vehicle access to the northern sections of the CBD. A new 12th Street Connector would improve CBD access and relieve the burden on the local, more residential neighborhood.

- Operational Conditions: The intersection of Northeast Boulevard and 12th Street currently operates with an overall Level of Service D and with the westbound approach failing (Level of Service F). This condition worsens slightly for the No-Build Without Development condition and degrades to overall failing levels of service for the No-Build With Development condition. The failing operational conditions are a result of the heavy left turning movements from 12th Street westbound to southbound Northeast Boulevard. A new roadway will help relieve congestion with or without future development.

- Economic Development: In the past few years, the City's waterfront along the Christina River has enjoyed enormous redevelopment success. Properties along Brandywine Creek through the project area are some of the last waterfront properties remaining in the City of Wilmington. Development of these properties is part of the City's vision. Recent clean up efforts on the Diamond State Salvage site further support development objectives. Development of this site is problematic, however, given the current incomplete and discontinuous network in the project area.

XII. Proposed Improvement Options

Three main options were developed to address the defined Purpose and Need of the 12th Street Connector project area. Each improvement option utilizes the intersection of 12th Street and Thatcher Avenue as the eastern terminus of the project while the western terminus for all options is the intersection of 16th Street, Jessup Street, and Pine Street. Option 1, with three variations, shows new alignment with partial re-use of existing streets. Option 2 and Option 3 are similar, with three variations each, and use as much of the existing City grid street system as possible.

Typical Section

All of the improvement options have been designed with the same typical section: a two-lane urban street with one 11-foot wide travel lane in each direction, an 8 foot parking lane and a 5-foot wide sidewalk. The typical section was developed with input from the City of Wilmington. A 4 foot bike lane was provided in the East Coast Greenway designated segments. Figure 16 shows the typical sections for bicycle compatible and standard segments.

Overview of Improvement Options

Options 1A - 1C

Options 1A, 1B and 1C were variations on the preferred conceptual alignment developed during the 2003 DelDOT study. (Figure 1) The options are shown on Figure 17.

Option 1A

Option 1A is a refinement of the preferred conceptual alignment shown on the previous conceptual study. It begins at the intersection of 12th Street and Thatcher Avenue where the improvement concept follows the existing alignment of 12th Street until just before its intersection with Northeast Boulevard. At this intersection, 12th Street is re-aligned with Northeast Boulevard to address the slight skew at which 12th Street currently intersects. This will require crossing a corner of the newly opened Marion T Academy in the northeast quadrant of the intersection.

Option 1A will then traverse the City of Wilmington parcel directly opposite the 12th Street and Northeast Boulevard intersection. This segment of the alignment nearly bisects the City parcel as it links up with the intersection of 13th Street and Locust Street. Because of the angles involved in joining the new 12th Street alignment with the intersection of 13th Street and Locust Street, it is recommended that the segment of 13th Street between Locust Street and Northeast Boulevard be abandoned.

The option then follows existing 13th Street towards Church Street and then onto new alignment as it crosses the Diamond State Salvage site, utilizing some of the existing right-of-way for 14th Street. A small section of 14th Street between the proposed alignment and Church Street is recommended for abandonment as is the segment of Church Street between 14th Street and 13th Street.

Option 1A skims the abandoned quarry owned by the Boys Club of Wilmington before becoming a fourth leg at the intersection of 16th Street, Jessup Street, and Pine Street. Because of the current, uncontrolled nature of this intersection, more clarity through a roundabout design is suggested for this terminus. Figure 17 shows the alignment of Option 1A.

Option 1B

The purpose of Option 1B was to increase the potential development area along the water by shifting the alignment north into the vacant property adjacent to the Ames Engineering building. From the intersection of 12th Street and Thatcher Avenue to the re-use of 13th Street, Option 1B is identical to Option 1A. Where Option 1A follows 13th Street to its end before crossing the Diamond State Salvage site, Option 1B turn north slightly, crosses Church Street and onto new alignment. Option 1B crosses the Diamond State Salvage site, utilizing more of the existing right-of-way for 14th Street than Option 1A. A small section of 14th Street between the proposed alignment and Church Street is recommended for abandonment as is the segment of Church Street between 14th Street and 13th Street. Option 1B ends at the intersection of 16th Street, Jessup Street, and Pine Street the same as Option 1A.

Option 1C

The purpose of Option 1C was to maximize the amount of waterfront property for development by shifting the alignment further north and acquire the entire parcel owned by Ames Engineering. Option 1C is identical to Options 1A and 1B between the intersection of 12th Street and Thatcher Avenue and the City of Wilmington parcel directly opposite the 12th Street and Northeast Boulevard intersection.

Option 1C crosses the City parcel but does not align with 13th Street. Instead, Option 1C crosses through the intersection of 13th Street and Locust Street and through the property in the northwest corner of that intersection. With this option, it is recommended that the entire segment of 13th Street between Church Street and Northeast Boulevard be abandoned. The option then crosses Church Street and onto new alignment. Option 1C crosses the Diamond State Salvage site, utilizing more of the existing right-of-way for 14th Street than Option 1A. A small section of 14th Street between the proposed alignment and Church Street is recommended for abandonment as is the segment of Church Street between 14th Street and 13th Street. Option 1C ends at the intersection of 16th Street, Jessup Street, and Pine Street the same as Options 1A and 1B.

The three options were presented to DelDOT and the City of Wilmington for review and comment at the July 15, 2004 coordination meeting. Option 1C was preferred of the three alternatives because it maximized the potential development area. Upon review, the City was not in favor of these alternatives which have a "boulevard" type appearance and requested that the alignment maintain more of the urban grid system. The City also requested that impacts to their parcel at the corner of Northeast Blvd. and 13th Street be minimized by moving the proposed intersection closer to 13th Street. At that time, it was also thought that the Northeast Shopping Center property was vacant and possibly available for acquisition.

Options 2A - 2C

Options 2A, 2B and 2C were developed in response the City's comments and are shown on 18.

Option 2A

Option 2A begins at the intersection of 12th Street and Thatcher Avenue but quickly turns northward and crosses the newly opened Marion T. Academy site, impacting the building itself, to intersect with Northeast Boulevard and a re-aligned 13th Street.

The alignment then begins following existing 13th Street, through its intersection with Locust Street to just before its intersection with Church Street. At this point, Option 2A makes a 90-degree turn up Church Street before intersecting with 14th Street. Motorists would then turn left onto an upgraded 14th Street,

which would become a fourth leg at the intersection of 16th Street, Jessup Street, and Pine Street. Because of the current, uncontrolled nature of this intersection a roundabout design is suggested for this terminus.

Option 2B

Option 2B is identical to Option 2A, except in its alignment across the Marion T. Academy site. To minimize the impacts to the structure of the school, Option 2B is located more to the west, missing the building but still cutting across the parking lot.

Option 2C

Option 2C is identical to Option 2B between the intersection of 12th Street and Thatcher Avenue and the intersection of 13th Street and Church Street. Instead of following Church Street, however, Option 2C turns northward, crosses Church Street and across a small portion of the Diamond State Salvage site before following existing 14th Street. Church Street would be reconfigured slightly to provide an intersection with the new 12th Street alignment while making its current intersection with 14th Street a T-intersection. This option provides preference for the through movement along the 12th Street Connector, as opposed to the stop condition required under Options 2A & B. Option 2C would end at the intersection of 16th Street, Jessup Street, and Pine Street in a roundabout.

Options 3A - 3C

Options 3A, 3B and 3C were developed in response the City's Department of Economic Development to further minimize impacts to the City owned parcel and try to utilize the existing intersection of Northeast Boulevard and 13th Street and are shown on Figure 19.

Option 3A

Option 3A begins at the intersection of 12th Street and Thatcher Avenue but quickly turns northward and crosses the newly opened Marion T. Academy site, impacting the building significantly, to intersect with Northeast Boulevard at 13th Street.

The alignment then follows existing 13th Street, through its intersection with Locust Street to its intersection with Church Street. At this point, Option 3A makes a 90-degree turn up Church Street before intersecting with 14th Street. Motorists would then turn left onto an upgraded 14th Street which would become a fourth leg at the intersection of 16th Street, Jessup Street, and Pine Street.

Option 3B

Option 3B is identical to Option 3A except for how it crosses the newly opened Marion T. Academy site and connects to 13th Street. Option 3B begins at the intersection of 12th Street and Thatcher Avenue, coming in at a skew. The alignment angles across the newly opened Marion T. Academy site, impacting the building slightly, to intersect with Northeast Boulevard and a re-aligned 13th Street. The remainder of Option 3B is the same as Option 3A.

Option 3C

Option 3C is similar to Option 3A and Option 3B, but seeks to "soften" the movements through the system. Option 3C begins at the intersection of 12th Street and Thatcher Avenue but quickly turns

northward and crosses the newly opened Marion T. Academy site, missing the building itself, to intersect with Northeast Boulevard and a re-aligned 13th Street.

The alignment then begins following existing 13th Street, through its intersection with Locust Street to just before its intersection with Church Street. At this point, Option 3C makes a 90-degree turn up Church Street before intersecting with 14th Street. Motorists would then turn left onto an upgraded 14th Street, which would become a fourth leg at the intersection of 16th Street, Jessup Street, and Pine Street.

Marion T. Academy School Bus Circulation

Marion T. Academy operates two school facilities on 12th Street between Thatcher Street and Northeast Boulevard. The Elementary School is located south of 12th Street and has curb frontage on 12th and Thatcher Streets. The Middle School partially occupies the Northeast Boulevard Shopping Center. The current enrollment is approximately 450 students. The school system uses ten full size buses with three of the buses making double runs to furnish rides to school for the students. Currently, buses load and unload along 12th Street and Thatcher Street. Approximately 90% of the students use the bus service. The balance of the student population, or approximately 10% of the students, are dropped-off in the same areas used by the buses or use the parking area in the Northeast Boulevard Shopping Center.

Thatcher Street is one-way northbound south of its unsignalized intersection with 12th Street. Buses and auto arriving at the front door of the complex along Thatcher Street must use Heald Street, circle through 11th Street and exit at 12th Street intersection. The intense use of the curb side areas, pedestrian movements between drop-off and the buildings and poor circulation patterns results in congestion.

Two conceptual schemes have been developed to improve curb operations and circulation as summarized below and shown on Figure 20. These schemes are adaptable to any of the options developed:

Scheme A

In this scheme, Thatcher Street is converted to one-way southbound south of 12th Street and creates a counterclockwise circulation pattern with 11th and Heald Streets. Buses and autos would enter southbound Thatcher and unload on the curb side fronting the school. Exiting vehicles would travel 11th Street to Heald Street and enter 12th Street at the existing signal. The scheme would allow bus drop-offs from the right side of the bus directly to the building front and avoid the conflicts and delay for exiting vehicles at the stopped controlled 12th Street. However, this scheme would require that the auto parts distributor's loading dock on Thatcher be relocated to the other side of their building. The cost to relocate the loading dock is estimated to be approximately $15,000 to $20,000. Modifications to the building internal area made necessary by the relocation are unknown and therefore not included in the estimate.

Scheme B

The second scheme proposes constructing a new driveway behind the elementary school building linking 12th Street to 11th Street. The driveway would enter the privately held property west of the school between the school building and Northeast Boulevard and create a common driveway on 12th Street between Thatcher Street and Northeast Boulevard. Buses would use this new driveway to access Thatcher Street for loading and unloading operations. The roadway would eliminate some of the school parking area behind the building. Introducing a driveway closer to the Northeast Boulevard intersection and building the roadway adjacent the Brandywine Creek bank are concerns requiring additional study.

Future Build Traffic Volumes

Given the relative similarity in the build options, traffic volume estimates for future Build conditions were not developed for each individual option, but a general Build condition. As with No-Build, two variations of the Future Build Traffic Volumes were developed:

- A condition in which no development occurs along the waterfront and a 12th Street Connector is constructed, and;
- A condition in which a 12th Street Connector is constructed and development is allowed to occur along the waterfront.

The origin-destination survey showed over 50 percent of the vehicles making a left-hand turn from 12th Street to Northeast Boulevard ultimately make a right turn from Spruce Street onto 10th Street during the morning peak hour. The evening peak hour showed 34 percent making the same movement. Of the vehicles making right turns from 12th Street onto Northeast Boulevard, 38 percent during the morning peak hour and 20 percent during the evening peak hour make left hand turns onto Vandever Avenue.

Based upon an assessment of travel times along the existing routes and the new 12th Street Connector route, it was estimated that 60 percent of traffic traveling to/from downtown Wilmington via Northeast Boulevard, 11th Street, Walnut Street, and 10th Street would divert to the new 12th Street Connector. This diversion accounts for 245 vehicles during the morning peak hour and 259 vehicles during the evening peak hour. Similarly, half of the vehicles traveling to/from downtown Wilmington via Northeast Boulevard, Vandever Avenue and Jessup/Pine Streets would divert to the 12th Street Connector. This equates to 46 vehicles during the morning peak hour and 29 vehicles during the evening peak hour.

An analysis of the existing traffic counts and O-D survey showed that approximately half of the morning peak hour traffic traveling south on Northeast Boulevard across Brandywine Creek was destined for downtown Wilmington. In the evening peak hour 33 percent of these vehicles showed the same pattern. As with traffic from 12th Street, 60 percent of the vehicles traveling on Northeast Boulevard across Brandywine Creek were diverted to the 12th Street Connector, or 246 vehicles during the morning peak hour and 281 vehicles during the evening peak hour.

In total, about 565 vehicles during the morning peak hour and 605 vehicles during the evening peak hour are expected to divert to the 12th Street Connector. Total intersection volume is summarized in Table 17 while Figure 21 shows the turning movement volumes for the 2025 Build Without Development condition.

Table 17
2025 Build Without Development Peak Hour Intersection Volume

Location	Morning Peak Hour	Evening Peak Hour
Spruce Street and 10th Street	1,164	822
Spruce Street and 11th Street	1,355	1,354
11th Street and Church Street	1,632	1,709
12th Street and Northeast Boulevard	2,022	2,128
Northeast Boulevard and Vandever Avenue	1,531	1,572
Vandever Avenue and Jessup Street	605	862
16th Street Bridge/Jessup Street/Pine Street	685	871

The development traffic utilized for No-Build With Development condition was incorporated into the Build With Development condition. Figure 22 depicts the turning movement volumes for study area intersections while Table 18 summarizes the total intersection volume for the 2025 Build With Development condition.

Table 18
2025 Build With Development Peak Hour Intersection Volume

Location	Morning Peak Hour	Evening Peak Hour
Spruce Street and 10th Street	1,019	719
Spruce Street and 11th Street	1,109	1,056
11th Street and Church Street	1,403	1,424
12th Street and Northeast Boulevard	2,457	2,494
Northeast Boulevard and Vandever Avenue	1,658	1,788
Vandever Avenue and Jessup Street	730	955
16th Street Bridge/Jessup Street/Pine Street	1,296	1,460

Future Build Levels of Service

Analysis of both Build conditions was conducted following the same procedures utilized for the operational assessment of existing and No-Build conditions. Levels of service for both No-Build conditions are summarized on Figure 21 and Figure 22 and in Table 19 and Table 20.

Table 19
2025 Build Without Development Peak Hour Levels of Service

Location	Morning Peak Hour	Evening Peak Hour
Spruce Street and 10th Street	A (7.1)	A (7.3)
Spruce Street and 11th Street	B (14.1)	B (14.6)
11th Street and Church Street	A (6.1)	B (10.6)
12th Street and Northeast Boulevard	C (22.5)	D (37.1)
Northeast Boulevard and Vandever Avenue	B (16.6)	B (17.6)
Vandever Avenue and Jessup Street	B (10.3)	B (11.1)
16th Street Bridge/Jessup Street/Pine Street[1]	A (9.3)	A (7.5)

[1] *Note: the roundabout analysis was prepared using SIDRA*

Operational conditions between the No-Build and Build conditions vary only slightly. Slight decreases in delay (but no change in overall intersection level of service) are noted at: Northeast Boulevard, 11th Street and Church Street; 11th Street and Spruce Street; 10th Street and Spruce Street. The most significant changes are at the intersection of Northeast Boulevard and 12th Street. During the morning peak hour for the Build Without Development condition, this intersection is expected to operate at Level of Service C, improving from Level of Service for the No-Build Without Development condition. The evening peak hour for the Build Without Development condition improves slightly when compared to the No-Build Without Development condition.

Table 20
2025 Build With Development Peak Hour Levels of Service

Location	Morning Peak Hour	Evening Peak Hour
Spruce Street and 10th Street	A (7.1)	A (7.3)
Spruce Street and 11th Street	B (14.1)	B (14.6)
11th Street and Church Street	A (6.2)	B (10.7)
12th Street and Northeast Boulevard	C (25.0)	D (35.5)
Northeast Boulevard and Vandever Avenue	B (16.7)	B (17.7)
Vandever Avenue and Jessup Street	B (10.3)	B (11.1)
16th Street Bridge/Jessup Street/Pine Street[1]	A (9.5)	A (8.1)

[1] *Note: the roundabout analysis was prepared using SIDRA*

Small increases in delay are expected between the Build Without Development and Build With Development for the two intersections most affected by development of the waterfront: Northeast Boulevard and 12th Street; 16th Street, Jessup Street, and Pine Street. No changes to the overall level of services are expected.

It should be noted that the intersection of 16th Street, Jessup Street, and Pine with the new 12th Street Connector was analyzed as a roundabout, given the broad area of existing intersection. The roundabout analysis indicates that the intersection would operate with very good levels of service during both the morning and evening peak hours, with and without development of the waterfront property.

XIII. Analysis of Improvement Options

The impacts for each of the option sets discussed in detail below are tabulated in Appendix C.

Options 1A - C

The Option 1 alternatives have similar alignments between Locust Street and Northeast Boulevard and identical alignments between Northeast Boulevard and Thatcher Street. For this reason, they have nearly the same impacts on Blocks 2, 4, and 5. At Block 4, all three alignments bisect the City of Wilmington construction storage yard. For Option 1A, the roadway is set back 190 feet from the waterfront at the western edge of Block 4 and 60 feet at the eastern edge, creating a triangular shaped lot. This leaves approximately 0.71 acres north of the roadway and 0.67 acres south of the roadway open for development. Options 1B and 1C have a similar effect. The required waterfront setback of 35 feet from the Brandywine Creek could restrict the potential waterfront development in this block. At Block 5, the three alternatives have no impact on the Marion T. Academy Middle School building, and only a slight loss of parking due to an increased curb radius at the northeast corner of Northeast Boulevard and 12th Street. None of the Option 1 alternatives will impact any Block 2 properties.

In contrast, the three alignments vary significantly in the amount of total waterfront development potential they provide. Due to its winding alignment through the eastern half of the Block 6 Superfund site, Option 1A provides the least amount of waterfront development potential (5.7 acres) of the Option 1 alternatives. This alignment has a relatively small setback from the waterfront (95 feet) near Church Street, which create the narrowest corridor for waterfront development. However, it also has the lowest displacement impacts because it avoids the Ames Engineering facility and its parking lot in Block 1. The only potential business displacement for Option 1A is the ministry building at the northeast corner of Block 3.

In contrast, Option 1C provides the greatest amount of waterfront development potential (7.6 acres) because the proposed roadway alignment is closer to existing 12th Street through the Block 6 Superfund site and cuts through the center of Block 1. The roadway is set back at least 200 feet from the waterfront for most of its alignment. As a result, this alignment potentially displaces the Ames Engineering building and isolates its parking lot from the rest of the parcel. It should be noted that the ministry building located at the northeast corner of Block 3 is not impacted under this option.

The alignment for Option 1B is located between Options 1A and 1C and thus provides an average amount of waterfront development potential (6.7 acres). Option 1B has similar setbacks to Option 1C west of Church Street and similar setbacks to Option 1A east of Church Street. Although this alignment impacts the parking lot in Block 1 and the ministry at the northeast corner of Block 3, it completely avoids the Ames Engineering building.

Options 2A - C

Option 2A and 2B follow the existing 12th Street, Church Street and 13th Street alignments west of Locust Street and thus have minimal potential impacts on the Block 1, 2, 3, and 6. Between Locust Street and Northeast Boulevard, these alignments follow 13th Street and then clip the northeast corner of Block 4 near the intersection of 13th Street and Northeast Boulevard. Due to this alignment, Option 2A and 2B leave significantly more total waterfront land open (8.5 acres) than the Option 1 alternatives. This includes 1.6 acres of the City of Wilmington construction storage yard, all to the south of the proposed

roadway. Additionally, setbacks of 220 feet at the west edge of Block 4 and 250 feet at the east edge allow significant opportunities for development along the waterfront.

For the most part, Option 2C follows the same alignment as Options 2A and 2B west of Locust Street. However, Option 2C provides slightly less total waterfront development potential (8.2 acres) because the alignment curves through the northeast corner of the Block 6 Superfund site. Overall, Option 2C still provides more acres for potential waterfront development than any of the Option 1 alternatives, especially at the Superfund site and the City storage yard.

Due to the proposed alignment of 12th Street between Northeast Boulevard and Thatcher Street, Option 2A has significant impacts on the T. Academy Middle School building in Block 5. This alternative also displaces a large number of the school's parking spaces as it winds through the center of the lot. Options 2B and 2C avoid impacts to the Marion T. Academy Middle School building by shifting the proposed intersection at Northeast Boulevard south and straightening the alignment of 12th Street through the parking lot. However, under all of the Option 2 alignments, it would be necessary to find a replacement parking lot to mitigate parking displacements.

Option 3A - C

The Option 3 alternatives also generally follow the existing 12th Street, Church Street and 13th Street alignments west of Locust Street and thus have minimal potential impacts on Blocks 1, 2, 3, and 6. The Church Street and 13th Street intersection remains at its current location and configuration. The roadway in Options 3A and 3B creates a set back of approximately 85 feet from the waterfront at the western edge of Block 3. Since Option 3C transitions from 13th to Church Street on a curve instead of a 90-degree intersection resulting in a minimum 140 feet of separation between the roadway and the waterfront. Overall, the Option 3 alternatives provide a similar amount of total waterfront development acreage as the Option 2 alternatives (between 8.2 and 8.4 acres). Potential impacts to the Superfund site in Block 6 are similar to those of Option 2.

The Option 3 alignments have significant differences between Locust Street and Thatcher Street. Option 3A follows the existing 13th Street alignment up to Northeast Boulevard, which avoids impacting the City of Wilmington parcel in Block 4 and leaves approximately1.9 acres for potential development. The alignment in this area will have significant potential impacts on the frontage of the Franklin Fibre-Lamitex Corporation Facility and the Kaufman Glass store. Furthermore, the proposed alignment of Option 3A between Northeast Boulevard and Thatcher Street runs directly through the Marion T. Academy Middle School building and its parking lot in Block 5 resulting a potential total displacement and relocation of the school operation.

In contrast, Option 3C follows the existing 13th Street alignment along the western half of Block 4 but then cuts through the northeast corner of the construction storage yard before intersecting Northeast Boulevard. For this reason, the parcel has slightly less area (1.6 acres) available along the waterfront for development, along with a reduced setback on the eastern edge (210 versus 325 feet). The alignment of Option 3C between Northeast Boulevard and Thatcher Street avoids impacts to the Marion T. Academy Middle School building but still displaces approximately 88 parking spaces.

The alignment for Option 3B is located between Options 3A and 3B to the west of Northeast Boulevard, creating a Block 4 parcel of approximately 1.7 acres. Between Northeast Boulevard and Thatcher Street, this alignment has the least impacts on the Marion T Academy Middle School but would displace Ray's Grocery & Deli at the southeast corner of Block 5. Similar to Option 2, under each of the Option 3 alternatives it would be necessary to find a replacement parking lot to mitigate parking displacements.

Superfund Site

Additional Right of Way on the Superfund site will be necessary for all of the options developed. Some result in substantial new portions of ROW (Option 1C), while others minimally impact the parcel (Option 2B). Diminished access or loss of substantial use of the property should be evaluated for each option.

XIV. Summary of Impacts

The impacts of the proposed improvements were analyzed with respect to right-of-way, utilities and environmental resources.

Right-of-Way Impacts

Preliminary right-of-way lines were established for each of the proposed improvement concepts. The required right-of-way lines were set approximately 11 to 12 feet from the proposed edge of shoulder. The required right of way lines will need to be refined during preliminary design.

Table 21 summarizes the right-of-way impacts for each of the improvement options.

Table 21
Right-of-Way Impacts by Improvement Option

Option	ROW Impacts			Waterfront Redevelopment	Abandonment of Existing ROW
	Total Area (acres)	Displaced Businesses	Displaced Parking Spaces	Total Area (acres)	Total Area (acres)
1A	2.20	1	38	5.70	0.65
1B	2.09	1	39	6.67	0.62
1C	2.20	1	38	7.60	0.81
2A	1.65	1	102	8.53	0.00
2B	1.59	0	101	8.50	0.00
2C	1.86	0	101	8.15	0.00
3A	1.94	4	97	8.44	0.00
3B	2.06	4	131	8.17	0.00
3C	1.70	2	88	8.21	0.00

Notes:
"Displaced Parking Spaces" assumes 168 SF/space (8' stall width by 10' stall length + 11' half lane)
"Waterfront Development" summarizes the acreage available for development for each option.

Based upon a review of Table 21, Option 2B requires the least amount of right of way for the new roadway, while Option 1C requires the most amount of right of way. Options 2B and 2C would displace no businesses, while Options 3A and 3B would displace four. Displacement of parking spaces is minimized with Options 1A, 1B, and 1C, while Option 3B takes the most. Options 2A and 2B provide the most acreage for waterfront development, while Option 1A provides the least. Several options would not require the abandonment of existing right-of-way, but Options 1A, 1B, and 1C would require abandoning between 0.6 and 0.8 acres of current right-of-way.

Utility Impacts

The location of surface utilities was identified through field survey and from a review of utility plans from the utility companies within the study area. Subsurface utilities have also been identified via the utility plans. While impacts to utilities are expected for any of the options, no quantification of impacts has been performed at this point as no coordination with the utility companies has been initiated. The main utility concern will be avoiding the large transmission towers along 14th Street.

Environmental Impacts

Included in Appendix D is the Categorical Exclusion Evaluation prepared by our subconsultant, AD Marble, Inc. This document covers in detail the environmental resources present in the project area and surrounding environs and highlights the potential impacts. The known resources and potential impacts are summarized as follows:

- 1330 Thatcher Avenue (#14) may be potentially eligible for listing on the National Register of Historic Places.
- The North Church Street Bridge (#20), located on the southwest border of the study area, was determined eligible in 1988 for listing on the National Register of Historic Places. This structure may be within the Area of Potential Effect and would possibly require additional documentation and mediation.
- Residential displacements are not anticipated. One to three businesses are potentially impacted depending on option. A relocation of a school facility is possible, not probable.
- Relocations are in an area with high minority population.
- Relocations are in an area with low income population.
- A walk though in 2004 by representatives from Tetra Tech and DelDOT's HAZMAT Coordinator found that there were no apparent physical signs of soil contamination at the Diamond State Salvage site. However, it should be noted that due to the long-term industrial use of the site, subsurface contamination cannot be discounted without additional investigation and testing.
- The proposed improvement concepts all fall within the 100-year flood plain boundaries. However, no hydrological studies have been conducted to determine the impact of these options on the flood plain.

Tetra Tech, Inc, in their December 2004 Phase II Environmental Assessment, had the following conclusions and recommendations:

Based on field observations and the analytical data collected during this investigation, soils within the study area have been contaminated as a result of the historical industrial/manufacturing land use of properties within the study area. The presence of elevated concentrations of arsenic and PAHs in the soil is consistent with the type and concentration of soil contamination detected within other areas of the City

of Wilmington and other urban areas. Specific areas of concern identified during this Phase II Environmental Investigation include the City of Wilmington property located at the intersection of 12th Street and Northeast Boulevard, the paved area of the Ames property, and the 14th Street right-of-way.

Based on the final alignment of the proposed 12th Street Connector roadway, contaminated soil may be encountered during construction activities. This potential increases if underground utility trenching work is performed during the construction activities. Therefore, to address potential worker health and safety issues, and the handling and disposal of excavated soils, Tetra Tech recommends the following DelDOT Specifications be included in the final design/specification bid package: #202531 (Contaminated Material Management Work Plan); and #202532 (Removal of Contaminated Material).

XV. Recommended Option and Cost Estimate

Preferred Alternative

All alternatives satisfy the project purpose and need. There is not any difference in impacts to potential environmental or cultural resources among the 9 alternatives evaluated. Option 2B is the preferred alternative. Because:

- It creates the second highest amount of potential waterfront development area. (8.5 acres)
- It avoids significant impacts on the operations of the Marian T. Academy.
- It preserves and recreates the urban grid pattern of streets.
- Performs as well or better than all other Alternative evaluated.

Cost Estimate

A preliminary Capital Transportation Program cost estimate has been prepared for Option 2B (Table 22). Given the relatively similar nature of all the improvement concepts, project costs for the other options would be similar.

The construction cost estimates are based on major construction items such as roadway reconstruction, excavation, drainage, maintenance of traffic, traffic signals and lighting. A 20 percent contingency was also used to account for the additional construction items not covered by this level of study. Utility relocation costs are not included in the cost estimates. The estimate represents the current construction cost (prepared December 2004) and should be escalated for the anticipated start date of construction for budgeting purposes. The CTP Detailed Cost Estimate is included in Appendix F.

For Option 2B, approximately $335,000 in environmental studies was estimated including Phase I archeological studies, remediation for contaminated soil, and Phase I Historic studies. Preliminary engineering studies were estimated at $561,000 including design and utility test holes. A total of $385,000 was estimated for real estate purchases in the form of partial acquisitions and temporary easements. Construction estimates were approximately $2,600,000.

Table 22
Summary of Cost Estimate

Cost Category	Cost
Location and Environmental Studies	$335,500
Preliminary Engineering	$561,000
Real Estate	$385,000
Construction	$2,598,660
TOTAL COST	**$3,880,160**

Future Waterfront Development

The total potential waterfront area available for development is shown in Figure 23 and is estimated to be 8.90+/- acres. The entire site consisting of 1.60+/- acres owned by the City of Wilmington, 1.35 +/- acres in private ownership, 5.56 +/- acres in remediated Superfund site and 0.39+/- acres of vacated streets. The areas in Waterfront District zoning classifications W-4 and W-2 are 6.36+/- and 2.54+/- acres, respectively.

Scale: 0 170 340 680 1,020 Feet

Figure 17:
Proposed Improvement Concept 1A- 1C

12th Street Connector Project

December 2004

Scale: 0 170 340 680 1,020 Feet

N E S W

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Figure 18:
Proposed Improvement Concept 2A- 2C
12th Street Connector Project
December 2004

Scale: 0 170 340 680 1,020 Feet

N E S W

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Figure 19:
Proposed Improvement Concept 3A- 3C
12th Street Connector Project
December 2004