FINAL REPORT - FEBRUARY 2013

Wrightsville Beach | Community Transportation Plan

Prepared for:

Town of Wrightsville Beach

Wilmington Urban Area Metropolitan Planning Organization

Kimley-Horn
and Associates, Inc.

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Acknowledgements

The Wrightsville Beach Community Transportation Plan is the direct result of a collaborative effort between the Town of Wrightsville Beach and the Wilmington Urban Area Metropolitan Planning Organization with support from the North Carolina Department of Transportation. We extend our sincere appreciation to the elected officials, residents, stakeholders, and local staff who participated in the planning process and guided the development of this plan. Everyone's time, input, and energy are greatly appreciated.

Kimley-Horn and Associates, Inc.

Adopted by the Board of Aldermen February 14, 2013

Chapter 1 | Purpose, Philosophy, and Vision

Protecting the mobility for 2,500 year round residents in a Town surrounded by water and accessible only by boat or bridge is difficult enough. Extending that mobility to as many as 40,000 residents and visitors during the seasonal peak period is a challenge that requires a plan based on proven planning concepts and tested engineering principles. The *Wrightsville Beach Community Transportation Plan* (*CTP*) blends the needs of motorists, bicyclists, pedestrians, and emergency service providers into a plan for residents and visitors while respecting the natural resources and amenities that give the Town its charm and support its tourism-based economy.

Purpose and Need

Wrightsville Beach continues to be one of the premier beach communities in North Carolina. With quick access from I-40 and the City of Wilmington nearby, it's no wonder people choose Wrightsville Beach as their home or vacation spot. The Town has a history of providing an ideal quality of life for its residents and visitors. But with popularity comes frustration. Traffic congestion, safety, pedestrian and bicycle circulation, and parking issues are daily concerns.

The purpose of the *Wrightsville Beach CTP* is to identify problems, separate fact from perception, and develop coordinated transportation solutions that protect what makes Wrightsville Beach great. Several adopted plans have started to tackle these concerns: Cape Fear Commutes 2035 Plan; Pelican Drive/Salisbury Street Bicycle Plan; 2007-2012 Parks, Recreation, and Open Space Master Plan; Wave Short-Range Transit Plan; and many others. The findings, results, and recommendations of these plans have been vetted and incorporated into the *Wrightsville Beach CTP* where appropriate. The planning process for the *CTP* also delves deeper into the issues identified during community outreach and analysis specific to the *CTP*. The underlying need for the plan is based on these outcomes and expressed in the vision described later in this introductory chapter.

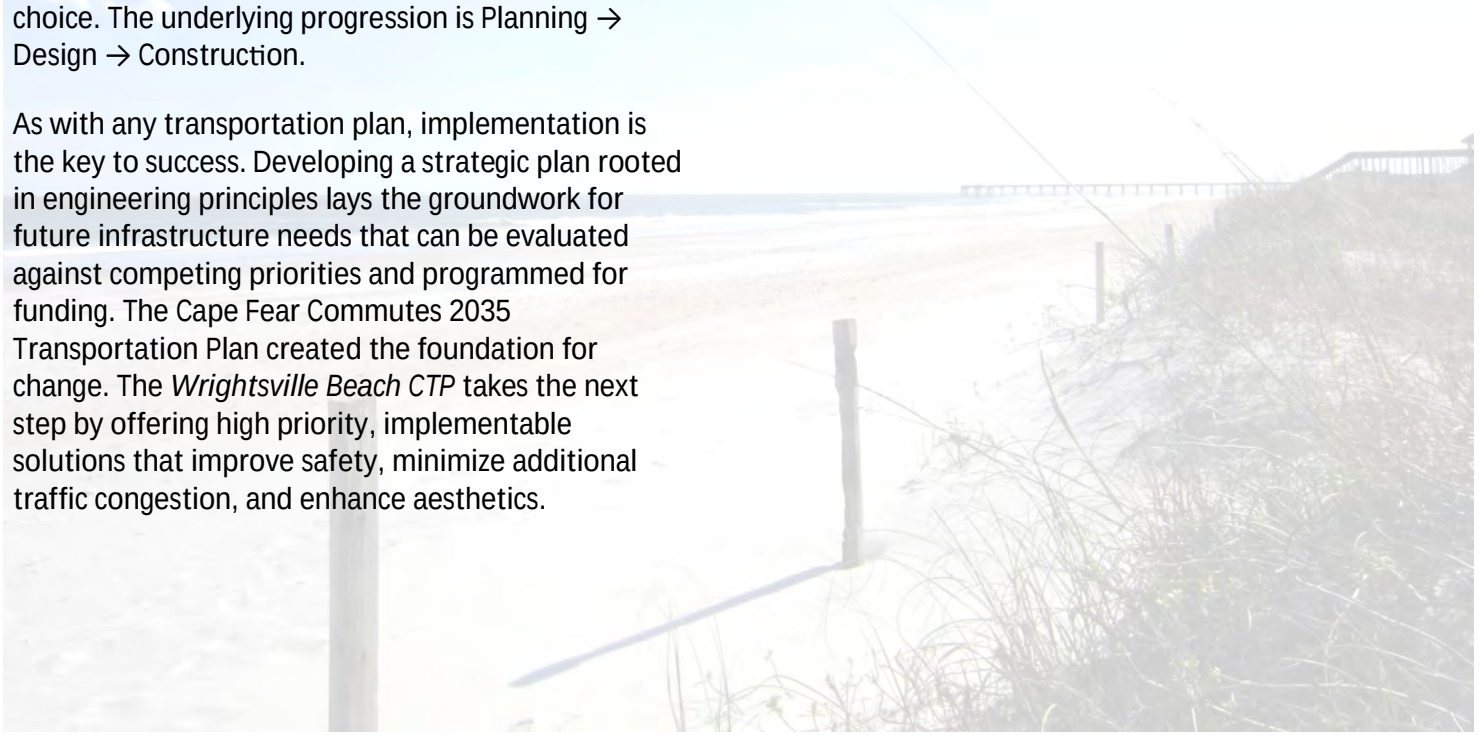
Safety for bicyclists, pedestrians, and motorists throughout Town is a core component of the plan. Bicyclists and pedestrians outnumber vehicles in many areas in Wrightsville Beach, particularly during the summer. Bicyclists, pedestrians, and vehicles routinely share the same space. The ultimate design for the Town's strategic corridors and intersections must incorporate the principles of complete streets and blend the needs of non-motorized users with the mobility of the roadway.

Plan Philosophy

As multimodal issues are evaluated, local decision-makers can't lose focus that in most cases they are trying to protect what they have today. In other words, limited funding and the geography of Wrightsville Beach mean new crosstown connections may not be possible or desirable. It also means major infrastructure recommendations must be reinforced through analysis and supported by the community. The philosophy of the *Wrightsville Beach CTP* is to protect and enhance what exists today by making strategic decisions that provide transportation choice. The underlying progression is Planning → Design → Construction.

As with any transportation plan, implementation is the key to success. Developing a strategic plan rooted in engineering principles lays the groundwork for future infrastructure needs that can be evaluated against competing priorities and programmed for funding. The Cape Fear Commutes 2035 Transportation Plan created the foundation for change. The *Wrightsville Beach CTP* takes the next step by offering high priority, implementable solutions that improve safety, minimize additional traffic congestion, and enhance aesthetics.

The plan philosophy has been translated into a process structured to evaluate alternatives with a planning, design, and construction perspective. While some plans may sit on the shelf because they are unrealistic, the *Wrightsville Beach CTP* is conceived to go beyond planning by including engineering and design expressed in conceptual drawings for key focus areas such as Causeway Drive at Salisbury Street and Causeway Drive at Waynick Boulevard. The design perspective ensures the constructability of recommendations.



Vision and Guiding Statements

Given the unique geography of the study area and the need to balance competing interests, it was important to clearly communicate the intent of the plan among participants and policy makers throughout the process—not just when the final report was delivered. The Steering Committee helped establish the following vision to direct the process of developing the Wrightsville Beach CTP and simplify the intent of the plan.

The Vision of the Wrightsville Beach CTP is to develop an integrated community-based transportation plan that provides choice, establishes identity, and promotes safety for residents, business owners, and visitors.

The guiding statements represent five interrelated value statements from the major priorities of the *CTP*. The statements add depth to the vision by building upon its key concepts. The following guiding statements stand among the most significant content generated during the early phases of the project.

Integrated | Blend previous planning efforts with new analysis and purposeful community involvement to create realistic and implementable solutions.

Community-based | Establish an understanding of the Town's needs and achieve informed consent through active and transparent outreach.

Choice | Connect homes, parks, businesses, and other key destinations with facilities designed for bicyclists, pedestrians, and motorists.

Identity | Foster a sense of place tied to livability and active lifestyles with a focus on enhancing gateways, critical intersections, and key corridors.

Safety | Promote safe travel and enhance the sense of comfort for using and interacting with different travel modes.

Community Outreach

Each of the guiding statements touch on aspects of community outreach. This reflects the notion that transportation planning at its best is collaborative and infused with the energy of local citizenry. Outreach for the *Wrightsville Beach CTP* was based on the premise that a public platform that gathers, processes, and applies a diversity of opinions from residents, business owners, and civic groups is more likely to yield a feasible plan championed by the community. Outreach for the *CTP* occurred through a variety of small- and large-group meetings and held fast to two principles:

1. The community understands the transportation network and are affected directly and daily by the decisions made on their behalf.
2. The community can share in the collective vision for a project even as they hold differing opinions on how this vision should be fulfilled.

With respect to these two principles, the planning process for the *CTP* was designed to create an open dialogue about the needs of residents (year-round and seasonal), visitors, and business owners. Along the way, several overarching issues emerged:

- We need to make Wrightsville Beach safer for bicyclists and pedestrians.
- We need to accommodate vehicular traffic, particularly during events and evacuations.
- We need to improve the gateway to our community.

These themes—and others—surfaced during the various channels of public outreach detailed on the following pages.

Steering Committee

A Steering Committee was established to provide strategic direction and offer a deeper understanding of the general consensus held by local stakeholders and the general public. The Steering Committee included staff from the Town (parks and recreation, public works, and planning), the Wilmington Metropolitan Planning Organization (WMPO), and the North Carolina Department of Transportation (NCDOT). The Steering Committee officially convened three times during the planning process to serve as a sounding board, offer technical assistance, and participate in interactive work sessions.

Steering Committee

- Meeting #1
  June 11, 2012
  Purpose: Introduce the project team, discuss the process and deliverables, and engage in a mapping exercise.
- Meeting #2
  July 24, 2012
  Purpose: Review existing conditions, establish the vision and guiding statements, and discuss outreach opportunities.
- Meeting #3
  November 7, 2012.
  Purpose: Review preliminary recommendations prior to presenting the plan to the community.

Stakeholder Interviews

The Steering Committee helped identify stakeholders that could offer specialized attention to specific issues relevant to the *CTP*. These stakeholders included numerous representatives from the Town, including the Town manager, Mayor, and Board of Aldermen. Representatives from Wrightsville Beach Parks & Recreation Advisory Committee, Wrightsville Beach Fire and Police Departments, the Wrightsville Beach Merchants Association, Harbor Island Garden Club, business owners, and citizen advocates also participated.

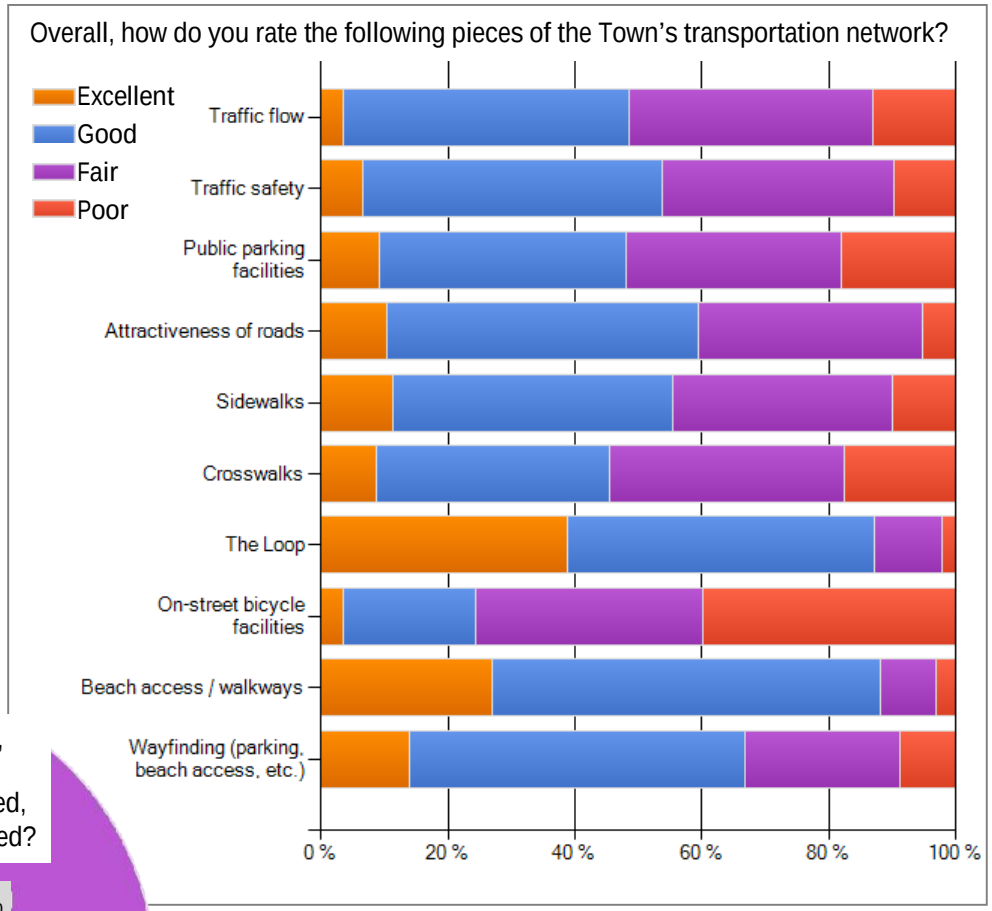
Conversations with stakeholders on September 18, 2012 provided insight into a variety of issues spanning the different modes of transportation and the economic, cultural, and historical context of previous plans and ongoing conversations. Feedback gathered through these conversations helped validate background information collected through discussions with the Steering Committee and the results of other public outreach efforts. Most importantly, the conversations helped the project team prepare a list of initial recommendations.

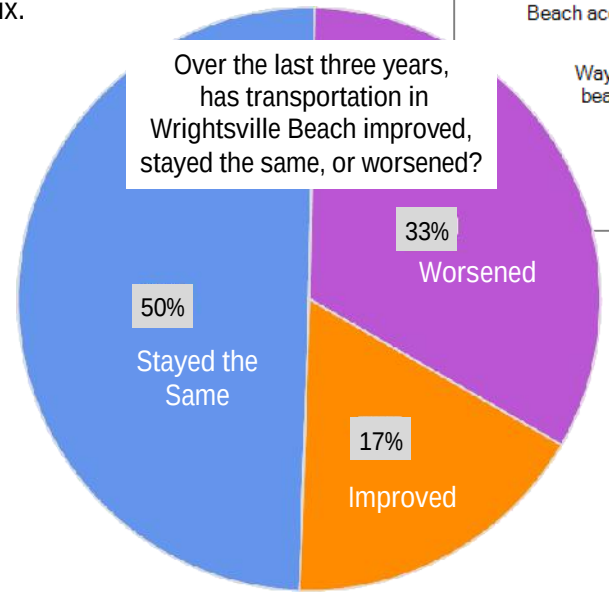
Some of the comments included:

- Vehicle to bicycle incidents are equal in number to vehicle.
- Families should be able to ride their bikes along the entire Loop.
- Emergency response needs to be enhanced, particularly during peak periods.
- Bicycle amenities are needed on Causeway Drive and Waynick Boulevard.
- While bicycling in Town can be dangerous, the bridges and development patterns on the island are a constraint to developing a robust bicycle network.

Questionnaire

To better understand the Town's transportation needs, a questionnaire was developed that built upon surveys conducted for previous planning efforts in the Town. The questionnaire, made available online and in hard copy on August 10, 2012, included general demographic questions and a series of questions on a variety of transportation topics to gauge the community's perception of the multimodal transportation network. Some questions challenged respondents to choose among competing transportation priorities by allocating funds for improvements. The receipt of more than 230 responses proved helpful in assessing the transportation system and compiling multimodal recommendations. A selection of the questions and comments are presented here. Full results are available in the appendix.



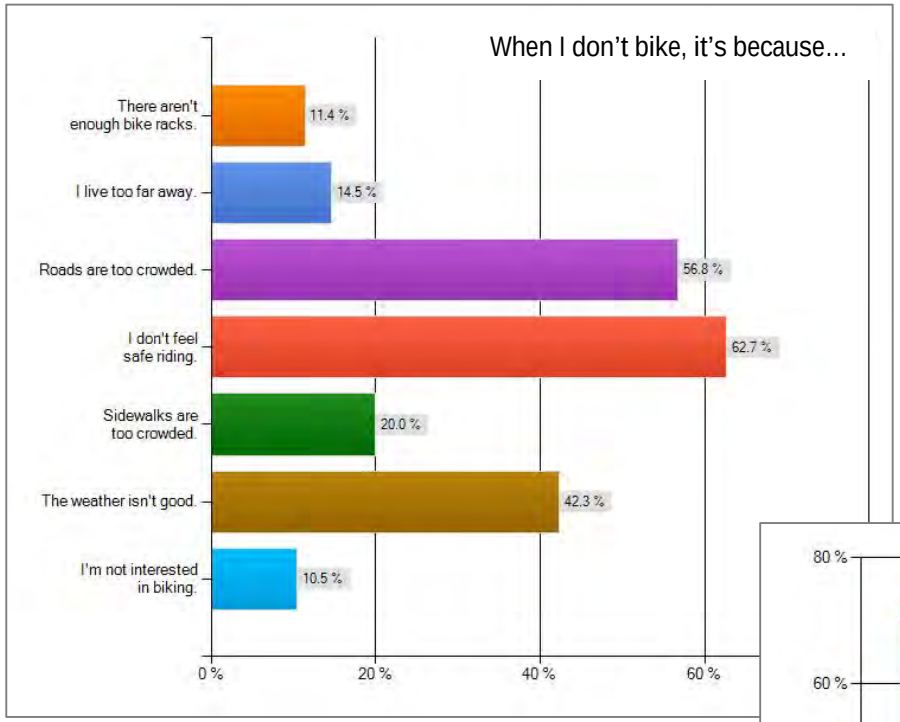


The lack of sidewalks, extremely limited width of The Loop, and unsafe pedestrian crossing are of the utmost concern to me.

The answer is not more public parking or trolleys. There will never be enough.

For the most part I think the transportation system is good. One suggestion would be to use the street sweeper to clean the shoulders more frequently to get rid of broken glass and built up sand. Also more signs needed to keep cyclists off the sidewalk at the Loop.

Having safer better cycling there could cut down on the traffic and the parking problems.

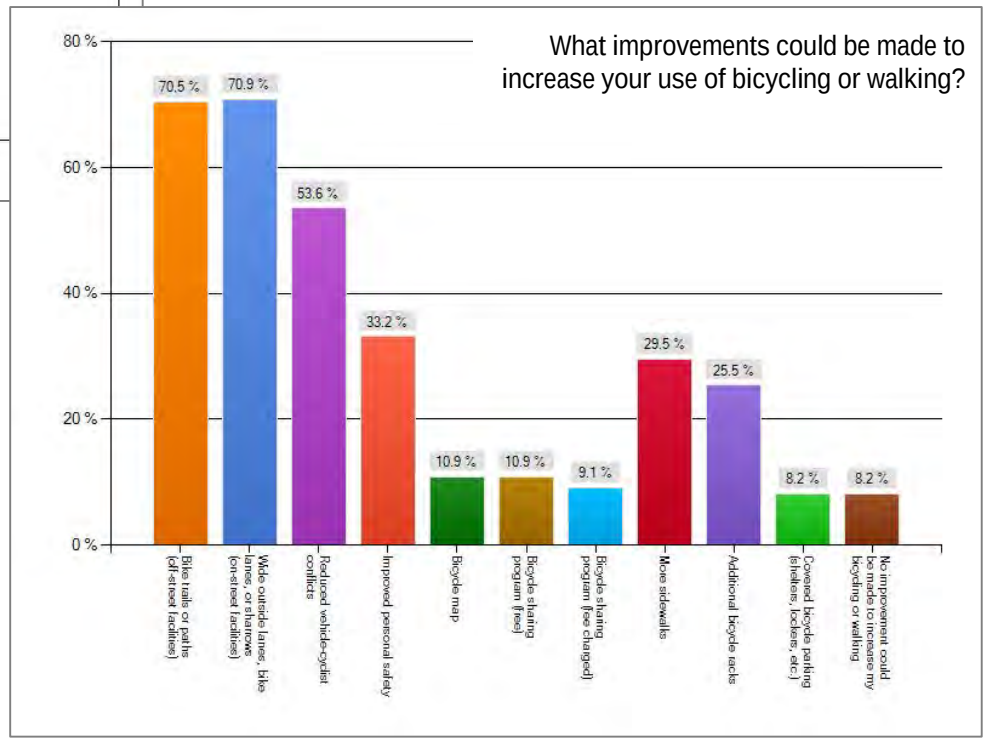


Sidewalks along The Loop are extremely inadequate and should be at least 8-14 feet wide given the amount of pedestrian traffic. They are also poorly constructed without curb and with utility poles within the pedestrian clear zone.

WB is a great place to live, cycling is a great form of transportation and exercise. Let's continue to make it better.

There are constantly people biking and walking up and down Lumina Avenue, especially North Lumina. This would be a great place for an off street multi-purpose path. It could tie into the Loop and be a wonderful feature for all.

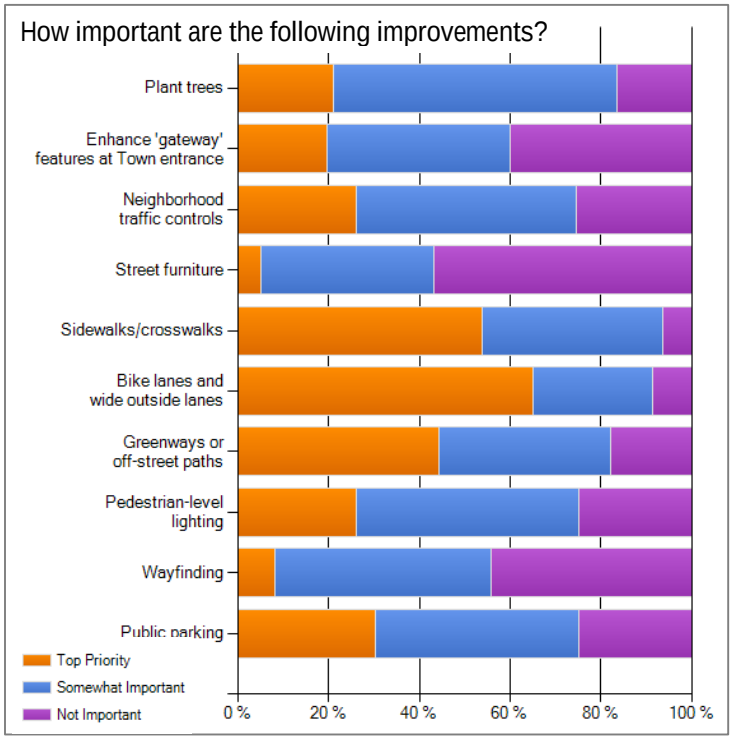
Our beach needs to be more bicycle and pedestrian friendly.



Along Causeway Dr and Waynick Blvd, road diets could accommodate bicycle lanes and wider sidewalks within the existing right-of-way. The roads are far below capacity today and could likely operate well with three-lane cross-sections well into the future.

I would bike more if we had designated lanes that were continuous. Because I do not feel safe biking I tend to walk the Loop and to the south end. Please try to make Wrightsville a more bike friendly area for kids and adults!

Riding bikes at the beach is risky business. Although the idea of bike trails is nice, there is really no room for them at Wrightsville Beach!



I see too many inexperienced bike riders or young riders using the middle turn lane as a bike lane, which can cause accidents and traffic issues.

Neighborhood traffic calming is needed for entire island...speed limit 25 mph max.

We need bus service to the beach!

A safe and beautiful environment for all forms of transportation is key. Visitors will continue to flock to this extremely sensitive environment and no amount of parking will satisfy the numbers of folks wanting to enjoy it here!!!!

Lumina/Causeway/Waynick—this is our most dangerous intersection for pedestrians/bikes. Provide permanent bike lane on Lumina, not just weekends.

Bike lanes will help people to have other safe options!

Installation, in many locations across the beach, of improved crosswalk signage and lighting would increase pedestrian safety.

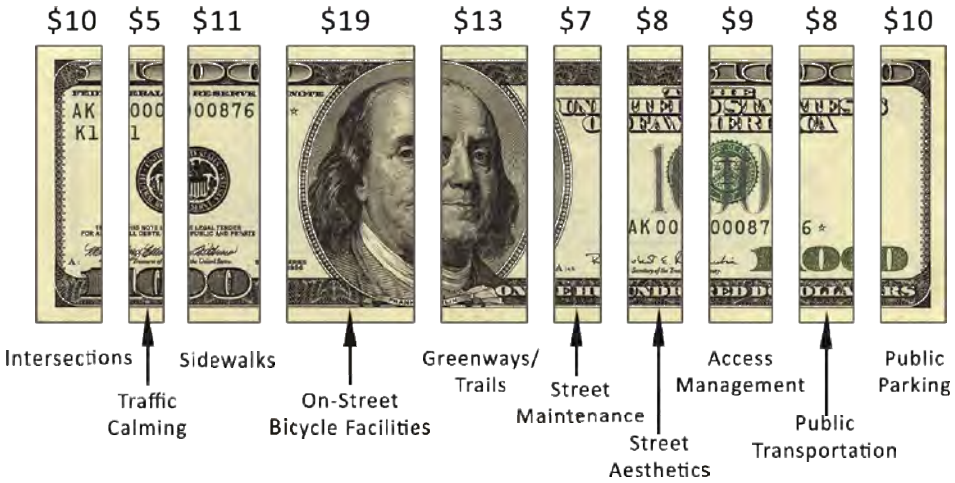
At every marked crosswalk I would have a sign in the middle of crosswalk saying it is the law to stop for pedestrians.

There needs to be a crosswalk so you can get to Mellow Mushroom and those restaurants from the Loop. We walk over from Station One and we can barely get across the street.

I'm surprised you didn't solicit feedback on reducing the speed limit on Causeway and Salisbury. Causeway should be reduced to 25 mph and Salisbury to 35 mph.

I would absolutely love to see bike lanes, especially on Causeway Drive where it is the most frightful leg of the Loop. Perhaps consider adding a wide bike path adjacent to the existing pedestrian sidewalk, between the sidewalk and the marsh/Town property.

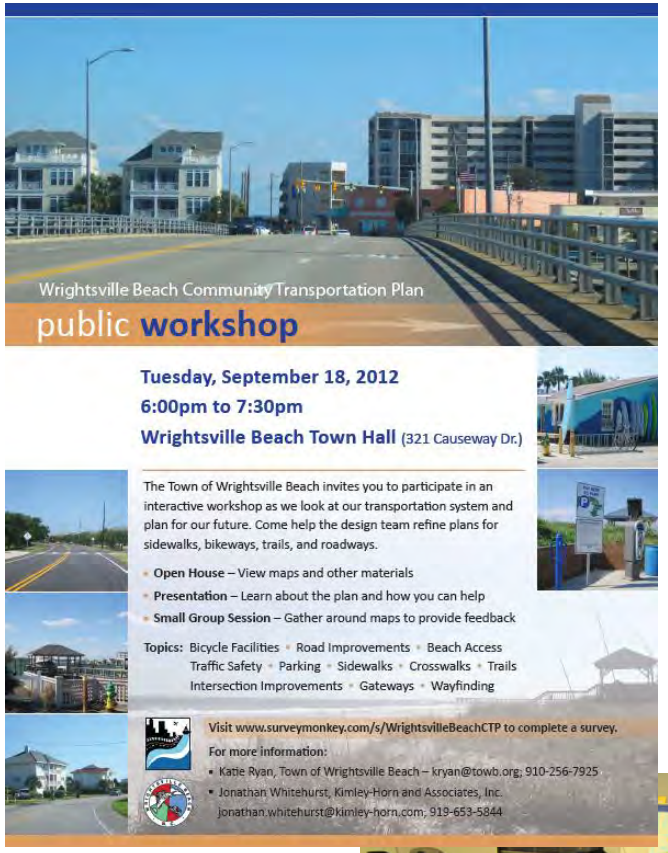
If you had $100 to spend on transportation improvements, how would you spend it?



Interactive Workshop

Citizens have unique experiences traveling to, from, and within the Town. They understand the system's strengths and weaknesses and are directly affected by transportation decisions each day. To tap into this knowledge, the *CTP* included two workshops: 1) an interactive workshop to identify issues, vet existing conditions, and brainstorm solutions and 2) an open house to view preliminary recommendations.

The first public workshop, held September 18, 2012 at Wrightsville Beach Town Hall, was designed as an interactive session which would yield a finalized vision and guiding statements, an understanding of what works well today, and a list of issues and concerns. The workshop began with free time to view maps and other materials followed by a brief informal presentation that outlined the purpose of the plan and explained the exhibits in more detail. This discussion set the stage for small group breakout sessions, at which attendees gathered around maps to discuss operational and design concerns. Major topics discussed at the workshop included bicycle and pedestrian facilities, beach access, traffic safety, intersection improvements, and gateway treatments.



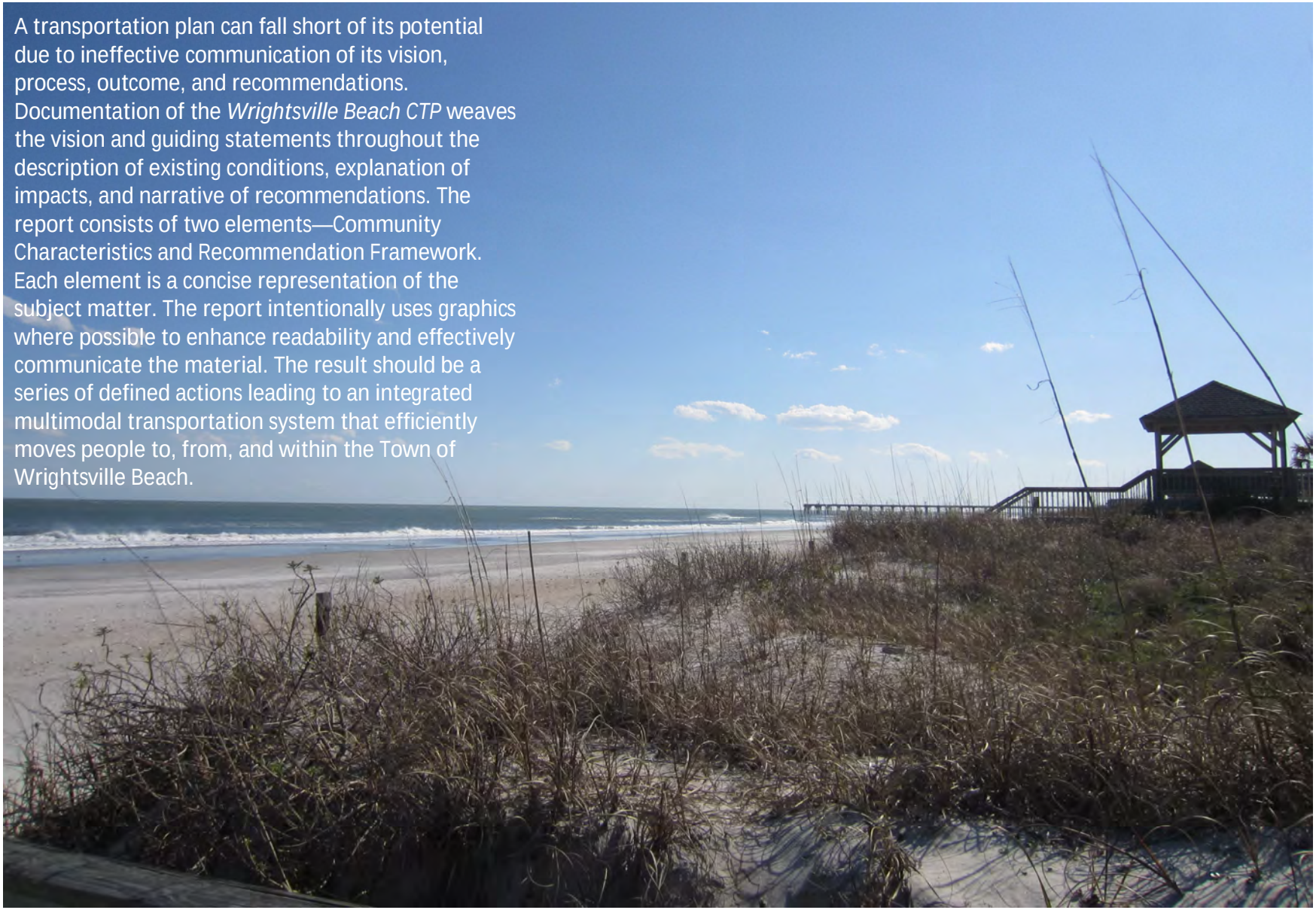
Open House

Feedback from the Steering Committee, stakeholders, questionnaires, and interactive workshop was combined with the review of previous plans and analysis of existing conditions to form the basis of the *Wrightsville Beach CTP*. Following an initial review of preliminary recommendations at Steering Committee Meeting #3, the project team joined the public to discuss preliminary recommendations at an Open House. The event was hosted by the Town and WMPO on November 15, 2012. Attendees viewed maps and exhibits describing their ideas to improve safety and mobility for bicyclists, pedestrians, and motorists.

Three stations were set up – 1) What We Heard, 2) Conceptual Designs and Intersection Performance, and 3) System-Level Recommendations. Each station was staffed with a member of the project team so attendees could engage in conversations about the planned improvements. Attendees visited the stations to learn more about areas of personal interest. They also were invited to scribe ideas and concerns on a comment wall or comment cards. The feedback supported the direction of the plan and specific recommendations. Slight adjustments to some of the system-level maps were made based on information collected at the Open House.

Plan Overview

A transportation plan can fall short of its potential due to ineffective communication of its vision, process, outcome, and recommendations. Documentation of the *Wrightsville Beach CTP* weaves the vision and guiding statements throughout the description of existing conditions, explanation of impacts, and narrative of recommendations. The report consists of two elements—Community Characteristics and Recommendation Framework. Each element is a concise representation of the subject matter. The report intentionally uses graphics where possible to enhance readability and effectively communicate the material. The result should be a series of defined actions leading to an integrated multimodal transportation system that efficiently moves people to, from, and within the Town of Wrightsville Beach.



Chapter 2 | Community Characteristics

Transportation—for pleasure and livelihood—has been important on the islands that became Wrightsville Beach for centuries. Early visitors to the area were fishermen. Sailing also became popular, resulting in the founding of the third oldest yacht club in the United States in April 1853. It would be more than 30 years before the first road connected Wilmington to Wrightsville Beach. The "Shell Road," completed in 1887, got its name from using oyster shells as pavers. In the same year, rail service was chartered to Harbor Island and a footbridge built across Banks Channel to the barrier island. Development began to accelerate, and in 1889 the rail line was extended across Bank's Channel to the beach where it ran along present-day South Lumina Avenue. The new access gave rise to homes as well as hotels, businesses, and trolley service that attracted visitors to the beach.

The characteristics of the community that residents and visitors enjoy today have taken shape since the first footbridge was constructed. These characteristics and the transportation network that continues to shape them are summarized in this chapter. Community characteristics detailed here provide the framework for the recommendations presented in Chapter 3.

Related Planning Efforts

Local, regional, and state agencies have initiated numerous studies—many with extensive stakeholder and community outreach—to document ongoing concerns and identify solutions for travel into and within Wrightsville Beach. The following plans highlight prior efforts that helped define the *CTP*.

- 2009 Pelican Drive / Salisbury Street Bicycle Plan
- Cape Fear Commutes 2035 Transportation Plan
- 2007-2012 Parks, Recreation, and Open Space Master Plan
- Comprehensive Greenway Plan for Wilmington/New Hanover County Wrightsville Avenue 2030
- Wrightsville Sound Small Area Plan
- Bike Route Plan for Wrightsville Beach (completed in 2005 but not adopted)
- Wave Short-Range Transit Plan

In many ways, the *CTP* is vetting recommendations from previous plans and blending them into a coordinated, community-based transportation plan. Recommendations from these plans are briefly summarized on the pages that follow.

Pelican Drive / Salisbury Street Bicycle Plan

The Pelican Drive / Salisbury Street Bicycle Plan (adopted in September 2009) offers two alternatives for bicycle facilities along Salisbury Street. Option A accommodates advanced bicyclists with on-road bicycle facilities (bike lanes and sharrows) but is not ideal for beginner bicyclists. Option B accommodates bicyclists with both separate off-road facilities and on-road facilities but at a higher construction cost. Option B also includes the construction of adjacent bicycle/pedestrian bridge structures over Kenans Creek and Banks Channel.

The Pelican Drive/Salisbury Street Bicycle Plan included two options. Option A (top) includes bicycle lanes and sharrows. Option B (bottom) includes sharrows and a bicycle-pedestrian bridge.

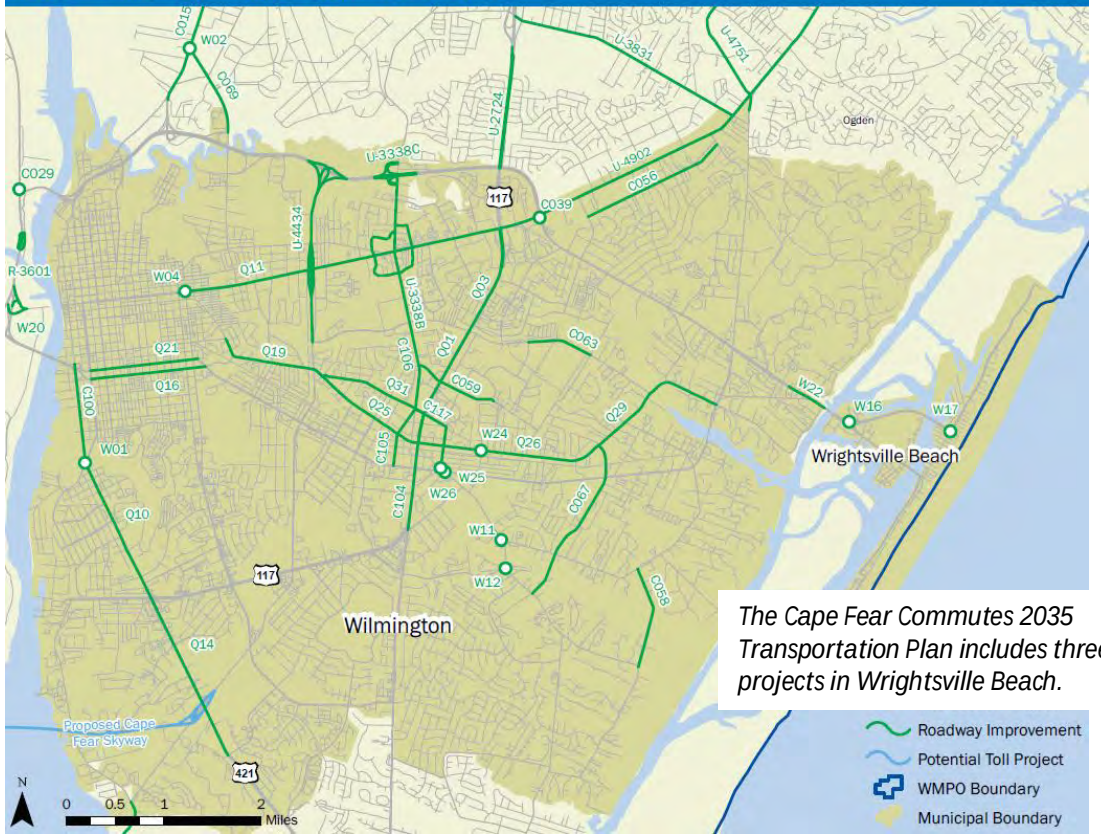
Cape Fear Commutes 2035 Transportation Plan

The Cape Fear Commutes 2035 Transportation Plan (adopted in December 2010) outlines strategies for the Wilmington Urban Area through 2035. The plan envisions a safe, efficient, appropriate, responsible, integrated, and multimodal transportation system. Notable projects in the plan include a roundabout at Salisbury Street (US 74) and Causeway Drive (US 76), a roundabout at Salisbury Street (US 74) and Lumina Avenue, and roadway improvements to Wrightsville Avenue (US 74-76) between Pavilion Place and the Heide-Trask drawbridge. Recommendations from the Wrightsville Beach CTP will be incorporated into an update to the Cape Fear Commutes 2035 Transportation Plan.

2007-2012 Parks, Recreation, and Open Space Master Plan for the Town of Wrightsville Beach

This Master Plan (adopted in August 2007) guides the future growth and development of the Town's parks, greenways, trails, bike paths, and recreation programs and services. It recommends widening and improving the John Nesbitt Loop and constructing a comprehensive pedestrian and bicycle network, as well as establishing a Town Pedestrian and Non-Motorized Vehicle Transportation Committee to partner with the Wilmington Bike and Pedestrian Committee. An update to the plan is in progress and is expected to reiterate the recommendations of the 2007-2012 Plan.

Figure 4 - Roadway Projects (Wilmington Inset)



The Cape Fear Commutes 2035 Transportation Plan includes three projects in Wrightsville Beach.

Table 1: Cape Fear Commutes 2035 Projects

Roadway Safety

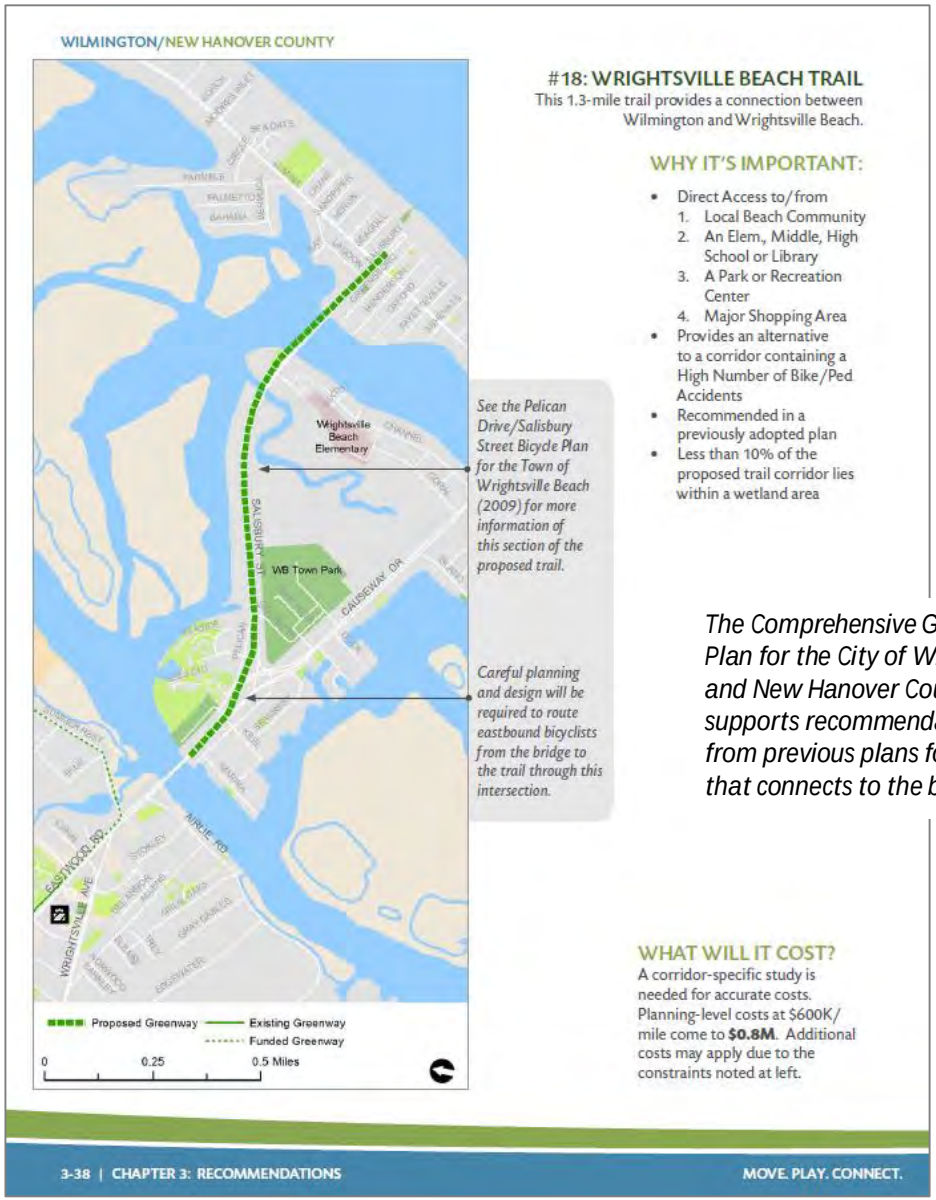
Project Number	Rank	Project Name	Jurisdiction	Horizon Period	Potential Funding Source	Cost (Escalated)
W17	6	Salisbury Street (US 74) roundabout at Lumina Avenue	Wrightsville Beach	2026-2035	STIP: Safety	$230,000
W16	23	Salisbury Street (US 74) roundabout at Causeway Drive (US 76)	Wrightsville Beach	2026-2035	STIP: Safety	$1,100,000
W22	16	Wrightsville Avenue (US 74-76) improvements between Pavillion Place and Heide-Trask Drawbridge	Wilmington	2016-2025	STIP: Safety	$2,100,000

Comprehensive Greenway Plan for Wilmington/New Hanover County

The Comprehensive Greenway Plan for the City of Wilmington and New Hanover County was initiated in January 2012, by the WMPO) in partnership with the City of Wilmington and New Hanover County. The vision for the plan is to provide a "framework for local governments and project partners to successfully establish a comprehensive network of greenways throughout Wilmington and New Hanover County.

The plan documents the insufficient space for cyclists and pedestrians on the Heide-Trask Drawbridge and notes the pedestrian conflicts along Causeway Drive, Lumina Avenue, and Waynick Boulevard. The Town's level of bicycle and pedestrian activity was supported by a Census-based equity analysis that placed Harbor Island and the beach area between Causeway Drive and Salisbury Street in the highest equity tier. This tier shows a higher percentage of households without a vehicle, a higher percentage of workers commuting by bicycle or on foot, or lower median household income.

The recommendations from Comprehensive Greenway Plan support previous planning efforts. The plan proposes a trail along Salisbury Street consistent with the 2009 Pelican Drive/Salisbury Street Bicycle Plan. It also calls for sharrows on Causeway Drive, North Lumina Avenue (south of South Ridge Lane), Waynick Boulevard, Sunset Avenue, and South Lumina Avenue (south of Sunset Avenue).



The Comprehensive Greenway Plan for the City of Wilmington and New Hanover County supports recommendation from previous plans for a trail that connects to the beach.

Wrightsville Avenue 2030

The Wrightsville Avenue 2030 (adopted in April 2010) plan seeks to protect the unique character of Wrightsville Avenue by recommending policies and action items that would guide growth and development along the avenue. The transportation goal of the Wrightsville Avenue 2030 plan is "to provide a safe and efficient travel route for all users that accommodates all modes of transportation (auto, bicycle, pedestrian, public transit)."

Wrightsville Sound Small Area Plan

The Wrightsville Sound Small Area Plan (adopted in July 2011) intends to preserve the community character, protect historic and natural resources, and promote a safe and connected community. The plan recommends efforts to improve the safety and function of bicycle and pedestrian access to Wrightsville Beach; supports the construction of a public walkway / pier underneath the Heide-Trask Drawbridge to accommodate bicyclists and pedestrians crossing Wrightsville Avenue; and discourages the construction of a high-rise bridge to Wrightsville Beach.

Bike Route Plan for Wrightsville Beach

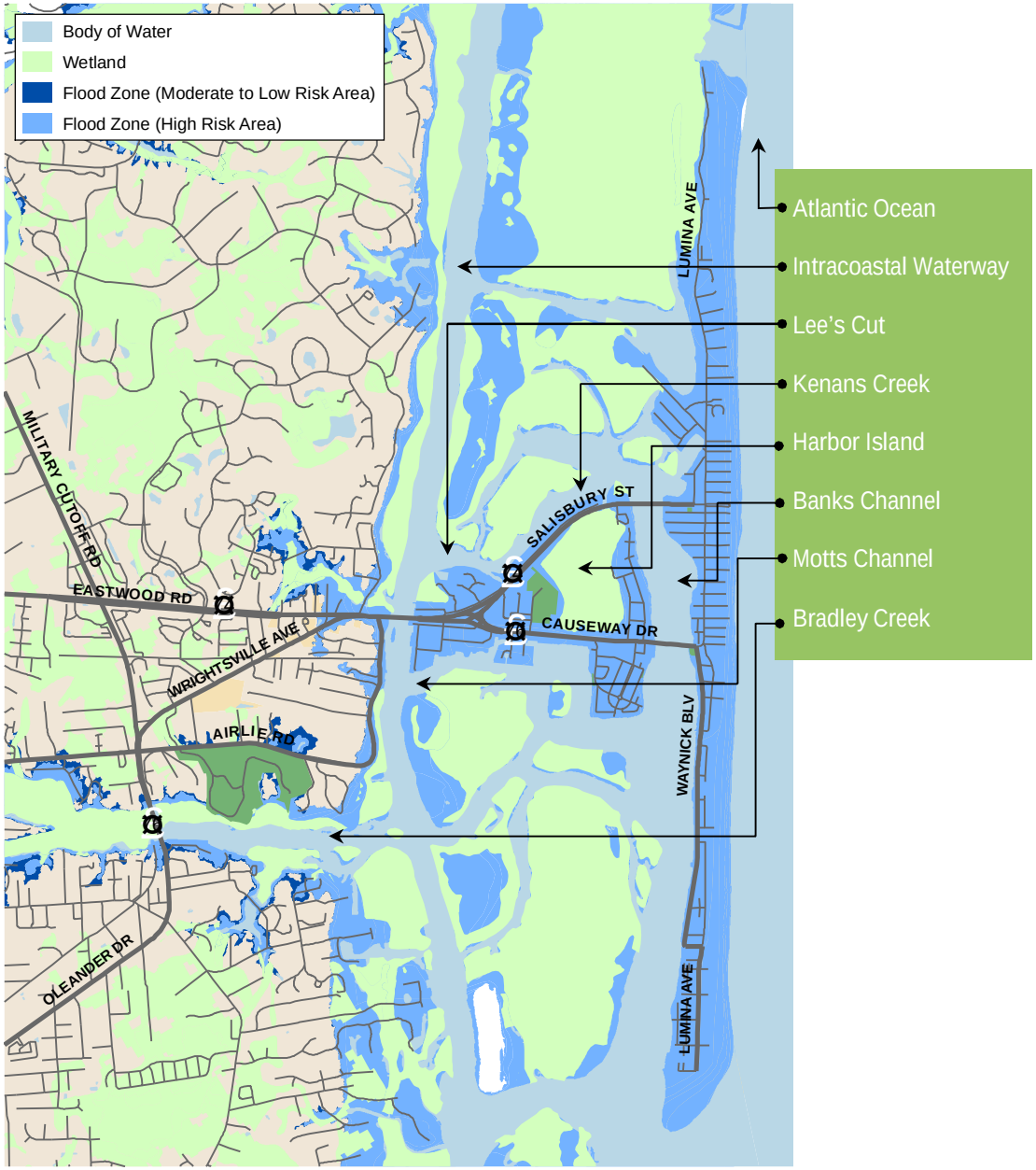
The Bike Route Plan (completed in 2005 but not adopted) inventories the existing bike facilities in Wrightsville Beach and offers an exhaustive list of roadway improvements to make the Town a more bike-friendly community. These improvements include adding bike lanes, replacing existing vehicle travel lanes with bike lanes, installing bike route signs, constructing bicyclist/pedestrian bridges, and providing multi-use paths. The installation of bicycle parking, lockers, and changing and shower facilities also are recommended. The plan advocates for improved bicycle education and safety and providing regional connections.

Wave Short-Range Transit Plan

The Wave Short-Range Transit Plan (adopted in June 2012) recommends future transit enhancements in the Wilmington area for the next five years. While the plan considered service to Wrightsville Beach, it did not recommend this improvement due to the cost associated with the service and a lack of community support.

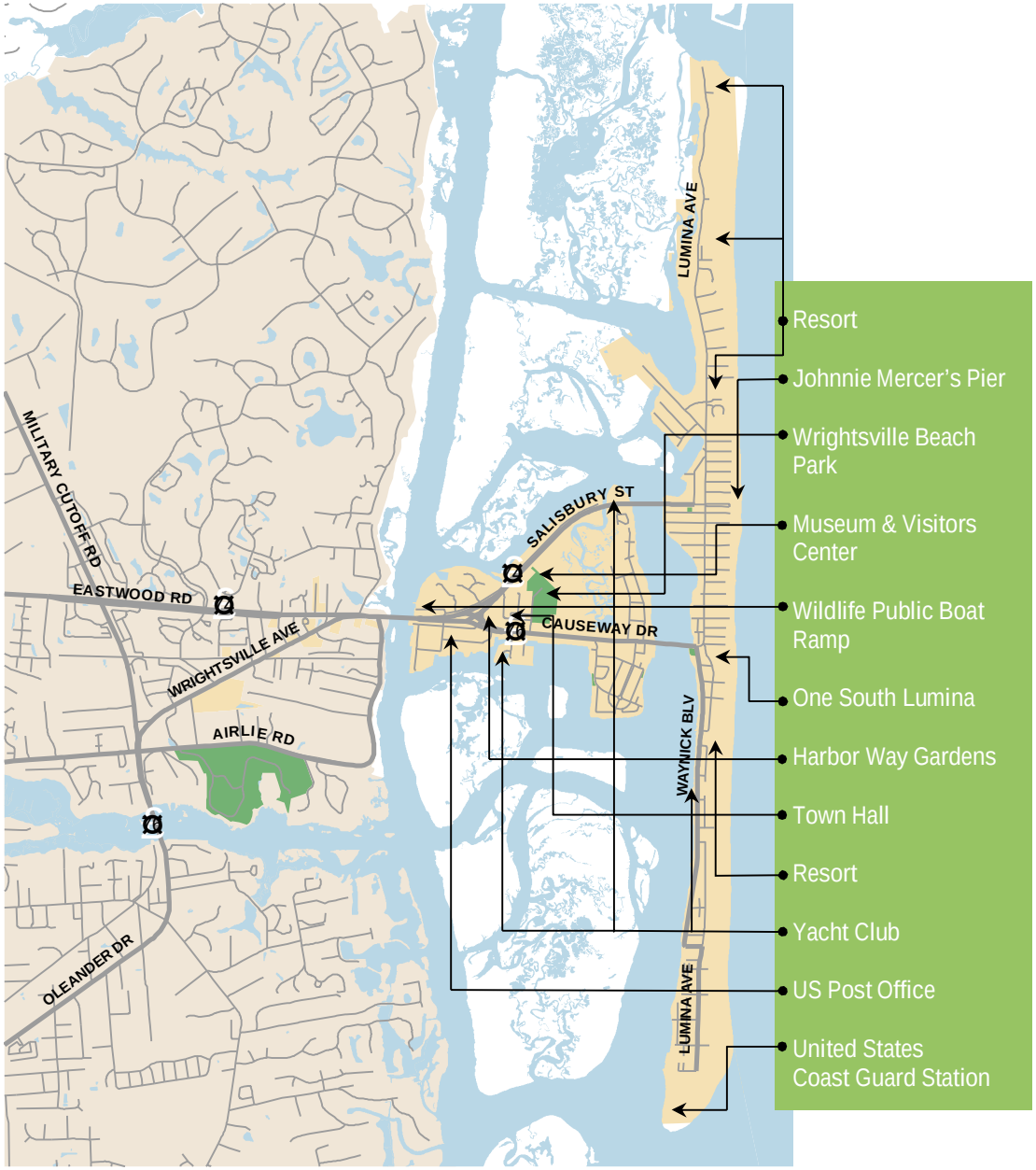
Natural Resources

The Town of Wrightsville Beach has long stressed the importance of protecting and enhancing the natural systems that give identity to its quality of life. This is logical given the Town is a beach community surrounded by water and accessible only by bridge and boat. The Town has an abundance of natural resources and is made up of two islands—Harbor Island on the interior and a 4-mile long barrier island. In addition to the Atlantic Ocean and the Intracoastal Waterway that separates Harbor Island from the barrier island, the Town's natural system includes Masonboro Sound, Mott's Channel, Lee's Cut, and Bank's Channel. The Wrightsville Beach 2005 CAMA Land Use Plan also identifies 114 acres of wetlands within the Town. It's not surprising that the overwhelming majority of the Town sits in either a high risk or moderate to low risk floodplain.



Activity Centers & Community Facilities

As an active community with a strong parks and recreation department and a focus on tourism, the Town of Wrightsville Beach enjoys numerous activity centers and community facilities. These locations serve as popular destinations, including schools, parks, public beach access points, marinas and boat ramps, resorts, commercial establishments, and the museum visitor center. The Town also is home to numerous churches. Many comments collected during the outreach events stressed the importance of connections to the Town's activity centers and community facilities.



Transportation Characteristics

The natural resources and community facilities are important components that give life to the Town of Wrightsville Beach. In many ways, the transportation network serves as the backbone for the Town. Understanding the roadway, bicycle, and pedestrian facilities currently serving Wrightsville Beach is critical to the development of the *CTP*. Chapter 3 offers additional detail for locations where recommended solutions are necessary.

Roadway Profiles

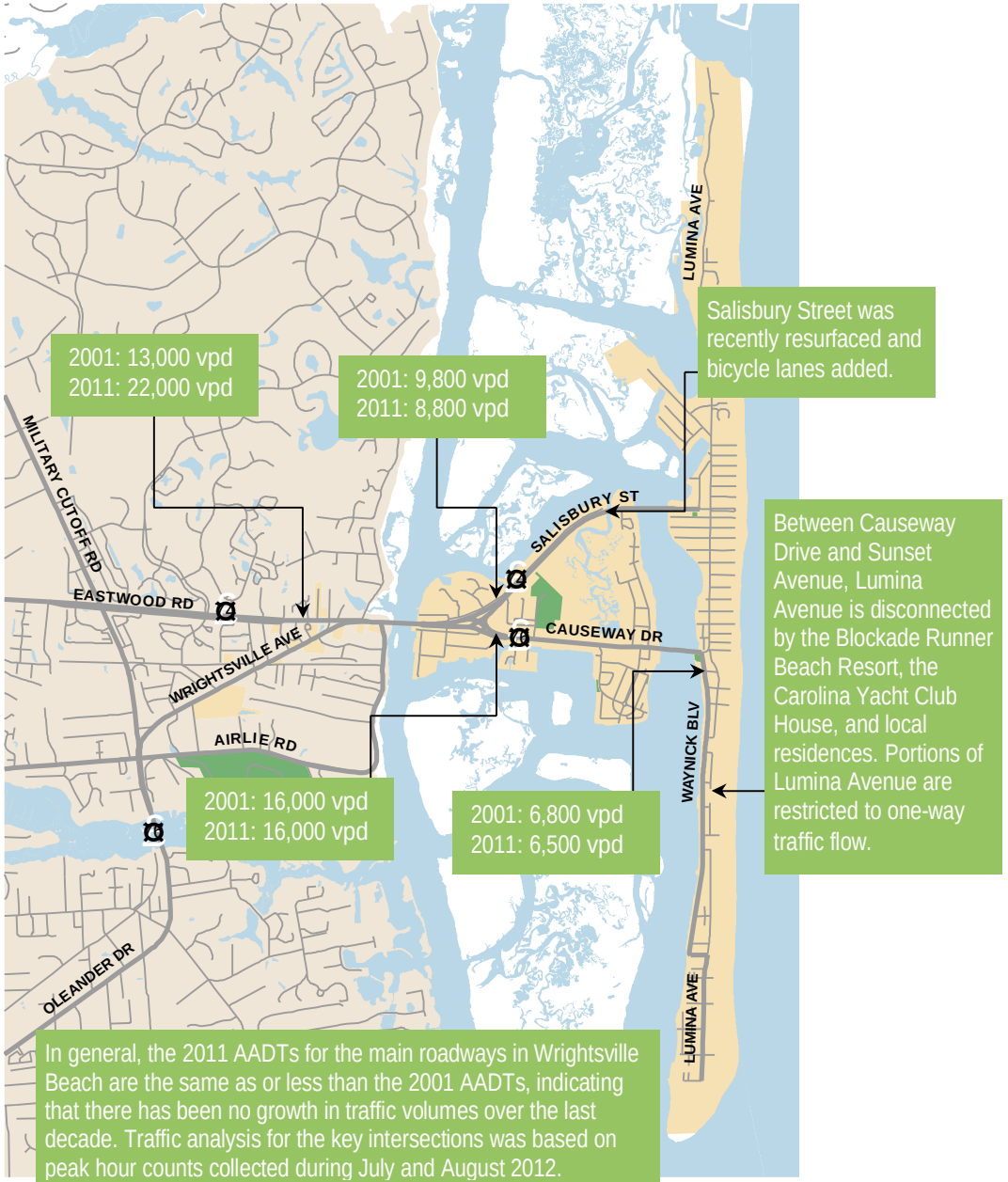
The main roadways in Wrightsville Beach are Salisbury Street (US 74), Causeway Drive (US 76), Lumina Avenue, and Waynick Boulevard.

Salisbury Street (Minor Arterial[1])
2-lane undivided | 45 mph | 8,800 vpd[2]

Causeway Drive (Minor Arterial[1])
4-lane undivided | 35 mph | 16,000 vpd

Lumina Avenue (Minor Arterial, Collector, and Local[1,3])
2-lane undivided | 25 mph | 4,400 to 5,100

Waynick Boulevard (Minor Arterial[1])
4-lane undivided | 35 mph | 6,500 vpd

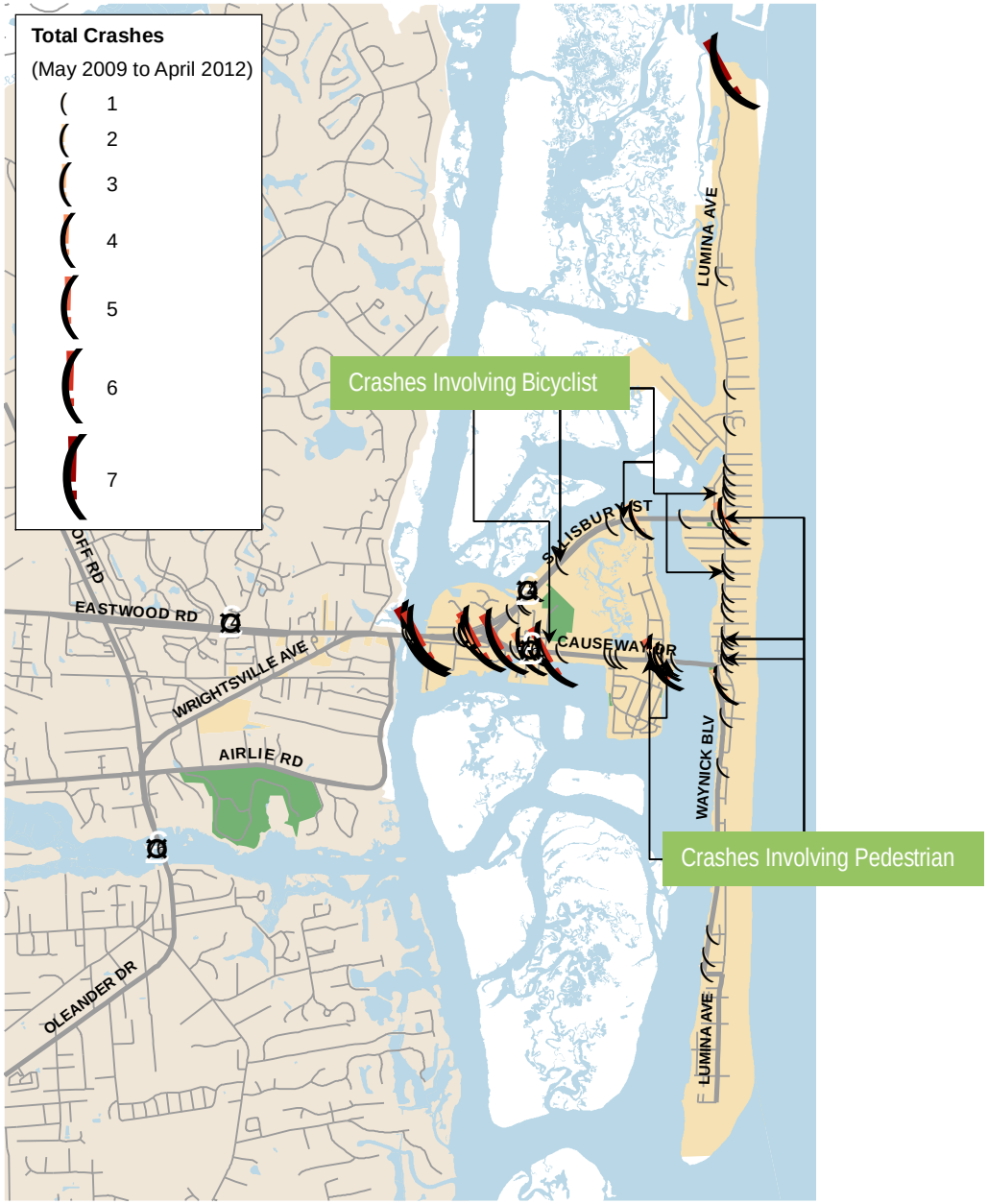


[1] NCDOT Urban Functional Classification
[2] 2011 Average Annual Daily Traffic (vehicles per day)
[3] Minor Arterial north of Salisbury Street; Collector Street between Salisbury Street and Causeway Drive, Local Street between Causeway Drive and Sunset Avenue; Minor Arterial south of Sunset Avenue

Crash Analysis

Safety for bicyclists, pedestrians, and motorists is an important piece of the *CTP*. Safety concerns are heightened because the various modes share the same space on many of the Town's roads. Examining the crash history typically can predict locations where improvements in traffic safety will be beneficial. NCDOT maintains a database of reported crashes statewide. The crash data summarizes reported crashes in Wrightsville Beach from May 1, 2009 through April 30, 2012.

- 122 crashes occurred in Wrightsville Beach.
- 6 crashes included collisions with bicycles.
- 5 crashes included collisions with pedestrians.
- Most vehicular crashes occurred on or near the Heide-Trask Drawbridge and around the intersection of Causeway Drive and Salisbury Street.
- The most prevalent crash type was "rear end, slow or stop."
- Most crashes occurred in the summer with July experiencing the highest number of crashes.
- No fatal crashes were reported; however, more than half of all of the crashes resulted in injuries.



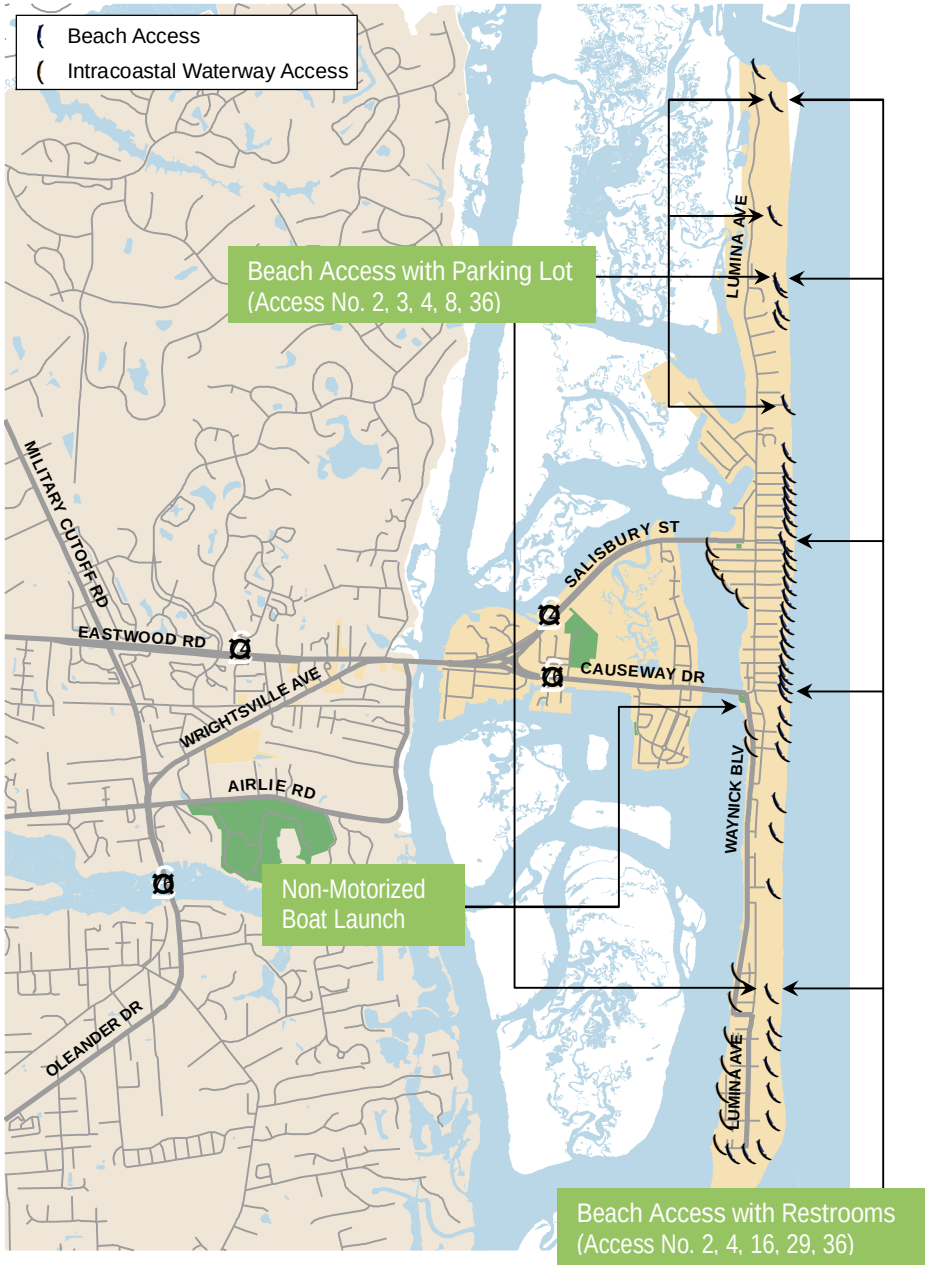
Beach Access

Safe access to public beaches is important to the Town's economy. The NC Division of Coastal Management recognizes four types of public access sites:

- Regional—Largest access sites with ample parking (25+) and typically with facilities such as restrooms, showers and picnic tables.
- Neighborhood—Sites with fewer parking spaces than regional sites and typically lacking facilities such as showers or restrooms.
- Local—Sites typically are simple dune crossovers primarily used by nearby residents.
- Waterfront—Sites generally located on estuarine waters in urbanized areas.

Currently, access to the ocean beaches is provided at 44 points. Most of these sites would be categorized as neighborhood or local access sites. Off-street parking lots are located at five access points. On-street parking is available at 39 beach access points, which demonstrates the widespread on-street parking found on the island. Restrooms are provided at five beach access points.

More than a dozen sites in Wrightsville Beach provide either public access or unimproved public right-of-way to the Intracoastal Waterway.



Bicycle & Pedestrian Facilities

The benefits of cycling and walking are well understood in Wrightsville Beach. Taking trips by bike or on foot improves the environment, promotes good health, saves money, eases the burden on roadways, and enhances livability. Some residents indicate they choose to bike or walk for these reasons. For other residents, bicycling and walking may be their only option. If the vision of the *CTP* is to create an integrated transportation system that provides choice and promotes safety, the planning and delivery of a safe and accessible bicycle and pedestrian network is a necessity. The outreach efforts for the *CTP* reinforced what many previous plans stated, namely that the community wants improvements for bicyclists and pedestrians.

The existing bicycle network is limited. Striped bicycle lanes occur at three locations: 1) Salisbury Street between Causeway Drive and the Banks Channel bridge, 2) within the parking lot of the boat ramp by the drawbridge, 3) Old Causeway Drive west of Keel Street. Paved shoulders are located along Lumina Avenue north of South Ridge Lane.

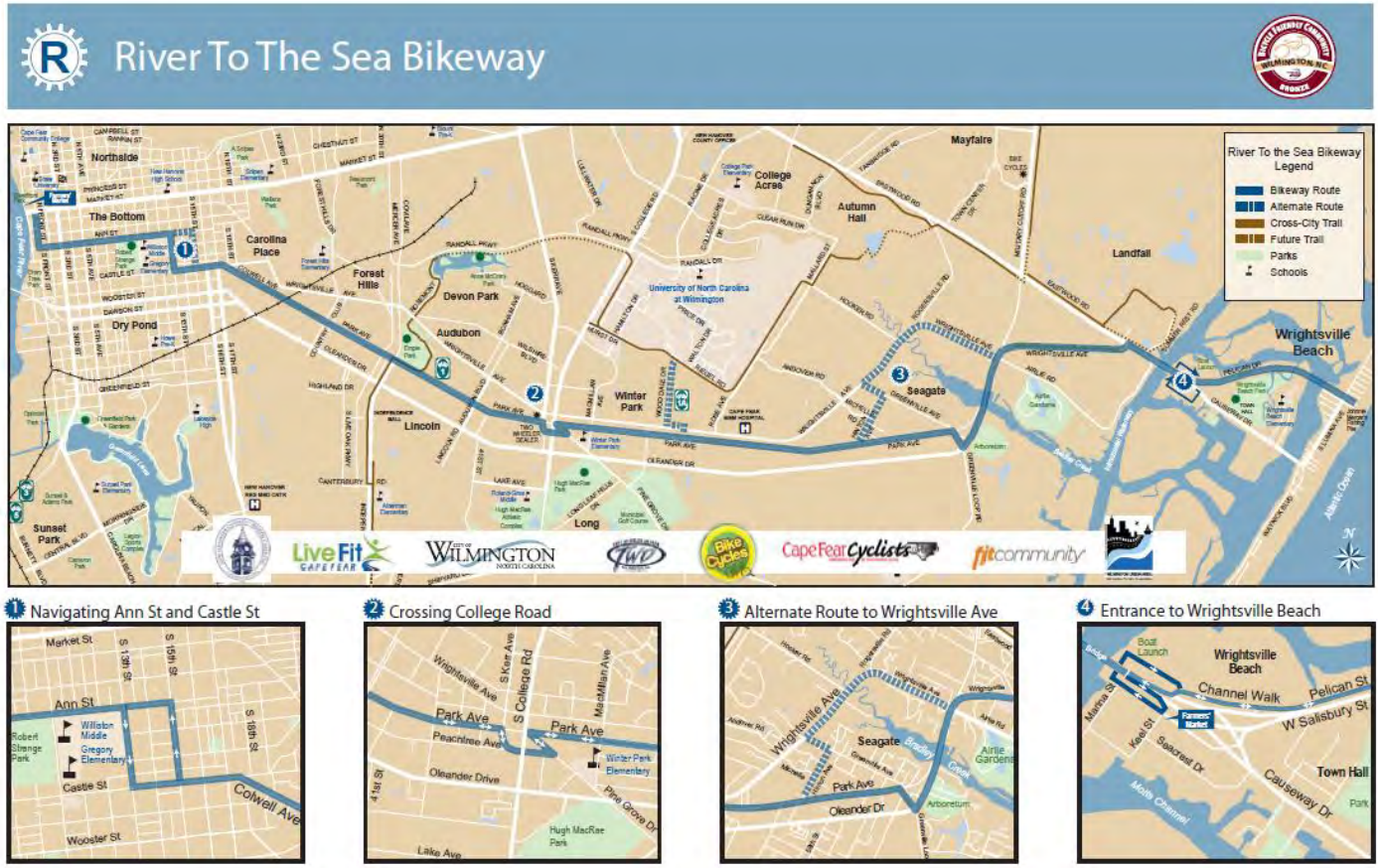
The John Nesbitt Loop is a 2.5-mile pedestrian trail formed by Lumina Avenue, Salisbury Street, and Causeway Drive. The Loop experiences a high level of use, including bicyclists whose use is not permitted. The popularity of the Loop has created several conflict points between motorists and pedestrians.

Regional Connections

Wrightsville Beach is an important part of the region anchored by Wilmington. Connections to the urban center are critical for residents and visitors.

River to the Sea Bikeway

The River to the Sea Bikeway extends from the Cape Fear River in Wilmington to the eastern end of Salisbury Street in Wrightsville Beach. The route directs seabound bicyclists across the Heide-Trask Drawbridge, south onto Keel Street, west onto Old Causeway Drive, north under the Drawbridge, and east through the boat launch to Pelican Drive. Currently, bicyclists traveling across the Heide-Trask Drawbridge walk their bike or ride on the sidewalk. Some bicyclists opt to travel the wrong way on Salisbury Drive instead of following the bike route under the bridge, posing serious safety concerns for both bicyclists and drivers.

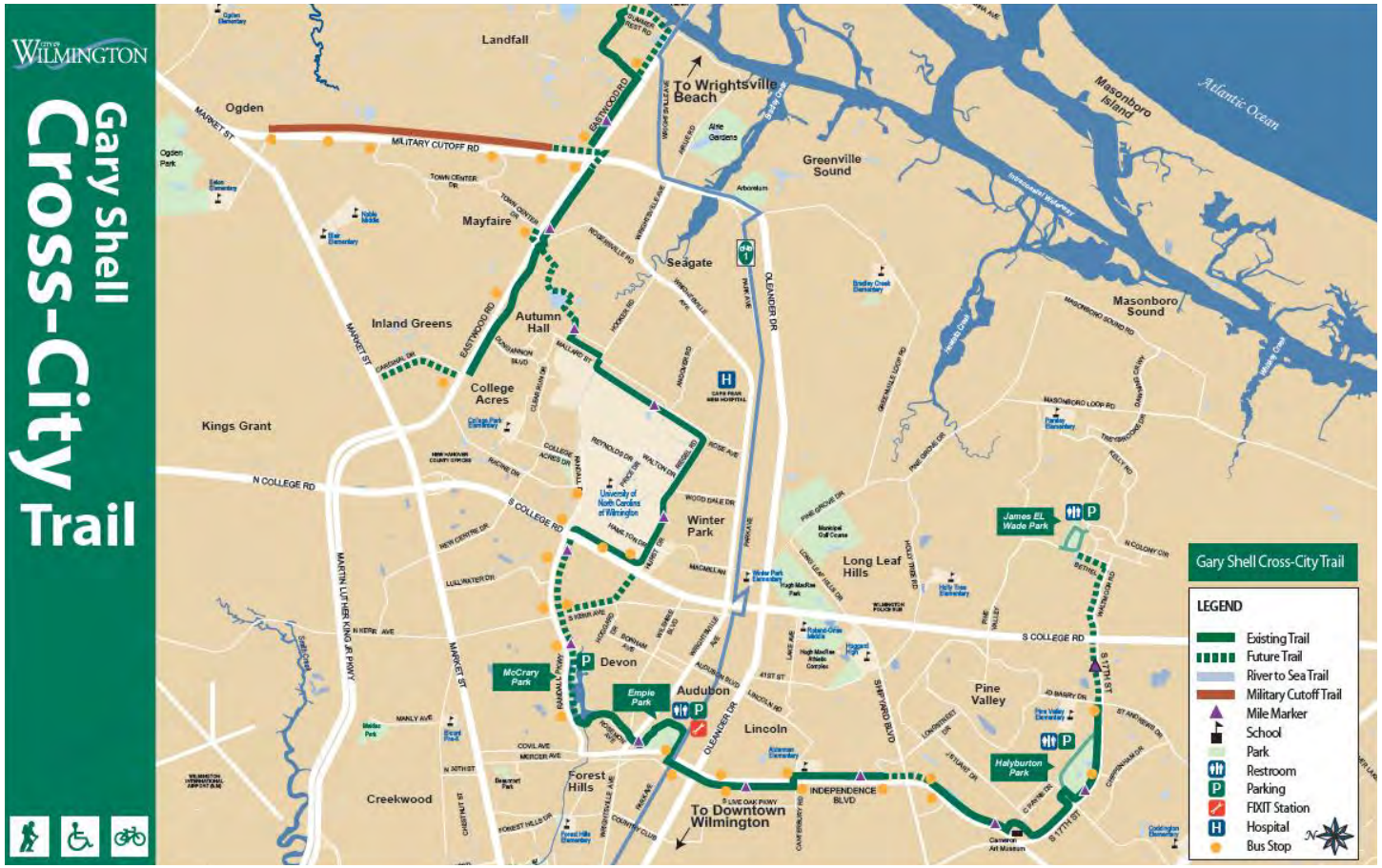


Gary Shell Cross-City Trail

The Gary Shell Cross-City Trail primarily is an off-road multi-use trail that crosses Wilmington. When completed, it will stretch from Wade Park in south Wilmington to the drawbridge at Wrightsville Beach. Previous plans supported a public walkway / pier underneath the Heide-Trask Drawbridge, which is discussed in more detail in Chapter 3.

Wave Transit

As previously mentioned, Wave Transit currently does not provide transit service to Wrightsville Beach. The Central Route approaches the Heide-Trask Drawbridge but does not cross into the Town. Future service to Wrightsville Beach is not planned.

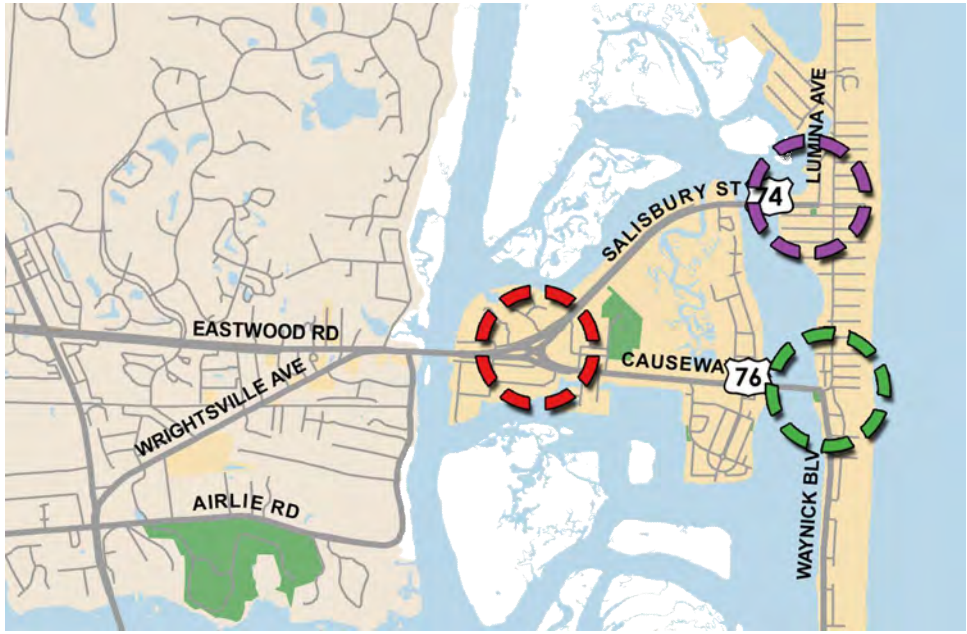


Intersection Analysis

The detailed analysis of existing conditions focused on the Town's strategic corridors and key intersections. Three focus areas were identified in consultation with the Steering Committee, which included representation from the Town, WMPO, and NCDOT. The critical intersections include:

- Causeway Drive at Salisbury Street—Includes the intersections of Causeway Drive at Keel Street, Causeway Drive at Old Causeway Drive, and Causeway Drive at Salisbury Street.
- Causeway Drive at Waynick Boulevard—Includes the intersections of Causeway Drive at Waynick Boulevard and Lumina Avenue at Stone Street.
- Salisbury Street at Lumina Avenue— Includes the area between the bridge to the parking lot at Johnnie Mercer's Pier.

At these locations, the project team analyzed traffic counts, turning movements, pedestrian crossings, safety concerns, intersection geometry, access management, connectivity, aesthetics, and the safety and comfort of bicycling and walking. The traffic assessment at these intersections included the capacity analysis detailed on the pages that follow. The recommendations in Chapter 3 include ways to reduce congestion, decrease driver confusion, improve safety, promote economic development and tourism, and enhance aesthetics.



Capacity Analysis Overview

Capacity analyses using Synchro 7 software were performed for the AM and PM peak hours to determine the operating characteristics of the intersections. Turning-movement counts including pedestrians and bicyclists were conducted in July and August 2012. Capacity (the maximum number of vehicles that can pass over a roadway segment or through an intersection) was combined with level-of-service (a qualitative description of operational conditions and motorist perceptions) to describe the operating characteristics. Six levels of service (LOS A to LOS F) are defined, with LOS A having the shortest average delays and LOS F having the longest. The levels are further categorized: Short Delays (LOS A, B, and C), Moderate Delays (LOS D and E), and Long Delays (LOS F).

Causeway Drive at Salisbury Street

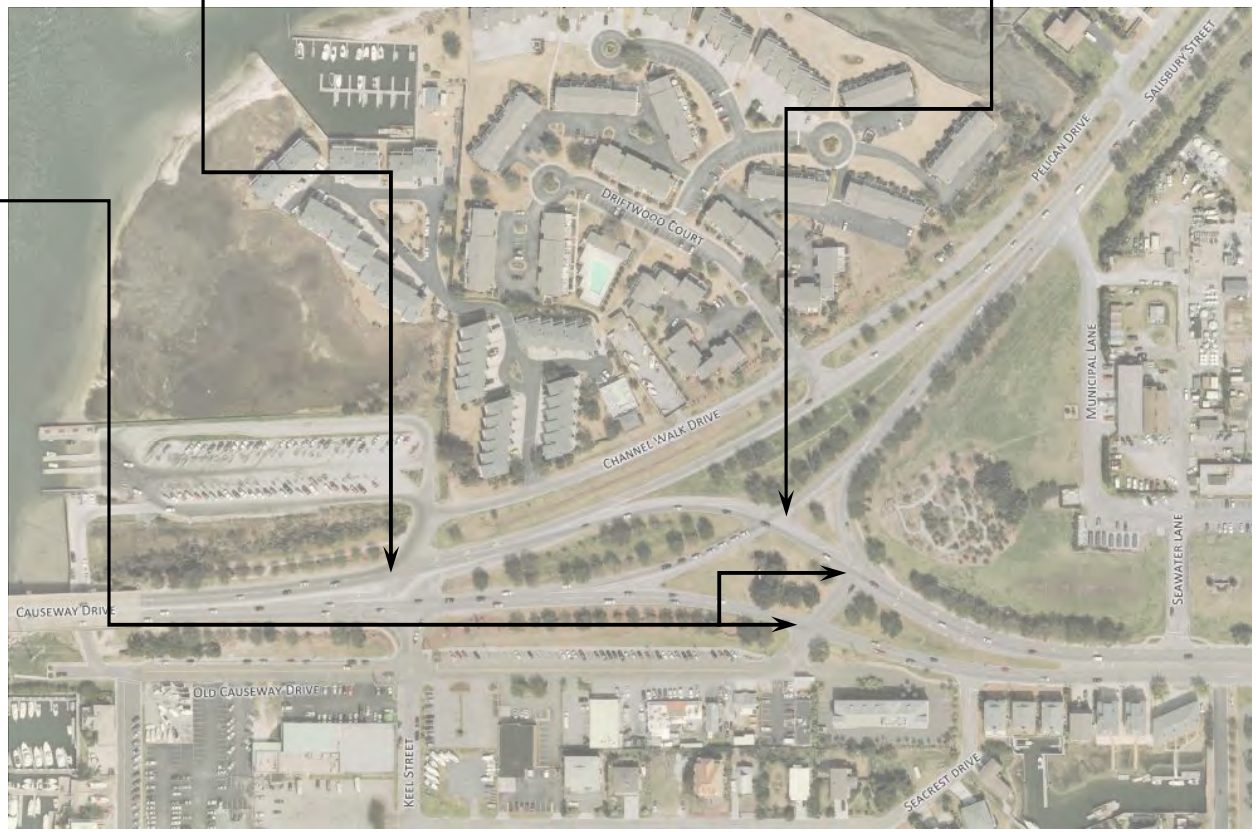
The current configuration for the intersection of Causeway Drive and Salisbury Street includes a group of smaller intersections, none of which are signalized.

Causeway Drive at Keel Street (unsignalized left-over crossing)
The westbound and eastbound approaches on Causeway Drive are full-movement. The north and southbound side-street approaches are restricted to turning right and stop-controlled. The capacity analysis shows the eastbound and westbound left-turn movements experience short delays in the AM peak hour and moderate delays in the PM peak hour for the existing traffic condition.

Causeway Drive at Old Causeway Drive (yield-controlled)

This location operates as two separate intersections where Old Causeway Drive intersects the east and westbound approaches of Causeway Drive. The capacity analysis shows the side-street approaches experience short delays in the AM peak hour and moderate to long delays in the PM peak hour for the existing traffic condition. Drivers were observed illegally traveling eastbound onto Salisbury Street from Old Causeway Drive.

Causeway Drive at Salisbury Street (stop-controlled westbound)
The capacity analysis shows the eastbound approach experiences short delays in the AM peak hour and long delays in the PM peak hour for the existing traffic condition. Drivers were observed illegally turning left at the location noted below, effectively making a u-turn and traveling westbound back to the boat ramp.



Causeway Drive at Waynick Boulevard

The intersection of Causeway Drive and Waynick Boulevard is currently signalized with permitted-protected left-turns. Just east of this intersection is the unsignalized intersection of Causeway Drive, Lumina Avenue, and Stone Street. Stone Street is stop-controlled. Lumina Avenue is a one-way southbound roadway south of the intersection. A capacity analysis was conducted based on peak hour traffic counts collected in July and August 2012. The result shows the signalized intersection operates at LOS B in the AM peak hour and LOS C in the PM peak hour for the existing traffic condition. The westbound approach of Stone Street experiences short delays in the AM and PM peak hours for the existing traffic condition.

Salisbury Street at Lumina Avenue

The intersection of Salisbury Street and Lumina Avenue currently is signalized with permitted-protected left-turns for the eastbound and northbound approaches, permitted left-turns for the westbound approach, and prohibited left-turns for the southbound approach. The capacity analysis based on the July and August 2012 traffic counts shows the signalized intersection operates at LOS B in the AM and PM peak hours for the existing traffic condition.

Recommendation Framework

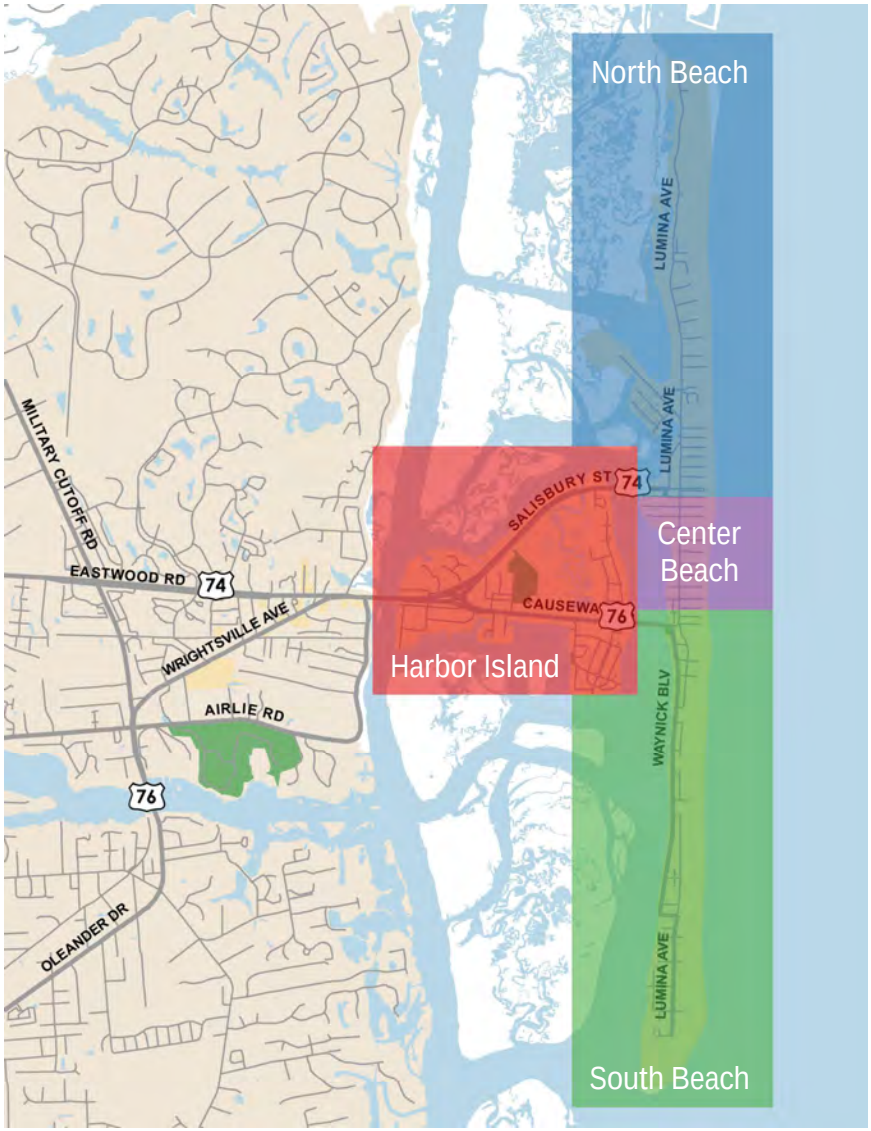
The recommendations for the *Wrightsville Beach Community Transportation Plan* are the result of Steering Committee involvement, public input, analysis, and comprehensive planning and are responsive to the Plan's vision for an integrated, community-based transportation system that provides choice and promotes safety.

This chapter communicates a plan to improve the safety and mobility of walkers and bicyclists, and it addresses the design of important roadways and intersections. To demonstrate the integration between travel modes, the recommendations of this chapter are organized geographically:

- Harbor Island
- North Beach
- South Beach
- Center Beach

Within each location, specific recommendations have been made for categories such as roadway cross-sections, bicycle and pedestrian enhancements, intersection designs, and recommended speed limits.

The remainder of this chapter is organized in a manner that documents key issues for each focus areas followed by a recommended remedy. The conclusion of this chapter also includes a universal set of system-wide recommendations that help to further the initiatives resulting from the planning process.



Harbor Island

Description: Harbor Island is defined as the area that begins at the Heide-Trask drawbridge east to the causeway bridges. This area generally is considered the gateway to Wrightsville Beach and includes a diversity of uses including Wrightsville Beach Town Hall, community post-office, community parks, fire station, Wrightsville Beach Elementary, marinas, retail and service uses, as well as a host of residential uses.

Key Issues: The Steering Committee and public identified the following key issues:

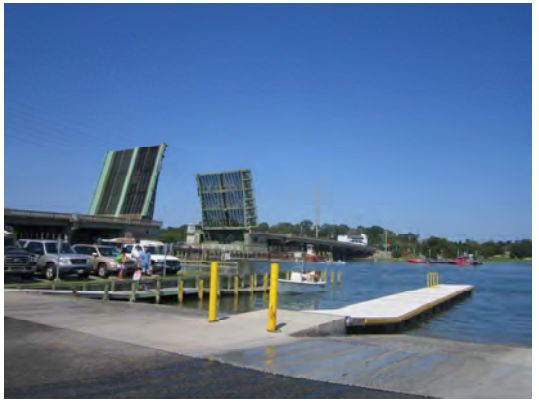
a. Confusing intersection at Salisbury/Causeway

b. Interruption of traffic flow resulting from drawbridge

c. Bicycle and pedestrian safety and connectivity

d. Perception of speeding

Harbor Island Imagery



Recommendations

In response to the documented concerns and issues, a series of recommendations were developed for Harbor Island:

Causeway Drive / Salisbury Street Intersection

US 74 and US 76 diverge at the intersection of Causeway Drive and Salisbury Street immediately east of the Heide-Trask drawbridge. As the only connection to the mainland, this intersection accommodates all movements on and off the island. The current unsignalized configuration places a priority on the Causeway Drive movements. According to traffic counts collected for the *CTP*, 7 out of 10 vehicles entering the intersection eastbound in the morning continue on Causeway Drive. The design of the intersection includes numerous stops, yields, and merges, resulting in numerous conflict points. Many visitors also find the atypical configuration confusing. The addition of heavy vehicles towing boats and turning to and from the marinas and boat ramps coupled with pedestrian and bicyclists trying to reach the Post Office and restaurants to the south results in several types of conflicts.

Note: The conceptual designs described in this chapter are based on the analysis of baseline transportation conditions. The design concepts allow the Wilmington Metropolitan Planning Organization (WMPO), NCDOT, and the Town of Wrightsville Beach to incorporate the design concepts into the development review process and the Metropolitan Transportation Improvement Program (MTIP).

Through cooperation with the Wilmington MPO, NCDOT, and Town, an evaluation of alternate intersection treatments was conducted. Specifically, two alternative designs were evaluated: a signalized intersection and a roundabout. The traffic analysis performed for each design demonstrated acceptable levels-of-service. (*Copies of the traffic analysis can be found in the Appendix)*. However, careful consideration by plan participants including the MPO, NCDOT, and Town as well as public input resulted in support for the roundabout option. The roundabout also is the recommended alternative in the Cape Fear Commutes 2035 Transportation Plan. The benefits of the roundabout option include:

- Reduces vehicular conflict points
- Channelizes pedestrian and bicycle movements
- Better distributes eastbound traffic and lessens the reliance on Causeway Drive for beach access
- Offers a signature gateway and sense of arrival to the island
- Operates seamlessly during power outages
- Creates additional open space at the Town entrance

Conceptual Design for Causeway Drive/Salisbury Street

Concept design of the preferred roundabout concept for the Causeway and Salisbury intersection. A full size drawing can be found in the Appendix.

Notable Features

- Dual lane roundabout
- Gateway features at roundabout
- Resurfaced roadways, including Old Causeway Drive
- Improved connection to Driftwood Court
- Painted bicycle lane in boat ramp parking lot
- Enhanced crosswalks and pedestrian connectivity at the roundabout and connections to Keel Street and Driftwood Court
- Wider Loop

Cost

- $3.14 million (see Appendix for details)

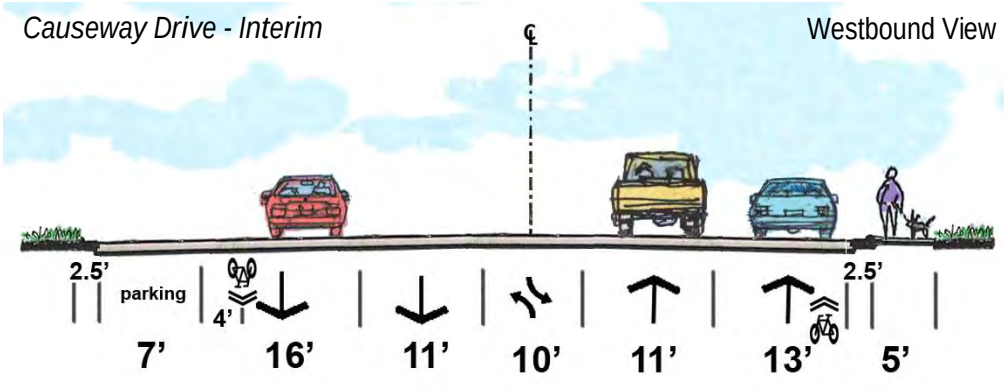
Recommended Cross Sections

Causeway Drive

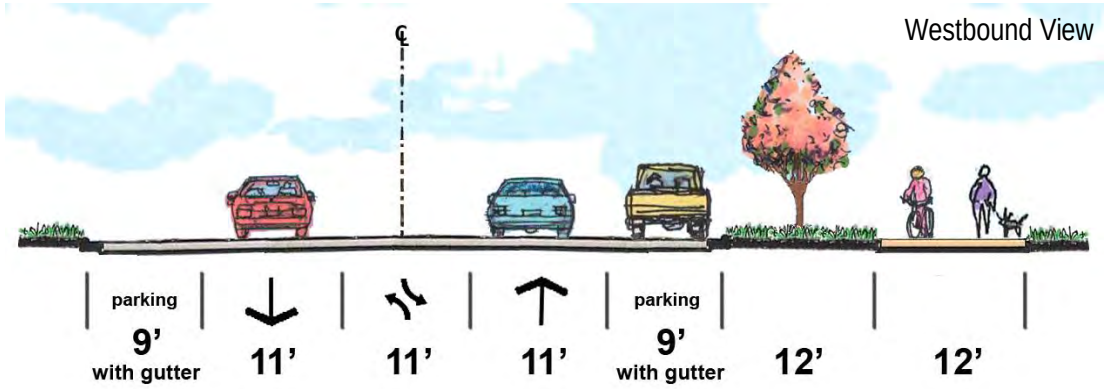
The recommended cross section for Causeway Drive is a simple shared lane marking or "sharrow" paired with wide outside lanes. Sharrows are a compromise between dedicated bicycle lanes (which are not feasible without widening or eliminating parking/ travel lanes) and unmarked outside lanes (which may require additional space and often still leave motorists unaware of bicycle traffic). Shared lane markings delineate space without setting a hard boundary between vehicle and bicycle areas, and they make all roadway users aware of the potential presence of bicyclists. Placement of the sharrow allows for a door zone on the side of the road with parking and is compliant with the Manual on Uniform Traffic Control Devices (MUTCD).

The planning process also explored a long-term alternatives if improvements to the bridge crossings are completed and if the community decides fewer travel lanes are appropriate for the Town's vision of community-focused streets. The alternatives presented here include either parking on both sides with normal travel lanes or wide lanes with parking only on the eastbound side. Before lane reduction is implemented a complete traffic study would be necessary.

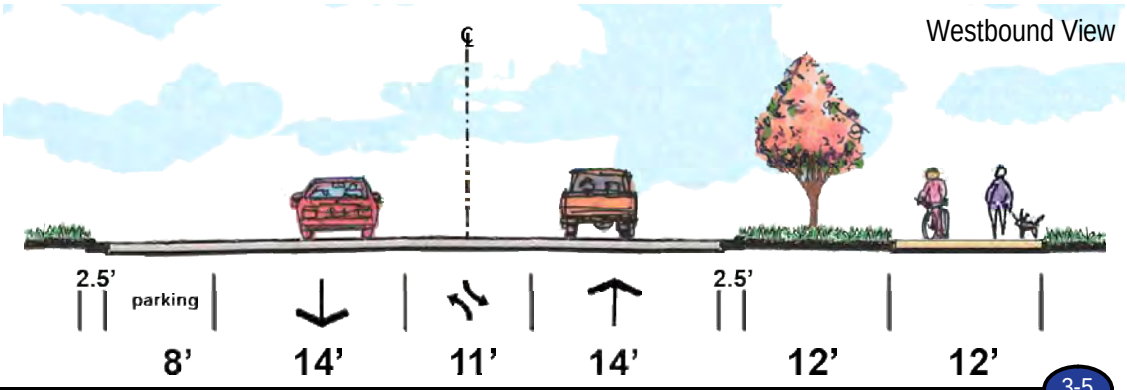
Causeway Drive - Interim Westbound View



Causeway Drive – Potential Long-term Alternative 1



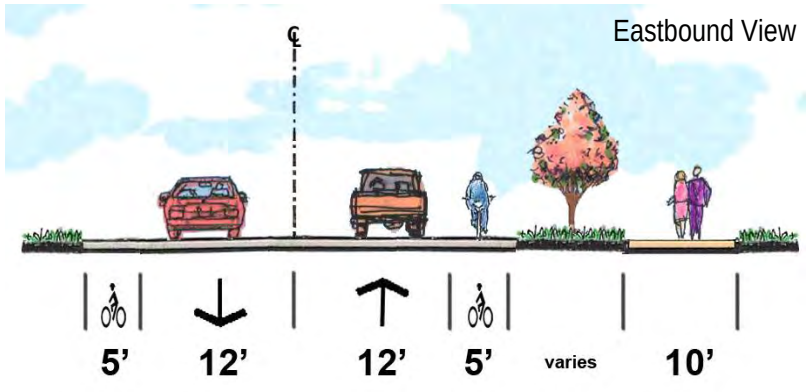
Causeway Drive – Potential Long-term Alternative 2



Salisbury Street

No significant change is recommended for Salisbury Street. The bicycle lanes striped during the recent resurfacing have delineated space for bicyclists. However, the width of the bicycle lane is inconsistent throughout the corridor. The recommended cross section establishes a minimum 5-foot bicycle lane and reflects the widening of the Loop to a minimum 10 feet. The 5-foot bicycle lane should be constructed only during the next resurfacing project.

Salisbury Street



Traffic Operations and Bridge Openings

It’s difficult to accurately forecast differences in how a bridge opening will affect the roundabout compared to existing conditions. Based on analysis conducted using Synchro and assuming a 10-minute bridge closure, it would take approximately 5 minutes for traffic to back up to the roundabout. Traffic would then extend through the intersection as it does during a bridge opening today. The traffic on Causeway Drive is not expected to back more than during current bridge openings. It likely would take 10 to 15 minutes for the queues to completely clear.

It should be noted that the existing configuration has one westbound lane from Causeway Drive going over the bridge and the other lane turning right onto Salisbury Street. The roundabout will feed two lanes on Causeway Drive through the intersection and over the bridge compared to one lane in the existing configuration. Clearing Causeway Drive of traffic following a bridge opening could be quicker with the roundabout configuration. However, motorists on Salisbury Street would have to yield to vehicles in the roundabout so the time it takes for traffic on Salisbury Street to clear could increase compared to existing conditions.

Posted Speed Limits

Many participants suggested that speeding was a problem on Salisbury Street and Causeway Drive. Participants that frequently walk or bike these corridors reinforced this perception. During the planning process, the project team reviewed the results of a speed study performed by NCDOT for Salisbury Street that confirmed what the project team had observed: 85th percentile speeds along Salisbury Street actually were *lower* than the posted speed limit of 45 mph. The disconnect between perception, observations, and analysis is not unusual and often results from a lack of clearly defined pedestrian and bicycle realm. While Salisbury Street is supported by the Loop (south side of the road), striped bicycle lanes, and a partial parallel route (Pelican Drive), substandard accommodations for both pedestrians and bicyclists crossing Bank's Channel remain. Furthermore, the free flow vehicular movements at the intersection of Salisbury Street and Causeway Drive result in increased time at risk for walkers and bikers crossing these facilities.

It is recommended that the posted speed limit on Salisbury Street be reduced from 45 mph to 35 mph. This will make the speed limit consistent with Causeway Drive and provide an appropriate posted limit for the corridor given the recent addition of a dedicated bike lane. Reducing the speed limit is cited in numerous previous plans including the Pelican Drive/Salisbury Street Bicycle Plan.

Pedestrian Improvements

HAWK Signals

The installation of a pedestrian signal on Causeway Drive at the intersection with North Channel Drive is expected in Spring 2013. NCDOT is sponsoring the installation of the High intensity Activated crosswalk (aka: HAWK Signal). The HAWK signal technically is a "beacon", meaning it remains dark for traffic unless a pedestrian activates the pushbutton. When activated, approaching drivers will see a FLASHING YELLOW for a few seconds, indicating that they should reduce speed and be prepared to stop for a pedestrian in the crosswalk. This improvement is further supported by Wrightsville Beach Elementary located along Coral Drive.

Pelican Drive is a parallel facility to Salisbury Street and offers an alternative for bicycle travel in the area. Pelican Drive also connects to single family and multifamily homes. A crosswalk was recently constructed at the eastern terminus of Pelican Drive to connect with the Loop. It is recommended that a HAWK signal also be added at this location.

An example an overhead HAWK signal.

The John Nesbitt Loop

The popularity of the Loop is well documented. The 2007-2012 Parks, Recreation, and Open Space Master Plan identifies the facility as the most used facility offered in Wrightsville Beach, drawing users from outside the Town limits. The Loop struggles under the weight of this active use and should be widened to at least 10 feet where possible. Near Town Hall on Harbor Island and along Salisbury Street, the space mostly exists for widening. Other areas (portions of Causeway Drive, water crossings, and along Lumina Avenue) will require extensive funds or a shift in priority from motor vehicles to bicyclists and pedestrians. Improvements to the on-street network of bicycle facilities adjacent to the Loop will relieve some pressure from bicyclists who currently use the Loop against the rules.

High visibility directional crosswalks are recommended to alert motorists on side streets and driveways to yield to pedestrians on the Loop. Per the Parks, Recreation, and Open Space Master Plan, the Loop also should be enhanced with lighting, signage, pavement markers, and ancillary facilities such as fitness stations and a watering mist system.

Crosswalks and Sidewalks

Numerous crosswalks and pedestrian improvements are recommended on Harbor Island. Many of these improvements are associated with the conversion of the existing intersection of Causeway Drive and Salisbury Street to a roundabout. The proposed roundabout will improve pedestrian safety by bringing all pedestrian to a single point, minimizing pedestrian exposure to traffic, and slowing vehicle speeds in the area. Other recommended improvements on Harbor Island include:

- Ground-mounted "Yield to Pedestrian" signs in crosswalks along the Loop and at HAWK signals
- A new sidewalk on Coral Drive connecting to Wrightsville Beach Elementary School (also mentioned in the Pelican Drive/Salisbury Street Bicycle Plan)

Bicycle Improvements

While the striped bicycle lane on Salisbury Street is a welcomed addition to the bicycle network in Wrightsville Beach, the lane width varies from approximately three feet to five feet. This should be corrected during future resurfacing. The bicycle lane should be widened to a standard four feet and the vehicle lanes narrowed.

Many participants stated a desire for bicycle facilities on Causeway Drive. Several options were considered. Reducing the laneage on Causeway Drive would allow space to widen the Loop and construct a planting strip to separate it from traffic. A cross section for this alternative is shown earlier in this chapter. Another option would include a restriping exercise that takes existing parking on the eastbound side and allocate the space to wide outside lanes or dedicated bicycle lanes. More detailed study on the impact to parking is necessary prior to restriping the roadway. The full benefit of these options is dampened by the constrained bridges that bookend Causeway Drive. When dedicated bicycle and pedestrian crossings are constructed, the cross section to Causeway Drive should be changed. The interim recommendation is to restripe the roadway to allow for wide outside lanes and sharrows on Causeway Drive.

Other improvements to the bicycle network on Harbor Island include:

- Construct a painted bike lane through the parking lot at the Wildlife Public Boat Ramp
- Provide a connection under the Heide-Trask drawbridge for the Cross City Trail as supported in the Wrightsville Sound Small Area Plan
- Construct a bicycle lane on Salisbury Street east of Bank's Channel in accordance with the Pelican Drive/Salisbury Street Bicycle Plan
- Re-paint sharrows on Pelican Drive in accordance with the Pelican Drive/Salisbury Street Bicycle Plan

An example of a sharrow in Asheville.
Source: www.pedbikeimages.org/LyubovZuyeva

Bridges and External Connections

The Heide-Trask drawbridge and bridges over Banks Channel and Kenans Creek are in relatively good condition and likely will not be replaced for several decades. Despite their structural condition, these bridges lack adequate accommodations for the bidirectional travel of bicycle and pedestrians. Furthermore, the width of these existing bridge decks limits the ability to add dedicated facilities for bicyclists. It is recommended that a feasibility study be conducted to evaluate future accommodation of both bicyclists and pedestrians. Over time, dedicated facilities crossing onto Harbor Island and the beach will become important to improve the safety of the traveling public. This type of structure was explored as part of the Pelican Drive/Salisbury Street Bicycle Plan. As populations in the region increase, demand for beach access also should increase. Providing dedicated facilities for bicyclists and pedestrians is one way to accommodate more visitors without increasing parking demand and traffic congestion.

The existing bridge on Causeway Drive is insufficient in width to include dedicated bike lanes requiring cyclists to mix with vehicular traffic.

The City of Wilmington is in the process of completing portions of the Gary Shell Cross-City Trail, which is a network of multi-use trails connecting numerous recreational, cultural and educational destinations in Wilmington and the surrounding environs. The Cross-City trail connects from Wade Park in south Wilmington to the drawbridge at Wrightsville Beach. If accommodations for walkers and bikers can be made across the Wrightsville Beach bridges, the accessibility to the trail will enhance tourism, improve mobility, and have a positive impact on the transportation strategy for Wrightsville Beach. The WMPO has requested assistance from NCDOT to fund the construction of a public walkway/pier underneath the west side of the Heide-Trask Drawbridge. The concept design shows a wooden walkway connecting the future Cross City Trail on the north side with a new sidewalk along Airlie Road to the south. A public viewing deck would be included on the north side. The intent is to provide a safe alternative for cyclists and pedestrians wishing to cross Wrightsville Avenue. The connection is supported by the Wrightsville Avenue Small Area Plan.

Emergency Signal at Bob Sawyer Drive

Discussions with emergency responders revealed the need for an emergency preemption signal on Causeway Drive at Bob Sawyer Drive. This signal was stated as the highest priority for the fire department. The cost of a signal varies greatly based on the type of materials used. A simple signal with wood poles could be installed for less than $100,000. However, to withstand hurricane-force winds, the location in Wrightsville Beach would require metal poles. Four poles likely would be necessary due to the width of the roads and the need to offset the stop bar locations. A signal using four metal poles and wires ranges from $125,000 to $150,000. If constructed with mast arm poles, the cost would range from $150,000 to $200,000. Mast arm poles may be required at Bob Sawyer Drive due to right-of-way constraints on the south side of Causeway Drive. An up-to-date detailed cross section from NCDOT is forthcoming.

South Beach

Description: South Beach is characterized as the portion of the barrier island from Stone Street south to the southern point of the island. Waynick Boulevard and South Lumina Avenue function as a parallel couplet offering access to several small secondary streets that provide access primarily to residential and recreational uses. South Lumina Avenue lacks full continuity and alternates between north and southbound one-way status.

Key Issues: The Steering Committee and public identified the following key issues:

a. Heavy conflicts between pedestrians, cyclists, and motor vehicles at the intersection of Waynick Boulevard and Causeway Drive
b. Northbound left-turns at Waynick Boulevard and Causeway Drive Intersection
c. Lack of north south bicycle and pedestrian connectivity
d. Waterfront access (beach and inner coast)
e. Underutilized lanes on Waynick Boulevard
f. Lack of special events parking
g. Perceived speeding on Waynick Boulevard

Recommendations

The following recommendations for South Beach were developed in response to the key issues.

Causeway Drive / Waynick Boulevard Intersection

This intersection serves as a secondary gateway to Wrightsville Beach because it is the main access point to the barrier island. The intersection actually is an elongated confluence of several roads, including Causeway Drive, Waynick Boulevard, Lumina Avenue, and Stone Street. The signalized intersection struggles under the weight of vehicle movements, pedestrian activity, and bicycle traffic. Traffic counts collected for the *CTP* revealed 56% of vehicles entering the intersection from eastbound Causeway Drive travel south on Waynick Boulevard in the morning peak period. The afternoon and event peak periods experience most vehicles turning left onto Causeway Drive. While South Lumina Avenue is one-way southbound, vehicles were observed traveling northbound. Waynick Boulevard was observed to function far below capacity, an observation echoed by the Steering Committee.

The discussion on this area focused on improving bicycle and pedestrian safety while better accommodating traffic exiting the beach. A design plan was developed that converts Waynick Boulevard to 3-lane facility with a striped multi-use path, creates dual lefts for the northbound approach, and tightens the intersection for improved pedestrian safety.

Conceptual Design for Causeway Drive/Waynick Boulevard

Concept design illustrating improvements to Causeway Drive and Waynick Boulevard. A full size drawing can be found in the Appendix.

Cost

- $257,000 (excludes restriping Waynick Boulevard; see Appendix for details)

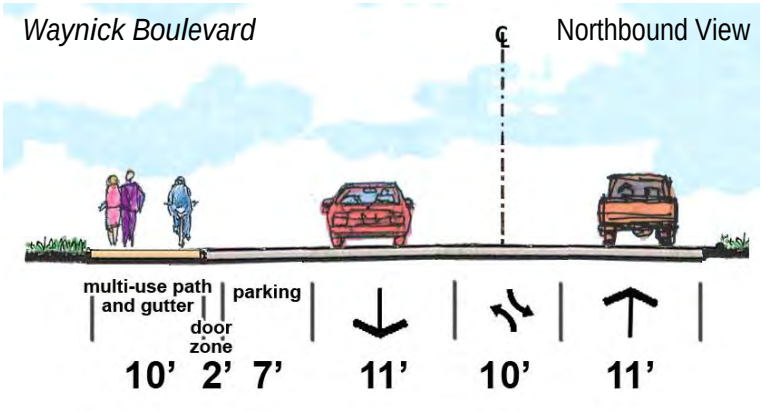
Notable Features

- Converts Waynick Boulevard to a 3-lane section with striped multi-use path with a door zone to separate it from parallel parking
- Provides dual left turns from Waynick Boulevard to Causeway Drive
- Channelizes one-way entrance to Lumina Avenue and improves lane markings to reduce wrong-way movements
- Adjusts stop bar locations to improve turning radii
- Utilizes parallel parking on Waynick Boulevard as a buffer between the road and multi-use path
- Straightens crosswalks at Waynick Boulevard to limit pedestrian exposure
- Includes bulbouts at Luminia Avenue / Stone Street intersection to reduce pedestrian exposure
- Adds ADA-compliant curb ramps at all crosswalks
- Adjusts the signal timing to provide adequate crossing
- Wayfinding sings could be installed for kayak launch points.
- Striped multi-use path could be converted to angled parking during special events.
- Traffic turning right from Waynick Boulevard may experience additional delay without an exclusive right-turn lane.

Recommended Cross Sections

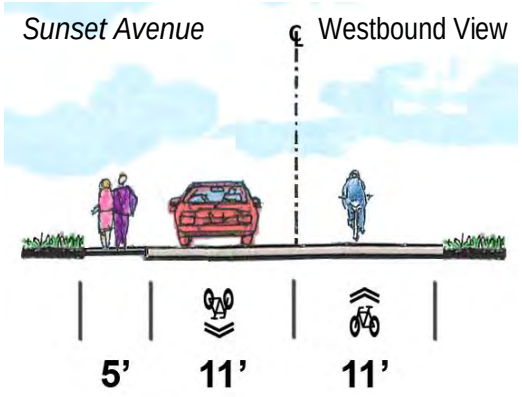
Waynick Boulevard

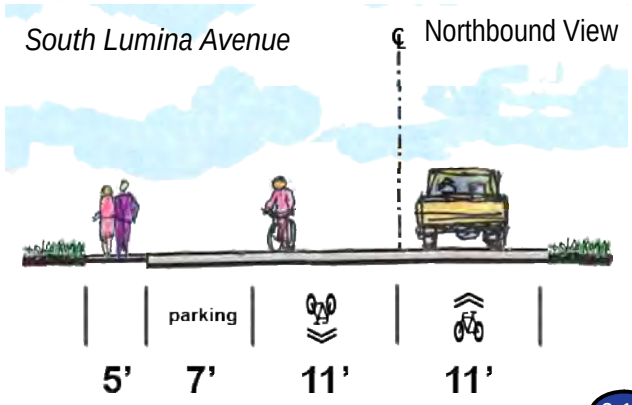
Following the decision to convert Waynick Boulevard from a four-lane undivided facility to a three-lane facility with bicycle and pedestrian facilities, the discussion focused on the preferred cross section. Consideration was given to using the extra space for bicycle lanes but that approach would make it difficult to provide adequate pedestrian facilities. The preferred cross section is a three-lane facility with a striped multi-use path adjacent to the water and separated from the travel lanes by parallel parking. This design will activate the waterfront and allow bicyclists and pedestrians to avoid the numerous driveways lining the northbound side of Waynick Boulevard.



Sunset Avenue / South Lumina Avenue

A connection for bicyclists and pedestrians between the southern terminus of Waynick Boulevard at Sunset Avenue and South Lumina Avenue is necessary. The preferred treatment for Sunset Avenue is to construct a sidewalk and paint sharrows. For South Lumina Avenue south of Sunset Avenue, sharrows are recommended. These improvements are consistent with the Comprehensive Greenway Plan for the City of Wilmington and New Hanover County.





Pedestrian Improvements

The improvements at Causeway Drive and points south will improve the pedestrian experience and encourage walking and bicycling. The low volumes and relatively slow speed on other streets in this area of Wrightsville Beach make walking safer and more pleasant. However, crosswalks are recommended at several locations to minimize the risk of conflict between vehicles and pedestrians. Once Waynick Boulevard is converted to a three-lane section with a multi-use path, additional crossings may be necessary to provide safer access to the path. The Town, in consultation with NCDOT, should explore crosswalks on Waynick Boulevard at Chadbourne Street and Arrindale Street. The crosswalk on Waynick Boulevard at the Carolina Yacht Club needs to be restriped and pedestrian signs added. Crosswalks also are recommended at the following locations:

- South Lumina Avenue at Sunset Avenue
- South Lumina Avenue at the Yacht Club
- South Lumina Avenue at Corbett Street
- South Lumina Avenue at Albright Street
- South Lumina Avenue at Northrop Street

The crosswalks should be high visibility with ground-mounted yield to pedestrian signs.

Bicycle Improvements

Bicyclists also will benefit from the striped multi-use path implemented as part of the Waynick Boulevard restriping exercise. While the project team was encouraged by the public to explore dedicated bicycle facilities on South Lumina Avenue, the alternating north and southbound one-way status diminishes the appeal of this option. The bicycle network is recommended to be supplemented with shared lane markings (sharrows) on Sunset Avenue and along South Lumina Avenue south of its intersection with Sunset Avenue. On lower volume, lower speed roads, bicyclists can easily blend in with vehicular traffic.

Posted Speed Limits

Speeding on Waynick Boulevard was cited as a cause for concern, especially given pedestrian activity across the road to docks and marinas. The posted speed limit on Waynick Boulevard currently is 35 mph, which is not recommended to be changed. The wide four-lane cross section is over-designed given traffic levels most days and times of the year. The conversion of the facility to a 3-lane section with striped multi-use path should alleviate some speeding problems on the corridor.

North Beach

Description: North Beach is characterized as the area located between Salisbury Street north to the terminus of North Lumina Avenue (at Shell Island Resort). It is primarily accessed by North Lumina Avenue with several local streets primarily offering access to residential and recreational uses.

Key Issues: The Steering Committee and public identified the following key issues:

a. Lack of support for a roundabout at North Lumina Avenue/Salisbury Street (as recommended in Cape Fear Commutes 2035 Transportation Plan)

b. Improved pedestrian crossings at North Lumina Avenue and Salisbury Street

c. Inconsistent bicycle accommodations

d. Emergency access to beach is in a location that is congested (proximity to Surf Club)

e. Pedestrian and bicycle access south to the Center Beach area

North Beach Imagery

Recommendations

The recommendations for the North Beach area focus on improving the bicycle and pedestrian network by raising awareness to bicyclists' right to the road and delineating pedestrian crossings.

Salisbury Street and North Lumina Avenue

The intersection of Salisbury Street and North Lumina Avenue is a secondary gateway to the beach area, particularly those destined for the resorts in north Wrightsville Beach. The intersection was studied in detail as part of the Pelican Drive/Salisbury Street Bicycle Plan. The intersection also appears in the Cape Fear Commutes 2035 Transportation Plan as a recommended roundabout. These plans were considered as alternatives were developed. Additional field review and traffic analysis showed the intersection does not operate poorly under existing conditions (see the Appendix for full details on the traffic analysis). Support for the roundabout was not strong among elected officials and the public, particularly if parking supply would be impacted.

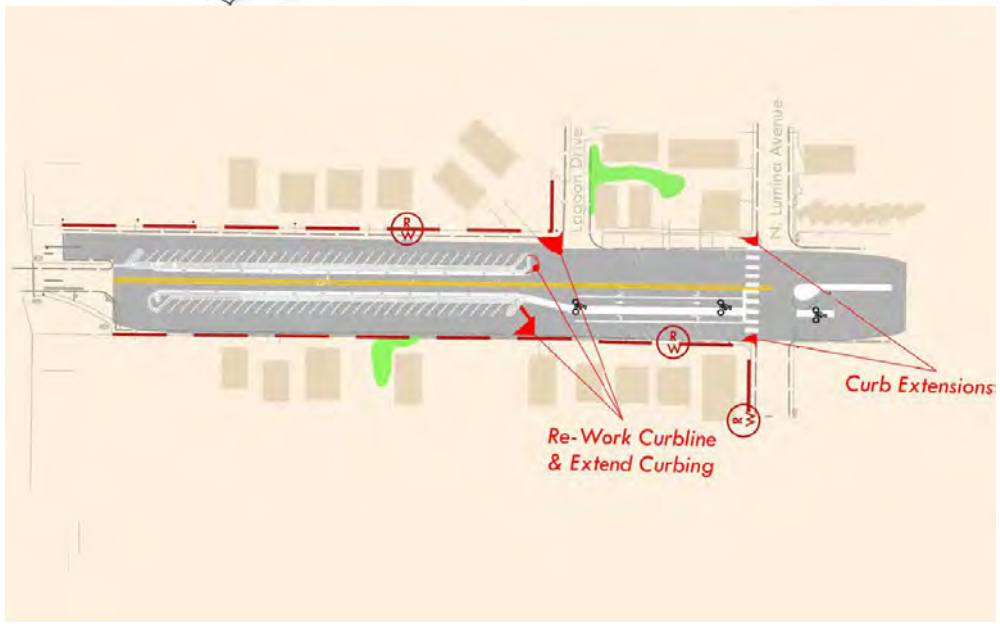
After careful consideration, the project team created a new design for the area that included features such as realigned travel lanes, reorganized parking, pedestrian refuge, and bicycle facilities. Ultimately, the Steering Committee elected to adhere to the results of the Pelican Drive/Salisbury Street Bicycle Plan, which recommendations in this area include the following:

- Alter parking areas on Salisbury Street to create room for 6-foot bicycle lanes on either side of the street
- Redesign parking areas for better traffic flow, clarity, and safety
- Install an eastbound bicycle lane to the public beach access at the end of Salisbury Street

Selected Images from the Pelican Drive/Salisbury Street Bicycle Plan

Street-level view of the proposed bike lane and curb extensions at the Salisbury/North Lumina intersection.

Profile view of Option B bike-ped bridges and off-road connector trail parallel to Salisbury Street.



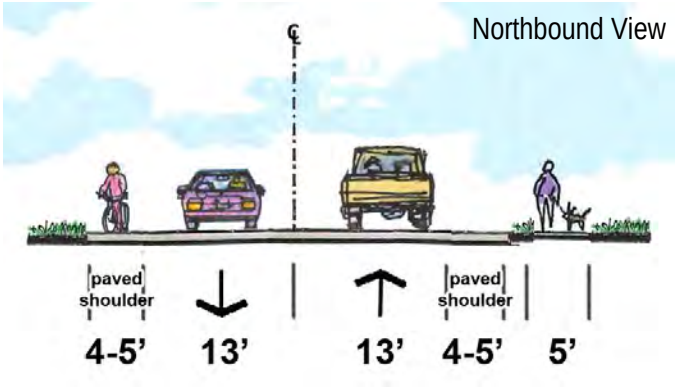
Proposed Recommendations for the Intersection of Salisbury Street and North Lumina Avenue.

Recommended Cross Sections

North Lumina Avenue (North of South Ridge Lane)

No changes are recommended for the northernmost portion of North Lumina Avenue. This portion of the corridor includes existing paved shoulders that vary in width from 4 feet to 5 feet. Share the Road signs are recommended to supplement the paved shoulder treatment.

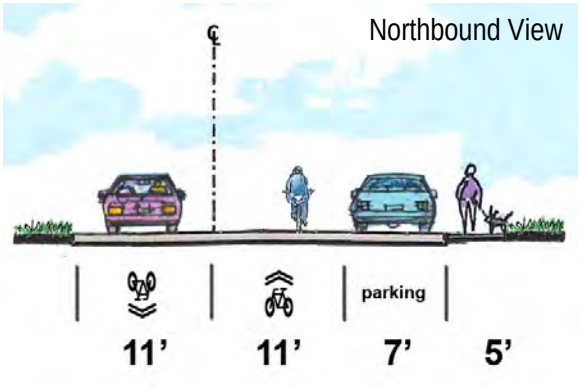
North Lumina Avenue (North of South Ridge Lane)



North Lumina Avenue (South Ridge Lane to Seaside Lane)

Between Seaside Lane and Northridge Lane, North Lumina Avenue has 11-foot travel lanes with parallel parking on the northbound side. A 5-foot sidewalk also exists on the northbound side. Shared lane markings (sharrows) are recommended on North Lumina Avenue to indicate that bicyclists in the area should take the lane and to make motorists aware that bicyclists may be present.

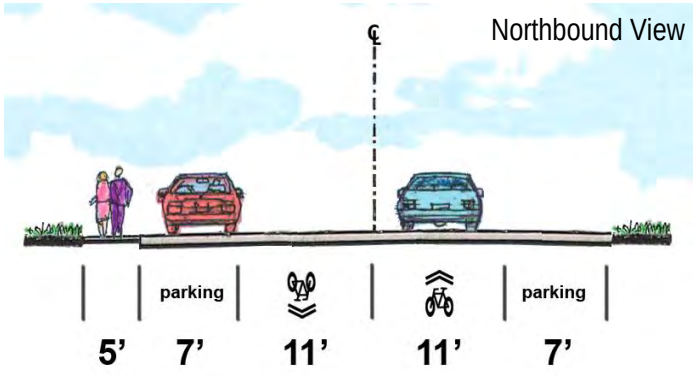
North Lumina Avenue (South Ridge Lane to Seaside Lane)



North Lumina Avenue (Salisbury Street to Seaside Lane)

Sharrows also are recommended on North Lumina Avenue between Salisbury Street and Seaside Lane. No other change is recommended to the existing cross section, which includes two 11-foot travel lanes, 7-foot parallel parking on both sides and a 5-foot sidewalk on the southbound side.

North Lumina Avenue (Salisbury Street to Seaside Lane)



Beach Access for Emergency Vehicles

The Wrightsville Beach Fire Department's Ocean Rescue Squad routinely requires beach access for emergency vehicles. Mallard Street currently is used as the beach access point for emergency vehicles and beach patrol. This street is among the most congested side streets in North Beach because it has public parking on both sides and serves the Surf Club. The congestion creates a potential public safety hazard. One block south, Crane Street has no public parking and only residential driveways. It is recommended that Crane Street be used for emergency access, which would require changes to the dunes to permit official four-wheel drive vehicles.

Bicycle Recommendations

In general, the street network north of Salisbury Street is limited. As a result, the bicycle network north of Salisbury Street includes only two main recommendations for North Lumina Avenue: Paint sharrows on the corridor south of Northridge Lane and install "Share the Road" signs along the length of the corridor.

Pedestrian Recommendations

The recent construction of bulbouts at the intersection of Salisbury Street and North Lumina Avenue is a positive improvement to the pedestrian network. Limited right-of-way makes it difficult and cost prohibitive to construct sidewalks along the full length of North Lumina Avenue. As a result, it is likely that pedestrians will continue to mix with bicyclists and motor vehicle traffic. Installing crosswalks will help complete the existing pedestrian network. Crosswalks are recommended at the following locations:

- North Lumina at Parmele Boulevard (directional-crossing Parmele Boulevard on west side of North Lumina Avenue)
- North Lumina Avenue at Seaside Lane
- North Lumina Avenue at North Ridge Lane

Center Beach

Description: Center Beach includes the portion of the beach located between Stone Street (to the south) and Salisbury Street (to the north). This area is the traditional center of the beach where several commercial uses including restaurants, rental, and recreational uses can be found as well as a diversity of residential uses. Parking along southbound Lumina Avenue is restricted on weekends to provide extra room for the Loop and access for emergency vehicles when warranted.

Key Issues: The Steering Committee and public identified the following key issues:

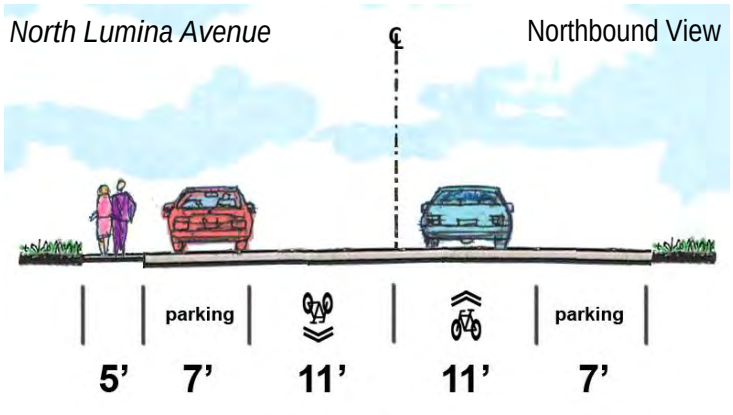
a. Congestion, including conflict between vehicles, pedestrians, and bicyclists
b. North Lumina Avenue serves as a portion of the Loop by pedestrians and bicyclists
c. Need to maintain dedicated space for emergency response along North Lumina Ave
d. Pedestrian crossings along North Lumina Ave within proximity to commercial uses
e. Parking
f. Salisbury Street and North Lumina Avenue intersection (design, parking and operations)

Recommendations

The recommendations for this area focus on short-term improvements to North Lumina Avenue. Right-of-way constraints are the limiting factor in the development of recommendations even though the area is bracketed by two access points to the beach—Causeway Drive to the south and Salisbury Street to the north—and suffers from the worst peak season congestion in Wrightsville Beach.

Recommended Cross Section

Two options for North Lumina Avenue between Causeway Drive and Salisbury Street were explored as part of the *CTP*. The recommended short-term option is to maintain the existing cross section and add sharrows to emphasize shared use between motor vehicles and bicyclists. Sharrows also should help draw bicyclists away from the parking areas into the travel lanes with slow-moving vehicles. The second option creates a striped multi-use path similar to the proposed path on Waynick Boulevard by permanently removing parking on the southbound side of the road. Parking in this area already is restricted during peak periods to allow emergency vehicle access and additional room on the Loop. By permanently removing parking and restriping the road for a multi-use path, a dedicated space for bicyclists and pedestrians can be created. This option would continue to provide space for emergency vehicles when necessary and may be converted to angled parking during events.



Recommended Crosswalks

Crosswalks are recommended on three locations along North Lumina Avenue:

- Columbia Street
- Atlanta Street
- Fayetteville Street

Action Plan

The foundation of the Action Plan is the commitment of plan partners (the Town, WMPO, and NCDOT), awareness of the Town's transportation issues, and strategic initiatives that support the plan's vision and adhere to the guiding statements.

The Vision of the Wrightsville Beach CTP is to develop an integrated community-based transportation plan that provides choice, establishes identity, and promotes safety for residents, business owners, and visitors.

Integrated | Blend previous planning efforts with new analysis and purposeful community involvement to create realistic and implementable solutions.

Community-based | Establish an understanding of the Town's needs and achieve informed consent through active and transparent outreach.

Choice | Connect homes, parks, businesses, and other key destinations with facilities designed for bicyclists, pedestrians, and motorists.

Identity | Foster a sense of place tied to livability and active lifestyles with a focus on enhancing gateways, critical intersections, and key corridors.

Safety | Promote safe travel and enhance the sense of comfort for using and interacting with different travel modes.

The Action Plan sets the stage for the successful orchestration of the improvements recommended in this chapter by prioritizing the projects. The table that follows lists appropriate actions to implement the recommendations of the *CTP* based on three timeframes—Short Term (Within 5 years), Mid Term (6 to 10 years), and Long Term (More than 10 years). Priorities were determined based on a combination of perceived need and relative ease of implementation. Many of the tasks are recommended to be folded into the update of the Cape Fear Commutes 2035 Transportation Plan.

Summary of Recommendations by Horizon Year			
Recommendation	Unit Cost	Total Cost	Notes
Immediate (Within 1 year)			
• Install HAWK signal on Causeway Drive at North Channel Street	N/A (funding complete)		
• Reduce speed limit on Salisbury Street to 35 mph	N/A		
• Form a Pedestrian and Non-Motorized Vehicle Transportation Committee to partner with the Wilmington Bike and Pedestrian Committee in accordance with the recommendation of the 2007-2012 Parks, Recreation, and Open Space Master Plan	N/A		
• Install ground-mounted yield to pedestrian signs in crosswalks	$200 per sign		Initiate action during this timeframe with full implementation to occur as funding is available
Short-Term (2 to 5 years)			
• Improve the intersection of Causeway Drive and Waynick Boulevard in accordance with the concept design (Page 3-13)		$257,000	
• Install an emergency signal on Causeway Drive at Bob Sawyer Drive		$150,000 to $200,000	
• Install HAWK signal on Salisbury Street and the eastern terminus of Pelican Drive		$80,000 to $100,000	
• Construct wooden walkway/pier under the Heide-Trask Drawbridge	TBD		Initiate action through the WMPO
• Install high visibility crosswalks along the Loop (directional crosswalks; 2 locations)	$500 per crossing	$1,000	Initiate action with full implementation to occur as funding is available

Recommendation	Unit Cost	Total Cost	Notes
• Add sharrows to Causeway Drive	$2,000 per mile or $200 per sharrow	$1,500	
• Add sharrows to South Lumina Avenue south of Sunset Avenue	$2,000 per mile or $200 per sharrow	$1,000	Implement in concert with conversion of Waynick Boulevard
• Add sharrows and construct sidewalk on Sunset Avenue	$2,000 per mile or $200 per sharrow; $25 per linear foot	$9,500 (excluding right-of-way)	Implement in concert with conversion of Waynick Boulevard
• Re-paint sharrows on Pelican Drive in accordance with the Pelican Drive/Salisbury Street Bicycle Plan	$2,000 per mile or $200 per sharrow	$1,200	
• Add sharrows on North Lumina Avenue between Causeway Drive and South Ridge Lane	$2,000 per mile or $200 per sharrow	$3,000	
• Paint bicycle lane in parking lot of Wildlife Public Boat Ramp parking lot	$10,000 per mile	$1,000	
• Switch beach access for emergency vehicles from Mallard Street to Crane Street	N/A (requires staff manhours for dune removal)		
• Widen the Loop to a minimum of 10' on Harbor Island where feasible	TBD		
• Install "Share the Road" signs along North Lumina Avenue	$225 per sign	$2,500	
• Conduct a feasibility study to evaluate a dedicated bicycle and pedestrian crossing of Bank's Channel		$40,000	

Recommendation	Unit Cost	Total Cost	Notes
• Install high visibility crosswalks on Waynick Boulevard: o Carolina Yacht Club (restripe existing; add signs) o Chadbourne Street o Arrindale Street	$5,000 per location	$10,000	Initiate action and compete in priority order as funding is available
• Install high visibility crosswalks on South Lumina Avenue in priority order: o Carolina Yacht Club o Corbett Street o Albright Street o Northrop Street o Sunset Avenue	$5,000 per location	$25,000	Initiate action and compete in priority order as funding is available
• Install high visibility crosswalks on North Lumina Avenue in priority order: o Northridge Lane o Seaside Lane o Parmele Boulevard o Fayetteville Street o Atlanta Street o Columbia Street	$5,000 per location	$30,000	

Recommendation	Unit Cost	Total Cost	Notes
Mid-Term (6 to 10 years)			
• Implement improvements to the intersection of Salisbury Street and North Lumina Avenue in accordance with the Pelican Drive/Salisbury Street Bicycle Plan	See Pelican Drive/Salisbury Street Bicycle Plan		
• Construct bicycle lane on Salisbury Street east of Bank's Channel in accordance with the Pelican Drive/Salisbury Street Bicycle Plan	See Pelican Drive/ Salisbury Street Bicycle Plan		
• Construct a sidewalk on Coral Drive to Wrightsville Beach Elementary School	$25 per linear foot	$25,000 (excluding right-of-way)	
Long-Term (More than 10 years)			
• Construct a roundabout at the intersection of Causeway Drive and Salisbury Street		$3,140,000	
• Alter parking areas on Salisbury Street to create room for 6-foot bicycle lanes on either side of the street (as recommended in the Pelican Drive/Salisbury Street Bicycle Plan)	See Pelican Drive/ Salisbury Street Bicycle Plan		
• Create a consistent and wider striped bicycle lane on Salisbury Street when the road is resurfaced	N/A (project to be completed during routine resurfacing)		Timing to be determined based on resurfacing
• Reduce laneage on Causeway Drive to three lanes and widen the Loop (long-term, once bicycle and pedestrian crossing of Banks Channel is identified)	TBD		

Kimley-Horn and Associates, Inc.

WWW.KIMLEY-HORN.COM

APPENDICES - FEBRUARY 2013

Wrightsville Beach | Community Transportation Plan

Prepared for:

Town of Wrightsville Beach

Wilmington Urban Area Metropolitan Planning Organization

Kimley-Horn
and Associates, Inc.

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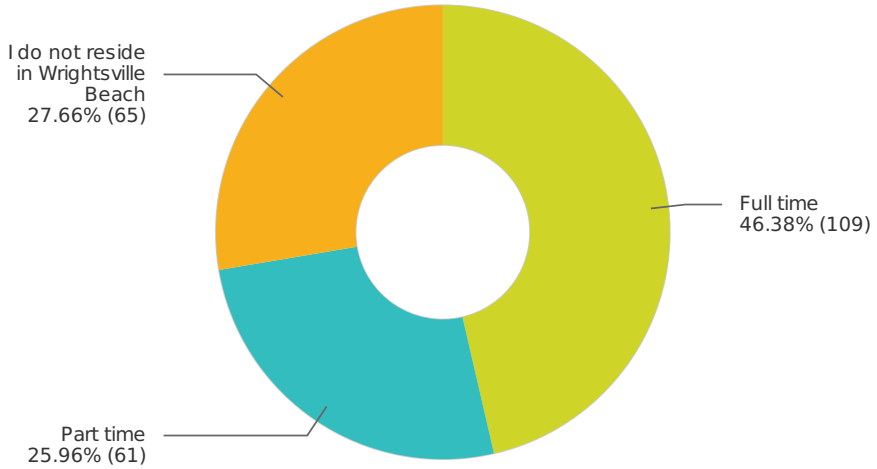
Appendix A

Survey Results

Appendix A Survey Results

Q1 Do you reside in Wrightsville Beach?

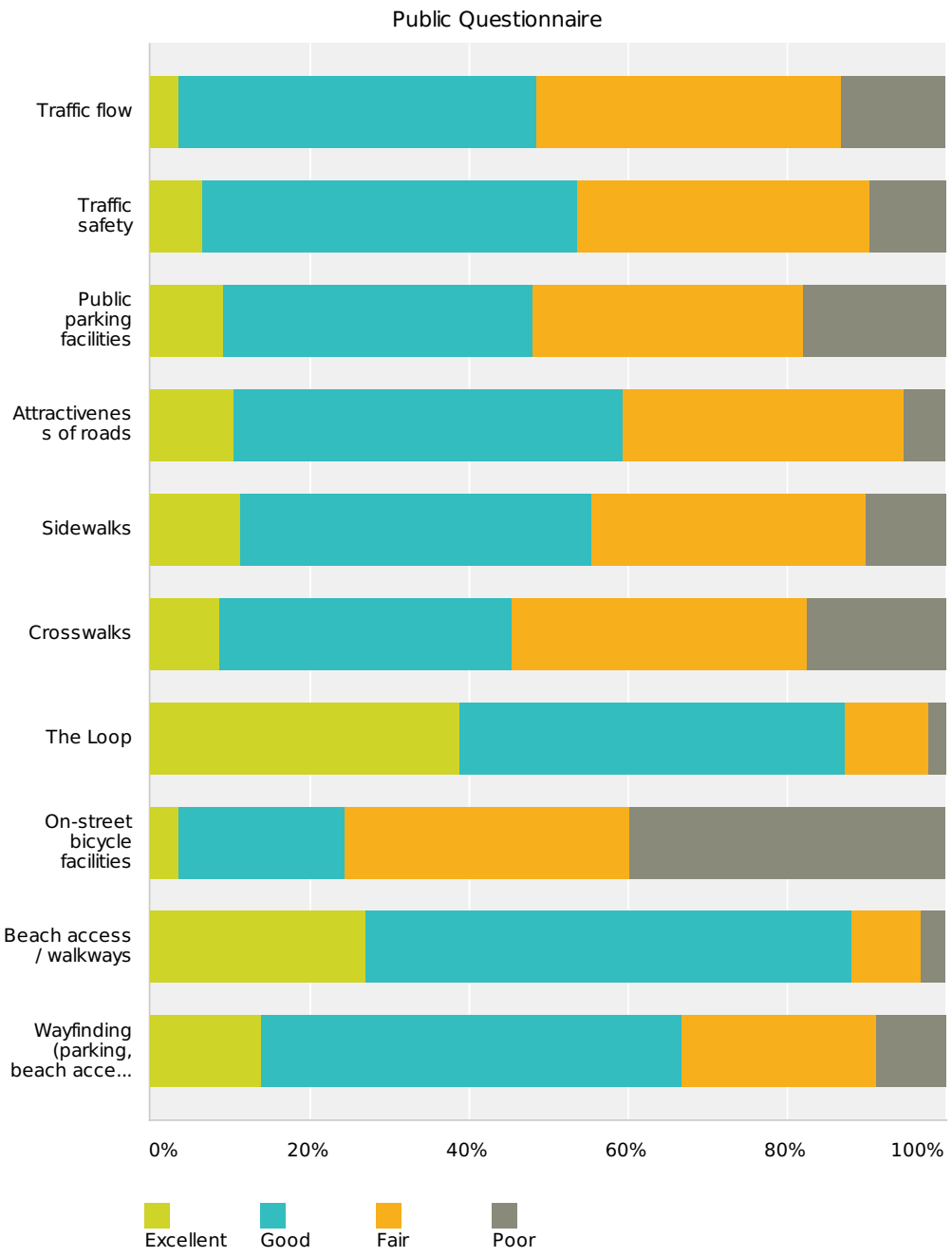
Answered: 235 Skipped: 0



Answer Choices	Responses	
Full time	**46.38%**	109
Part time	**25.96%**	61
I do not reside in Wrightsville Beach	**27.66%**	65
Total		235

Q2 Overall, how do you rate the following pieces of the Town's transportation network?

Answered: 229 Skipped: 6

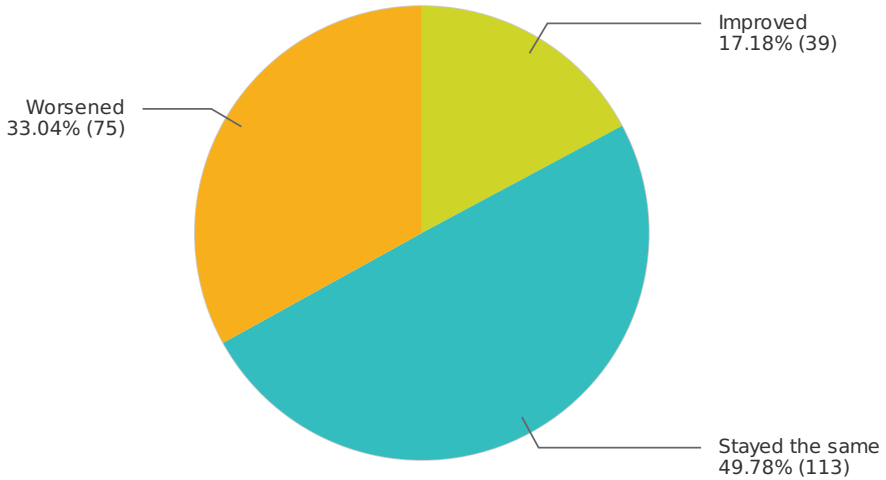


	Excellent	Good	Fair	Poor	Total
Traffic flow	**3.49%** 8	**44.98%** 103	**38.43%** 88	**13.10%** 30	229

Traffic safety	**6.55%** 15	**47.16%** 108	**36.68%** 84	**9.61%** 22	229
Public parking facilities	**9.17%** 21	**38.86%** 89	**34.06%** 78	**17.90%** 41	229
Attractiveness of roads	**10.48%** 24	**48.91%** 112	**35.37%** 81	**5.24%** 12	229
Sidewalks	**11.35%** 26	**44.10%** 101	**34.50%** 79	**10.04%** 23	229
Crosswalks	**8.73%** 20	**36.68%** 84	**37.12%** 85	**17.47%** 40	229
The Loop	**38.86%** 89	**48.47%** 111	**10.48%** 24	**2.18%** 5	229
On-street bicycle facilities	**3.49%** 8	**20.96%** 48	**35.81%** 82	**39.74%** 91	229
Beach access / walkways	**27.07%** 62	**61.14%** 140	**8.73%** 20	**3.06%** 7	229
Wayfinding (parking, beach access, etc.)	**13.97%** 32	**52.84%** 121	**24.45%** 56	**8.73%** 20	229

Q3 Over the last three years, has transportation in Wrightsville Beach improved, stayed the same, or worsened?

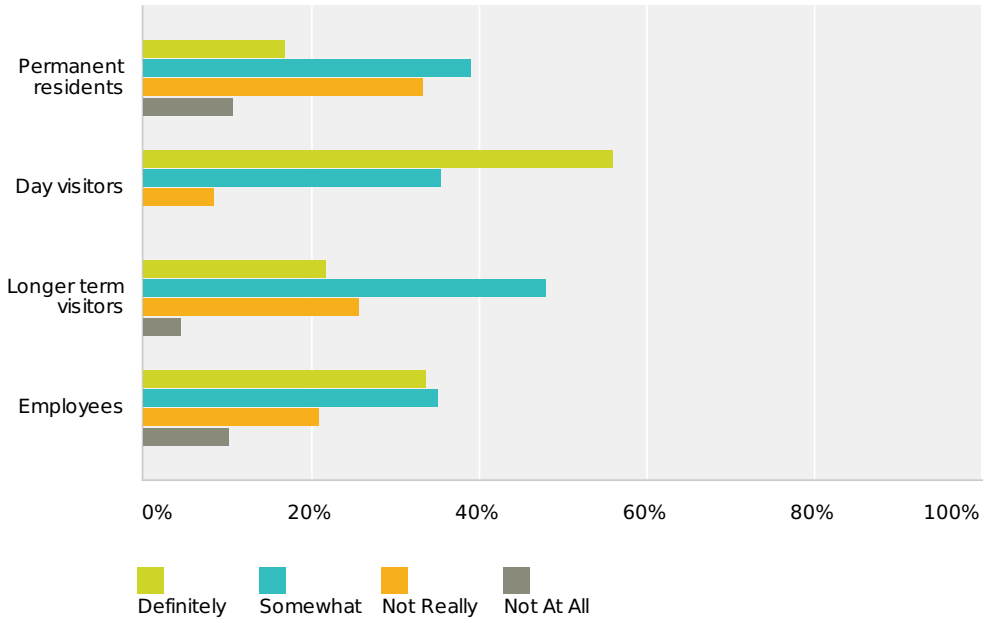
Answered: 227 Skipped: 8



Answer Choices	Responses	
Improved	**17.18%**	39
Stayed the same	**49.78%**	113
Worsened	**33.04%**	75
Total		227

Q4 Is parking a problem for the following groups?

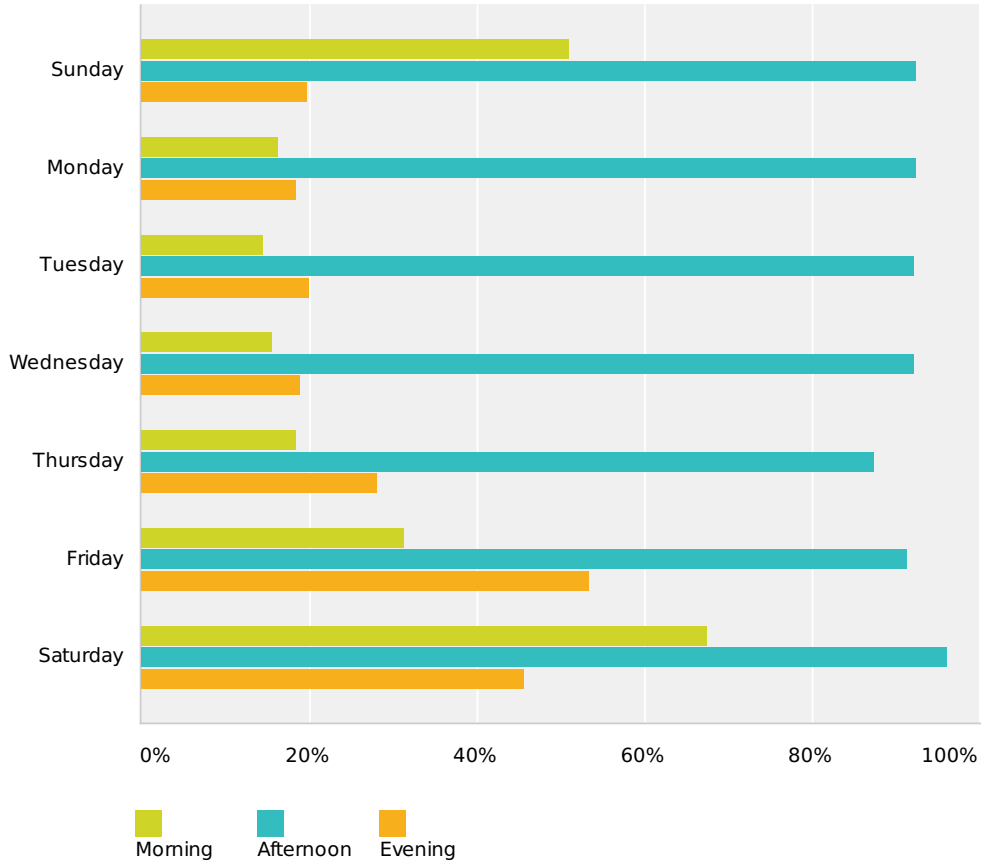
Answered: 225 Skipped: 10



	Definitely	Somewhat	Not Really	Not At All	Total
Permanent residents	**16.89%** 38	**39.11%** 88	**33.33%** 75	**10.67%** 24	225
Day visitors	**56.00%** 126	**35.56%** 80	**8.44%** 19	**0%** 0	225
Longer term visitors	**21.78%** 49	**48%** 108	**25.78%** 58	**4.44%** 10	225
Employees	**33.78%** 76	**35.11%** 79	**20.89%** 47	**10.22%** 23	225

Q5 Please indicate day(s) of week and time(s) of day that parking spaces are difficult to find.

Answered: 207 Skipped: 28

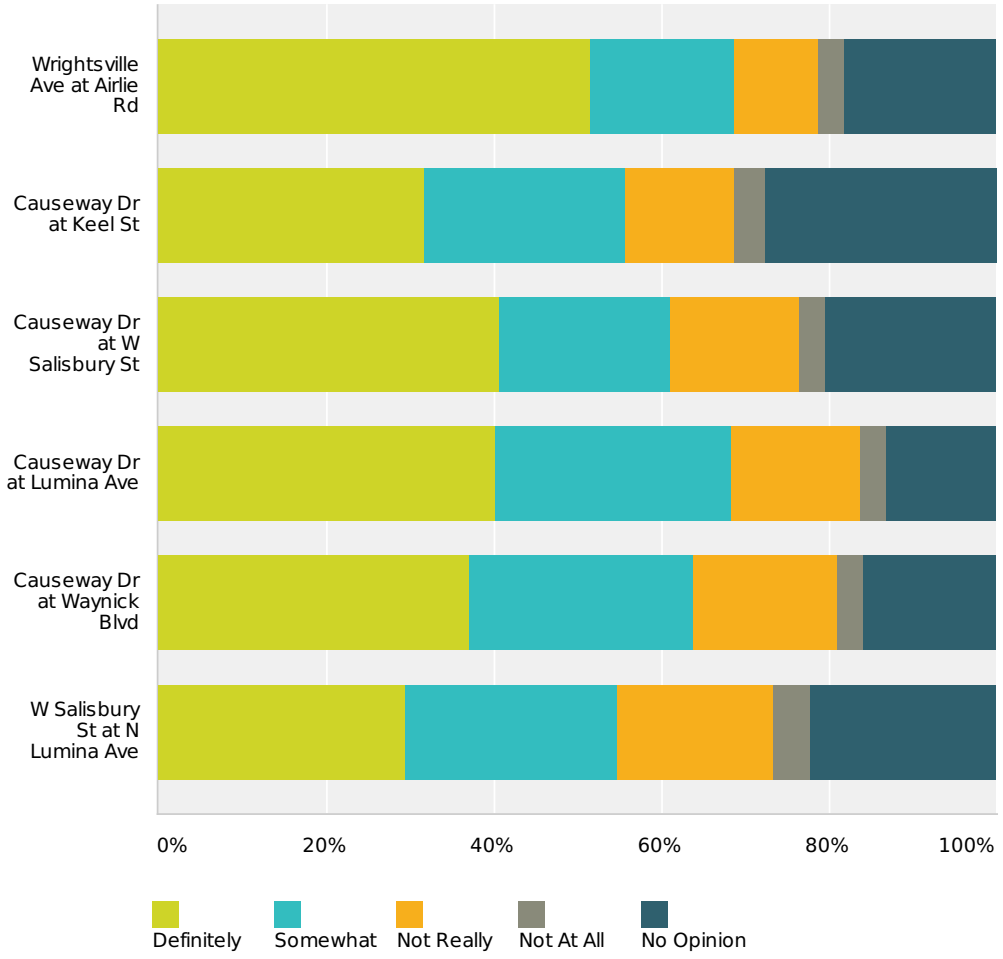


	Morning	Afternoon	Evening	Total Respondents
Sunday	**51.01%** 101	**92.42%** 183	**19.70%** 39	198
Monday	**16.30%** 15	**92.39%** 85	**18.48%** 17	92
Tuesday	**14.44%** 13	**92.22%** 83	**20%** 18	90

Wednesday	**15.56%** 14	**92.22%** 83	**18.89%** 17	 90
Thursday	**18.45%** 19	**87.38%** 90	**28.16%** 29	 103
Friday	**31.29%** 51	**91.41%** 149	**53.37%** 87	 163
Saturday	**67.48%** 139	**96.12%** 198	**45.63%** 94	 206

Q6 Do the following INTERSECTIONS or CROSSINGS in Town need to be improved for bicycle and pedestrian safety?

Answered: 221 Skipped: 14

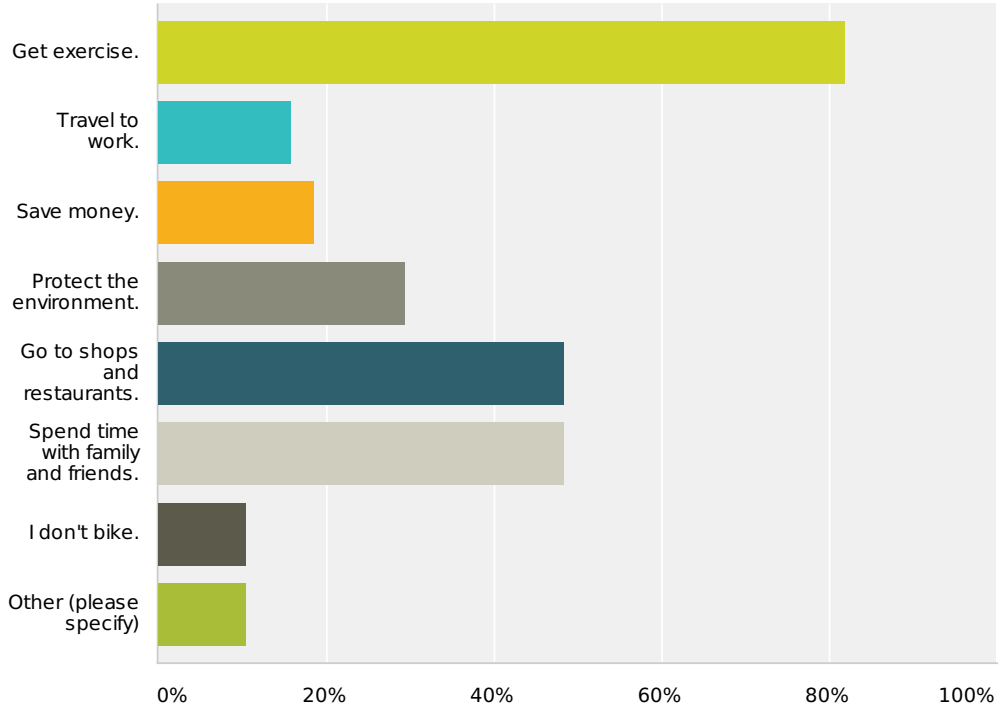


	Definitely	Somewhat	Not Really	Not At All	No Opinion	Total
Wrightsville Ave at Airlie Rd	**51.58%** 114	**17.19%** 38	**9.95%** 22	**3.17%** 7	**18.10%** 40	221

Causeway Dr at Keel St	**31.67%** 70	**23.98%** 53	**13.12%** 29	**3.62%** 8	**27.60%** 61	221
Causeway Dr at W Salisbury St	**40.72%** 90	**20.36%** 45	**15.38%** 34	**3.17%** 7	**20.36%** 45	221
Causeway Dr at Lumina Ave	**40.27%** 89	**28.05%** 62	**15.38%** 34	**3.17%** 7	**13.12%** 29	221
Causeway Dr at Waynick Blvd	**37.10%** 82	**26.70%** 59	**17.19%** 38	**3.17%** 7	**15.84%** 35	221
W Salisbury St at N Lumina Ave	**29.41%** 65	**25.34%** 56	**18.55%** 41	**4.52%** 10	**22.17%** 49	221

Q7 When I bike, it's to... (check all that apply)

Answered: 221 Skipped: 14



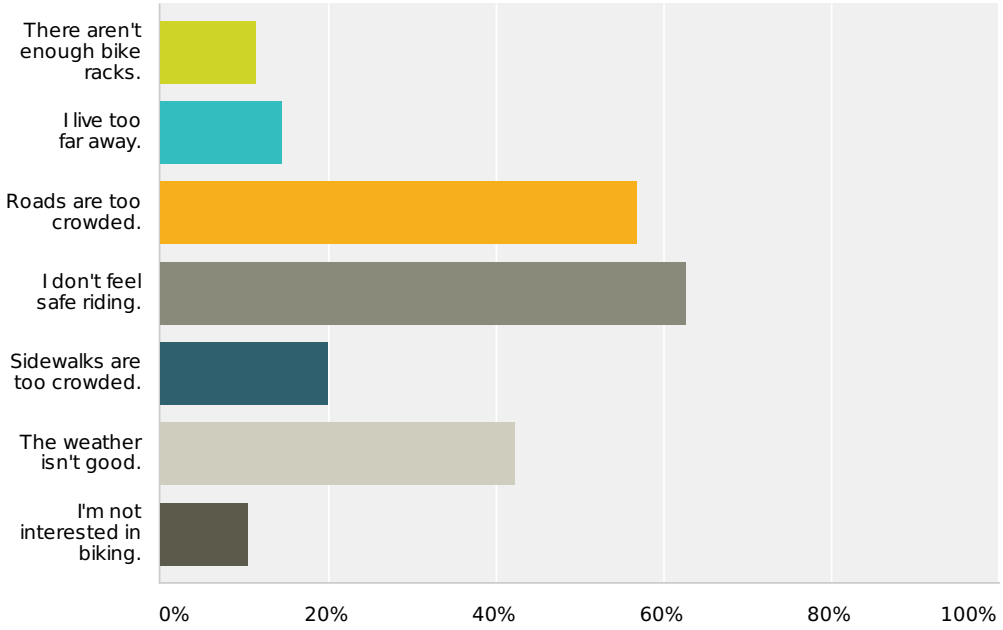
Answer Choices	Responses	
Get exercise.	**81.90%**	181
Travel to work.	**15.84%**	35
Save money.	**18.55%**	41
Protect the environment.	**29.41%**	65
Go to shops and restaurants.	**48.42%**	107
Spend time with family and friends.	**48.42%**	107
I don't bike.	**10.41%**	23
Other (please specify)	**10.41%**	23

Total Respondents: 221

#	Other (please specify)	Date
1	I cannot do it because unsafe	10/2/2012 11:02 AM
2	go to the beach	10/2/2012 8:19 AM
3	N/A	10/2/2012 8:04 AM
4	for fun	9/15/2012 2:20 PM
5	avoid parking problems	9/15/2012 1:15 PM
6	Avoid driving during heavy traffic & parking times	9/14/2012 9:16 AM
7	Use already paid for paths	9/13/2012 2:31 PM
8	When there is no parking spaces at beach acess	9/13/2012 12:54 PM
9	to go to church but it is scary but I still go	8/31/2012 6:33 AM
10	Fun	8/28/2012 6:19 PM
11	we do not need a bike path between Salisbury and Causeway on the beach...the path should go north of Salisbury and south of Causeway parking between the bridges has already been limited for the property owners	8/18/2012 7:26 AM
12	Avoid traffic delays and increasing traffic	8/17/2012 1:07 PM
13	Avoid having to locate a parking space as none are available.	8/17/2012 11:35 AM
14	goto beach	8/17/2012 9:48 AM
15	only viable on north end.	8/17/2012 5:34 AM
16	Recreation	8/17/2012 5:08 AM
17	not get a arrested for having two beers	8/17/2012 3:36 AM
18	see and feel the ambience at the beach environment	8/16/2012 6:04 PM
19	To check out the area and get outside	8/16/2012 3:50 PM
20	avoid parking issues	8/16/2012 2:26 PM
21	Recreation	8/16/2012 2:18 PM
22	avoid parking issues	8/16/2012 12:33 PM
23	pleasure	8/16/2012 11:41 AM

Q8 When I don't bike, it's because... (check all that apply)

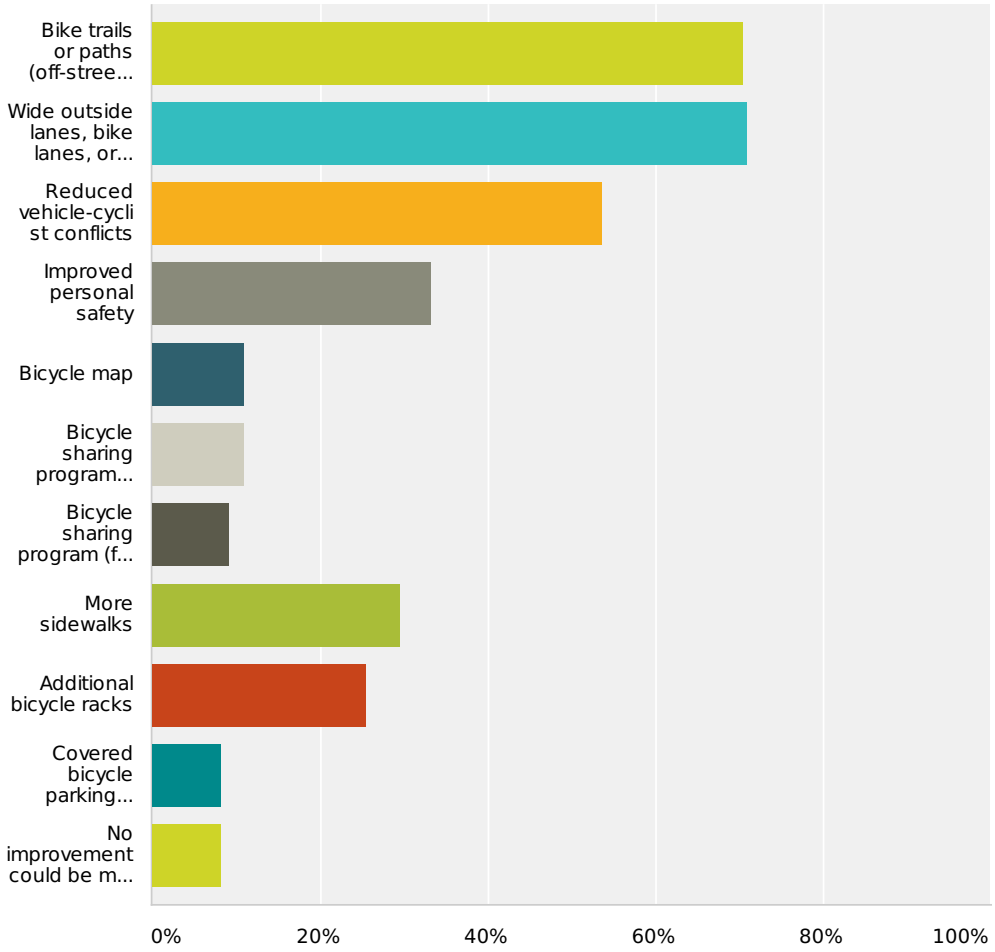
Answered: 220 Skipped: 15



Answer Choices	Responses	
There aren't enough bike racks.	**11.36%**	25
I live too far away.	**14.55%**	32
Roads are too crowded.	**56.82%**	125
I don't feel safe riding.	**62.73%**	138
Sidewalks are too crowded.	**20%**	44
The weather isn't good.	**42.27%**	93
I'm not interested in biking.	**10.45%**	23
Total Respondents: 220		

Q9 What improvements could be made to increase your use of bicycling or walking? (check all that apply)

Answered: 220 Skipped: 15



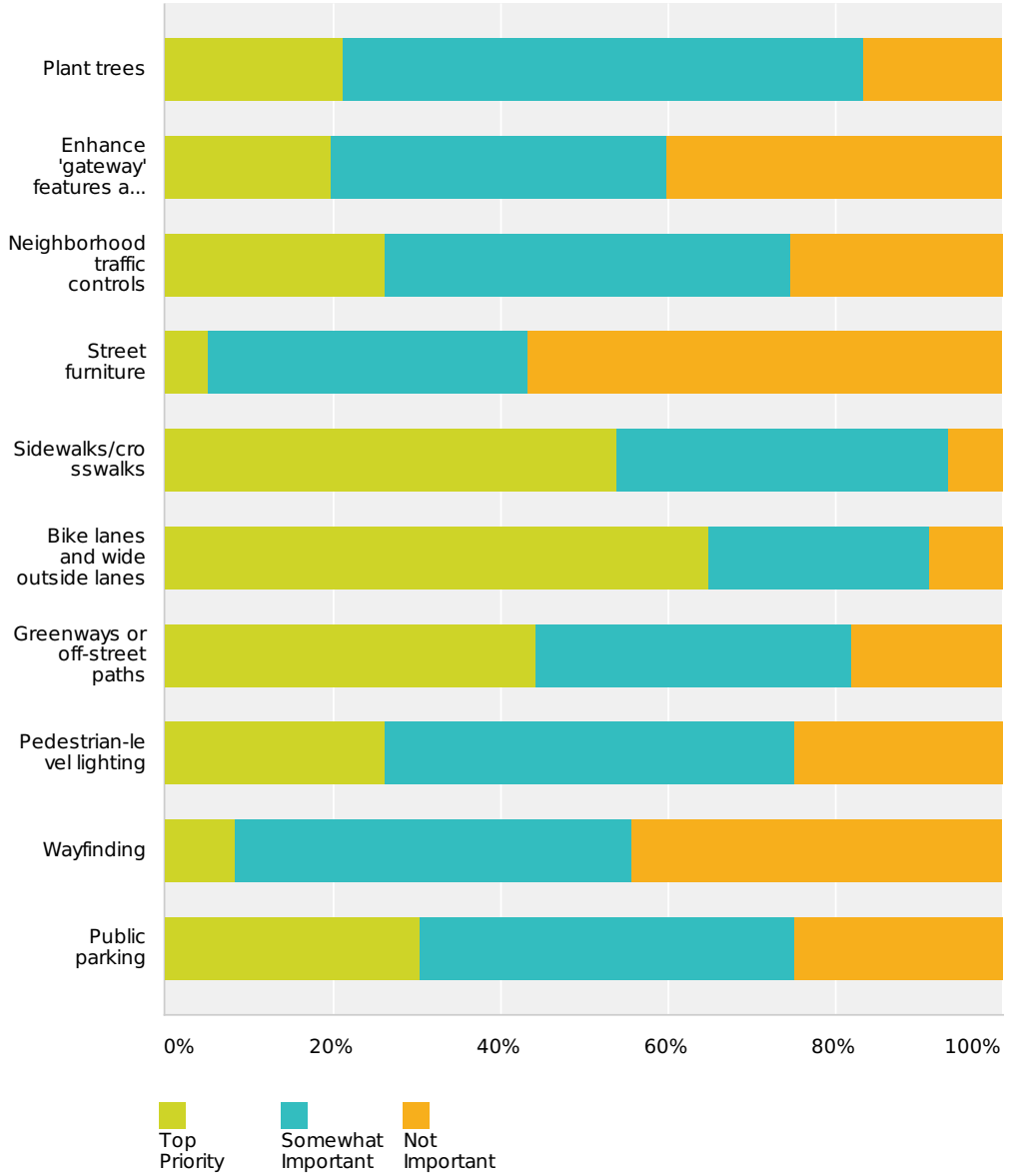
Answer Choices	Responses	
Bike trails or paths (off-street facilities)	**70.45%**	155
Wide outside lanes, bike lanes, or sharrows (on-street facilities)	**70.91%**	156

Total Respondents: 220

Reduced vehicle-cyclist conflicts	**53.64%**	118
Improved personal safety	**33.18%**	73
Bicycle map	**10.91%**	24
Bicycle sharing program (free)	**10.91%**	24
Bicycle sharing program (fee charged)	**9.09%**	20
More sidewalks	**29.55%**	65
Additional bicycle racks	**25.45%**	56
Covered bicycle parking (shelters, lockers, etc.)	**8.18%**	18
No improvement could be made to increase my bicycling or walking	**8.18%**	18
Total Respondents: 220		

Q10 How important are the following improvements?

Answered: 217 Skipped: 18

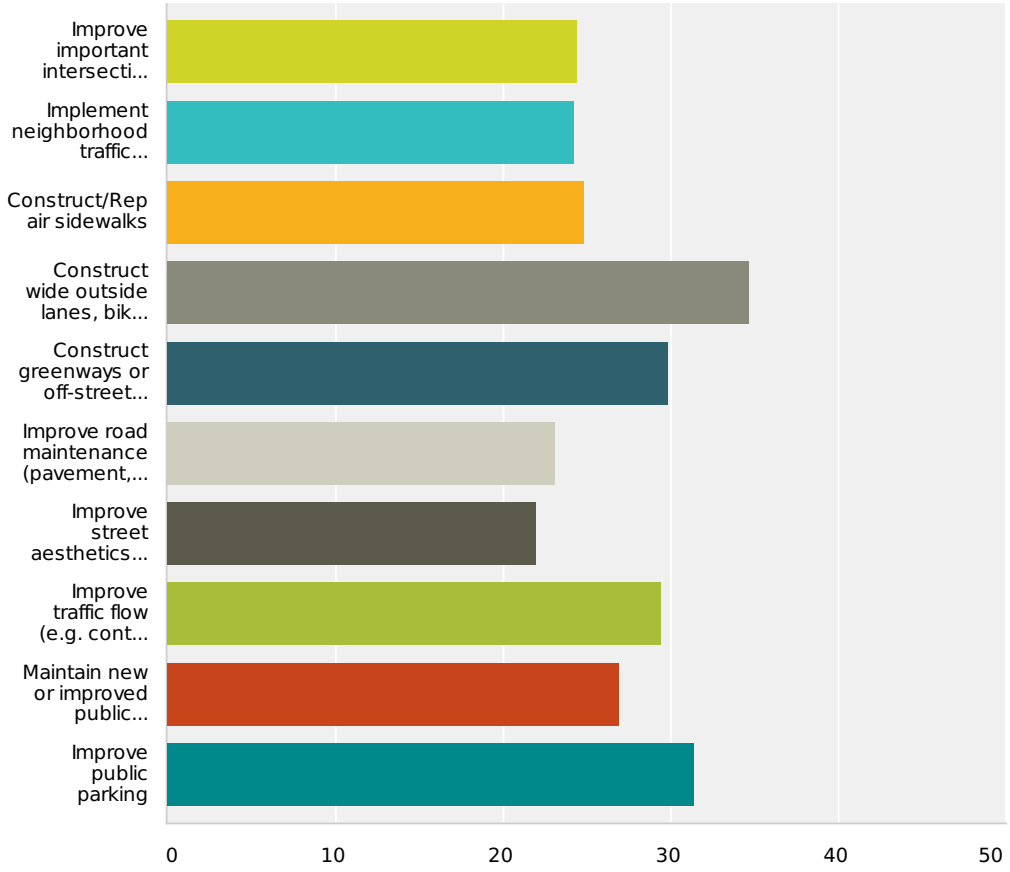


	Top Priority	Somewhat Important	Not Important	Total

Plant trees	**21.20%** 46	**62.21%** 135	**16.59%** 36	217
Enhance 'gateway' features at Town entrance	**19.82%** 43	**40.09%** 87	**40.09%** 87	217
Neighborhood traffic controls	**26.27%** 57	**48.39%** 105	**25.35%** 55	217
Street furniture	**5.07%** 11	**38.25%** 83	**56.68%** 123	217
Sidewalks/crosswalks	**53.92%** 117	**39.63%** 86	**6.45%** 14	217
Bike lanes and wide outside lanes	**64.98%** 141	**26.27%** 57	**8.76%** 19	217
Greenways or off-street paths	**44.24%** 96	**37.79%** 82	**17.97%** 39	217
Pedestrian-level lighting	**26.27%** 57	**48.85%** 106	**24.88%** 54	217
Wayfinding	**8.29%** 18	**47.47%** 103	**44.24%** 96	217
Public parking	**30.41%** 66	**44.70%** 97	**24.88%** 54	217

Q11 If you had $100 to spend on transportation improvements, how would you spend it? You can spend it on one thing or spread it around. Be sure your total equals $100.

Answered: 203 Skipped: 32



Answer Choices	Average Number	Total Number	Responses
Improve important intersections (signals, turn lanes, pedestrian crossings)	**24.41**	**2,124**	87
Total Respondents: 203			

Implement neighborhood traffic control or calming	**24.26**	**1,043**	43
Construct/Repair sidewalks	**24.83**	**2,160**	87
Construct wide outside lanes, bike lanes, and/or sharrows	**34.73**	**3,820**	110
Construct greenways or off-street trails	**29.86**	**2,598**	87
Improve road maintenance (pavement, potholes, etc.)	**23.13**	**1,480**	64
Improve street aesthetics (e.g. street trees, street lighting, planted medians)	**21.97**	**1,670**	76
Improve traffic flow (e.g. control driveways, medians, coordinate signals)	**29.45**	**1,767**	60
Maintain new or improved public transportation (e.g. buses, bus routes)	**26.95**	**1,563**	58
Improve public parking	**31.44**	**2,075**	66
Total Respondents: 203			

#	Improve important intersections (signals, turn lanes, pedestrian crossings)	Date
1	25	10/10/2012 8:32 AM
2	25	10/10/2012 8:25 AM
3	10	10/2/2012 11:09 AM
4	20	10/2/2012 8:10 AM
5	5	10/2/2012 7:38 AM
6	05	9/17/2012 8:21 PM
7	10	9/17/2012 7:03 PM
8	20	9/17/2012 2:26 PM
9	68	9/17/2012 4:47 AM
10	10	9/16/2012 3:47 PM
11	15	9/15/2012 4:00 PM
12	5	9/15/2012 2:23 PM
13	30	9/14/2012 9:21 AM
14	20	9/14/2012 8:23 AM

#	Improve important intersections (signals, turn lanes, pedestrian crossings)	Date
15	5	9/14/2012 7:08 AM
16	100	9/13/2012 1:20 PM
17	50	9/13/2012 11:44 AM
18	10	9/12/2012 5:45 PM
19	20	9/12/2012 8:21 AM
20	25	9/12/2012 5:36 AM
21	5	9/11/2012 12:46 PM
22	25	9/11/2012 10:19 AM
23	50	9/11/2012 10:16 AM
24	20	9/10/2012 10:53 AM
25	10	9/7/2012 2:05 PM
26	30	9/7/2012 6:58 AM
27	40	9/6/2012 1:11 PM
28	30	9/5/2012 5:46 AM
29	25	8/31/2012 6:37 AM
30	25	8/30/2012 10:57 AM
31	25	8/30/2012 5:01 AM
32	5	8/29/2012 6:31 AM
33	10	8/28/2012 6:45 PM
34	100	8/28/2012 6:21 PM
35	50	8/28/2012 6:06 PM
36	25	8/28/2012 1:41 PM
37	20	8/27/2012 9:13 AM
38	20	8/27/2012 8:23 AM
39	20	8/25/2012 10:05 AM
40	25	8/25/2012 7:14 AM
41	10	8/23/2012 5:18 PM
42	50	8/23/2012 5:06 PM
43	50	8/22/2012 9:09 AM

#	Improve important intersections (signals, turn lanes, pedestrian crossings)	Date
44	30	8/20/2012 1:34 PM
45	25	8/20/2012 7:15 PM
46	15	8/20/2012 1:51 PM
47	5	8/19/2012 2:37 PM
48	16	8/19/2012 1:30 PM
49	25	8/19/2012 1:12 PM
50	10	8/19/2012 12:35 PM
51	20	8/19/2012 12:14 PM
52	50	8/19/2012 4:49 AM
53	20	8/18/2012 6:20 PM
54	15	8/18/2012 7:54 AM
55	25	8/18/2012 7:30 AM
56	30	8/17/2012 3:38 PM
57	30	8/17/2012 2:16 PM
58	0	8/17/2012 2:15 PM
59	10	8/17/2012 1:12 PM
60	10	8/17/2012 9:54 AM
61	10	8/17/2012 9:51 AM
62	15	8/17/2012 6:58 AM
63	10	8/17/2012 5:43 AM
64	25	8/17/2012 5:35 AM
65	99	8/17/2012 5:27 AM
66	5	8/17/2012 5:17 AM
67	10	8/17/2012 5:15 AM
68	10	8/17/2012 4:19 AM
69	25	8/17/2012 3:40 AM
70	33	8/17/2012 2:17 AM
71	20	8/16/2012 8:45 PM
72	25	8/16/2012 6:41 PM

#	Improve important intersections (signals, turn lanes, pedestrian crossings)	Date
73	10	8/16/2012 6:13 PM
74	75	8/16/2012 5:28 PM
75	20	8/16/2012 3:56 PM
76	5	8/16/2012 3:02 PM
77	10	8/16/2012 2:35 PM
78	35	8/16/2012 1:59 PM
79	20	8/16/2012 1:16 PM
80	25	8/16/2012 1:15 PM
81	15	8/16/2012 12:57 PM
82	33	8/16/2012 12:36 PM
83	25	8/16/2012 12:17 PM
84	50	8/16/2012 11:57 AM
85	10	8/16/2012 11:46 AM
86	10	8/16/2012 11:22 AM
87	0	8/16/2012 11:19 AM

#	Implement neighborhood traffic control or calming	Date
1	50	10/10/2012 8:25 AM
2	10	10/2/2012 11:00 AM
3	20	10/2/2012 8:10 AM
4	05	9/17/2012 8:21 PM
5	2	9/17/2012 4:47 AM
6	25	9/16/2012 8:52 PM
7	10	9/16/2012 3:47 PM
8	10	9/15/2012 2:23 PM
9	10	9/14/2012 8:23 AM
10	20	9/14/2012 7:08 AM
11	25	9/13/2012 6:34 PM
12	100	9/13/2012 12:42 PM
13	25	9/13/2012 12:40 PM
14	10	9/13/2012 11:44 AM

#	Implement neighborhood traffic control or calming	Date
15	10	9/7/2012 2:05 PM
16	100	9/4/2012 8:48 PM
17	0	8/29/2012 6:31 AM
18	20	8/27/2012 9:13 AM
19	25	8/25/2012 7:14 AM
20	10	8/21/2012 1:34 PM
21	15	8/20/2012 1:51 PM
22	20	8/20/2012 7:10 AM
23	25	8/20/2012 6:42 AM
24	16	8/19/2012 1:30 PM
25	30	8/19/2012 12:14 PM
26	100	8/18/2012 6:05 PM
27	20	8/17/2012 3:38 PM
28	20	8/17/2012 2:16 PM
29	0	8/17/2012 2:15 PM
30	50	8/17/2012 10:52 AM
31	10	8/17/2012 9:51 AM
32	5	8/17/2012 6:58 AM
33	10	8/17/2012 5:43 AM
34	25	8/17/2012 5:35 AM
35	5	8/17/2012 5:15 AM
36	10	8/16/2012 3:56 PM
37	5	8/16/2012 3:02 PM
38	15	8/16/2012 1:59 PM
39	5	8/16/2012 1:15 PM
40	20	8/16/2012 12:17 PM
41	10	8/16/2012 11:46 AM
42	50	8/16/2012 11:35 AM
43	90	8/16/2012 11:19 AM

#	Construct/Repair sidewalks	Date

#	Construct/Repair sidewalks	Date
1	25	10/10/2012 8:32 AM
2	25	10/10/2012 8:25 AM
3	80	10/2/2012 11:00 AM
4	50	10/2/2012 8:16 AM
5	20	10/2/2012 8:10 AM
6	50	10/2/2012 8:05 AM
7	20	10/2/2012 7:55 AM
8	20	10/2/2012 7:53 AM
9	50	10/2/2012 7:49 AM
10	50	9/18/2012 9:39 AM
11	10	9/17/2012 8:21 PM
12	10	9/17/2012 7:03 PM
13	5	9/17/2012 2:26 PM
14	5	9/17/2012 4:47 AM
15	5	9/16/2012 3:47 PM
16	25	9/15/2012 4:00 PM
17	20	9/15/2012 2:23 PM
18	10	9/14/2012 9:21 AM
19	5	9/14/2012 8:23 AM
20	10	9/14/2012 7:08 AM
21	25	9/13/2012 6:34 PM
22	15	9/13/2012 5:44 PM
23	50	9/13/2012 1:14 PM
24	10	9/13/2012 11:44 AM
25	25	9/11/2012 10:19 AM
26	30	9/11/2012 6:07 AM
27	10	9/10/2012 1:39 PM
28	100	9/8/2012 7:23 PM
29	20	9/7/2012 2:05 PM

#	Construct/Repair sidewalks	Date
30	50	9/7/2012 1:37 PM
31	5	9/7/2012 6:58 AM
32	10	9/6/2012 1:11 PM
33	25	9/5/2012 5:46 AM
34	25	8/30/2012 12:13 PM
35	25	8/29/2012 9:46 AM
36	5	8/29/2012 6:31 AM
37	25	8/28/2012 8:54 PM
38	10	8/28/2012 6:06 PM
39	30	8/27/2012 8:23 AM
40	40	8/25/2012 10:05 AM
41	0	8/25/2012 7:14 AM
42	10	8/21/2012 1:34 PM
43	10	8/21/2012 11:13 AM
44	30	8/20/2012 5:33 PM
45	15	8/20/2012 1:51 PM
46	25	8/19/2012 2:37 PM
47	10	8/19/2012 1:30 PM
48	40	8/19/2012 12:35 PM
49	25	8/19/2012 12:14 PM
50	50	8/18/2012 8:36 PM
51	20	8/18/2012 7:51 PM
52	20	8/18/2012 6:20 PM
53	10	8/17/2012 3:38 PM
54	20	8/17/2012 2:16 PM
55	5	8/17/2012 2:15 PM
56	10	8/17/2012 1:12 PM
57	25	8/17/2012 12:55 PM
58	50	8/17/2012 11:38 AM

#	Construct/Repair sidewalks	Date
59	25	8/17/2012 10:10 AM
60	20	8/17/2012 9:54 AM
61	10	8/17/2012 9:51 AM
62	20	8/17/2012 7:40 AM
63	10	8/17/2012 7:34 AM
64	10	8/17/2012 6:58 AM
65	5	8/17/2012 5:43 AM
66	50	8/17/2012 5:38 AM
67	25	8/17/2012 5:35 AM
68	5	8/17/2012 5:15 AM
69	20	8/17/2012 4:19 AM
70	100	8/16/2012 7:49 PM
71	35	8/16/2012 7:30 PM
72	25	8/16/2012 6:41 PM
73	20	8/16/2012 4:20 PM
74	30	8/16/2012 3:56 PM
75	15	8/16/2012 3:02 PM
76	100	8/16/2012 2:48 PM
77	5	8/16/2012 2:35 PM
78	5	8/16/2012 1:59 PM
79	20	8/16/2012 1:16 PM
80	20	8/16/2012 1:15 PM
81	50	8/16/2012 12:19 PM
82	10	8/16/2012 12:17 PM
83	50	8/16/2012 11:53 AM
84	10	8/16/2012 11:46 AM
85	10	8/16/2012 11:22 AM
86	50	8/16/2012 11:22 AM
87	0	8/16/2012 11:19 AM

#	Construct wide outside lanes, bike lanes, and/or sharrows	Date
#	Construct wide outside lanes, bike lanes, and/or sharrows	Date
1	100	10/2/2012 11:11 AM
2	50	10/2/2012 8:18 AM
3	20	10/2/2012 8:10 AM
4	10	10/2/2012 7:38 AM
5	25	10/2/2012 7:28 AM
6	20	10/2/2012 6:39 AM
7	50	9/18/2012 9:39 AM
8	30	9/17/2012 8:21 PM
9	20	9/17/2012 7:03 PM
10	15	9/17/2012 2:26 PM
11	25	9/16/2012 8:52 PM
12	20	9/16/2012 3:47 PM
13	0	9/15/2012 2:23 PM
14	20	9/14/2012 9:21 AM
15	5	9/14/2012 8:23 AM
16	25	9/14/2012 7:42 AM
17	10	9/14/2012 7:08 AM
18	25	9/13/2012 6:34 PM
19	20	9/13/2012 5:44 PM
20	10	9/13/2012 1:03 PM
21	50	9/13/2012 12:58 PM
22	50	9/13/2012 12:29 PM
23	0	9/13/2012 11:44 AM
24	20	9/12/2012 8:21 AM
25	25	9/12/2012 5:36 AM
26	25	9/12/2012 4:45 AM
27	25	9/11/2012 10:19 AM
28	50	9/11/2012 6:07 AM
29	50	9/10/2012 1:58 PM

30	80	9/10/2012 1:48 PM

#	Construct wide outside lanes, bike lanes, and/or sharrows	Date
31	10	9/10/2012 1:39 PM
32	10	9/10/2012 10:53 AM
33	5	9/7/2012 2:05 PM
34	50	9/7/2012 1:37 PM
35	20	9/7/2012 6:58 AM
36	10	9/5/2012 5:46 AM
37	100	9/2/2012 6:15 AM
38	50	8/31/2012 6:37 AM
39	25	8/30/2012 12:13 PM
40	25	8/30/2012 10:57 AM
41	30	8/29/2012 6:31 AM
42	25	8/28/2012 8:54 PM
43	30	8/28/2012 6:45 PM
44	10	8/28/2012 6:06 PM
45	25	8/28/2012 1:41 PM
46	20	8/27/2012 9:13 AM
47	40	8/27/2012 8:23 AM
48	0	8/25/2012 7:14 AM
49	80	8/23/2012 5:18 PM
50	10	8/21/2012 1:34 PM
51	40	8/21/2012 11:13 AM
52	25	8/20/2012 7:15 PM
53	15	8/20/2012 1:51 PM
54	100	8/20/2012 1:20 PM
55	20	8/20/2012 7:10 AM
56	25	8/20/2012 6:42 AM
57	5	8/19/2012 2:37 PM
58	4	8/19/2012 1:30 PM
59	25	8/19/2012 1:12 PM

#	Construct wide outside lanes, bike lanes, and/or sharrows	Date
60	20	8/19/2012 12:14 PM
61	50	8/19/2012 4:49 AM
62	25	8/18/2012 7:54 AM
63	50	8/18/2012 7:44 AM
64	100	8/18/2012 4:57 AM
65	10	8/17/2012 3:38 PM
66	80	8/17/2012 2:15 PM
67	60	8/17/2012 1:12 PM
68	50	8/17/2012 11:38 AM
69	100	8/17/2012 11:37 AM
70	25	8/17/2012 10:10 AM
71	50	8/17/2012 10:09 AM
72	20	8/17/2012 9:54 AM
73	10	8/17/2012 9:51 AM
74	100	8/17/2012 9:28 AM
75	60	8/17/2012 7:40 AM
76	30	8/17/2012 7:34 AM
77	50	8/17/2012 7:13 AM
78	50	8/17/2012 6:58 AM
79	55	8/17/2012 5:43 AM
80	25	8/17/2012 5:15 AM
81	50	8/17/2012 4:19 AM
82	25	8/17/2012 3:40 AM
83	33	8/17/2012 2:17 AM
84	30	8/16/2012 8:45 PM
85	25	8/16/2012 6:55 PM
86	25	8/16/2012 6:41 PM
87	40	8/16/2012 6:13 PM
88	40	8/16/2012 4:20 PM

#	Construct wide outside lanes, bike lanes, and/or sharrows	Date
89	50	8/16/2012 4:20 PM
90	20	8/16/2012 3:56 PM
91	30	8/16/2012 3:02 PM
92	60	8/16/2012 2:35 PM
93	15	8/16/2012 1:59 PM
94	50	8/16/2012 1:30 PM
95	20	8/16/2012 1:16 PM
96	20	8/16/2012 1:15 PM
97	50	8/16/2012 1:06 PM
98	50	8/16/2012 12:57 PM
99	100	8/16/2012 12:38 PM
100	33	8/16/2012 12:36 PM
101	25	8/16/2012 12:31 PM
102	20	8/16/2012 12:19 PM
103	10	8/16/2012 12:17 PM
104	50	8/16/2012 11:57 AM
105	25	8/16/2012 11:53 AM
106	20	8/16/2012 11:46 AM
107	65	8/16/2012 11:45 AM
108	100	8/16/2012 11:29 AM
109	10	8/16/2012 11:22 AM
110	0	8/16/2012 11:19 AM

#	Construct greenways or off-street trails	Date
1	25	10/10/2012 8:32 AM
2	100	10/10/2012 8:18 AM
3	80	10/2/2012 11:09 AM
4	50	10/2/2012 11:06 AM
5	10	10/2/2012 11:00 AM

#	Construct greenways or off-street trails	Date
6	50	10/2/2012 8:18 AM
7	50	10/2/2012 8:16 AM
8	40	10/2/2012 8:15 AM
9	5	10/2/2012 7:55 AM
10	10	10/2/2012 7:38 AM
11	100	10/2/2012 7:31 AM
12	25	10/2/2012 7:28 AM
13	50	10/2/2012 6:39 AM
14	15	10/2/2012 6:33 AM
15	10	9/17/2012 8:21 PM
16	10	9/17/2012 4:47 AM
17	20	9/16/2012 3:47 PM
18	15	9/15/2012 4:00 PM
19	10	9/15/2012 2:23 PM
20	5	9/14/2012 8:23 AM
21	25	9/14/2012 7:42 AM
22	5	9/14/2012 7:08 AM
23	5	9/13/2012 5:44 PM
24	100	9/13/2012 2:52 PM
25	65	9/13/2012 1:03 PM
26	0	9/13/2012 11:44 AM
27	20	9/12/2012 8:21 AM
28	50	9/12/2012 5:36 AM
29	25	9/12/2012 4:45 AM
30	100	9/11/2012 5:25 PM
31	40	9/11/2012 12:46 PM
32	25	9/11/2012 10:19 AM
33	50	9/10/2012 1:58 PM
34	70	9/10/2012 1:39 PM

#	Construct greenways or off-street trails	Date
35	50	9/10/2012 10:53 AM
36	5	9/7/2012 2:05 PM
37	20	9/7/2012 6:58 AM
38	30	9/6/2012 1:11 PM
39	20	9/5/2012 5:46 AM
40	25	8/30/2012 5:01 AM
41	75	8/29/2012 1:06 PM
42	25	8/29/2012 9:46 AM
43	15	8/29/2012 6:31 AM
44	10	8/29/2012 5:53 AM
45	50	8/28/2012 8:54 PM
46	30	8/28/2012 6:45 PM
47	30	8/28/2012 6:06 PM
48	0	8/25/2012 7:14 AM
49	10	8/23/2012 5:18 PM
50	5	8/21/2012 1:34 PM
51	15	8/21/2012 11:13 AM
52	25	8/20/2012 7:15 PM
53	10	8/20/2012 1:51 PM
54	100	8/19/2012 7:20 PM
55	50	8/19/2012 2:37 PM
56	4	8/19/2012 1:30 PM
57	5	8/19/2012 12:14 PM
58	20	8/18/2012 7:51 PM
59	10	8/18/2012 7:54 AM
60	5	8/17/2012 3:38 PM
61	5	8/17/2012 2:15 PM
62	20	8/17/2012 1:12 PM
63	25	8/17/2012 10:10 AM

#	Construct greenways or off-street trails	Date
64	10	8/17/2012 9:51 AM
65	20	8/17/2012 7:40 AM
66	10	8/17/2012 5:43 AM
67	20	8/17/2012 5:15 AM
68	10	8/17/2012 4:19 AM
69	25	8/17/2012 3:40 AM
70	34	8/17/2012 2:17 AM
71	40	8/16/2012 8:45 PM
72	25	8/16/2012 6:55 PM
73	100	8/16/2012 6:15 PM
74	20	8/16/2012 6:13 PM
75	100	8/16/2012 6:08 PM
76	25	8/16/2012 4:26 PM
77	50	8/16/2012 4:20 PM
78	10	8/16/2012 3:56 PM
79	30	8/16/2012 3:02 PM
80	0	8/16/2012 1:59 PM
81	25	8/16/2012 1:30 PM
82	10	8/16/2012 1:15 PM
83	25	8/16/2012 12:57 PM
84	25	8/16/2012 12:31 PM
85	5	8/16/2012 11:46 AM
86	25	8/16/2012 11:22 AM
87	0	8/16/2012 11:19 AM

#	Improve road maintenance (pavement, potholes, etc.)	Date
1	25	10/2/2012 11:06 AM
2	50	10/2/2012 8:05 AM
3	5	10/2/2012 7:38 AM
4	50	10/2/2012 7:33 AM

#	Improve road maintenance (pavement, potholes, etc.)	Date
5	10	9/17/2012 8:21 PM
6	30	9/17/2012 7:03 PM
7	10	9/17/2012 2:26 PM
8	10	9/17/2012 4:47 AM
9	50	9/16/2012 8:52 PM
10	5	9/16/2012 3:47 PM
11	25	9/15/2012 4:00 PM
12	5	9/15/2012 2:23 PM
13	15	9/14/2012 9:21 AM
14	5	9/14/2012 8:23 AM
15	25	9/14/2012 7:42 AM
16	10	9/14/2012 7:08 AM
17	25	9/13/2012 6:34 PM
18	20	9/13/2012 5:44 PM
19	50	9/13/2012 1:14 PM
20	50	9/13/2012 12:29 PM
21	20	9/13/2012 11:44 AM
22	25	9/12/2012 4:45 AM
23	10	9/11/2012 10:16 AM
24	10	9/10/2012 1:39 PM
25	20	9/7/2012 2:05 PM
26	25	8/30/2012 5:01 AM
27	5	8/29/2012 6:31 AM
28	10	8/29/2012 5:53 AM
29	15	8/27/2012 9:13 AM
30	25	8/25/2012 7:14 AM
31	10	8/21/2012 1:34 PM
32	15	8/20/2012 1:51 PM
33	5	8/19/2012 2:37 PM

#	Improve road maintenance (pavement, potholes, etc.)	Date
34	5	8/19/2012 1:30 PM
35	50	8/18/2012 8:36 PM
36	10	8/18/2012 6:20 PM
37	25	8/18/2012 7:54 AM
38	50	8/18/2012 7:44 AM
39	25	8/18/2012 7:30 AM
40	5	8/17/2012 3:38 PM
41	5	8/17/2012 2:15 PM
42	25	8/17/2012 12:55 PM
43	25	8/17/2012 10:10 AM
44	50	8/17/2012 10:09 AM
45	20	8/17/2012 9:54 AM
46	10	8/17/2012 9:51 AM
47	50	8/17/2012 7:34 AM
48	100	8/17/2012 7:02 AM
49	10	8/17/2012 6:58 AM
50	5	8/17/2012 5:43 AM
51	25	8/17/2012 5:35 AM
52	10	8/17/2012 5:15 AM
53	35	8/16/2012 7:30 PM
54	25	8/16/2012 6:55 PM
55	25	8/16/2012 4:26 PM
56	100	8/16/2012 3:54 PM
57	5	8/16/2012 2:35 PM
58	0	8/16/2012 1:59 PM
59	20	8/16/2012 1:16 PM
60	10	8/16/2012 12:17 PM
61	10	8/16/2012 11:46 AM
62	15	8/16/2012 11:45 AM

#	Improve road maintenance (pavement, potholes, etc.)	Date
63	50	8/16/2012 11:22 AM
64	10	8/16/2012 11:19 AM

#	Improve street aesthetics (e.g. street trees, street lighting, planted medians)	Date
1	25	10/10/2012 8:32 AM
2	10	10/2/2012 11:09 AM
3	25	10/2/2012 11:06 AM
4	20	10/2/2012 7:38 AM
5	10	10/2/2012 6:33 AM
6	05	9/17/2012 8:21 PM
7	25	9/17/2012 5:12 PM
8	10	9/17/2012 2:26 PM
9	5	9/17/2012 4:47 AM
10	10	9/16/2012 3:47 PM
11	5	9/15/2012 4:00 PM
12	5	9/15/2012 2:23 PM
13	10	9/14/2012 8:23 AM
14	5	9/14/2012 7:08 AM
15	5	9/13/2012 5:44 PM
16	50	9/13/2012 12:58 PM
17	10	9/13/2012 11:44 AM
18	20	9/11/2012 12:46 PM
19	20	9/11/2012 10:16 AM
20	20	9/10/2012 10:53 AM
21	10	9/7/2012 2:05 PM
22	5	9/7/2012 6:58 AM
23	20	9/6/2012 1:11 PM
24	25	8/30/2012 12:13 PM
25	0	8/29/2012 6:31 AM
26	10	8/29/2012 5:53 AM

#	Improve street aesthetics (e.g. street trees, street lighting, planted medians)	Date
27	10	8/28/2012 6:45 PM
28	10	8/25/2012 10:05 AM
29	0	8/25/2012 7:14 AM
30	75	8/22/2012 5:52 PM
31	5	8/21/2012 1:34 PM
32	20	8/21/2012 11:13 AM
33	25	8/20/2012 7:15 PM
34	5	8/20/2012 1:51 PM
35	50	8/20/2012 7:10 AM
36	25	8/20/2012 6:42 AM
37	5	8/19/2012 2:37 PM
38	2	8/19/2012 1:30 PM
39	25	8/19/2012 1:12 PM
40	10	8/19/2012 12:35 PM
41	50	8/19/2012 6:32 AM
42	40	8/18/2012 7:51 PM
43	25	8/18/2012 7:54 AM
44	25	8/18/2012 7:30 AM
45	5	8/17/2012 3:38 PM
46	5	8/17/2012 2:15 PM
47	30	8/17/2012 9:54 AM
48	10	8/17/2012 9:51 AM
49	10	8/17/2012 7:34 AM
50	5	8/17/2012 5:43 AM
51	1	8/17/2012 5:27 AM
52	10	8/17/2012 5:15 AM
53	100	8/17/2012 4:57 AM
54	10	8/17/2012 4:19 AM
55	50	8/17/2012 3:48 AM

#	Improve street aesthetics (e.g. street trees, street lighting, planted medians)	Date
56	25	8/16/2012 6:41 PM
57	20	8/16/2012 6:13 PM
58	50	8/16/2012 4:26 PM
59	40	8/16/2012 4:20 PM
60	5	8/16/2012 3:02 PM
61	20	8/16/2012 2:35 PM
62	100	8/16/2012 2:23 PM
63	100	8/16/2012 2:12 PM
64	0	8/16/2012 1:59 PM
65	40	8/16/2012 1:49 PM
66	15	8/16/2012 1:16 PM
67	10	8/16/2012 1:15 PM
68	10	8/16/2012 12:57 PM
69	17	8/16/2012 12:36 PM
70	25	8/16/2012 12:31 PM
71	100	8/16/2012 12:26 PM
72	20	8/16/2012 12:17 PM
73	20	8/16/2012 11:46 AM
74	10	8/16/2012 11:22 AM
75	25	8/16/2012 11:22 AM
76	0	8/16/2012 11:19 AM

#	Improve traffic flow (e.g. control driveways, medians, coordinate signals)	Date
1	100	10/10/2012 8:20 AM
2	10	9/17/2012 8:21 PM
3	25	9/17/2012 5:12 PM
4	20	9/17/2012 2:26 PM
5	20	9/16/2012 3:47 PM
6	15	9/15/2012 4:00 PM
7	5	9/15/2012 2:23 PM

#	Improve traffic flow (e.g. control driveways, medians, coordinate signals)	Date
8	15	9/15/2012 1:17 PM
9	15	9/14/2012 9:21 AM
10	40	9/14/2012 8:23 AM
11	10	9/14/2012 7:08 AM
12	15	9/13/2012 5:44 PM
13	75	9/13/2012 12:40 PM
14	0	9/13/2012 11:44 AM
15	20	9/12/2012 8:21 AM
16	25	9/12/2012 4:45 AM
17	10	9/7/2012 2:05 PM
18	10	9/7/2012 6:58 AM
19	100	9/6/2012 5:25 AM
20	25	8/30/2012 12:13 PM
21	25	8/30/2012 10:57 AM
22	0	8/29/2012 6:31 AM
23	15	8/27/2012 9:13 AM
24	10	8/27/2012 8:23 AM
25	25	8/25/2012 7:14 AM
26	50	8/23/2012 5:06 PM
27	25	8/22/2012 5:52 PM
28	5	8/21/2012 1:34 PM
29	20	8/20/2012 5:33 PM
30	5	8/20/2012 1:51 PM
31	10	8/20/2012 7:10 AM
32	100	8/20/2012 6:45 AM
33	25	8/20/2012 6:42 AM
34	5	8/19/2012 2:37 PM
35	25	8/19/2012 1:30 PM
36	50	8/19/2012 6:32 AM

#	Improve traffic flow (e.g. control driveways, medians, coordinate signals)	Date
37	10	8/18/2012 6:20 PM
38	10	8/17/2012 3:38 PM
39	0	8/17/2012 2:15 PM
40	50	8/17/2012 12:55 PM
41	10	8/17/2012 9:51 AM
42	100	8/17/2012 8:26 AM
43	10	8/17/2012 6:58 AM
44	95	8/17/2012 5:17 AM
45	5	8/17/2012 5:15 AM
46	50	8/17/2012 3:48 AM
47	25	8/16/2012 6:55 PM
48	10	8/16/2012 3:56 PM
49	10	8/16/2012 3:02 PM
50	20	8/16/2012 1:59 PM
51	50	8/16/2012 1:06 PM
52	17	8/16/2012 12:36 PM
53	25	8/16/2012 12:31 PM
54	30	8/16/2012 12:19 PM
55	50	8/16/2012 11:48 AM
56	10	8/16/2012 11:46 AM
57	50	8/16/2012 11:35 AM
58	100	8/16/2012 11:27 AM
59	10	8/16/2012 11:22 AM
60	0	8/16/2012 11:19 AM

#	Maintain new or improved public transportation (e.g. buses, bus routes)	Date
1	100	10/2/2012 11:03 AM
2	10	10/2/2012 8:15 AM
3	30	10/2/2012 7:38 AM
4	50	10/2/2012 7:33 AM

#	Maintain new or improved public transportation (e.g. buses, bus routes)	Date
5	20	10/2/2012 7:28 AM
6	30	10/2/2012 6:39 AM
7	100	10/2/2012 6:29 AM
8	10	9/17/2012 8:21 PM
9	10	9/17/2012 7:03 PM
10	5	9/17/2012 2:26 PM
11	0	9/16/2012 3:47 PM
12	0	9/15/2012 4:00 PM
13	20	9/15/2012 2:23 PM
14	10	9/14/2012 9:21 AM
15	13	9/14/2012 7:42 AM
16	10	9/14/2012 7:08 AM
17	5	9/13/2012 5:44 PM
18	0	9/13/2012 11:44 AM
19	20	9/12/2012 8:21 AM
20	15	9/11/2012 12:46 PM
21	20	9/11/2012 10:16 AM
22	0	9/7/2012 2:05 PM
23	5	9/7/2012 6:58 AM
24	15	9/5/2012 5:46 AM
25	80	8/29/2012 3:22 PM
26	15	8/29/2012 6:31 AM
27	30	8/29/2012 5:53 AM
28	10	8/28/2012 6:45 PM
29	50	8/28/2012 1:41 PM
30	10	8/27/2012 9:13 AM
31	30	8/25/2012 10:05 AM
32	0	8/25/2012 7:14 AM
33	100	8/23/2012 10:52 AM

#	Maintain new or improved public transportation (e.g. buses, bus routes)	Date
34	10	8/22/2012 9:09 AM
35	10	8/21/2012 1:34 PM
36	15	8/21/2012 11:13 AM
37	100	8/21/2012 8:52 AM
38	0	8/20/2012 1:51 PM
39	8	8/19/2012 1:30 PM
40	20	8/18/2012 7:51 PM
41	2	8/17/2012 3:38 PM
42	0	8/17/2012 2:15 PM
43	50	8/17/2012 10:52 AM
44	10	8/17/2012 9:51 AM
45	50	8/17/2012 6:08 AM
46	50	8/17/2012 5:38 AM
47	5	8/17/2012 5:15 AM
48	10	8/16/2012 8:45 PM
49	10	8/16/2012 7:30 PM
50	0	8/16/2012 1:59 PM
51	100	8/16/2012 1:17 PM
52	5	8/16/2012 1:16 PM
53	10	8/16/2012 1:15 PM
54	25	8/16/2012 11:53 AM
55	5	8/16/2012 11:46 AM
56	100	8/16/2012 11:41 AM
57	100	8/16/2012 11:33 AM
58	0	8/16/2012 11:19 AM

#	Improve public parking	Date
1	100	10/10/2012 8:30 AM
2	100	10/2/2012 8:20 AM
3	50	10/2/2012 8:15 AM
4	20	10/2/2012 8:10 AM

#	Improve public parking	Date
5	75	10/2/2012 7:55 AM
6	80	10/2/2012 7:53 AM
7	50	10/2/2012 7:49 AM
8	100	10/2/2012 7:47 AM
9	20	10/2/2012 7:38 AM
10	25	10/2/2012 7:28 AM
11	75	10/2/2012 6:33 AM
12	100	10/1/2012 12:01 PM
13	100	10/1/2012 11:32 AM
14	05	9/17/2012 8:21 PM
15	20	9/17/2012 7:03 PM
16	50	9/17/2012 5:12 PM
17	15	9/17/2012 2:26 PM
18	0	9/16/2012 3:47 PM
19	0	9/15/2012 4:00 PM
20	20	9/15/2012 2:23 PM
21	25	9/15/2012 1:17 PM
22	12	9/14/2012 7:42 AM
23	15	9/14/2012 7:08 AM
24	15	9/13/2012 5:44 PM
25	25	9/13/2012 1:03 PM
26	0	9/13/2012 11:44 AM
27	90	9/12/2012 5:45 PM
28	20	9/11/2012 12:46 PM
29	20	9/11/2012 6:07 AM
30	20	9/10/2012 1:48 PM
31	10	9/7/2012 2:05 PM
32	5	9/7/2012 6:58 AM
33	25	8/31/2012 6:37 AM

#	Improve public parking	Date
34	25	8/30/2012 10:57 AM
35	25	8/30/2012 5:01 AM
36	20	8/29/2012 3:22 PM
37	25	8/29/2012 1:06 PM
38	50	8/29/2012 9:46 AM
39	25	8/29/2012 6:31 AM
40	40	8/29/2012 5:53 AM
41	0	8/25/2012 7:14 AM
42	5	8/21/2012 1:34 PM
43	50	8/20/2012 5:33 PM
44	5	8/20/2012 1:51 PM
45	10	8/19/2012 1:30 PM
46	25	8/19/2012 1:12 PM
47	40	8/19/2012 12:35 PM
48	30	8/18/2012 6:20 PM
49	25	8/18/2012 7:30 AM
50	3	8/17/2012 3:38 PM
51	30	8/17/2012 2:16 PM
52	0	8/17/2012 2:15 PM
53	10	8/17/2012 9:51 AM
54	50	8/17/2012 7:13 AM
55	50	8/17/2012 6:08 AM
56	5	8/17/2012 5:15 AM
57	25	8/17/2012 3:40 AM
58	20	8/16/2012 7:30 PM
59	25	8/16/2012 5:28 PM
60	10	8/16/2012 1:59 PM
61	60	8/16/2012 1:49 PM
62	25	8/16/2012 1:30 PM

#	Improve public parking	Date
63	5	8/16/2012 12:17 PM
64	50	8/16/2012 11:48 AM
65	20	8/16/2012 11:45 AM
66	0	8/16/2012 11:19 AM

Appendix B

Traffic Analysis

Appendix B Traffic Analysis

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	23	802	12	0	13	0	0	0	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	100		125	125		0	0		0	0		0
Storage Lanes	0		0	1		0	0		0	0		1
Taper Length (ft)	150		125	100		100	100		100	100		100
Satd. Flow (prot)	0	0	0	1770	3532	0	0	1863	0	0	0	1611
Flt Permitted				0.950								
Satd. Flow (perm)	0	0	0	1770	3532	0	0	1863	0	0	0	1611
Link Speed (mph)		35			35			35			25	
Link Distance (ft)		350			304			41			158	
Travel Time (s)		6.8			5.9			0.8			4.3	
Confl. Peds. (#/hr)						10						
Confl. Bikes (#/hr)												
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	25	894	0	0	14	0	0	0	25
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 59.1%		ICU Level of Service B	
Analysis Period (min) 15			

Wrightsville Beach CTP
1: Causeway Drive (WB) & Pelican Drive
Existing AM
8/19/2012

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	23	802	12	0	13	0	0	0	23
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	0	0	0	25	881	13	0	14	0	0	0	25
Pedestrians											10	
Lane Width (ft)											12.0	
Walking Speed (ft/s)											4.0	
Percent Blockage											1	
Right turn flare (veh)												
Median type		Raised			None							
Median storage veh)		1										
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	905			0			516	955	0	956	948	457
vC1, stage 1 conf vol							0	0		948	948	
vC2, stage 2 conf vol							516	955		7	0	
vCu, unblocked vol	905			0			516	955	0	956	948	457
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			98			100	95	100	100	100	95
cM capacity (veh/h)	741			1622			431	291	1084	244	293	546

Direction, Lane #	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	25	588	307	14	25
Volume Left	25	0	0	0	0
Volume Right	0	0	13	0	25
cSH	1622	1700	1700	291	546
Volume to Capacity	0.02	0.35	0.18	0.05	0.05
Queue Length 95th (ft)	1	0	0	4	4
Control Delay (s)	7.3	0.0	0.0	18.0	11.9
Lane LOS	A			C	B
Approach Delay (s)	0.2			18.0	11.9
Approach LOS				C	B

Intersection Summary				
Average Delay	0.8			
Intersection Capacity Utilization	59.1%	ICU Level of Service		B
Analysis Period (min)	15			

K:\RAL_TPTO_Planning\011335041_WrightsvilleBeachCTP\Traffic\Synchro\Existing_AM.syn
Kimley-Horn and Associates, Inc.
Synchro 7 - Report

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	13	646	99	0	0	0	0	0	31	0	23	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	100		125	0		0	0		0	0		0
Storage Lanes	1		1	0		0	0		1	0		0
Taper Length (ft)	150		125	100		100	100		100	100		100
Satd. Flow (prot)	1770	3539	1583	0	0	0	0	0	1611	0	1863	0
Flt Permitted	0.950											
Satd. Flow (perm)	1770	3539	1583	0	0	0	0	0	1611	0	1863	0
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		347			269			243			41	
Travel Time (s)		6.8			5.2			4.7			0.8	
Confl. Peds. (#/hr)			9									
Confl. Bikes (#/hr)												
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	14	710	109	0	0	0	0	0	34	0	25	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 59.1%		ICU Level of Service B	
Analysis Period (min) 15			

Wrightsville Beach CTP
2: Causeway Drive (EB) & Pelican Drive
Existing AM
8/19/2012

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	13	646	99	0	0	0	0	0	31	0	23	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	14	710	109	0	0	0	0	0	34	0	25	0
Pedestrians								9				
Lane Width (ft)								12.0				
Walking Speed (ft/s)								4.0				
Percent Blockage								1				
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	0			828			760	747	364	418	856	0
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	0			828			760	747	364	418	856	0
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	100	95	100	91	100
cM capacity (veh/h)	1622			793			270	334	628	485	289	1084

Direction, Lane #	EB 1	EB 2	EB 3	EB 4	NB 1	SB 1
Volume Total	14	355	355	109	34	25
Volume Left	14	0	0	0	0	0
Volume Right	0	0	0	109	34	0
cSH	1622	1700	1700	1700	628	289
Volume to Capacity	0.01	0.21	0.21	0.06	0.05	0.09
Queue Length 95th (ft)	1	0	0	0	4	7
Control Delay (s)	7.2	0.0	0.0	0.0	11.1	18.7
Lane LOS	A				B	C
Approach Delay (s)	0.1				11.1	18.7
Approach LOS					B	C

Intersection Summary					
Average Delay	1.1				
Intersection Capacity Utilization	59.1%	ICU Level of Service		B	
Analysis Period (min)	15				

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Synchro 7 - Report

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	35	21	0	17	0	0	0	0	12	489	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		1	0		0	0		0	0		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Satd. Flow (prot)	0	1863	1583	0	1863	0	0	0	0	0	3532	0
Flt Permitted											0.999	
Satd. Flow (perm)	0	1863	1583	0	1863	0	0	0	0	0	3532	0
Link Speed (mph)		25			25			35			35	
Link Distance (ft)		115			107			464			454	
Travel Time (s)		3.1			2.9			9.0			8.8	
Confl. Peds. (#/hr)			5	5								8
Confl. Bikes (#/hr)			2									4
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	44	26	0	21	0	0	0	0	0	630	0
Sign Control		Yield			Yield			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 32.2%		ICU Level of Service A	
Analysis Period (min) 15			

Wrightsville Beach CTP
3: Old Causeway Drive & Causeway Drive (EB)
Existing AM
8/19/2012

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	35	21	0	17	0	0	0	0	12	489	3
Sign Control		Yield			Yield			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	0	44	26	0	21	0	0	0	0	15	611	4
Pedestrians		8						5				
Lane Width (ft)		12.0						0.0				
Walking Speed (ft/s)		4.0						4.0				
Percent Blockage		1						0				
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	662	651	320	389	653	0	623			0		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	662	651	320	389	653	0	623			0		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	88	96	100	94	100	100			99		
cM capacity (veh/h)	326	380	671	471	379	1084	948			1622		

Direction, Lane #	EB 1	EB 2	WB 1	SB 1	SB 2
Volume Total	44	26	21	321	309
Volume Left	0	0	0	15	0
Volume Right	0	26	0	0	4
cSH	380	671	379	1622	1700
Volume to Capacity	0.12	0.04	0.06	0.01	0.18
Queue Length 95th (ft)	10	3	4	1	0
Control Delay (s)	15.7	10.6	15.1	0.4	0.0
Lane LOS	C	B	C	A	
Approach Delay (s)	13.8		15.1	0.2	
Approach LOS	B		C		

Intersection Summary				
Average Delay		2.0		
Intersection Capacity Utilization		32.2%	ICU Level of Service	A
Analysis Period (min)		15		

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	34	18	0	0	0	0	18	433	11	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	225		0	0		0
Storage Lanes	0		0	0		0	1		1	0		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Satd. Flow (prot)	0	1803	0	0	0	0	1770	1863	1583	0	0	0
Flt Permitted		0.968					0.950					
Satd. Flow (perm)	0	1803	0	0	0	0	1770	1863	1583	0	0	0
Link Speed (mph)		25			35			35			45	
Link Distance (ft)		107			290			410			205	
Travel Time (s)		2.9			5.6			8.0			3.1	
Confl. Peds. (#/hr)	1						1		1			
Confl. Bikes (#/hr)												
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	63	0	0	0	0	22	522	13	0	0	0
Sign Control		Yield			Yield			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 32.8%		ICU Level of Service A	
Analysis Period (min) 15			

Wrightsville Beach CTP
4: Old Causeway Drive & Causeway Drive
Existing AM
8/19/2012

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	34	18	0	0	0	0	18	433	11	0	0	0
Sign Control		Yield			Yield			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	41	22	0	0	0	0	22	522	13	0	0	0
Pedestrians		1			1						1	
Lane Width (ft)		12.0			0.0						0.0	
Walking Speed (ft/s)		4.0			4.0						4.0	
Percent Blockage		0			0						0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	567	580	1	577	567	524	1			536		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	567	580	1	577	567	524	1			536		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	90	95	100	100	100	100	99			100		
cM capacity (veh/h)	429	419	1083	406	427	553	1620			1032		

Direction, Lane #	EB 1	NB 1	NB 2	NB 3
Volume Total	63	22	522	13
Volume Left	41	22	0	0
Volume Right	0	0	0	13
cSH	426	1620	1700	1700
Volume to Capacity	0.15	0.01	0.31	0.01
Queue Length 95th (ft)	13	1	0	0
Control Delay (s)	14.9	7.3	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	14.9	0.3		
Approach LOS	B			

Intersection Summary				
Average Delay		1.8		
Intersection Capacity Utilization		32.8%	ICU Level of Service	A
Analysis Period (min)		15		

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Synchro 7 - Report

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	209	0	0	0	0	0	452	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Satd. Flow (prot)	0	1855	0	0	0	0	0	1863	0	0	0	0
Flt Permitted		0.996										
Satd. Flow (perm)	0	1855	0	0	0	0	0	1863	0	0	0	0
Link Speed (mph)		35			45			35			45	
Link Distance (ft)		374			256			205			330	
Travel Time (s)		7.3			3.9			4.0			5.0	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	236	0	0	0	0	0	466	0	0	0	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 56.8%		ICU Level of Service B	
Analysis Period (min) 15			

Wrightsville Beach CTP
5: Salisbury Street & Causeway Drive
Existing AM
8/19/2012

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	20	209	0	0	0	0	0	452	0	0	0	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	21	215	0	0	0	0	0	466	0	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	466	466	0	574	466	466	0			466		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	466	466	0	574	466	466	0			466		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	96	56	100	100	100	100	100			100		
cM capacity (veh/h)	507	494	1085	283	494	597	1623			1095		

Direction, Lane #	EB 1	NB 1
Volume Total	236	466
Volume Left	21	0
Volume Right	0	0
cSH	495	1700
Volume to Capacity	0.48	0.27
Queue Length 95th (ft)	63	0
Control Delay (s)	18.7	0.0
Lane LOS	C	
Approach Delay (s)	18.7	0.0
Approach LOS	C	

Intersection Summary				
Average Delay		6.3		
Intersection Capacity Utilization		56.8%	ICU Level of Service	B
Analysis Period (min)		15		

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Synchro 7 - Report

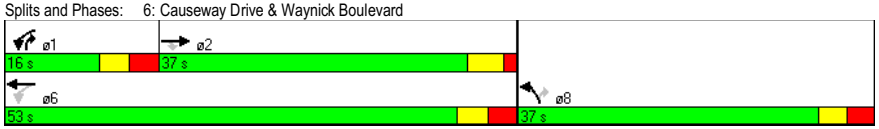
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	137	181	26	133	199	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)		0	0		0	0
Storage Lanes		1	0		1	1
Taper Length (ft)		100	100		100	100
Satd. Flow (prot)	1676	1425	0	3160	1593	1425
Flt Permitted				0.910	0.950	
Satd. Flow (perm)	1676	1386	0	2895	1580	1346
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		206				43
Link Speed (mph)	35			25	35	
Link Distance (ft)	1289			164	1132	
Travel Time (s)	25.1			4.5	22.1	
Confl. Peds. (#/hr)		9	9		6	17
Confl. Bikes (#/hr)		6				
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	156	206	0	181	226	43
Turn Type		Perm	pm+pt			pm+ov
Protected Phases	2		1	6	8	1
Permitted Phases		2	6			8
Detector Phase	2	2	1	6	8	1
Switch Phase						
Minimum Initial (s)	10.0	10.0	7.0	10.0	7.0	7.0
Minimum Split (s)	27.0	27.0	14.0	17.0	27.0	14.0
Total Split (s)	37.0	37.0	16.0	53.0	37.0	16.0
Total Split (%)	41.1%	41.1%	17.8%	58.9%	41.1%	17.8%
Yellow Time (s)	3.8	3.8	3.0	3.2	3.0	3.0
All-Red Time (s)	1.4	1.4	3.2	3.0	2.9	3.2
Lost Time Adjust (s)	-0.2	-0.2	-1.2	-1.2	-0.9	-1.2
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lag	Lag	Lead			Lead
Lead-Lag Optimize?	Yes	Yes	Yes			Yes
Recall Mode	Min	Min	None	Min	None	None
Act Effct Green (s)	13.3	13.3		17.5	11.0	19.6
Actuated g/C Ratio	0.34	0.34		0.45	0.28	0.50
v/c Ratio	0.27	0.34		0.14	0.50	0.06
Control Delay	14.8	5.1		6.8	17.1	2.4
Queue Delay	0.0	0.0		0.0	0.0	0.0
Total Delay	14.8	5.1		6.8	17.1	2.4
LOS	B	A		A	B	A

Wrightsville Beach CTP
6: Causeway Drive & Waynick Boulevard
Existing AM
8/19/2012

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Approach Delay	9.2			6.8	14.7	
Approach LOS	A			A	B	
Queue Length 50th (ft)	18	0		10	28	0
Queue Length 95th (ft)	81	38		26	104	9
Internal Link Dist (ft)	1209			84	1052	
Turn Bay Length (ft)						
Base Capacity (vph)	1406	1196		2866	1337	818
Starvation Cap Reductn	0	0		0	0	0
Spillback Cap Reductn	0	0		0	0	0
Storage Cap Reductn	0	0		0	0	0
Reduced v/c Ratio	0.11	0.17		0.06	0.17	0.05

Intersection Summary			
Area Type:	CBD		
Cycle Length: 90			
Actuated Cycle Length: 39			
Natural Cycle: 70			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.50			
Intersection Signal Delay: 10.5		Intersection LOS: B	
Intersection Capacity Utilization 46.1%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 6: Causeway Drive & Waynick Boulevard



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Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	134	52	21	110	9	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)		0	125		0	0
Storage Lanes		0	1		1	0
Taper Length (ft)		100	100		100	100
Satd. Flow (prot)	1613	0	0	3160	1553	0
Flt Permitted				0.992	0.967	
Satd. Flow (perm)	1613	0	0	3160	1553	0
Link Speed (mph)	25			25	25	
Link Distance (ft)	164			2880	134	
Travel Time (s)	4.5			78.5	3.7	
Confl. Peds. (#/hr)		87	87		13	84
Confl. Bikes (#/hr)		5				1
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	233	0	0	164	16	0
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	CBD		
Control Type: Unsignalized			
Intersection Capacity Utilization 39.6%		ICU Level of Service A	
Analysis Period (min) 15			

Wrightsville Beach CTP
7: Lumina Avenue & Stone Street
Existing AM
8/19/2012

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	134	52	21	110	9	4
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	168	65	26	138	11	5
Pedestrians	13			84	87	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	1			7	7	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	164					
pX, platoon unblocked			0.96		0.96	0.96
vC, conflicting volume			320		421	371
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			266		372	320
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		98	99
cM capacity (veh/h)			1149		516	558

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	232	72	92	16
Volume Left	0	26	0	11
Volume Right	65	0	0	5
cSH	1700	1149	1700	528
Volume to Capacity	0.14	0.02	0.05	0.03
Queue Length 95th (ft)	0	2	0	2
Control Delay (s)	0.0	3.1	0.0	12.0
Lane LOS		A		B
Approach Delay (s)	0.0	1.4		12.0
Approach LOS				B

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	39.6%	ICU Level of Service	A
Analysis Period (min)	15		

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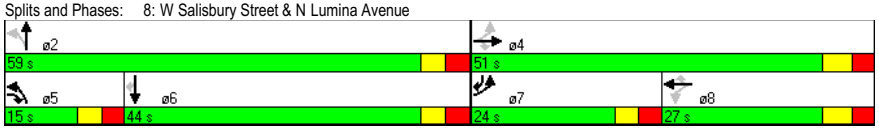
Synchro 7 - Report

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	167	18	39	12	48	8	71	39	14	0	42	165
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	75		25	0		250	0		100
Storage Lanes	1		1	1		1	1		1	0		1
Taper Length (ft)	100		100	25		25	50		50	100		100
Satd. Flow (prot)	1433	1676	1282	1433	1676	1282	1593	1589	0	0	1676	1425
Flt Permitted	0.417			0.744			0.510					
Satd. Flow (perm)	627	1676	1155	1034	1676	1252	837	1589	0	0	1676	1357
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			43			9		16				183
Link Speed (mph)		35			20			25			25	
Link Distance (ft)		278			435			2880			559	
Travel Time (s)		5.4			14.8			78.5			15.2	
Confl. Peds. (#/hr)	1		22	22		1	15		12	12		15
Confl. Bikes (#/hr)			1						5			7
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)	0		0	0		0						
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	186	20	43	13	53	9	79	59	0	0	47	183
Turn Type	pm+pt		pm+ov	Perm		Perm	pm+pt					pm+ov
Protected Phases	7	4	5		8		5	2			6	7
Permitted Phases	4		4	8		8	2					6
Detector Phase	7	4	5	8	8	8	5	2			6	7
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	10.0			10.0	7.0
Minimum Split (s)	13.0	25.0	13.0	25.0	25.0	25.0	13.0	42.0			42.0	13.0
Total Split (s)	24.0	51.0	15.0	27.0	27.0	27.0	15.0	59.0	0.0	0.0	44.0	24.0
Total Split (%)	21.8%	46.4%	13.6%	24.5%	24.5%	24.5%	13.6%	53.6%	0.0%	0.0%	40.0%	21.8%
Yellow Time (s)	3.0	3.8	3.0	3.8	3.8	3.8	3.0	3.2			3.2	3.0
All-Red Time (s)	2.9	2.9	2.8	2.9	2.9	2.9	2.8	3.3			3.3	2.9
Lost Time Adjust (s)	-0.9	-1.7	-0.8	-1.7	-1.7	-1.7	-0.8	-1.5	1.0	1.0	-1.5	-0.9
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead		Lead	Lag	Lag	Lag	Lead				Lag	Lead
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						Yes
Recall Mode	None	None	None	None	None	None	None	Min			Min	None
Act Effct Green (s)	20.8	20.8	29.9	9.8	9.8	9.8	22.7	22.7			12.7	26.4
Actuated g/C Ratio	0.38	0.38	0.55	0.18	0.18	0.18	0.42	0.42			0.23	0.48
v/c Ratio	0.42	0.03	0.06	0.07	0.18	0.04	0.17	0.09			0.12	0.24
Control Delay	14.8	9.9	1.6	26.4	26.6	15.6	13.7	10.7			24.1	2.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Delay	14.8	9.9	1.6	26.4	26.6	15.6	13.7	10.7			24.1	2.7
LOS	B	A	A	C	C	B	B	B			C	A

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		12.1			25.3			12.4			7.1	
Approach LOS		B			C			B			A	
Queue Length 50th (ft)	42	4	0	4	18	0	18	9			15	0
Queue Length 95th (ft)	84	14	7	20	51	12	49	34			45	28
Internal Link Dist (ft)		198			355			2800			479	
Turn Bay Length (ft)				75		25						100
Base Capacity (vph)	614	1378	718	460	745	562	501	1425			1224	892
Starvation Cap Reductn	0	0	0	0	0	0	0	0			0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0			0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0			0	0
Reduced v/c Ratio	0.30	0.01	0.06	0.03	0.07	0.02	0.16	0.04			0.04	0.21

Intersection Summary			
Area Type:	CBD		
Cycle Length: 110			
Actuated Cycle Length: 54.5			
Natural Cycle: 95			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.42			
Intersection Signal Delay: 11.9		Intersection LOS: B	
Intersection Capacity Utilization 44.6%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 8: W Salisbury Street & N Lumina Avenue



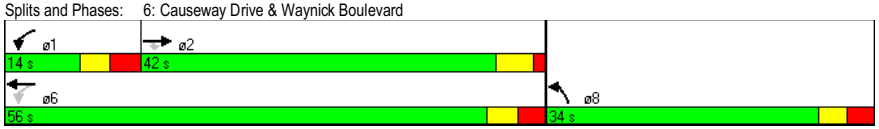
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	137	181	26	133	199	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)		0	0		150	0
Storage Lanes		1	0		1	0
Taper Length (ft)		100	100		100	100
Satd. Flow (prot)	1676	1425	0	3160	3020	0
Flt Permitted				0.890	0.960	
Satd. Flow (perm)	1676	1362	0	2828	2988	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		206			26	
Link Speed (mph)	35			25	35	
Link Distance (ft)	645			164	1132	
Travel Time (s)	12.6			4.5	22.1	
Confl. Peds. (#/hr)		9	9		6	17
Confl. Bikes (#/hr)		6				
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	156	206	0	181	269	0
Turn Type		Perm	pm+pt			
Protected Phases	2		1	6	8	
Permitted Phases		2	6			
Detector Phase	2	2	1	6	8	
Switch Phase						
Minimum Initial (s)	10.0	10.0	7.0	10.0	7.0	
Minimum Split (s)	27.0	27.0	14.0	17.0	27.0	
Total Split (s)	42.0	42.0	14.0	56.0	34.0	0.0
Total Split (%)	46.7%	46.7%	15.6%	62.2%	37.8%	0.0%
Yellow Time (s)	3.8	3.8	3.0	3.2	3.0	
All-Red Time (s)	1.4	1.4	3.2	3.0	2.9	
Lost Time Adjust (s)	-0.2	-0.2	-1.2	-1.2	-0.9	-1.2
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	2.8
Lead/Lag	Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes	Yes			
Recall Mode	Min	Min	None	Min	None	
Act Effct Green (s)	11.5	11.5		11.5	8.0	
Actuated g/C Ratio	0.39	0.39		0.39	0.27	
v/c Ratio	0.24	0.31		0.16	0.32	
Control Delay	7.3	2.8		6.4	8.8	
Queue Delay	0.0	0.0		0.0	0.0	
Total Delay	7.3	2.8		6.4	8.8	
LOS	A	A		A	A	

Wrightsville Beach CTP
6: Causeway Drive & Waynick Boulevard
Existing AM Improved
11/12/2012

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Approach Delay	4.7			6.4	8.8	
Approach LOS	A			A	A	
Queue Length 50th (ft)	14	0		8	14	
Queue Length 95th (ft)	33	17		17	27	
Internal Link Dist (ft)	565			84	1052	
Turn Bay Length (ft)					150	
Base Capacity (vph)	1676	1362		2828	2972	
Starvation Cap Reductn	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	
Storage Cap Reductn	0	0		0	0	
Reduced v/c Ratio	0.09	0.15		0.06	0.09	

Intersection Summary			
Area Type:	CBD		
Cycle Length: 90			
Actuated Cycle Length: 29.5			
Natural Cycle: 70			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.32			
Intersection Signal Delay: 6.5		Intersection LOS: A	
Intersection Capacity Utilization 43.6%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 6: Causeway Drive & Waynick Boulevard



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Kimley-Horn and Associates, Inc.
Synchro 7 - Report

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	134	52	21	110	9	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)		0	125		0	0
Storage Lanes		0	1		1	0
Taper Length (ft)		100	100		100	100
Satd. Flow (prot)	1613	0	0	3160	1553	0
Flt Permitted				0.992	0.967	
Satd. Flow (perm)	1613	0	0	3160	1553	0
Link Speed (mph)	25			25	25	
Link Distance (ft)	164			1440	134	
Travel Time (s)	4.5			39.3	3.7	
Confl. Peds. (#/hr)		87	87		13	84
Confl. Bikes (#/hr)		5				1
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	233	0	0	164	16	0
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	CBD		
Control Type: Unsignalized			
Intersection Capacity Utilization	39.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	134	52	21	110	9	4
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	168	65	26	138	11	5
Pedestrians	13			84	87	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	1			7	7	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	164					
pX, platoon unblocked			1.00		1.00	1.00
vC, conflicting volume			320		421	371
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			315		417	366
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		98	99
cM capacity (veh/h)			1148		504	542

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	232	72	92	16
Volume Left	0	26	0	11
Volume Right	65	0	0	5
cSH	1700	1148	1700	515
Volume to Capacity	0.14	0.02	0.05	0.03
Queue Length 95th (ft)	0	2	0	2
Control Delay (s)	0.0	3.1	0.0	12.2
Lane LOS		A		B
Approach Delay (s)	0.0	1.4		12.2
Approach LOS				B

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	39.6%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	36	1352	6	0	46	0	0	0	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	100		125	125		0	0		0	0		0
Storage Lanes	0		0	1		0	0		0	0		1
Taper Length (ft)	150		125	100		100	100		100	100		100
Satd. Flow (prot)	0	0	0	1770	3536	0	0	1863	0	0	0	1611
Flt Permitted				0.950								
Satd. Flow (perm)	0	0	0	1770	3536	0	0	1863	0	0	0	1611
Link Speed (mph)		35			35			35			25	
Link Distance (ft)		350			304			41			158	
Travel Time (s)		6.8			5.9			0.8			4.3	
Confl. Peds. (#/hr)						2						
Confl. Bikes (#/hr)												
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.25
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	38	1414	0	0	48	0	0	0	240
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 85.1%		ICU Level of Service E	
Analysis Period (min) 15			

Wrightsville Beach CTP
1: Causeway Drive (WB) & Pelican Drive
Existing PM
8/19/2012

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	36	1352	6	0	46	0	0	0	60
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.25
Hourly flow rate (vph)	0	0	0	38	1408	6	0	48	0	0	0	240
Pedestrians											2	
Lane Width (ft)											12.0	
Walking Speed (ft/s)											4.0	
Percent Blockage											0	
Right turn flare (veh)												
Median type		Raised			None							
Median storage veh)		1										
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1417			0			1019	1492	0	1512	1488	709
vC1, stage 1 conf vol							0	0		1488	1488	
vC2, stage 2 conf vol							1019	1492		24	0	
vCu, unblocked vol	1417			0			1019	1492	0	1512	1488	709
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			98			100	70	100	100	100	36
cM capacity (veh/h)	476			1622			81	161	1084	111	161	376

Direction, Lane #	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	38	939	476	48	240
Volume Left	38	0	0	0	0
Volume Right	0	0	6	0	240
cSH	1622	1700	1700	161	376
Volume to Capacity	0.02	0.55	0.28	0.30	0.64
Queue Length 95th (ft)	2	0	0	29	106
Control Delay (s)	7.3	0.0	0.0	36.6	30.0
Lane LOS	A			E	D
Approach Delay (s)	0.2			36.6	30.0
Approach LOS				E	D

Intersection Summary					
Average Delay		5.3			
Intersection Capacity Utilization		85.1%	ICU Level of Service		E
Analysis Period (min)		15			

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Kimley-Horn and Associates, Inc.
Synchro 7 - Report

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	46	951	172	0	0	0	0	0	90	0	36	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	100		125	0		0	0		0	0		0
Storage Lanes	1		1	0		0	0		1	0		0
Taper Length (ft)	150		125	100		100	100		100	100		100
Satd. Flow (prot)	1770	3539	1583	0	0	0	0	0	1611	0	1863	0
Flt Permitted	0.950											
Satd. Flow (perm)	1770	3539	1583	0	0	0	0	0	1611	0	1863	0
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		347			269			243			41	
Travel Time (s)		6.8			5.2			4.7			0.8	
Confl. Peds. (#/hr)			8									
Confl. Bikes (#/hr)												
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	48	991	179	0	0	0	0	0	94	0	38	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 85.1%		ICU Level of Service E	
Analysis Period (min) 15			

Wrightsville Beach CTP
2: Causeway Drive (EB) & Pelican Drive
Existing PM
8/19/2012

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	46	951	172	0	0	0	0	0	90	0	36	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	48	991	179	0	0	0	0	0	94	0	38	0
Pedestrians								8				
Lane Width (ft)								12.0				
Walking Speed (ft/s)								4.0				
Percent Blockage								1				
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	0			1178			1113	1094	503	685	1274	0
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	0			1178			1113	1094	503	685	1274	0
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	97			100			100	100	82	100	77	100
cM capacity (veh/h)	1622			585			129	205	510	265	160	1084

Direction, Lane #	EB 1	EB 2	EB 3	EB 4	NB 1	SB 1
Volume Total	48	495	495	179	94	38
Volume Left	48	0	0	0	0	0
Volume Right	0	0	0	179	94	0
cSH	1622	1700	1700	1700	510	160
Volume to Capacity	0.03	0.29	0.29	0.11	0.18	0.23
Queue Length 95th (ft)	2	0	0	0	17	22
Control Delay (s)	7.3	0.0	0.0	0.0	13.6	34.3
Lane LOS	A				B	D
Approach Delay (s)	0.3				13.6	34.3
Approach LOS					B	D

Intersection Summary				
Average Delay	2.2			
Intersection Capacity Utilization	85.1%	ICU Level of Service		E
Analysis Period (min)	15			

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Synchro 7 - Report

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	49	45	1	37	0	0	0	0	121	906	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		1	0		0	0		0	0		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Satd. Flow (prot)	0	1863	1583	0	1861	0	0	0	0	0	3514	0
Flt Permitted					0.999						0.994	
Satd. Flow (perm)	0	1863	1583	0	1861	0	0	0	0	0	3514	0
Link Speed (mph)		25			25			35			35	
Link Distance (ft)		115			107			464			454	
Travel Time (s)		3.1			2.9			9.0			8.8	
Confl. Peds. (#/hr)			2	2								4
Confl. Bikes (#/hr)												
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	58	53	0	45	0	0	0	0	0	1220	0
Sign Control		Yield			Yield			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 46.2%		ICU Level of Service A	
Analysis Period (min) 15			

Wrightsville Beach CTP
3: Old Causeway Drive & Causeway Drive (EB)
Existing PM
8/19/2012

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	49	45	1	37	0	0	0	0	121	906	10
Sign Control		Yield			Yield			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	0	58	53	1	44	0	0	0	0	142	1066	12
Pedestrians		4						2				
Lane Width (ft)		12.0						0.0				
Walking Speed (ft/s)		4.0						4.0				
Percent Blockage		0						0				
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1382	1360	545	901	1366	0	1082			0		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1382	1360	545	901	1366	0	1082			0		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	57	89	99	67	100	100			91		
cM capacity (veh/h)	72	134	481	129	133	1084	638			1622		

Direction, Lane #	EB 1	EB 2	WB 1	SB 1	SB 2
Volume Total	58	53	45	675	545
Volume Left	0	0	1	142	0
Volume Right	0	53	0	0	12
cSH	134	481	133	1622	1700
Volume to Capacity	0.43	0.11	0.34	0.09	0.32
Queue Length 95th (ft)	47	9	34	7	0
Control Delay (s)	50.9	13.4	45.4	2.3	0.0
Lane LOS	F	B	E	A	
Approach Delay (s)	33.0		45.4	1.3	
Approach LOS	D		E		

Intersection Summary				
Average Delay		5.3		
Intersection Capacity Utilization		46.2%	ICU Level of Service	A
Analysis Period (min)		15		

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Synchro 7 - Report

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	95	113	0	0	0	0	44	732	25	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	225		0	0		0
Storage Lanes	0		0	0		0	1		1	0		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Satd. Flow (prot)	0	1822	0	0	0	0	1770	1863	1583	0	0	0
Flt Permitted		0.978					0.950					
Satd. Flow (perm)	0	1822	0	0	0	0	1770	1863	1583	0	0	0
Link Speed (mph)		25			35			35			45	
Link Distance (ft)		107			290			410			205	
Travel Time (s)		2.9			5.6			8.0			3.1	
Confl. Peds. (#/hr)	1								1			
Confl. Bikes (#/hr)												
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	224	0	0	0	0	47	787	27	0	0	0
Sign Control		Yield			Yield			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 56.4%		ICU Level of Service B	
Analysis Period (min) 15			

Wrightsville Beach CTP
4: Old Causeway Drive & Causeway Drive
Existing PM
8/19/2012

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	95	113	0	0	0	0	44	732	25	0	0	0
Sign Control		Yield			Yield			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	102	122	0	0	0	0	47	787	27	0	0	0
Pedestrians					1						1	
Lane Width (ft)					0.0						0.0	
Walking Speed (ft/s)					4.0						4.0	
Percent Blockage					0						0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	883	910	0	943	883	789	0			815		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	883	910	0	943	883	789	0			815		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	61	54	100	100	100	100	97			100		
cM capacity (veh/h)	261	267	1085	153	276	391	1623			812		

Direction, Lane #	EB 1	NB 1	NB 2	NB 3
Volume Total	224	47	787	27
Volume Left	102	47	0	0
Volume Right	0	0	0	27
cSH	264	1623	1700	1700
Volume to Capacity	0.85	0.03	0.46	0.02
Queue Length 95th (ft)	175	2	0	0
Control Delay (s)	64.2	7.3	0.0	0.0
Lane LOS	F	A		
Approach Delay (s)	64.2	0.4		
Approach LOS	F			

Intersection Summary				
Average Delay		13.6		
Intersection Capacity Utilization		56.4%	ICU Level of Service	B
Analysis Period (min)		15		

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Synchro 7 - Report

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	41	228	0	0	0	0	0	811	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Satd. Flow (prot)	0	1848	0	0	0	0	0	1863	0	0	0	0
Flt Permitted		0.992										
Satd. Flow (perm)	0	1848	0	0	0	0	0	1863	0	0	0	0
Link Speed (mph)		35			45			35			45	
Link Distance (ft)		374			256			205			330	
Travel Time (s)		7.3			3.9			4.0			5.0	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	281	0	0	0	0	0	845	0	0	0	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 87.1%		ICU Level of Service E	
Analysis Period (min) 15			

Wrightsville Beach CTP
5: Salisbury Street & Causeway Drive
Existing PM
8/19/2012

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	41	228	0	0	0	0	0	811	0	0	0	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	43	238	0	0	0	0	0	845	0	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	845	845	0	964	845	845	0			845		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	845	845	0	964	845	845	0			845		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	85	21	100	100	100	100	100			100		
cM capacity (veh/h)	283	300	1085	81	300	363	1623			792		

Direction, Lane #	EB 1	NB 1
Volume Total	280	845
Volume Left	43	0
Volume Right	0	0
cSH	297	1700
Volume to Capacity	0.94	0.50
Queue Length 95th (ft)	231	0
Control Delay (s)	77.3	0.0
Lane LOS	F	
Approach Delay (s)	77.3	0.0
Approach LOS	F	

Intersection Summary				
Average Delay		19.3		
Intersection Capacity Utilization		87.1%	ICU Level of Service	E
Analysis Period (min)		15		

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Synchro 7 - Report

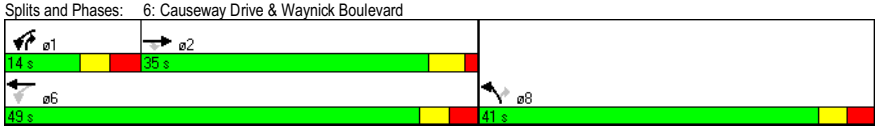
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	396	436	49	271	457	121
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)		0	0		0	0
Storage Lanes		1	0		1	1
Taper Length (ft)		100	100		100	100
Satd. Flow (prot)	1676	1425	0	3160	1593	1425
Flt Permitted				0.753	0.950	
Satd. Flow (perm)	1676	1129	0	2377	1531	1352
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		479				56
Link Speed (mph)	35			25	35	
Link Distance (ft)	1289			164	1132	
Travel Time (s)	25.1			4.5	22.1	
Confl. Peds. (#/hr)		152	152		30	15
Confl. Bikes (#/hr)		10				
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	435	479	0	352	502	133
Turn Type		Perm	pm+pt			pm+ov
Protected Phases	2		1	6	8	1
Permitted Phases		2	6			8
Detector Phase	2	2	1	6	8	1
Switch Phase						
Minimum Initial (s)	10.0	10.0	7.0	10.0	7.0	7.0
Minimum Split (s)	27.0	27.0	14.0	17.0	27.0	14.0
Total Split (s)	35.0	35.0	14.0	49.0	41.0	14.0
Total Split (%)	38.9%	38.9%	15.6%	54.4%	45.6%	15.6%
Yellow Time (s)	3.8	3.8	3.0	3.2	3.0	3.0
All-Red Time (s)	1.4	1.4	3.2	3.0	2.9	3.2
Lost Time Adjust (s)	-0.2	-0.2	-1.2	-1.2	-0.9	-1.2
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lag	Lag	Lead			Lead
Lead-Lag Optimize?	Yes	Yes	Yes			Yes
Recall Mode	Min	Min	None	Min	None	None
Act Effct Green (s)	23.9	23.9		33.5	28.4	37.4
Actuated g/C Ratio	0.33	0.33		0.46	0.39	0.51
v/c Ratio	0.79	0.69		0.30	0.81	0.18
Control Delay	36.6	8.4		12.9	33.6	6.8
Queue Delay	0.0	0.0		0.0	0.0	0.0
Total Delay	36.6	8.4		12.9	33.6	6.8
LOS	D	A		B	C	A

Wrightsville Beach CTP
6: Causeway Drive & Waynick Boulevard
Existing PM
8/19/2012

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Approach Delay	21.8			12.9	28.0	
Approach LOS	C			B	C	
Queue Length 50th (ft)	195	0		50	222	17
Queue Length 95th (ft)	#363	89		85	#403	46
Internal Link Dist (ft)	1209			84	1052	
Turn Bay Length (ft)						
Base Capacity (vph)	756	772		1586	862	746
Starvation Cap Reductn	0	0		0	0	0
Spillback Cap Reductn	0	0		0	0	0
Storage Cap Reductn	0	0		0	0	0
Reduced v/c Ratio	0.58	0.62		0.22	0.58	0.18

Intersection Summary			
Area Type:	CBD		
Cycle Length: 90			
Actuated Cycle Length: 72.9			
Natural Cycle: 75			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.81			
Intersection Signal Delay: 22.2		Intersection LOS: C	
Intersection Capacity Utilization 73.7%		ICU Level of Service D	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 6: Causeway Drive & Waynick Boulevard



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Synchro 7 - Report

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	283	100	37	251	27	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)		0	125		0	0
Storage Lanes		0	1		1	0
Taper Length (ft)		100	100		100	100
Satd. Flow (prot)	1618	0	0	3166	1564	0
Flt Permitted				0.994	0.963	
Satd. Flow (perm)	1618	0	0	3166	1564	0
Link Speed (mph)	25			25	25	
Link Distance (ft)	164			2880	134	
Travel Time (s)	4.5			78.5	3.7	
Confl. Peds. (#/hr)		232	232		27	164
Confl. Bikes (#/hr)		5				7
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	430	0	0	324	39	0
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	CBD		
Control Type: Unsignalized			
Intersection Capacity Utilization	57.6%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	283	100	37	251	27	8
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	318	112	42	282	30	9
Pedestrians	27			164	232	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	2			14	19	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	164					
pX, platoon unblocked			0.80		0.80	0.80
vC, conflicting volume			662		857	770
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			447		692	583
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			94		86	96
cM capacity (veh/h)			712		223	253

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	430	136	188	39
Volume Left	0	42	0	30
Volume Right	112	0	0	9
cSH	1700	712	1700	229
Volume to Capacity	0.25	0.06	0.11	0.17
Queue Length 95th (ft)	0	5	0	15
Control Delay (s)	0.0	3.6	0.0	23.9
Lane LOS		A		C
Approach Delay (s)	0.0	1.5		23.9
Approach LOS				C

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	57.6%	ICU Level of Service	B
Analysis Period (min)	15		

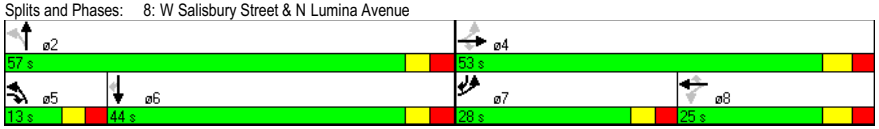
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	273	69	113	37	70	24	141	142	44	0	122	397
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	75		25	0		250	0		100
Storage Lanes	1		1	1		1	1		1	0		1
Taper Length (ft)	100		100	25		25	50		50	100		100
Satd. Flow (prot)	1433	1676	1282	1433	1676	1282	1593	1571	0	0	1676	1425
Flt Permitted	0.424			0.711			0.478					
Satd. Flow (perm)	580	1676	947	834	1676	1092	781	1571	0	0	1676	1340
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			116			25		19				409
Link Speed (mph)		35			20			25			25	
Link Distance (ft)		278			435			2880			559	
Travel Time (s)		5.4			14.8			78.5			15.2	
Confl. Peds. (#/hr)	32		67	67		32	21		65	65		21
Confl. Bikes (#/hr)			2			3			5			11
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)	0		0	0		0						
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	281	71	116	38	72	25	145	191	0	0	126	409
Turn Type	pm+pt		pm+ov	Perm		Perm	pm+pt					pm+ov
Protected Phases	7	4	5		8		5	2			6	7
Permitted Phases	4		4	8		8	2					6
Detector Phase	7	4	5	8	8	8	5	2			6	7
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	10.0			10.0	7.0
Minimum Split (s)	13.0	25.0	13.0	25.0	25.0	25.0	13.0	42.0			42.0	13.0
Total Split (s)	28.0	53.0	13.0	25.0	25.0	25.0	13.0	57.0	0.0	0.0	44.0	28.0
Total Split (%)	25.5%	48.2%	11.8%	22.7%	22.7%	22.7%	11.8%	51.8%	0.0%	0.0%	40.0%	25.5%
Yellow Time (s)	3.0	3.8	3.0	3.8	3.8	3.8	3.0	3.2			3.2	3.0
All-Red Time (s)	2.9	2.9	2.8	2.9	2.9	2.9	2.8	3.3			3.3	2.9
Lost Time Adjust (s)	-0.9	-1.7	-0.8	-1.7	-1.7	-1.7	-0.8	-1.5	1.0	1.0	-1.5	-0.9
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead		Lead	Lag	Lag	Lag	Lead				Lag	Lead
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						Yes
Recall Mode	None	None	None	None	None	None	None	Min			Min	None
Act Effct Green (s)	29.0	29.0	37.2	10.3	10.3	10.3	26.0	26.0			12.5	30.1
Actuated g/C Ratio	0.44	0.44	0.57	0.16	0.16	0.16	0.40	0.40			0.19	0.46
v/c Ratio	0.58	0.10	0.18	0.29	0.27	0.13	0.35	0.30			0.39	0.48
Control Delay	16.7	9.7	1.7	34.2	30.6	13.5	19.6	17.0			31.1	3.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Delay	16.7	9.7	1.7	34.2	30.6	13.5	19.6	17.0			31.1	3.1
LOS	B	A	A	C	C	B	B	B			C	A

Wrightsville Beach CTP
8: W Salisbury Street & N Lumina Avenue
Existing PM
8/19/2012

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		11.9			28.5			18.1			9.7	
Approach LOS		B			C			B			A	
Queue Length 50th (ft)	69	15	0	14	27	0	40	49			47	0
Queue Length 95th (ft)	132	36	14	45	68	21	94	114			106	39
Internal Link Dist (ft)		198			355			2800			479	
Turn Bay Length (ft)				75		25						100
Base Capacity (vph)	603	1252	632	266	533	364	414	1249			1040	959
Starvation Cap Reductn	0	0	0	0	0	0	0	0			0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0			0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0			0	0
Reduced v/c Ratio	0.47	0.06	0.18	0.14	0.14	0.07	0.35	0.15			0.12	0.43

Intersection Summary			
Area Type:	CBD		
Cycle Length: 110			
Actuated Cycle Length: 65.4			
Natural Cycle: 95			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.58			
Intersection Signal Delay: 14.0		Intersection LOS: B	
Intersection Capacity Utilization 66.2%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 8: W Salisbury Street & N Lumina Avenue



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Kimley-Horn and Associates, Inc.
Synchro 7 - Report

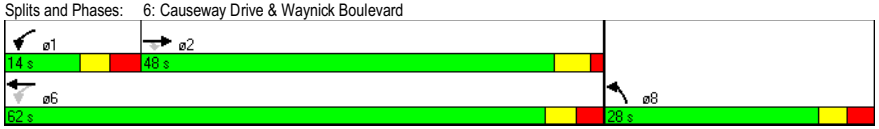
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	396	436	49	271	457	121
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)		0	0		150	0
Storage Lanes		1	0		1	0
Taper Length (ft)		100	100		100	100
Satd. Flow (prot)	1676	1425	0	3160	2999	0
Flt Permitted				0.844	0.962	
Satd. Flow (perm)	1676	937	0	2641	2847	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		479			37	
Link Speed (mph)	35			25	35	
Link Distance (ft)	645			164	1132	
Travel Time (s)	12.6			4.5	22.1	
Confl. Peds. (#/hr)		152	152		30	15
Confl. Bikes (#/hr)		6				
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	435	479	0	352	635	0
Turn Type		Perm	pm+pt			
Protected Phases	2		1	6	8	
Permitted Phases		2	6			
Detector Phase	2	2	1	6	8	
Switch Phase						
Minimum Initial (s)	10.0	10.0	7.0	10.0	7.0	
Minimum Split (s)	27.0	27.0	14.0	17.0	27.0	
Total Split (s)	48.0	48.0	14.0	62.0	28.0	0.0
Total Split (%)	53.3%	53.3%	15.6%	68.9%	31.1%	0.0%
Yellow Time (s)	3.8	3.8	3.0	3.2	3.0	
All-Red Time (s)	1.4	1.4	3.2	3.0	2.9	
Lost Time Adjust (s)	-0.2	-0.2	-1.2	-1.2	-0.9	-1.2
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	2.8
Lead/Lag	Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes	Yes			
Recall Mode	Min	Min	None	Min	None	
Act Effct Green (s)	17.9	17.9		17.9	14.6	
Actuated g/C Ratio	0.41	0.41		0.41	0.34	
v/c Ratio	0.62	0.72		0.32	0.61	
Control Delay	15.1	8.4		9.8	14.7	
Queue Delay	0.0	0.0		0.0	0.0	
Total Delay	15.1	8.4		9.8	14.7	
LOS	B	A		A	B	

Wrightsville Beach CTP
6: Causeway Drive & Waynick Boulevard
Existing PM Improved
11/12/2012

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Approach Delay	11.6			9.8	14.7	
Approach LOS	B			A	B	
Queue Length 50th (ft)	74	0		26	58	
Queue Length 95th (ft)	188	64		65	133	
Internal Link Dist (ft)	565			84	1052	
Turn Bay Length (ft)					150	
Base Capacity (vph)	1543	901		2601	1714	
Starvation Cap Reductn	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	
Storage Cap Reductn	0	0		0	0	
Reduced v/c Ratio	0.28	0.53		0.14	0.37	

Intersection Summary			
Area Type:	CBD		
Cycle Length: 90			
Actuated Cycle Length: 43.2			
Natural Cycle: 70			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.72			
Intersection Signal Delay: 12.3		Intersection LOS: B	
Intersection Capacity Utilization 64.6%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 6: Causeway Drive & Waynick Boulevard



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Kimley-Horn and Associates, Inc.
Synchro 7 - Report

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	283	100	37	251	27	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)		0	125		0	0
Storage Lanes		0	1		1	0
Taper Length (ft)		100	100		100	100
Satd. Flow (prot)	1618	0	0	3166	1564	0
Flt Permitted				0.994	0.963	
Satd. Flow (perm)	1618	0	0	3166	1564	0
Link Speed (mph)	25			25	25	
Link Distance (ft)	164			1440	134	
Travel Time (s)	4.5			39.3	3.7	
Confl. Peds. (#/hr)		232	232		27	164
Confl. Bikes (#/hr)		5				1
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	430	0	0	324	39	0
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	CBD		
Control Type: Unsignalized			
Intersection Capacity Utilization 57.6%		ICU Level of Service B	
Analysis Period (min) 15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	283	100	37	251	27	8
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	318	112	42	282	30	9
Pedestrians	27			164	232	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	2			14	19	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	164					
pX, platoon unblocked			0.85		0.85	0.85
vC, conflicting volume			662		857	770
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			519		747	645
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			94		86	96
cM capacity (veh/h)			719		221	247

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	430	136	188	39
Volume Left	0	42	0	30
Volume Right	112	0	0	9
cSH	1700	719	1700	226
Volume to Capacity	0.25	0.06	0.11	0.17
Queue Length 95th (ft)	0	5	0	15
Control Delay (s)	0.0	3.6	0.0	24.2
Lane LOS		A		C
Approach Delay (s)	0.0	1.5		24.2
Approach LOS				C

Intersection Summary				
Average Delay		1.8		
Intersection Capacity Utilization		57.6%	ICU Level of Service	B
Analysis Period (min)		15		

MOVEMENT SUMMARY

Site: Wrightsville AM

Causeway Drive Roundabout
Roundabout
Design Life Analysis (Practical Capacity): Results for 20 years

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Old Causeway Drive											
3	L	53	2.0	0.159	9.2	LOS A	0.4	10.5	0.58	0.91	23.8
8	T	28	2.0	0.159	9.2	LOS A	0.4	10.5	0.58	0.71	25.6
18	R	33	2.0	0.068	8.4	LOS A	0.2	4.5	0.58	0.77	25.8
Approach		114	2.0	0.159	9.0	LOS A	0.4	10.5	0.58	0.82	24.8
East: Causeway Drive											
1	L	28	2.0	0.491	12.0	LOS B	2.6	65.5	0.62	1.03	23.1
6	T	674	2.0	0.491	12.0	LOS B	2.6	65.5	0.62	0.78	24.7
16	R	17	2.0	0.491	12.0	LOS B	2.6	65.5	0.62	0.85	24.4
Approach		719	2.0	0.491	12.0	LOS B	2.6	65.5	0.62	0.80	24.6
North: Salisbury Street											
7	L	8	2.0	0.484	13.5	LOS B	1.9	48.4	0.61	0.99	22.3
4	T	39	2.0	0.484	13.5	LOS B	1.9	48.4	0.61	0.78	23.7
14	R	568	2.0	0.484	13.3	LOS B	1.9	48.4	0.60	0.83	23.5
Approach		614	2.0	0.484	13.3	LOS B	1.9	48.4	0.60	0.83	23.5
West: Causeway Drive											
5	L	325	2.0	0.531	10.1	LOS B	3.4	85.7	0.33	0.71	23.4
2	T	761	2.0	0.531	10.1	LOS B	3.4	85.7	0.33	0.40	25.6
12	R	5	2.0	0.531	10.1	LOS B	3.4	85.7	0.33	0.53	25.2
Approach		1090	2.0	0.531	10.1	LOS B	3.4	85.7	0.33	0.50	24.9
All Vehicles		2537	2.0	0.531	11.4	LOS B	3.4	85.7	0.49	0.68	24.5

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Model used.

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SIDRA INTERSECTION

MOVEMENT SUMMARY

Site: Wrightsville PM

Causeway Drive Roundabout
Roundabout
Design Life Analysis (Practical Capacity): Results for 23 years

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Old Causeway Drive											
3	L	67	2.0	0.375	17.8	LOS C	1.1	27.7	0.77	1.01	20.9
8	T	67	2.0	0.375	17.8	LOS C	1.1	27.7	0.77	0.89	21.9
18	R	62	2.0	0.186	14.3	LOS B	0.5	12.3	0.74	0.86	23.1
Approach		195	2.0	0.375	16.7	LOS C	1.1	27.7	0.76	0.92	21.9
East: Causeway Drive											
1	L	60	2.0	0.778	24.6	LOS C	7.2	181.7	0.86	1.16	19.3
6	T	1000	2.0	0.778	24.6	LOS C	7.2	181.7	0.86	1.07	20.0
16	R	34	2.0	0.778	24.6	LOS C	7.2	181.7	0.86	1.10	19.9
Approach		1095	2.0	0.778	24.6	LOS C	7.2	181.7	0.86	1.08	19.9
North: Salisbury Street											
7	L	34	2.0	0.840	40.8	LOS E	5.2	131.6	0.89	1.24	15.7
4	T	34	2.0	0.840	40.8	LOS E	5.2	131.6	0.89	1.18	15.8
14	R	741	2.0	0.840	39.8	LOS E	5.2	131.6	0.88	1.18	15.9
Approach		809	2.0	0.840	39.9	LOS E	5.2	131.6	0.88	1.19	15.9
West: Causeway Drive											
5	L	312	2.0	0.804	21.0	LOS C	10.1	255.6	0.75	0.77	20.1
2	T	1238	2.0	0.804	21.0	LOS C	10.1	255.6	0.75	0.64	21.1
12	R	14	2.0	0.804	21.0	LOS C	10.1	255.6	0.75	0.69	21.0
Approach		1563	2.0	0.804	21.0	LOS C	10.1	255.6	0.75	0.67	20.8
All Vehicles		3663	2.0	0.840	26.0	LOS D	10.1	255.6	0.81	0.92	19.3

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Model used.

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SIDRA INTERSECTION

Appendix C

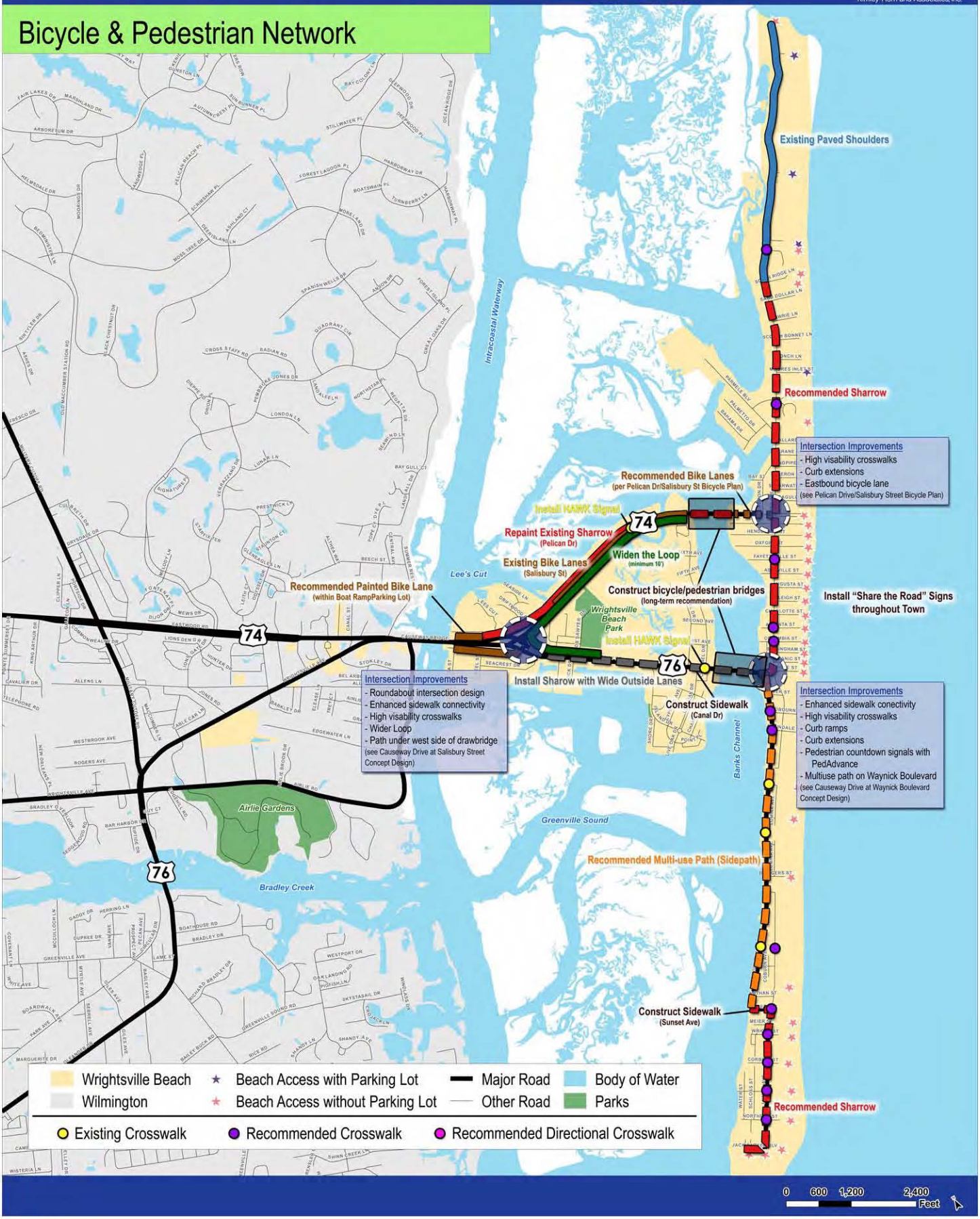
Recommendation Maps

Appendix C Recommendation Maps

Community Transportation Plan
Town of Wrightsville Beach, North Carolina

Kimley-Horn and Associates, Inc.

Bicycle & Pedestrian Network

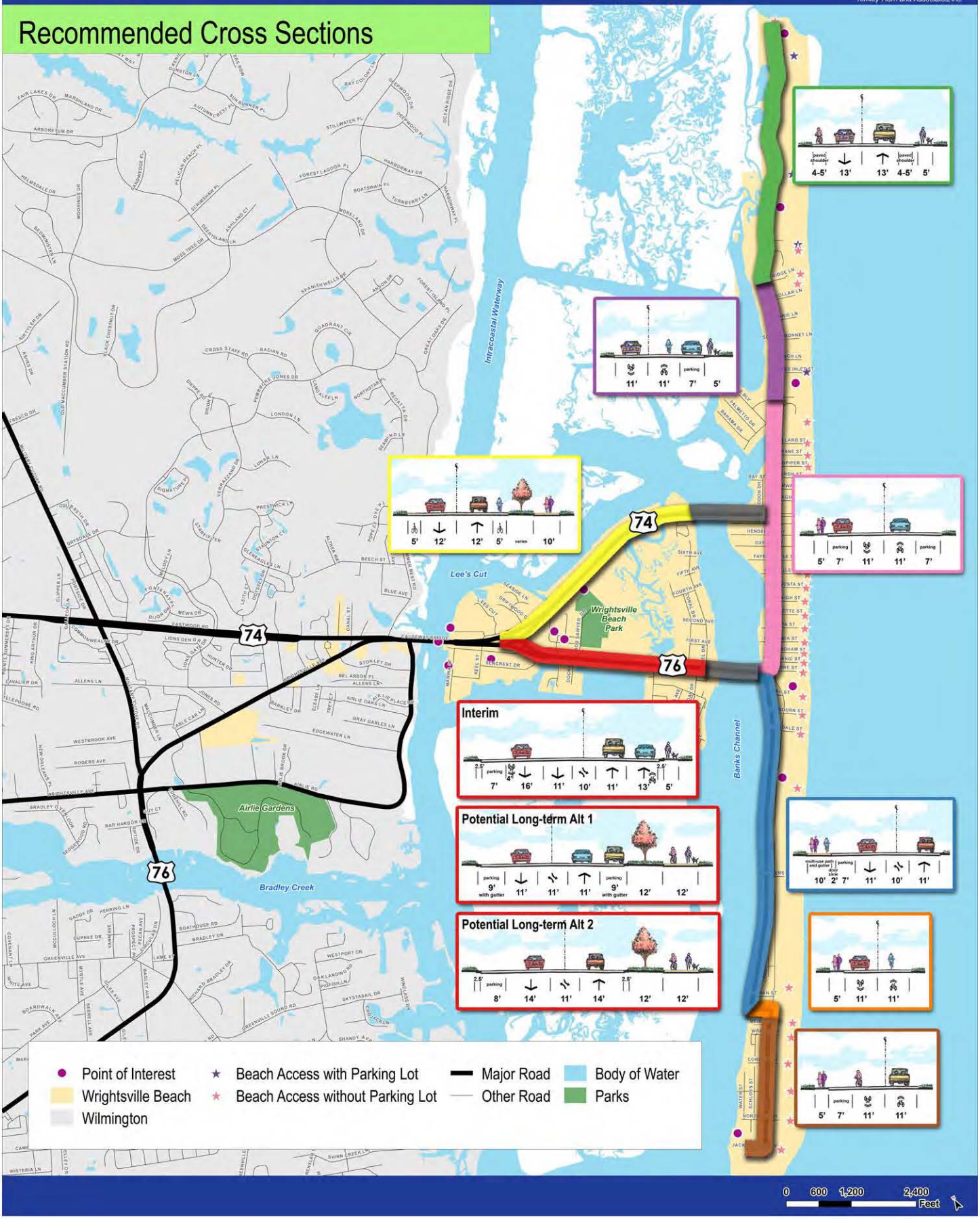


Community Transportation Plan

Town of Wrightsville Beach, North Carolina

Kimley-Horn and Associates, Inc.

Recommended Cross Sections

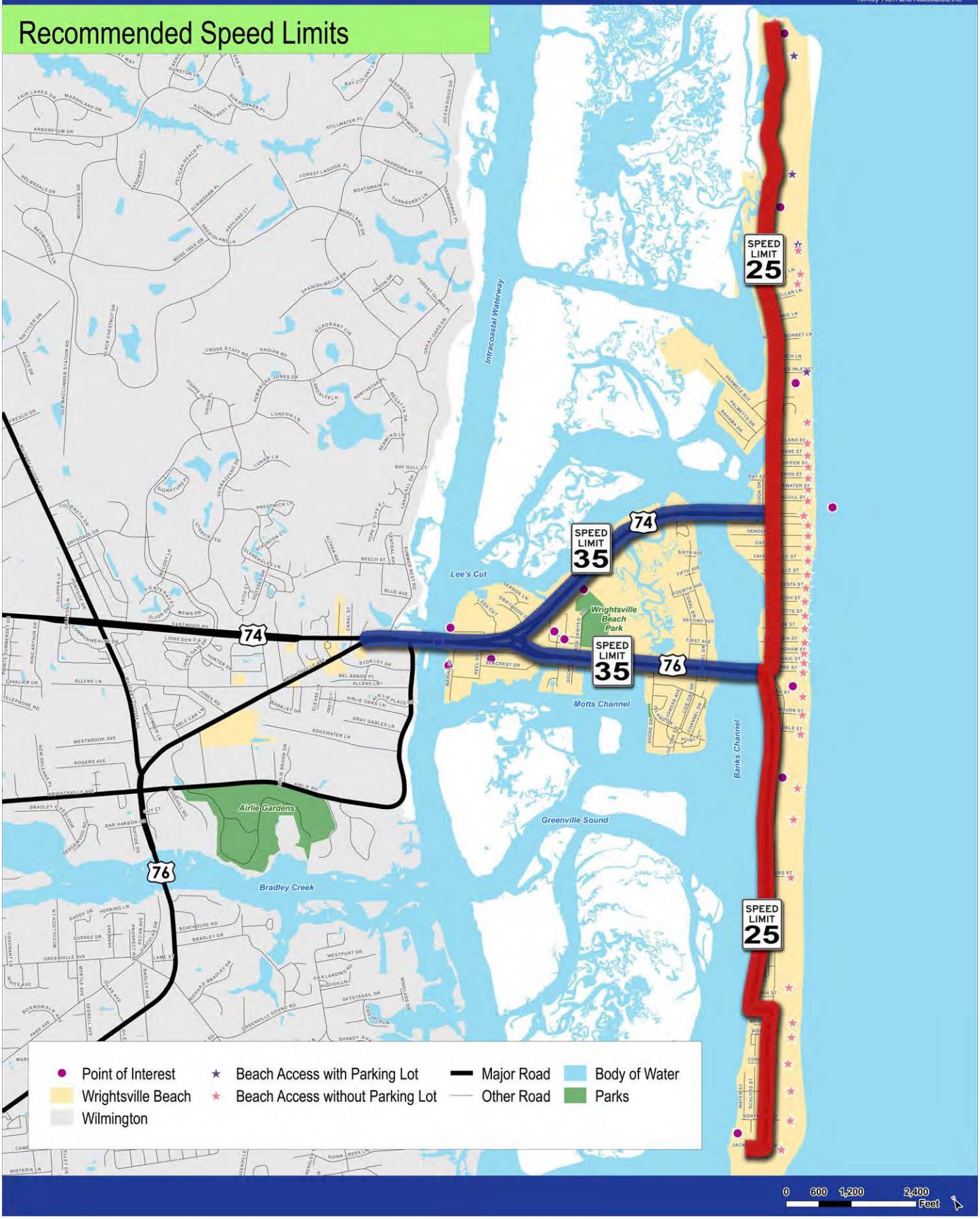


Community Transportation Plan

Town of Wrightsville Beach, North Carolina

Kimley-Horn and Associates, Inc.

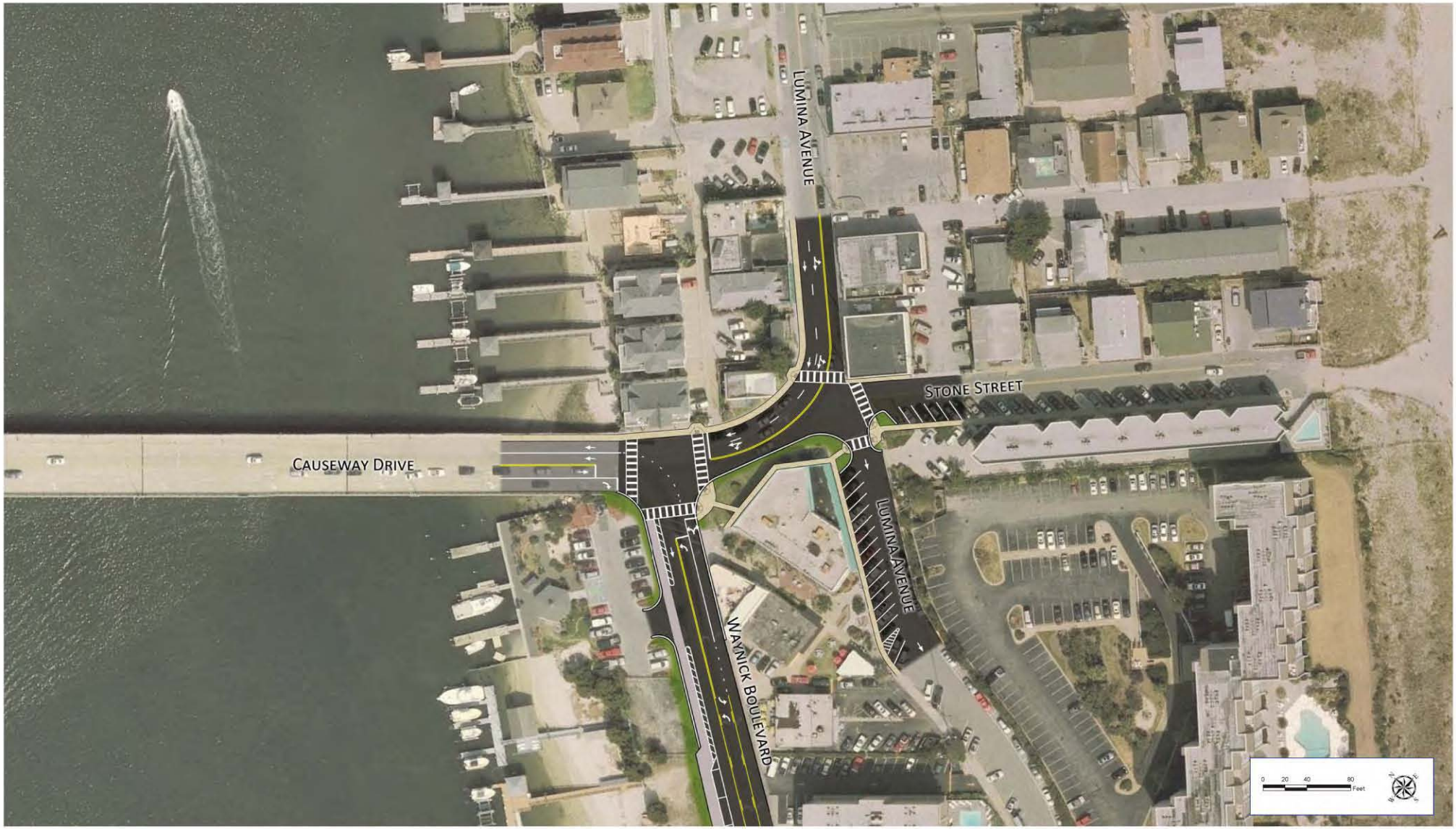
Recommended Speed Limits



Appendix D

Concept Designs

Appendix D Concept Designs



Prepared For:

WILMINGTON URBAN AREA
Metropolitan Planning Organization

WRIGHTSVILLE BEACH *Community Transportation Plan*

Causeway Drive at Waynick Boulevard Concept Design

Prepared By:

Kimley-Horn and Associates, Inc.

Prepared For:

WILMINGTON URBAN AREA
Metropolitan Planning Organization

WRIGHTSVILLE BEACH *Community Transportation Plan*

Causeway Drive at Salisbury Street Concept Design

Prepared By:

Kimley-Horn and Associates, Inc.

Prepared For:

WILMINGTON URBAN AREA
Metropolitan Planning Organization

WRIGHTSVILLE BEACH *Community Transportation Plan*

Causeway Drive at Salisbury Street Concept Design

Prepared By:

Kimley-Horn and Associates, Inc.

Appendix E

Concept Design
Cost Estimates

Appendix E Concept Design Cost Estimates

Total Length 650 LF 0.12 Miles

	Quantity	Unit	Price	Amount
Roadway				
5' Concrete Sidewalk	210	SY	$ 30.00	$ 6,300
Concrete Curb Ramps	9	EA	$ 1,200.00	$ 10,800
Pavement Removal	350	SY	$ 6.00	$ 2,100
2'-6" C&G	350	LF	$ 15.00	$ 5,250
Pavement Resurfacing	2200	SY	$ 12.00	$ 26,400
Earthwork	150	CY	$ 9.00	$ 1,350
Clearing and Grubbing	1	LS	$ 5,000.00	$ 5,000
Drainage				
Drainage for Bulbouts	1.00	LS	$ 25,000.00	$ 25,000
Pavement Marking & Signing	1	LS	$ 17,000.00	$ 17,000
Traffic Signals (Upgrade)				
Waynick Boulevard / Causeway Drive	1	EA	$ 75,000.00	$ 75,000
Traffic Control	1	LS	$ 5,000.00	$ 5,000
Misc Utility Relocations	1	LS	$ 10,000.00	$ 10,000
Sub-total				$ 189,200
Misc & Mob (35%Functional)				$ 67,000

Total	$ 257,000

Causeway Drive at Waynick Boulevard Opinion of Probable Construction Cost

Assumptions

1. Assumed average of 1.5' depth for earthwork.
2. No pedestrian lights included.
3. Assume existing street lights will remain
4. The cost for utility upgrades was not included in the construction cost or engineering cost.
5. The cost for re-striping Waynick Boulevard is not included with this opinion of probable construction cost because it is assumed to be a standard re-surfacing maintenance item.
6. The Engineer has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Engineer at this time and represent only the Engineer's judgment as a design professional familiar with the construction industry. The Engineer cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Total Length 4645 LF 0.88 Miles

	Quantity	Unit	Price	Amount
Roadway				
New Pavement	7600	SY	$ 50.00	$ 380,000
5' Concrete Sidewalk	2300	SY	$ 30.00	$ 69,000
Concrete Driveway (Reinforced)	500	SY	$ 55.00	$ 27,500
Concrete Curb Ramps	29	EA	$ 1,200.00	$ 34,800
Pavement Removal	9600	SY	$ 6.00	$ 57,600
10' Multi-Use Path	2000	SY	$ 32.00	$ 64,000
Monolithic Island	2300	SY	$ 45.00	$ 103,500
2'-6" C&G	11500	LF	$ 15.00	$ 172,500
Pavement Resurfacing	27000	SY	$ 12.00	$ 324,000
Earthwork	11500	CY	$ 9.00	$ 103,500
Clearing and Grubbing	2.3	AC	$ 15,000.00	$ 34,500
Brick Pavers	420	SY	$ 125.00	$ 52,500
Drainage				
Drainage	1	LS	$ 450,000.00	$ 450,000
Pavement Marking & Signing	1	LS	$ 50,000.00	$ 50,000
Street Lights	55	EA	$ 3,000.00	$ 165,000
Traffic Control	1	LS	$ 75,000.00	$ 75,000
Landscaping (Roundabout)	1	LS	$ 60,000.00	$ 60,000
Misc Utility Relocation	1	LS	$ 100,000.00	$ 100,000
Sub-total				$ 2,323,400
Misc & Mob (35%Functional)				$ 814,000

Total	$ 3,140,000

Causeway Drive at Salisbury Street (Roundabout)
Opinion of Probable Construction Cost

Assumptions

1. Assumed average of 1.5' depth for earthwork.
2. No pedestrian lights included.
3. Street lights to be installed every 150' along all roads.
4. The cost for utility upgrades was not included in the construction cost or engineering cost.
5. The Engineer has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Engineer at this time and represent only the Engineer's judgment as a design professional familiar with the construction industry. The Engineer cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Total Length 4720 LF 0.89 Miles

	Quantity	Unit	Price	Amount
Roadway				
New Pavement	7400	SY	$ 50.00	$ 370,000
5' Concrete Sidewalk	2400	SY	$ 30.00	$ 72,000
Concrete Driveway (Reinforced)	500	SY	$ 55.00	$ 27,500
Concrete Curb Ramps	29	EA	$ 1,200.00	$ 34,800
Pavement Removal	9800	SY	$ 6.00	$ 58,800
10' Asphalt Sidewalk	2100	SY	$ 32.00	$ 67,200
Monolithic Island	1550	SY	$ 45.00	$ 69,750
2'-6" C&G	9400	LF	$ 15.00	$ 141,000
Pavement Resurfacing	26900	SY	$ 12.00	$ 322,800
Earthwork	11000	CY	$ 9.00	$ 99,000
Clearing and Grubbing	2.3	AC	$ 15,000.00	$ 34,500
Drainage				
Drainage	1	LS	$ 450,000.00	$ 450,000
Pavement Marking & Signing	1	LS	$ 52,000.00	$ 52,000
Street Lights	55	EA	$ 3,000.00	$ 165,000
Traffic Signals (New Mast Arm)				
Salisbury Street / Causeway Drive	1	EA	$ 130,000.00	$ 130,000
Traffic Control	1	LS	$ 75,000.00	$ 75,000
Landscaping (Intersection)	1	LS	$ 60,000.00	$ 60,000
Misc Utility Relocation	1	LS	$ 100,000.00	$ 100,000
Sub-total				$ 2,329,350
Misc & Mob (35%Functional)				$ 816,000

Total	$ 3,150,000

Causeway Drive at Salisbury Street (Intersection)
Opinion of Probable Construction Cost

Assumptions

1. Assumed average of 1.5' depth for earthwork.
2. No pedestrian lights included.
3. Street lights to be installed every 150' along all roads.
4. The cost for utility upgrades was not included in the construction cost or engineering cost.
5. The Engineer has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Engineer at this time and represent only the Engineer's judgment as a design professional familiar with the construction industry. The Engineer cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

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