



# ***US-1 Multimodal Corridor Study***



**CONNECTING** COMMUNITIES  
*In Palm Beach County*

**HEALTH IMPACT ASSESSMENT**



**PALM BEACH**  
Transportation  
Planning Agency

## ACKNOWLEDGMENTS

We extend our sincere appreciation and gratitude to the residents, business owners, elected officials, local government staff, partner agencies, and specifically the **Working Group** who participated in the planning process and guided the development of the US-1 Health Impact Assessment.



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# EXECUTIVE SUMMARY

# US-1 HEALTH IMPACT ASSESSMENT SUMMARY

## WHAT IS AN HIA?

A Health Impact Assessment (HIA) is a process that analyzes and quantifies how a policy or investment influences people's health.

## GOALS OF THE HIA

Improve access to jobs and education

Improve access to health and community services

Improve safety for pedestrians and bicyclists

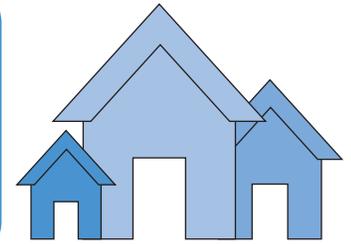
Support development / redevelopment along the corridor

## HOW TO USE THE HIA

An HIA helps decision-makers understand how pedestrian, bicycle, and transit investments can **benefit or impact the health of the communities** along the US-1 Corridor and help decision-makers **prioritize these investments** and **inform public policy changes**

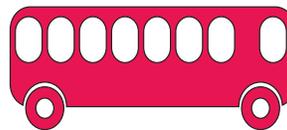
## THE US-1 CORRIDOR IS A CRITICAL ROADWAY FOR PALM BEACH COUNTY'S RESIDENTS

**68,000 Residents**  
*(13% of County Residents)*  
**102,000 Workers**  
*(19% of County Jobs)*



## US-1 Links the County in Multimodal Ways

**11,000 to 32,000**  
Daily Vehicle Trips



**8,600 Daily Transit Riders**  
*#1 Ridership Bus Route in the County*

**PEDESTRIAN AND BICYCLE SAFETY IS A CONCERN ALONG US-1 THROUGHOUT THE COUNTY**

**82%**

**Bicycle Crashes Occurring in Locations with No Bike Lane**

**15 Fatalities; All Occurred in Dark or Dusk** *(Between 2011-2016)*

## HOW DO RESIDENTS WITHIN 1/2 MILE...

**7.0%**  
WORK AT HOME  
COUNTY: 5.9%



**2.5%**  
WALK  
COUNTY: 1.5%



**1.4%**  
BICYCLE  
COUNTY: 0.7%



**3.3%**  
TRANSIT  
COUNTY: 2.0%



# HOW CAN PLANNING FOR ENHANCED TRANSIT AND COMPLETE STREETS IMPACT HEALTH?

## Access to Health and Community Services



High quality public transportation increases access to healthy food sources, especially for physically or economically disadvantaged  
(Victoria Transport Policy Institute, 2010)

Researchers observed a 42% lower risk of hypertension among those that moved from low to high walkability neighborhood  
(Chiu, 2015)

Lack of access to transportation reduces health care utilization among children, seniors, low-income people, and people with disabilities.  
(Statistic Brain, 2017)

Transit availability encourages an extra 20 blocks walked per month  
(Cambridge, 2015)

## Access to Jobs and Education

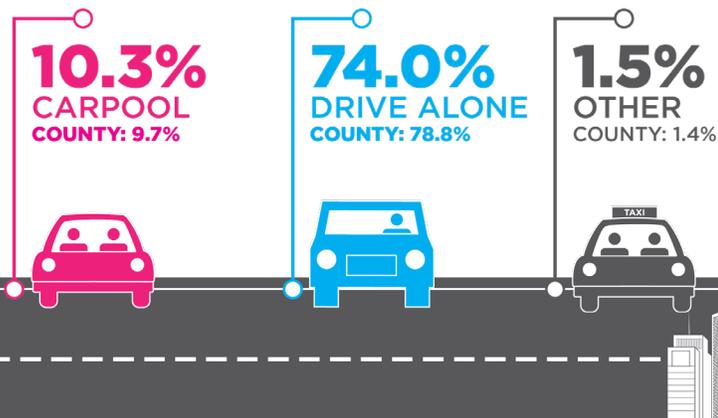


## Economic Development



Enhanced transit is capitalized into land value: Residents and businesses are willing to pay more to be closer to transit stations. In an auto-dependent environment, families spend an average of 25% of their budget on transportation. In a walkable environment, they spend 9%.  
(Center for Transit Oriented Development, 2008)

## PERCENTAGE OF US-1 GET TO WORK?



## Bicycle and Pedestrian Safety

Adding bicycle facilities on a street increases safety for all users.  
(Injury & Prevention, 2003)

# HOW ARE US-1 CORRIDOR USERS AFFECTED?



## THE DAVISES

### THE DAVISES IN BOYNTON BEACH

Mr. Davis (who was permanently injured in an accident 20 years ago) and his wife, who is also disabled, are grateful for their degree of independence. Because they do not own a personal vehicle, the Davises can be seen traversing the US-1 Corridor with their automatic wheel chairs. They rely on **Palm Tran for nearly all of their daily trips**: playing bingo, visiting the beach, shopping, medical appointments, and visiting nearby parks to feed the ducks.

They live just two blocks from the Palm Tran stop at US-1 and 6th Avenue, however, Mr. Davis noted that they both need to ride their wheelchairs in the bike lane because of the **lack of continuous sidewalks**. Mr. Davis noted that, while he is riding in the street, he has been told by local authorities to use the sidewalk or face getting a ticket. There is no sidewalk.

# 30%

Residents in the US-1 Corridor who have had **obesity-related health issues**

**2** Food Deserts in the US-1 Corridor (Boynton Beach + Riviera Beach)

# 43%

The **hypertension** rate in the US-1 Corridor: Higher than the County, State, and National averages

# 14%

Residents in the US-1 Corridor who have had **diabetes-related issues**

# 20%

Survey respondents indicated they were **unable to get to work or health care services** along US-1 **due to public transportation issues**



HEALTH INDICATOR	DISTRIBUTION OF IMPACT
 Access to Health Care & Healthy Food	High likelihood of positive impact to vulnerable populations and the overall reduction of food deserts
 Mental Health & Depression	Positive impact on elderly populations and auto-dependent communities
 Chronic Illness (Diabetes, Hypertension, Asthma)	Positive impact to auto-dependent communities
 Obesity	High likelihood of positive impact to vulnerable populations and auto-dependent communities
 Bike & Pedestrian Crash Rates	High likelihood of positive impact to all users of the US-1 Corridor - especially high-speed areas
 Taxable Land Value	Moderate positive impacts to areas of likely development and redevelopment Possible negative impacts to vulnerable populations (displacement mitigation)

# PRIMARY HIA RECOMMENDATIONS

## ADVANCE ALTERNATIVES AND IMPLEMENT BUS RAPID TRANSIT SERVICE ON THE US-1 CORRIDOR

### Lead Agency:

- Palm Tran

### Partnering Agencies:

- Palm Beach TPA
- FDOT
- Municipalities along US-1 Corridor

## IMPLEMENT THE COMPLETE STREETS ENHANCEMENTS ON THE US-1 CORRIDOR

### Lead Agency:

- FDOT

### Partnering Agencies:

- Palm Beach TPA
- Municipalities along US-1 Corridor
- Palm Beach County

## SECONDARY HIA RECOMMENDATIONS

The secondary recommendations focused on specific issues on the US-1 Corridor. Those issues were categorized into **five typologies**: policy, transportation, land use, education, and marketing.

POLICY

TRANSPORTATION

LAND USE

EDUCATION

MARKETING

## MONITORING, EVALUATION, AND FOLLOW-UP

The Palm Beach TPA will track and document the impact of the implementation of the US-1 Multimodal Corridor Study as it relates to the the health indicators described in this US-1 HIA Appendix. It is recommended that the HIA Monitoring Plan determines the following:

1

WHICH RECOMMENDATIONS IN THIS HIA HAVE BEEN ENACTED TO PROMOTE AND IMPROVE HEALTH ALONG THE US-1 CORRIDOR?

2

AS A DIRECT RESULT OF THE US-1 HIA'S PRIMARY RECOMMENDATIONS, WHAT IS THE EVIDENCE SHOWING THE CHANGE IN THE OVERALL COMMUNITY HEALTH ALONG THE US-1 CORRIDOR?

3

AS A DIRECT RESULT OF THE US-1 HIA'S SECONDARY RECOMMENDATIONS, WHAT IS THE EVIDENCE SHOWING CHANGE IN THE OVERALL COMMUNITY HEALTH ALONG THE US-1 CORRIDOR?



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# INTRODUCTION

# INTRODUCTION

The Palm Beach Transportation Planning Agency (TPA), in collaboration with local municipal governments and their partners, completed the US-1 Multimodal Corridor Study with the overall goal of providing a consistent and coherent vision for the US-1 Corridor that reflects and meets the needs of all users. Specifically the study's goals included improving safety and accessibility for all users, providing connected walking and bicycling facilities, and examining the potential for a corridor-based premium transit service. The US-1 Multimodal Corridor Study presents the TPA with a unique opportunity to advance healthy community planning into the transportation planning process.

With chronic diseases like diabetes and cardiovascular disease on the rise, the built environment has become an important aspect of health-promotion strategies. Health, in this Study's context, is viewed as not merely the absence of disease or infirmity, but as "a state of physical, mental, and social well-being".<sup>1</sup> With this in mind, well planned and designed transportation investments, such as those proposed in the US-1 Multimodal Corridor Study, can have a greater impact by positively influencing the future health of the Corridor residents, workers, and businesses.

A Health Impact Assessment (HIA) helps link transportation and health planning by giving policymakers more information about how the implementation of proposed multimodal facilities can affect the health conditions of communities that will be served by them. At the same time, the HIA offers the opportunity to influence planning and design decisions for the Corridor Study by capturing the potential health benefits of the multimodal investments. In addition, the community outreach, literature review, and data collection and analysis that are part of the HIA process can provide policy and decision makers with information on health, environmental, and economic matters that may not have been part of conventional transportation planning or health planning discussions.

As a part of the US-1 Multimodal Corridor Study, a HIA was conducted to aid in the decision making process on choices that improve public health through community design. The HIA is intended to provide a better understanding of the impacts the multimodal improvements proposed in the Study and how those potential physical, social, economic, and emotional impacts influence the overall health of the communities served by the Corridor. The HIA followed the Center for Disease Control and Prevention's (CDC) 6-step process shown in **Figure 1**. It identified vulnerable populations within the Study Corridor with the most acute active transportation needs and used data and existing research to demonstrate how various solutions are likely to affect the well-being of area residents. This analysis and demonstration effectively incorporates health considerations into the transportation planning decision-making process. Additionally, introducing the health focus into the transportation planning process adds an equity dimension into policy and infrastructure investment decisions, taking into account the influence of transportation investments on the most vulnerable populations.

This HIA will equip Palm Beach County leaders with critical information to enable the proposed improvements from the US-1 Multimodal Corridor Study to be infrastructure investments that improve overall mobility *and* provide an opportunity to create more economically competitive and healthy communities along the US-1 Corridor.



<sup>1</sup> World Health Organization, 1946.

# WHAT ARE HEALTH IMPACT ASSESSMENTS?

A Health Impact Assessment is a formal evaluation process that incorporates location-specific scientific data, health expertise, and public input to assess a proposed project or policy’s impact on the health of a population and the distribution of those effects within the population. The primary goal of a HIA is to identify the potential health impacts of a project or policy and encourage informed decisions related to the project that will positively influence a population’s health.

A HIA is similar to an environmental impact assessments conducted by many agencies under the National Environmental Policy Act (NEPA). However, the key difference is that while NEPA assessments focus on the environmental effects of a project, a HIA focuses on the effect a project is likely to have on human health and well-being.

The HIA is a tool to help decision-makers recognize the health consequences of the decisions they make so they can refine community investments and policies towards a healthier living environment.

A HIA outlines potential consequences for decision-makers and concludes with a set of policy and design/planning recommendations intended to minimize health risks and maximize health benefits. HIA's are based on the best available evidence, both quantitative (such as health surveys and data) and qualitative (such as interviews with stakeholders). HIA's are a useful way to ensure that health needs and opportunities are considered in policy decision-making processes.

The HIA process can vary depending on the subject matter, study time that is available, and stakeholders involved. The process is generally comprised of six key stages: 1) Screening, 2) Scoping, 3) Assessment, 4) Recommendations, 5) Reporting, and 6) Monitoring and Evaluation.

The US-1 HIA completed stages 1 to 5. The details of the sixth and final stage, Monitoring and Evaluation, will be addressed during and after the implementation of the proposed improvements from the US-1 Multimodal Corridor Study.

**FIGURE 1: 6-STEP HIA PROCESS**

<b>1</b>	<b>SCREENING</b>	Determine whether a HIA is feasible, timely, and would add value to the decision-making process.
<b>2</b>	<b>SCOPING</b>	Identify the health indicators that the project will likely impact, identify the study area and affected populations, prioritize research questions, identify evidence and research methods, establish stakeholder roles, and establish a timeline for the process.
<b>3</b>	<b>ASSESSMENT</b>	Create an existing conditions profile for the study area in order to understand baseline conditions and to be able to predict change.  Assess potential health impacts, including the magnitude and direction of impacts, using quantitative and qualitative research methods and data.
<b>4</b>	<b>RECOMMENDATIONS</b>	Develop recommendations to improve the project, plan or policy’s health benefits and/or to mitigate any negative health impacts.
<b>5</b>	<b>REPORTING</b>	Create a written or visual documentation of the HIA results and recommendations, which take many forms including written reports, presentations, and comment letters.  Communicate the results within the decision-making process. A communications plan can include media outreach and public input.
<b>6</b>	<b>MONITORING AND EVALUATION</b>	Track the impacts of the HIA on the decision-making process, the implementation of the decision, and the impacts of the decision on health indicators.  Evaluate the HIA process.

## WHY CONDUCT AN HIA ON US-1?

The TPA and Palm Tran were interested to know how transit, bicycle, and pedestrian improvements on the US-1 Corridor could enhance the health of the adjacent communities. Undertaking an ambitious Corridor Study, the HIA was conducted to help influence and inform the planning and design decisions related to the multimodal improvements. The timing of the US-1 HIA was advantageous and allows it to influence the selected transit alternative in addition to providing new, useful information to key decision makers in the process.



## PARTNERSHIPS AND COMMUNITY OUTREACH

Incorporating community input throughout the HIA process and soliciting feedback on HIA outcomes are core components of the HIA practice. The US-1 HIA process involved the formation of the HIA Working Group (an advisory body of transit and public health experts, and stakeholders), public outreach through the use of online Transit and Quality of Life Survey and on-the-ground corridor engagement, and integration into the US-1 Multimodal Corridor Study charrette series (which included six charrettes, one for each section of the Study Corridor). These outreach methods provided key information at several points during the Study, as outlined in the rest of this report.

### WORKING GROUP

The US-1 HIA Study Team met with the HIA Working Group five times throughout the study to share study findings and obtain input on key elements of the HIA, such as the pathway diagram, primary indicators, and HIA recommendations. This Working Group allowed the interface between the transportation and health industry to be frequent and timely.



### COMMUNITY OUTREACH

A primary goal of the US-1 HIA was to ensure the process was inclusive and reached a diverse audience. The outreach effort was focused on encouraging participation that is reflective of the diverse population of the US-1 Corridor. In order to accomplish this, the outreach effort employed several strategies including:

- Bus rider interviews were conducted along the corridor. Study Team members started conversations at high activity transit stops, community hubs, and on Palm Tran bus vehicles to garner stories of bus rider experiences and explore what they would do to improve the transit, bike, and pedestrian systems near US-1.
- A Transit and Quality of Life Survey was hosted online and promoted through Corridor events throughout the duration of the study. A total of 105 responses were collected, which helped the Study Team better understand: (1) access to health care and healthy food along the Corridor; (2) user perception of social connectedness; (3) how users travel along the Corridor; and (4) what transit, bicycle, and pedestrian improvements are most important to them.
- Integration in the US-1 Multimodal Corridor Study charrettes held along the Corridor. At these workshops, the general public was welcomed to give their input and participate in discussion on the concept plans and ideas being developed for their corridor section. Each charrette began with a presentation to introduce the study and ended with a presentation of the concepts developed for that section of the corridor.
- Throughout the report, there are real-life stories from residents, business owners, employees, and visitors of the US-1 Corridor. These stories helped to affirm the conclusions found in the data analysis.



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# STUDY CORRIDOR OVERVIEW

# STUDY CORRIDOR OVERVIEW

## CORRIDOR CHARACTER

The study identified the health impacts of the proposed project for the study corridor of US-1 between Camino Real and Indiantown Road. This stretch of roadway spans 42 miles and 14 communities and was further divided into six sections. Those sections are as follows (and shown in Figure 2):

- **Section 1:** Boca Raton
- **Section 2:** Delray Beach, Boynton Beach, Gulf Stream
- **Section 3:** Hypoluxo, Lantana, Lake Worth
- **Section 4:** West Palm Beach
- **Section 5:** Riviera Beach, Lake Park, North Palm Beach
- **Section 6:** Juno Beach, Jupiter, Palm Beach Gardens

Throughout these communities, the corridor features different transportation and land use characteristics. As described below, some areas of the study corridor function as throughways, with high speeds and low bicycle and pedestrian volumes, while other areas make up key parts of the downtown core.

FIGURE 2: STUDY CORRIDOR



## BOCA RATON

US-1 functions as a six-lane arterial through most of Boca Raton. It generally has high travel speeds and low bicycle and pedestrian volumes. It briefly passes through the downtown core of Boca Raton, with surrounding retail and apartment land uses.



## DELRAY BEACH, BOYNTON BEACH, AND GULF STREAM

US-1 is a high-speed arterial through Delray Beach, Boynton Beach, and Gulf Stream. Auto-oriented land uses with ample parking are common throughout the section. US-1 passes through the Delray Beach downtown core as one-way couplet, with some retail land uses fronting the street, leading to a more walkable environment.



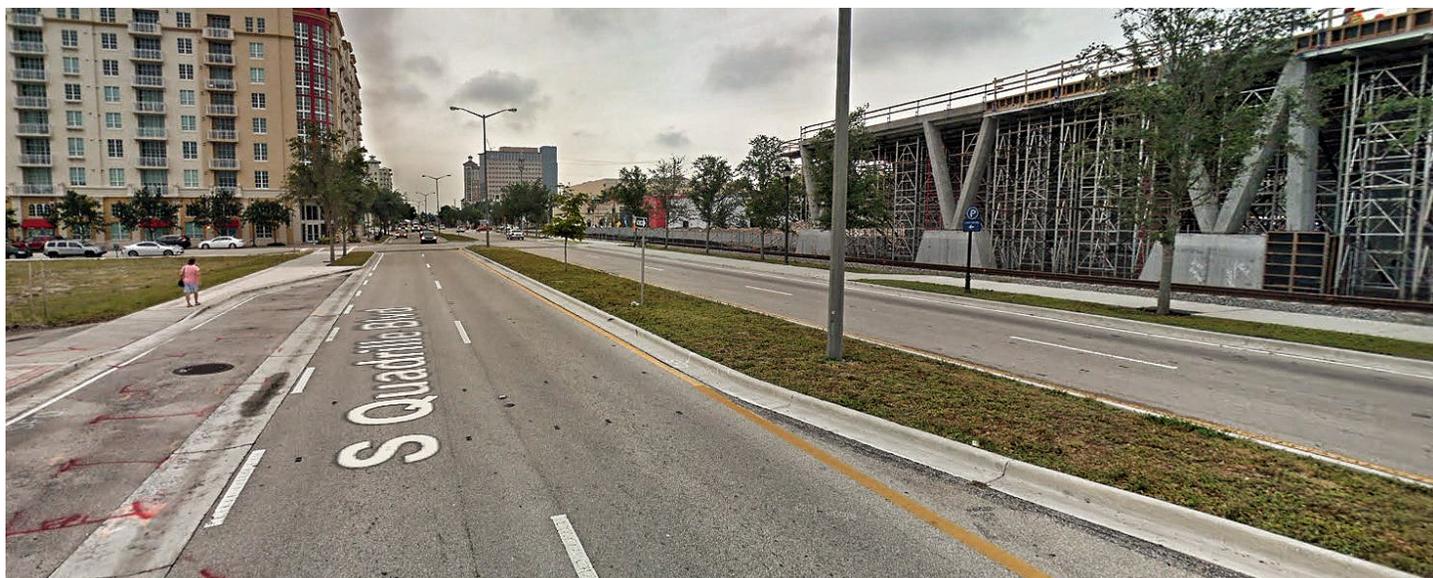
## HYPOLUXO, LANTANA, AND LAKE WORTH

The Hypoluxo, Lantana, and Lake Worth sections feature the highest amount of residential land uses in the corridor. US-1 is generally a four-lane, undivided roadway throughout this section.



## WEST PALM BEACH

The West Palm Beach section features sections of four-lane undivided roadway with auto-oriented retail land uses as well as sections with an urban context in the downtown core area.



## RIVIERA BEACH, LAKE PARK, AND NORTH PALM BEACH

US-1 is generally a fast-moving arterial, with assorted auto-oriented retail and many residential land uses in the surrounding areas.



## JUNO BEACH, JUPITER, PALM BEACH GARDENS

In the northernmost section of the study corridor, US-1 is a fast-moving, rural arterial. A few retail and residential land uses border the highway.



# SOCIOECONOMIC CONTEXT

The US-1 Corridor is diverse in its residents, users, and land uses. To better understand the users of the US-1 Corridor, demographic and socioeconomic background research was conducted for the communities in the study corridor.

## THE US-1 CORRIDOR IS A KEY EMPLOYMENT CORRIDOR

Over 250,000 residents live in the study area and over 100,000 employees work in it. In total, the corridor makes up 13% of Palm Beach County residents and 19% of Palm Beach County jobs. As shown in **Figure 3**, approximately 88,400 employees commute to a job inside the US-1 Corridor, 54,200 employees commute to a job outside the US-1 corridor, and 13,600 employees live and work within the US-1 Corridor. Transit and Complete Streets improvements have the potential to provide better access to jobs.<sup>2</sup>



**Bus Rapid Transit**  
improvements enhance job access by shortening journey times

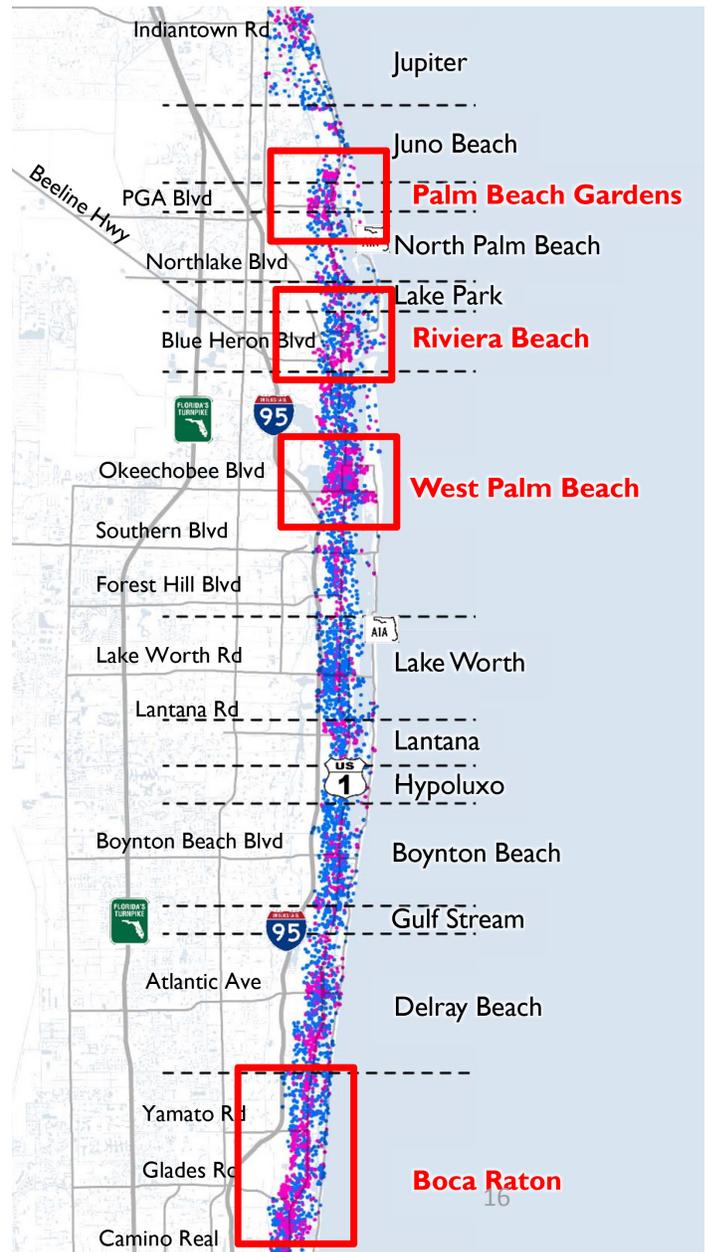
**WORK INFLOW / OUTFLOW**  
1/2 Mile of Study Corridor

**88,400**  
Employees Coming into the Study Area to Work

**13,600**  
Residents Live & Work in the Study Area

**54,200**  
Residents Leaving the Study Area to Work

**FIGURE 3: US-1 CORRIDOR EMPLOYMENT INFLOW AND OUTFLOW**



**Employment and Residents**

- 100 jobs
- 100 residents

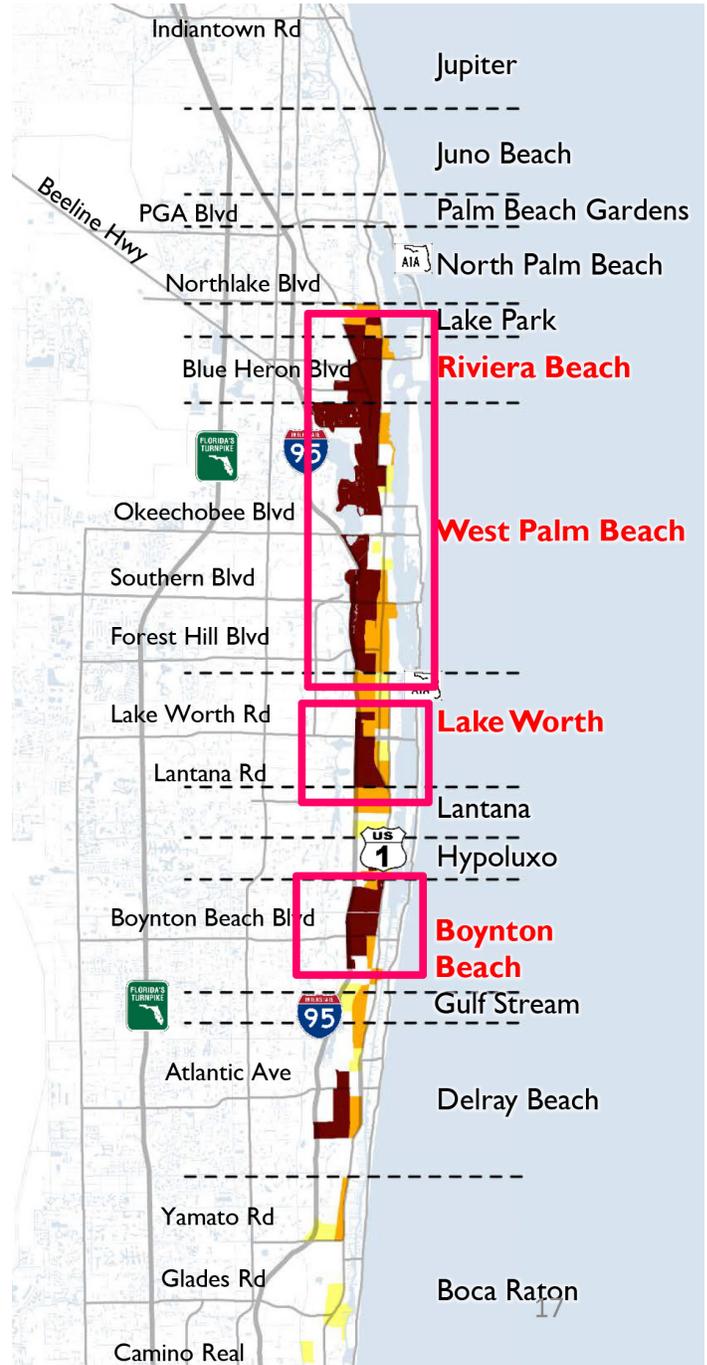
<sup>2</sup> Andrew Guthrie, "Economic Development Impacts of Bus Rapid Transit," 2016

## THE US-1 CORRIDOR IS RACIALLY AND ETHNICALLY DIVERSE

The US-1 Corridor is a racially and ethnically diverse area. Understanding this distribution ensures that planning and design alternatives consider impacts and benefits to the populations that have historically been impacted or under served.

According to the US Census Bureau (2011-2015 5-Year Estimates) approximately 45% of the Study Corridor residents report they are non-White. This percentage is higher than the national average of 39%. As shown in **Figure 4**, the communities with the highest concentrations of non-White ethnicities are Riviera Beach, West Palm Beach, Lake Worth, and Boynton Beach, with some census blocks showing more than a 76% racial and ethnic minority population.

**FIGURE 4: RACIAL AND ETHNIC MINORITIES ALONG THE US-1 CORRIDOR**

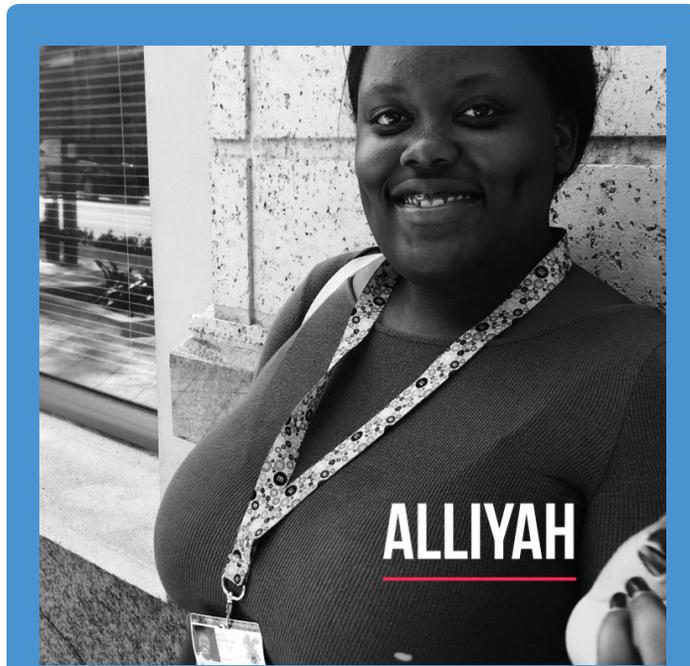


### Racial + Ethnic Minorities

- 38% (County Avg) – 50%
- 51% - 75%
- 76% - 100%

## THE US-1 CORRIDOR IS HOME TO MANY RESIDENTS THAT HAVE LIMITED MOBILITY CHOICES

Transit-dependent populations often include people that live below the poverty line and those that do not have access to a vehicle. Given the employment barriers for those unable to drive, race and poverty play an intricate role in reliance on transit. In the Study Corridor, approximately 33% of low income African Americans, 25% of low income Latinos, and 12% of low income Whites lack automobile access. **Figure 5** shows that a relatively high portion of the population does not have vehicle access.

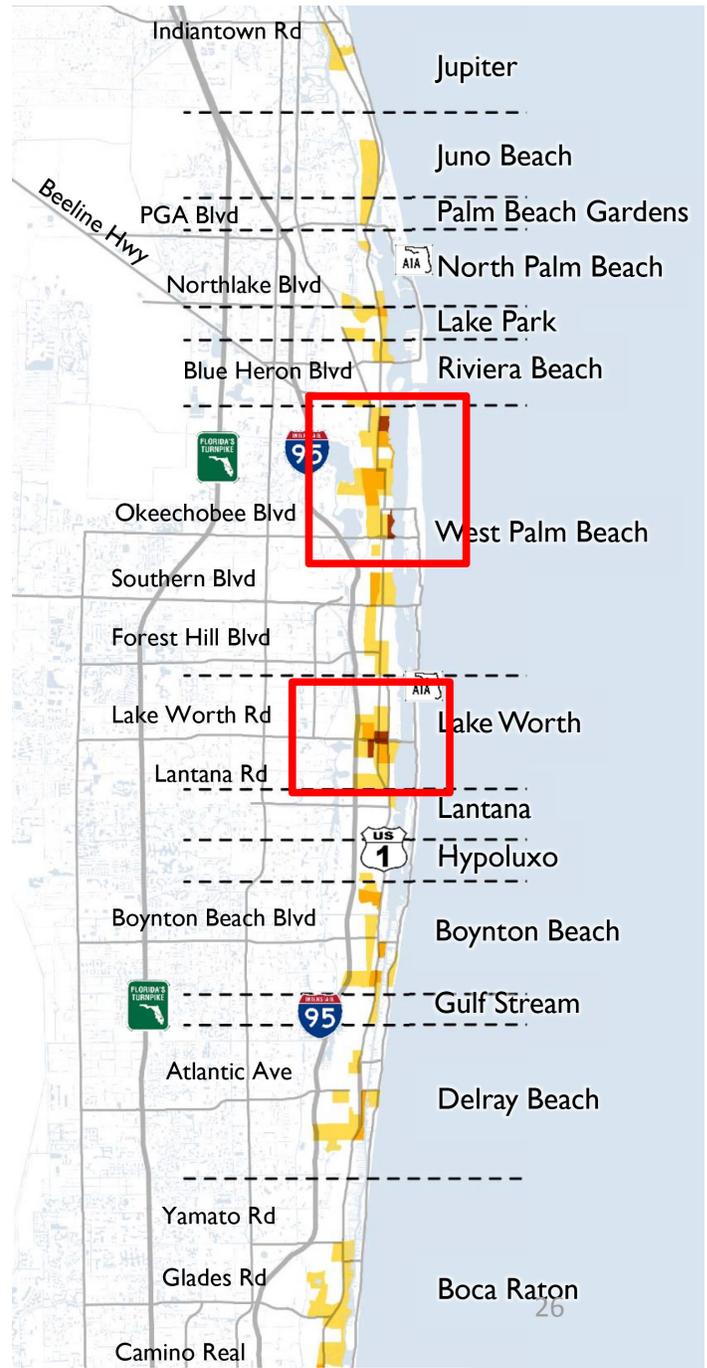


**ALLIYAH**

### ALLIYAH IN WEST PALM BEACH

Alliyah enjoys riding the Trolley in Downtown West Palm Beach and often uses it to transfer over to the Icoal Route 1 bus service, but she noted, "I wish the buses were more reliable so that people, like me, won't miss important things like job interviews and doctor appointments!"

**FIGURE 5: HOUSEHOLDS WITHOUT ACCESS TO A VEHICLE ALONG US-1 CORRIDOR**



Households Without Access to a Vehicle

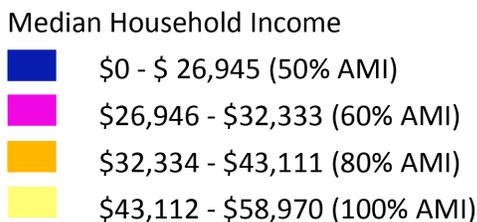
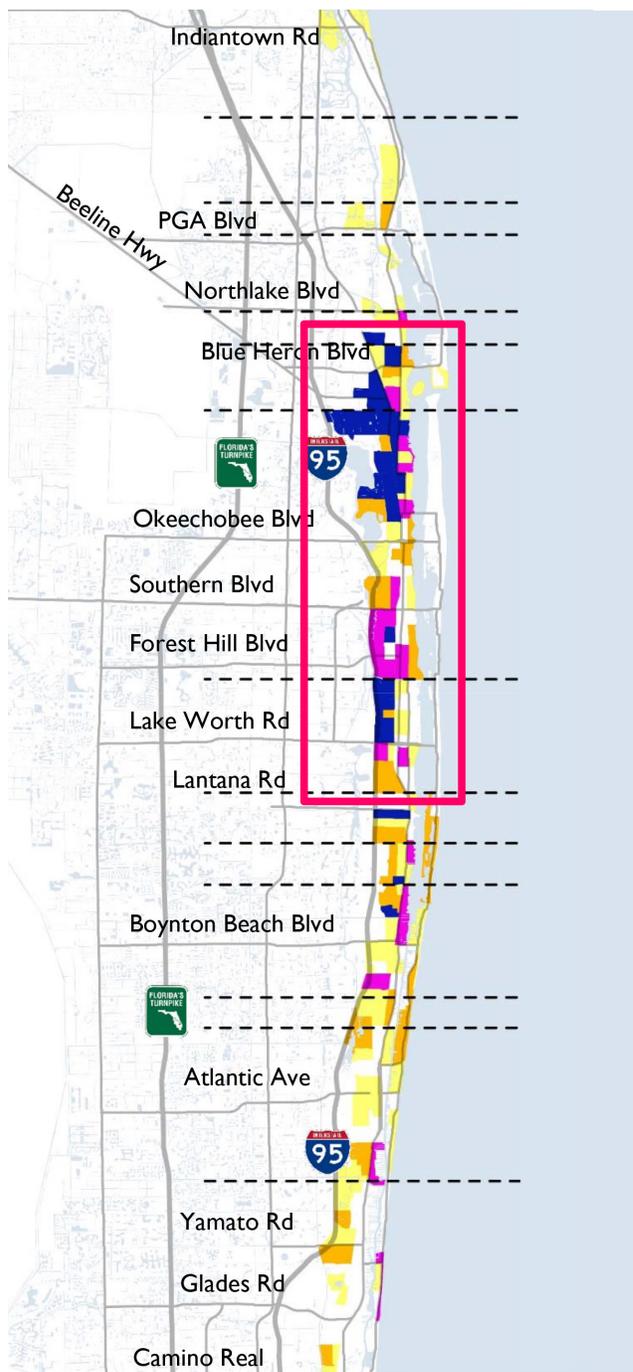
- 0.29 (County Avg) – 1 / Acre
- 1.01 – 1.5 / Acre
- 1.6 – 10.5 / Acre

Low-income households can also be an indicator of the level of potentially transit-dependent population that would benefit from improved service in the Corridor. Lake Worth, Riviera Beach, and West Palm Beach experienced the lowest incomes and have the most households under the poverty line, with some showing median household income less than 50% of the Area Median Income (AMI), shown in **Figure 6**. Based on an analysis of these trends as well as other topics such as education and number of households without access to personal vehicles, the communities of Riviera Beach, West Palm Beach, Lake Worth, and Boynton Beach were identified as vulnerable populations.<sup>3</sup>

 Many physically and economically **disadvantaged** people **depend on public transportation to access medical services** and to **obtain healthy, affordable food.**



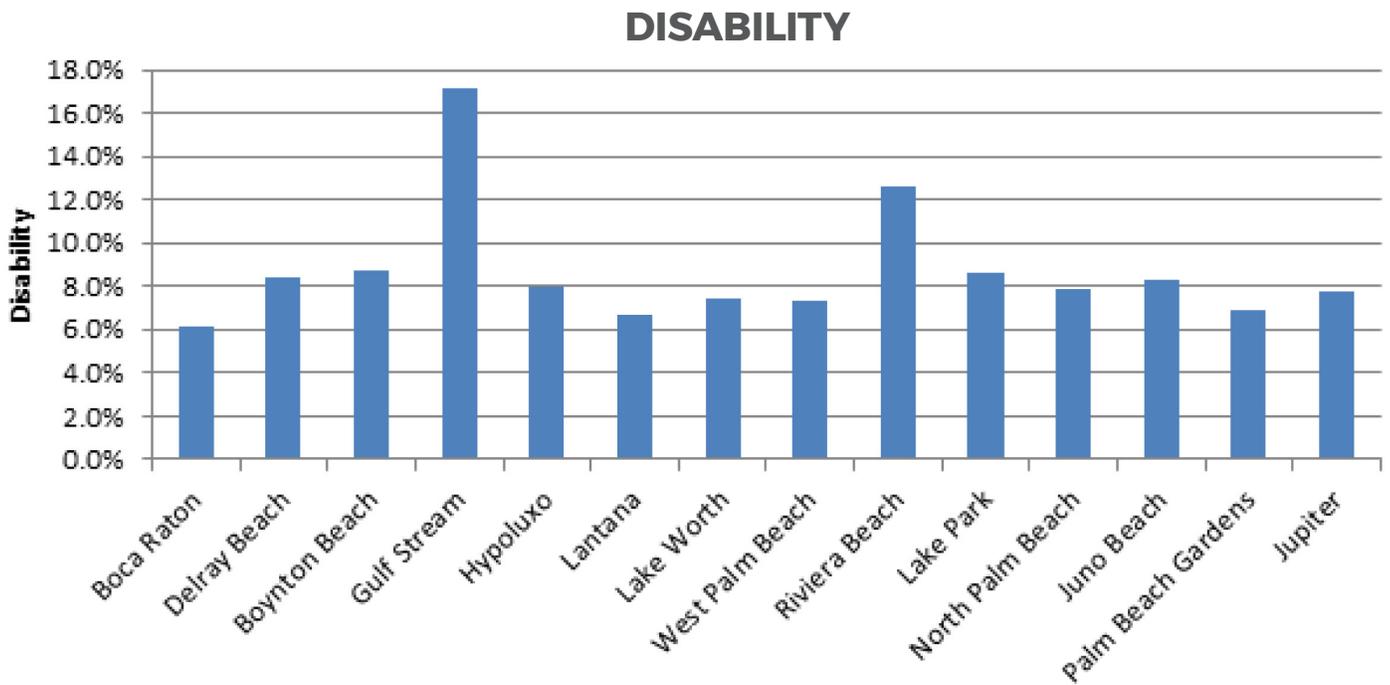
**FIGURE 6: MEDIAN HOUSEHOLD INCOME ALONG THE US-1 CORRIDOR**



<sup>3</sup> Litman, "Evaluating Public Transportation Health Benefits," (June 2010).

A community with more direct limitation in mobility are persons with disabilities. This population has unique access and mobility needs when it comes to planning transit and pedestrian infrastructure. On average, approximately 8% of the US-1 Corridor has a disability of some kind. As seen in **Table 1**, Gulf Stream and Riviera Beach show higher than average disability populations of 17% and 12%, respectively. Enhanced transit can open up access to education, employment, health care, and healthy foods for this unique population.

**TABLE 1: PERCENTAGE OF DISABLED POPULATION ALONG THE US-1 CORRIDOR**



# THE US-1 CORRIDOR INCLUDES PREDOMINANTLY MIDDLE-AGED POPULATION, WITH CONCENTRATIONS OF HIGH PERCENTAGES OF POPULATION WITH A HIGH SCHOOL DEGREE OR LESS

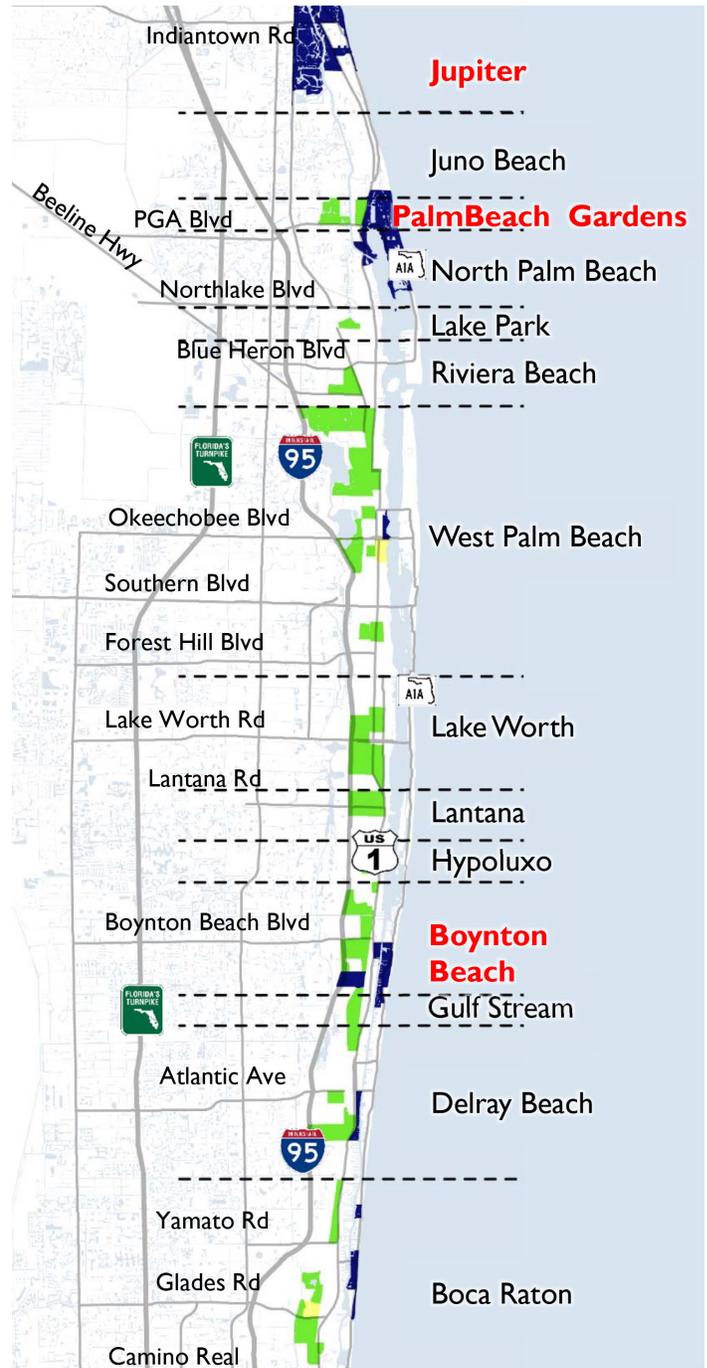
Various sections along the US-1 Corridor experience a median age above 65, as shown in **Figure 7**. Adults over the age of 65 often have less transportation options than younger adults, as one in five Americans over the age of 65 do not drive.<sup>4</sup> Populations such as Jupiter, Palm Beach Gardens, and Boynton Beach may thus be especially reliant upon transit to get to their destinations.



**One in five** Americans over the age of **65** do **not** drive.



**FIGURE 7: MEDIAN HOUSEHOLD INCOME ALONG THE US-1 CORRIDOR**



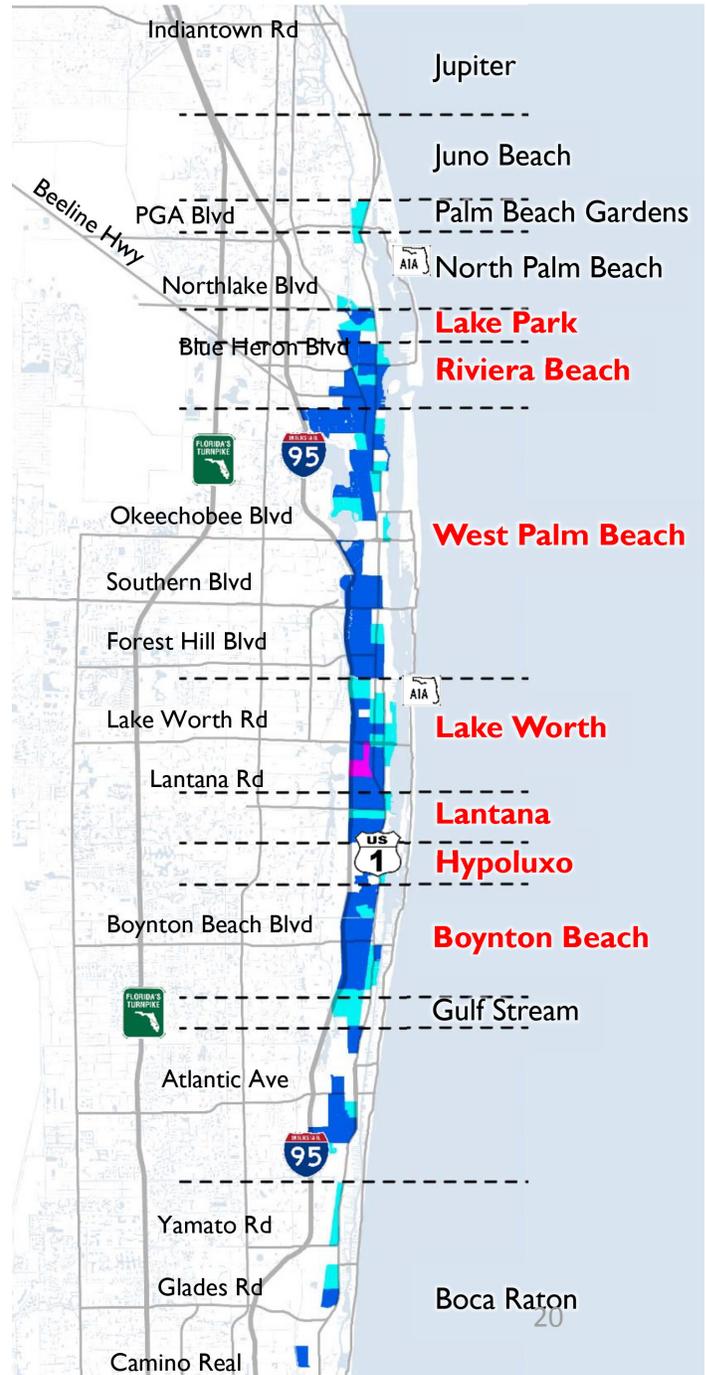
Median Age

Yellow	21 – 25
Green	26 – 35
Blue	65 - 86

<sup>4</sup> Bell, "The Transportation Prescription," (July 2009).

As shown in **Figure 8**, many areas along the Study Corridor see adverse educational outcomes. Lake Worth, Riviera Beach, West Palm Beach, and Boynton Beach especially see large percentages of residents over the age of 25 without a high school degree. These populations also have a high number of households without access to a vehicle, as shown in **Figure 5**. In a similar way that transit and complete streets improvements improve access to employment, they also improve access to educational opportunities for those without access to a personal vehicle.

**FIGURE 8: EDUCATIONAL OUTCOMES ALONG THE US-1 CORRIDOR**



Population 25 or over with a High School Degree or Less

- 37% (County Avg) – 50%
- 51% - 75%
- 76% - 100%



# TRANSPORTATION CONTEXT

Convenient, safe, and healthy transportation options for all users of the corridor are key priorities of the US-1 Multimodal Corridor Study. The US-1 Corridor features a variety of competing needs along the corridor. Personal vehicles, transit, pedestrians, and bicyclists all use the corridor to access destinations.

## THE US-1 CORRIDOR IS THE HIGHEST TRANSIT RIDERSHIP CORRIDOR IN PALM BEACH

Currently, 18 transit routes operate along the US-1 Corridor, including Route 1, which features the highest transit ridership in the County (8,600 daily riders). Of this ridership, approximately 50% of them are transit-dependent, relying on transit as their primary mode of transportation. Enhanced transit options can improve health outcomes for transit-dependent and low-income populations. A study by the Journal of Community Health found that around 25% of lower-income Americans have missed or rescheduled appointments due to a lack of transportation options. With more options available, these missed appointments may occur less often.



**FIGURE 9: TRANSIT BOARDINGS AND ALIGHTINGS ALONG THE US-1 CORRIDOR**



## THE US-1 CORRIDOR HAS PEDESTRIAN AND BICYCLIST MOBILITY AND SAFETY CHALLENGES

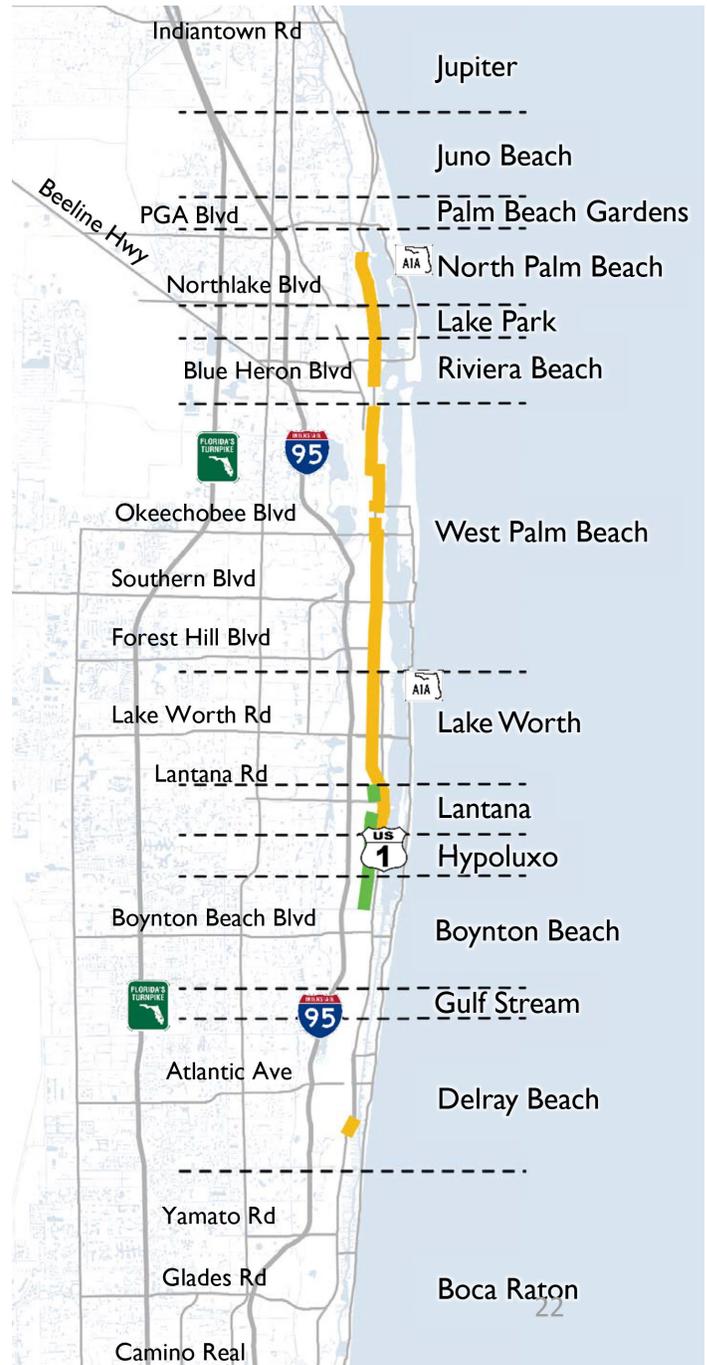
While both bike lanes and sidewalks are provided along some segments of the corridor, neither are provided continuously. **Figure 10** shows gaps in pedestrian and bicycle facilities along the length of the corridor. These gaps can make trips along the corridor inefficient and unsafe for bicyclists and pedestrians.



### MIKE IN WEST PALM BEACH

Mike noted that bicycling would be much easier than driving and trying to find a parking space, especially when visiting restaurants and nightlife Clematis Street. In his opinion and perception, the absence of pedestrian safety features or dedicated bike lanes makes it tough to consider exclusively biking here. He has used the Trolley in the past and agrees it is convenient, but given the time savings of driving, Mike does not really consider using the fixed route system.

**FIGURE 10: PEDESTRIAN AND BICYCLING FACILITIES ALONG THE US-1 CORRIDOR**

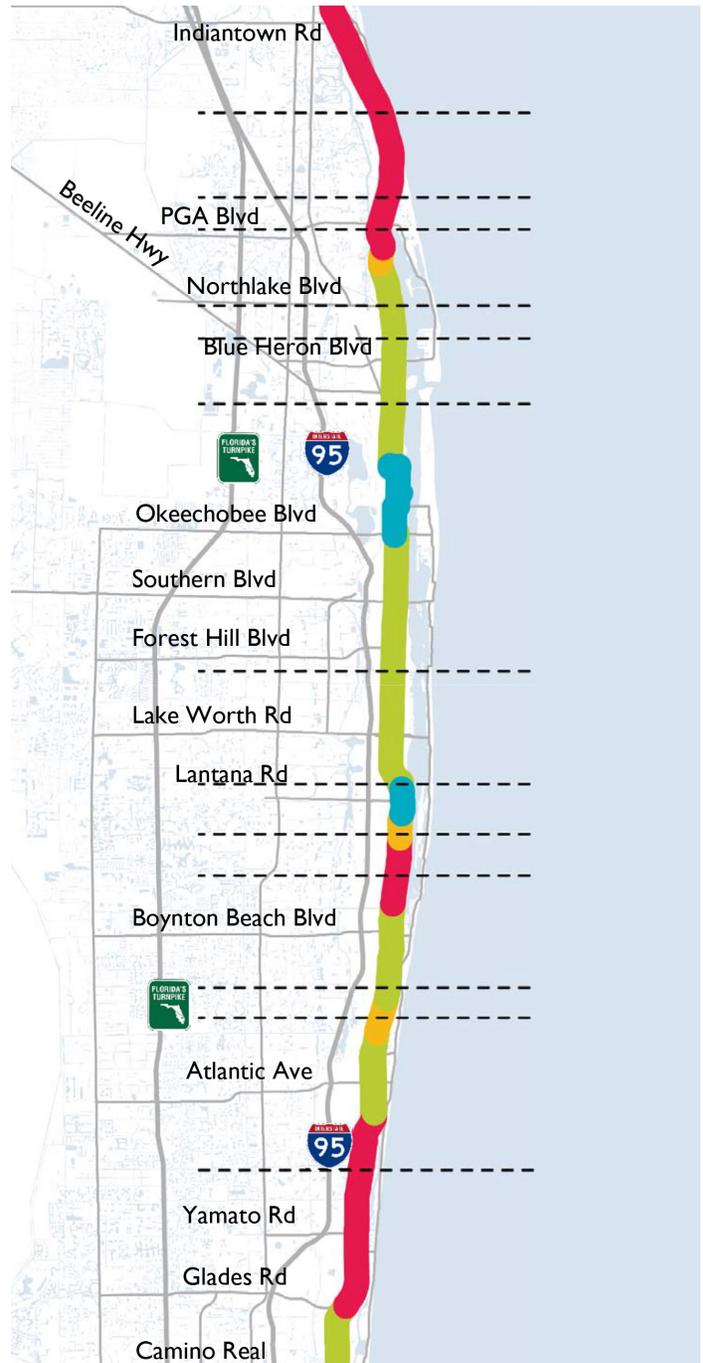


### Walking and Bicycling Facilities

- Bicycle Facility Gap
- Sidewalk Gap

Posted speeds vary throughout the corridor from 30 to 45 miles per hour, as shown in **Figure 11**. Areas with rural and suburban contexts tend to see higher posted speed limits, while areas with urban contexts, such as downtown cores, tend to see lower speed limits. The latter typically allows better bicycle and pedestrian access and encourages development of land uses such as shops and multifamily residential. The former tends to discourage bicycle and pedestrian access and encourages development of auto-oriented land uses.

**FIGURE 11: POSTED SPEED LIMITS ALONG THE US-1 CORRIDOR**



Posted Speed Limit

- 30
- 35
- 40
- 45



As shown in **Figure 12**, the average daily traffic along the corridor varies as well. Some areas, especially in the southern part of the County, see high average daily traffic. Parts of Boca Raton see over 40,000 trips per day. Most parts of the US-1 Corridor, however, see moderate traffic volumes throughout the day.

**FIGURE 12: ANNUAL AVERAGE DAILY TRAFFIC ALONG THE US-1 CORRIDOR**



Annual Average Daily Traffic (AADT)

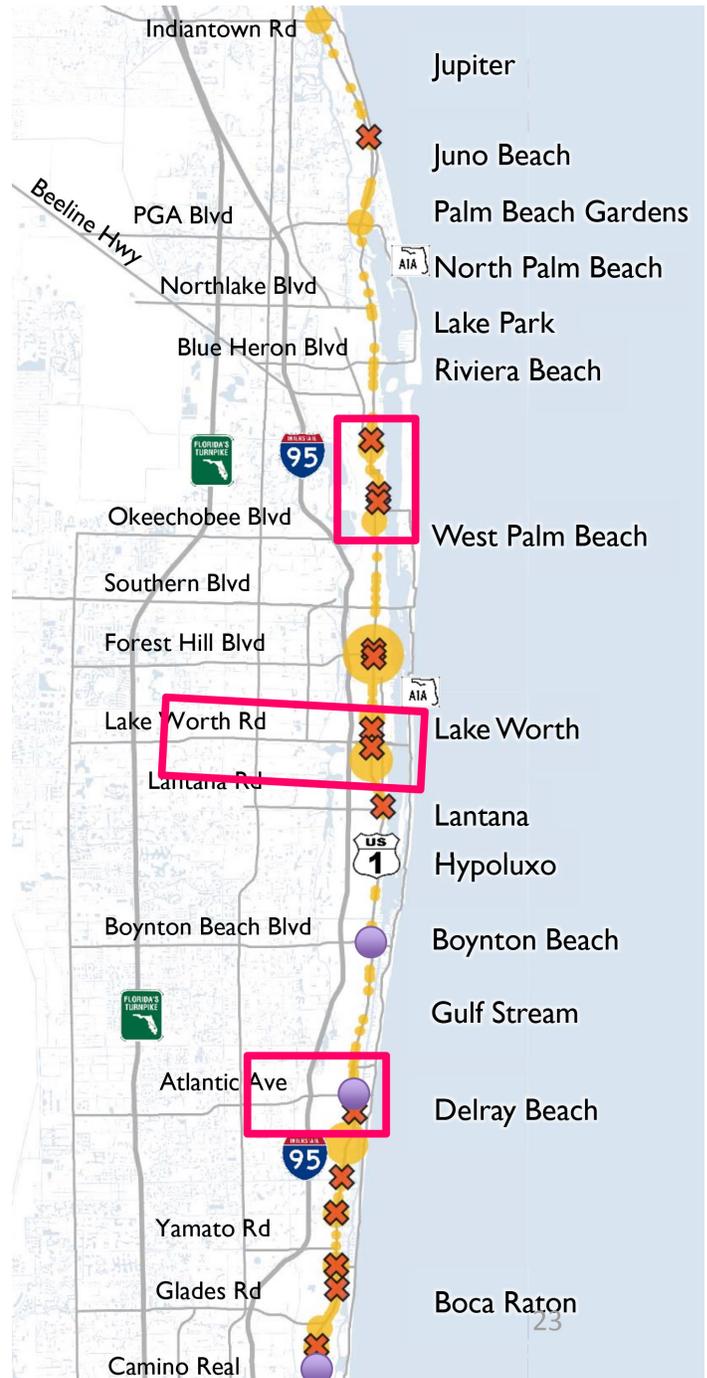
- 9,800 – 10,000
- 10,000 – 20,000
- 20,001 – 30,000
- 30,001 – 40,000



There were 321 bicycle and pedestrian crashes along the corridor between 2011 and 2016, 15 of which involved fatalities. All fatalities occurred in dark-lighted conditions and over 80% of bicycle crashes occurred in locations without a bicycle lane. 12 of the 15 fatalities were pedestrians, with concentrations of pedestrian fatalities occurring in Lake Worth and West Palm Beach. All three bicycle fatalities occurred in Boca Raton between Glades Road and Hidden Valley Boulevard. These outcomes contributed to Palm Beach County (along with the rest of South Florida) being rated as the **11th most dangerous** metro area in the United States for pedestrians.<sup>5</sup>



**FIGURE 13: PEDESTRIAN AND BICYCLE CRASHES ALONG THE US-1 CORRIDOR**



- Ped / Bike Crashes
- Least
- Greatest
- ◆ Fatality
- Crash Hot Spot
- ▭ High Crash Corridor

<sup>5</sup> Smart Growth America, "Dangerous by Design," 2016.

As shown in **Figure 5**, the areas of Lake Worth and West Palm Beach have high numbers of residents without access to vehicles. Throughout the US-1 Corridor, non-single occupancy vehicles modes of transportation are used at a higher rate than anywhere else in the County. 3.3% of commuting traffic are conducted via transit, versus 2.0% throughout Palm Beach County.

In order to best understand the Corridor-specific needs of the study population, a quality of life survey was conducted. It found that while most people **feel** they are in good health (89% of respondents) and many are within 30 minutes of a healthy food source (93%), just **over a fifth** of respondents are unable to get to work or health care due to public transportation issues (21%). While half of the respondents reported walking or biking along US-1 during the week, many try to avoid it or shift quickly to parallel routes, because of safety concerns. Specifically, respondents cited safer crossings, wider sidewalks, and separated bike facilities as needed transportation infrastructure improvements along the corridor to improve their perception of safety.

Based on all background research conducted on the US-1 Corridor, the following key findings were used to inform corridor goals and future actions and recommendations:



- High transit ridership

- Critical pedestrian/bicycling safety issue, especially at night

- Employment corridor

- Redevelopment occurring

- Concentrations of lower income, lower education populations

- Concentrations of transit-dependent and minority populations







# US-1 CORRIDOR STUDY GOALS AND HEALTH INDICATORS

# US-1 CORRIDOR STUDY GOALS AND HEALTH INDICATORS

The primary goal of the US-1 HIA was to better understand the impacts of potential improvements proposed by the US-1 Multimodal Corridor Study on the overall health of the communities served by these improvements. This would include potential impacts of improvements on:

- **Access to Jobs and Education**
- **Access to Health and Community Services**
- **Pedestrian and Bicycle Safety**
- **Development and Redevelopment Along the Corridor**

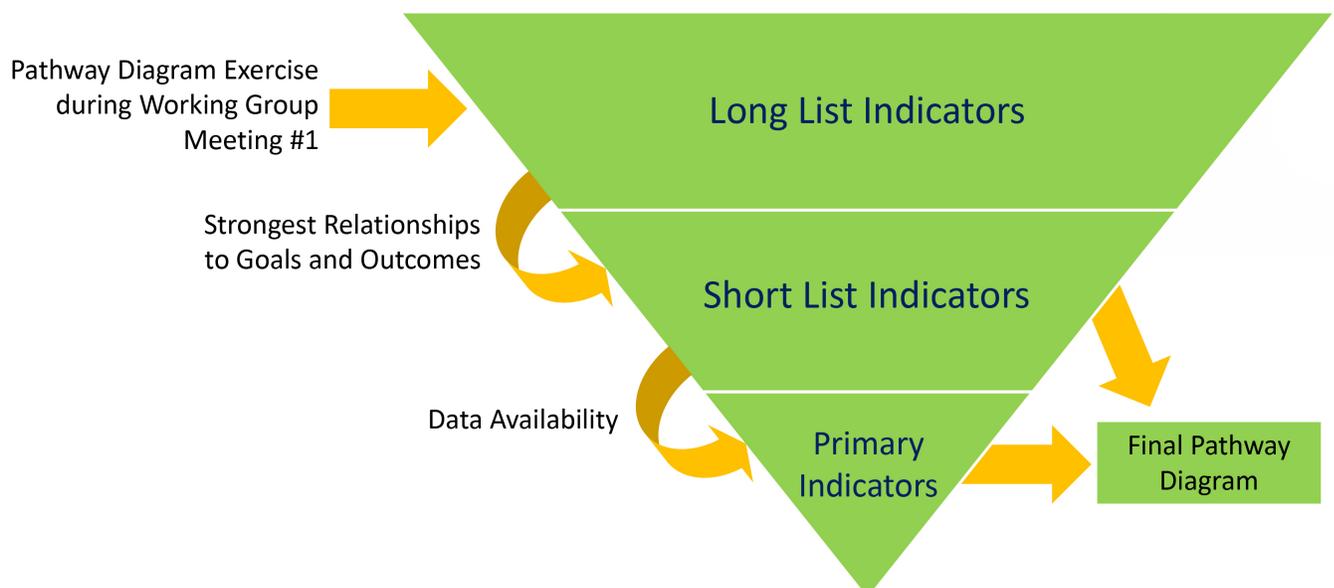


## HEALTH INDICATORS AND PATHWAY DIAGRAM

In order to best understand the health impacts of the proposed transportation improvements on the study area, indicators were chosen to track changes in community health. A pathway diagram was used to select and refine these indicators. This exercise connected the project goals with immediate, intermediate, and long-term health outcomes.

A large variety of indicators were considered initially to be included in this list through the pathway diagram exercise. Among these were transit ridership, vehicle miles traveled, air quality, and obesity rates, as well as some less common measures such as school absenteeism, insurance rates, and noise pollution. The initial list of indicators was refined into a short list based on the correlation between the indicator and the study goals and this short list was further refined into the following six primary health indicators, as shown below:

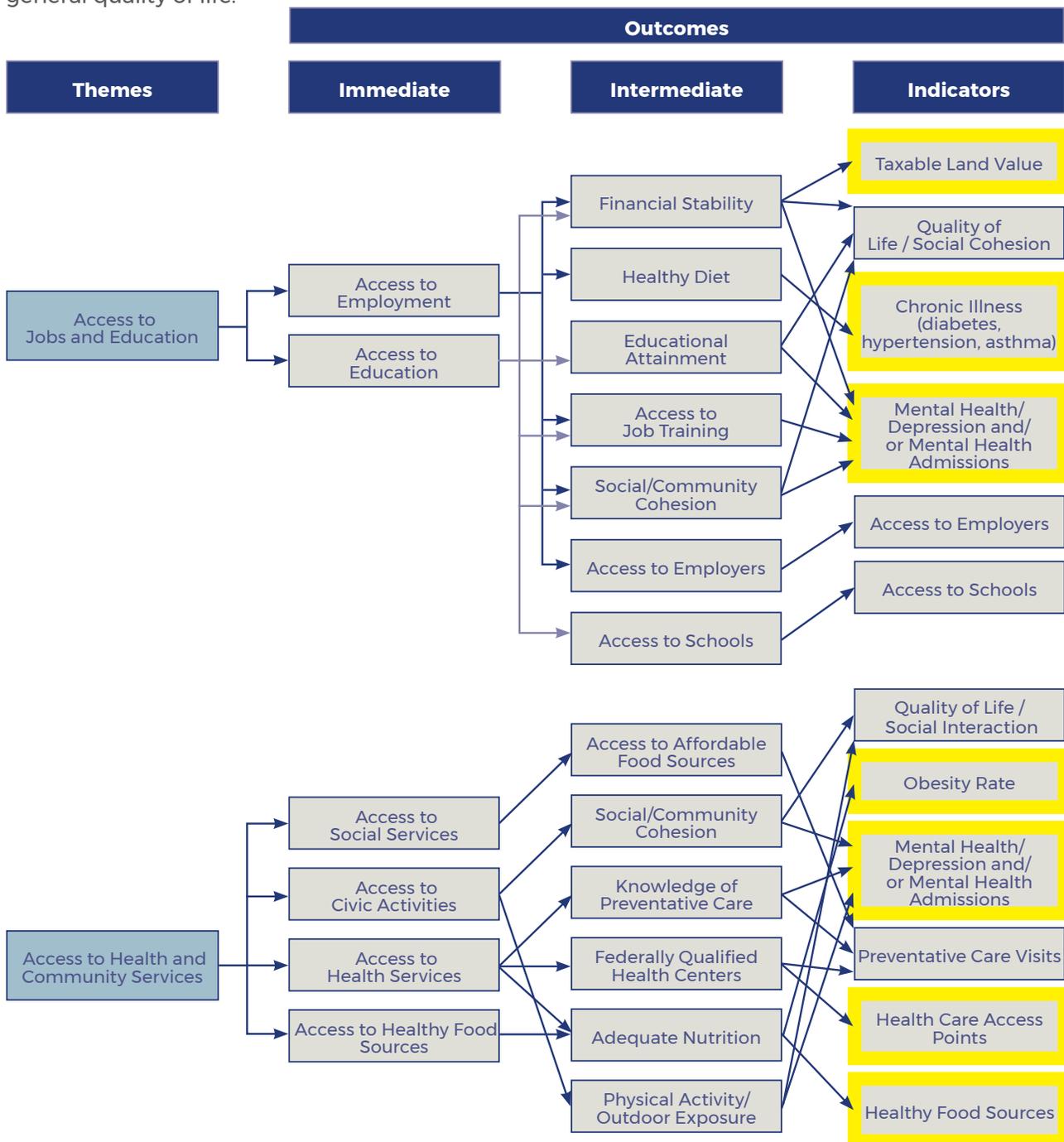
- Access to health care and healthy food
- Mental health and depression
- Chronic illness such as diabetes, hypertension, and asthma
- Obesity
- Bike and pedestrian crash rates
- Taxable land value

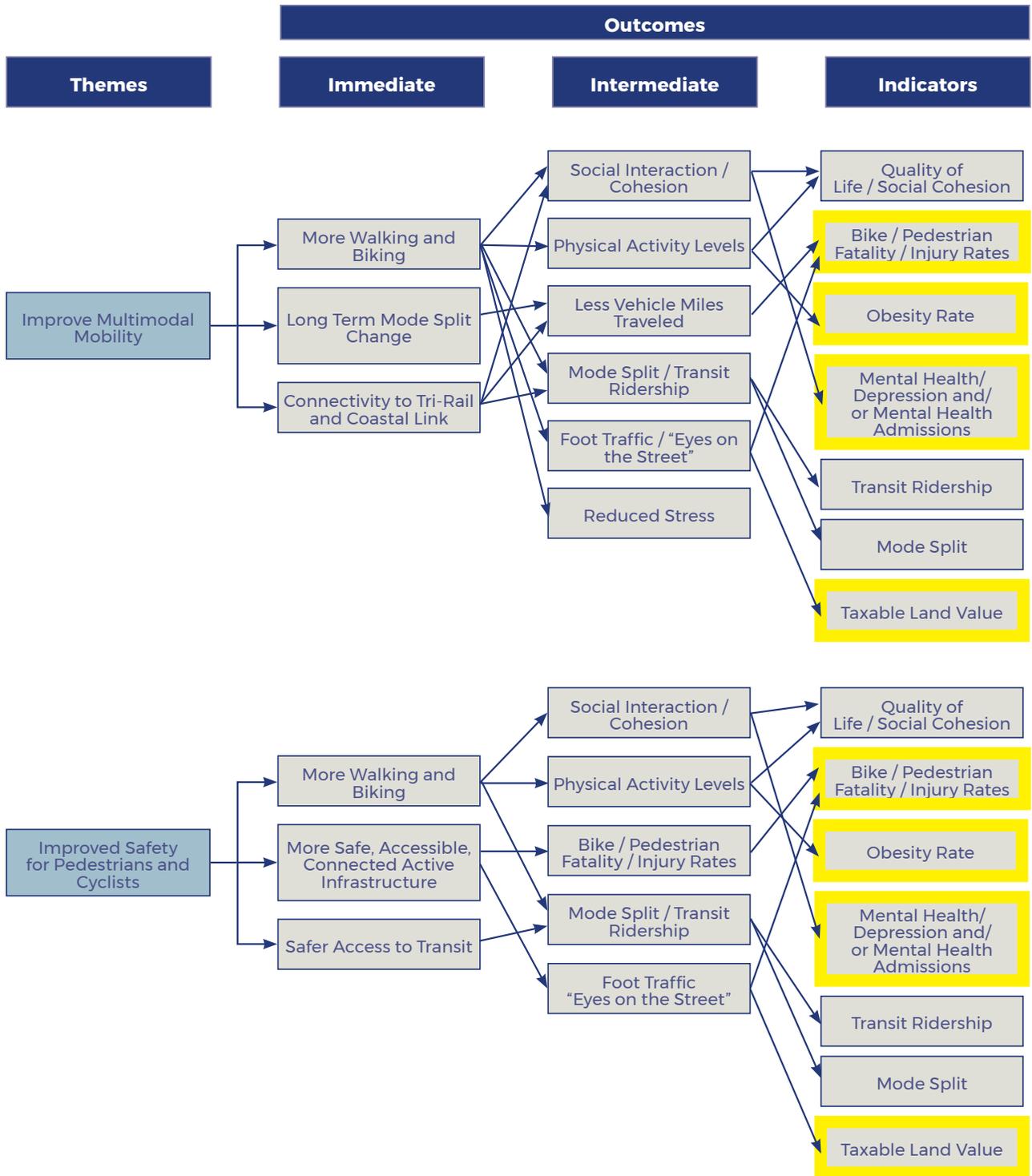


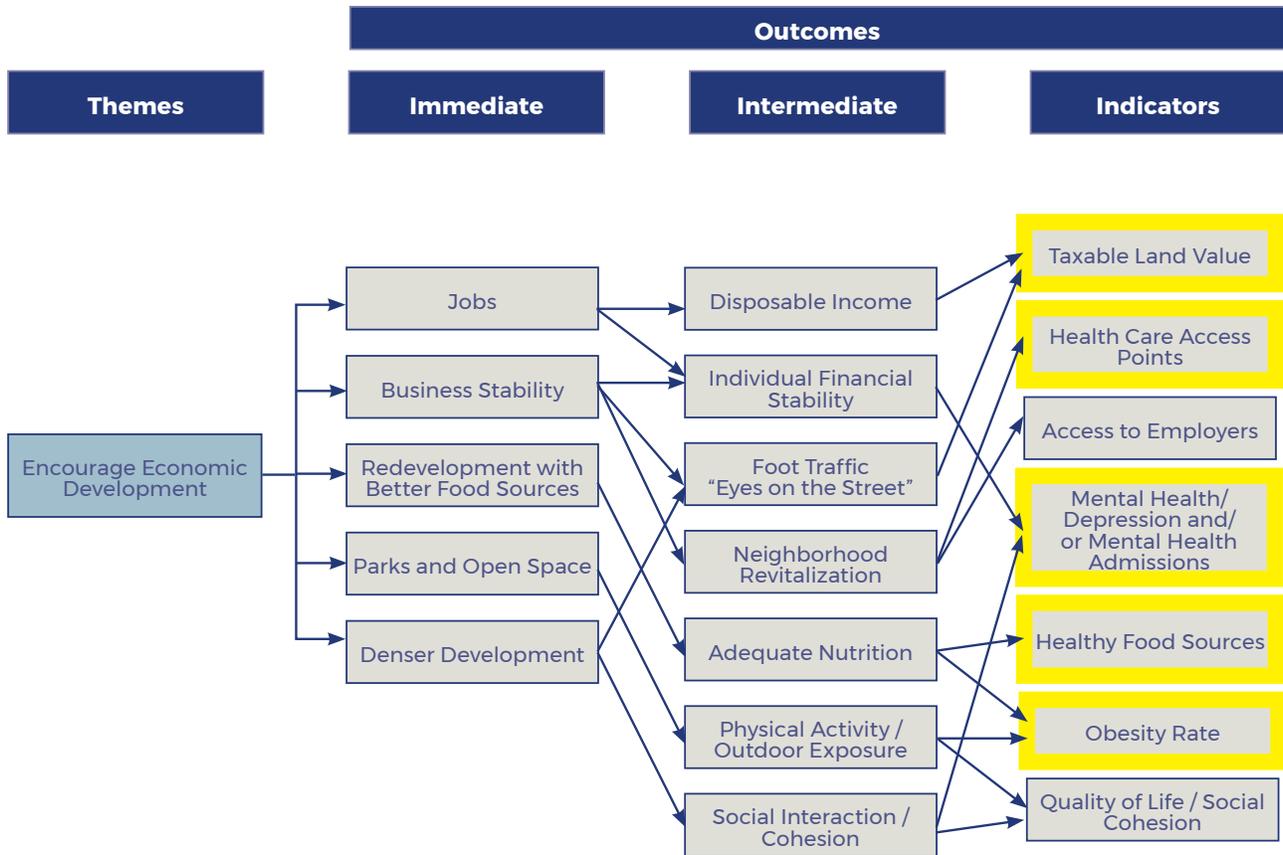
# THE HEALTH INDICATOR REFINEMENT PROCESS WAS BASED ON THE RELATIONSHIP OF INDICATORS TO THE STUDY GOALS

Many items not included as primary indicators (shown in the yellow boxes below) were still considered throughout the study as secondary indicators. These indicators include access to jobs and education, transit ridership and mode split, and general quality of life.

Using the primary and secondary indicators identified in the indicator refinement process and with the help of the HIA Working Group, the study team created a final pathway diagram showing the immediate, intermediate, and long-term health outcomes of the proposed project improvements, shown below:







## LITERATURE REVIEW

In order to best understand the effects of the proposed improvements on the identified health indicators, a literature review was conducted to understand current research of industry-leading thought leaders and their viewpoints on the effects active transportation investments on health. This literature review answered the following questions:

- How will the project improve access to healthy living sources such as hospitals, clinics, and healthy food sources?
- How will the project affect levels of injury from collisions between motor vehicles and pedestrian and cyclists?
- How will the project encourage and support development and redevelopment along the corridor?
- How will the increased physical activity benefits of the project affect obesity levels in the study corridor?
- How will the enhanced commute benefits of

the project affect mental health, and depression levels in the corridor?

- How will the enhanced commute benefits of the project affect chronic disease (diabetes, hypertension, asthma) levels in the corridor?

The research showed that improvements to multimodal infrastructure tends to have a variety of positive effects on community health. Improvements of this kind tend to increase the access of low income individuals and individuals without access to a personal vehicle to health care and healthy food sources, support transit-oriented development and redevelopment, and increase physical activity. These effects together tend to have a positive effect on the overall health outcomes experienced in the community.



The image features a white background with several thick, parallel diagonal stripes in the upper right quadrant. The stripes are colored red, blue, dark blue, green, and orange from top to bottom. A thin, light green circular line is partially visible, curving across the right side of the image. The word "ASSESSMENT" is written in a light grey, sans-serif font, positioned diagonally within the dark blue stripe.

ASSESSMENT

# ASSESSMENT

A growing body of scientific evidence has shown that the built environment can have significant effects on both physical and mental health, particularly among minority and low-income populations already burdened with disproportionate rates of illness and morbidity. The combination of lack of sufficient infrastructure (e.g., sidewalks, bicycle facilities, and parks), affordable housing, and stores with access to healthy food increases the risks of both physical and mental illnesses.<sup>6</sup>

The HIA process is driven by evidence published in the scientific and medical literature that link transportation design and operations to direct, indirect, or cumulative health impacts and benefits. The primary health indicators, identified by the HIA Working Group through the Pathway Diagram described previously, were evaluated based on the availability of data and information related to each indicator. Six primary indicators were chosen to be the focus of the US-1 HIA. These indicators are described in detail to establish the Corridor’s baseline conditions in the succeeding pages. Each of the indicators is discussed based on literature linking positive health outcomes with implementation of enhanced transit and bicycle and pedestrian improvements hereafter referred to as “Complete Streets” improvements.

The primary health indicators were grouped into four categories:

1. Access to Health
2. Physical Health Indicators
3. Bicycle and Pedestrian Injuries and Fatalities
4. Economic Health

A variety of data sources provided for a baseline assessment of the primary health indicators within the US-1 Corridor. Each indicator was evaluated with regard to:

- Magnitude of Impact – Relatively how many people are impacted by this?
- Likelihood – How likely is it that these impacts will occur as a result of the enhanced transit and Complete Streets improvements?
- Population Distribution – Are there subpopulations or communities that are impacted more than others? Which ones are most impacted?

This information can help inform planners and community leaders on the best solutions for their communities and can allow them to track how changes to the built environment are helping or harming their communities.

**Complete Streets**

**Enhanced Transit**



<sup>6</sup> Hood, 2005.

## HOW TRANSIT CAN INFLUENCE ACCESS TO HEALTH CARE AND HEALTHY FOOD



### PEDRO IN BOYNTON BEACH

Pedro is a certified nursing assistant (CNA) employed by Bethesda East Hospital in Boynton Beach. Each morning at 4:30 AM he walks, in the dark, to the West Palm Beach Intermodal Center from his home west of downtown. With the lack of pedestrian lighting on his path, he is very concerned for his personal safety and “fears [he] will be a target” for crime.

Pedro's roundtrip journey to work takes a little over four hours each day. Because of his safety concerns, he sometimes rides Tri-Rail in the morning, however, he uses the bus on the return trip due to the cost. He usually purchases a weekly bus pass, but on the day he was interviewed his weekly pass had expired and he was forced to purchase a single pass because of personal financial issues. Pedro felt that the cost for a weekly pass was too much for a trip that would normally take about 20 minutes by car.

## ACCESS TO HEALTH CARE FACILITIES

One of barriers to healthy lifestyle is physical access to health care. Many times, people are hindered from going to or even scheduling health care visits due to a lack of quality transportation. A lack of access to quality transportation reduces health care utilization amongst those who are most dependent upon transit, walking, and biking. These populations include children, seniors, low-income people, and people with disabilities. In fact, a 2006 research report found that approximately “4% of U.S. children (3.2 million in total) missed a health care visit or did not schedule a visit during the preceding year because of transportation restrictions.”<sup>6</sup>

Some US-1 Corridor communities have poor access to health care. Approximately 15% of HIA survey respondents indicated that their average walking or biking trip takes longer than 30 minutes. Approximately 20% of respondents indicated at least sometimes being unable to get to work or health care services along US-1 due to public transportation issues.

Incidentally, the communities with poor access to health care facilities are also the communities burdened by limited incomes and greater health disparities. The Florida Department of Health's (FDOH) list of health clinics and hospitals was used to spatially locate health care facility access areas for those who are transit dependent. There are several communities along the corridor that do not have good walking access (1½ mile) to a health care clinic or hospital. These communities include near the border of Boynton Beach and Hypoluxo, northern Lake Worth, Riviera Beach, and the communities along the long stretch of US-1 between Juno Beach and Jupiter.

<sup>6</sup> Redlener, MD, “The Growing Health Care Access Crisis for American Children,” 2006.

Incidentally, the communities with poor access to health care facilities are also the communities burdened by limited incomes and greater health disparities. The Florida Department of Health's (FDOH) list of health clinics and hospitals was used to spatially locate health care facility access areas for those who are transit dependent. As seen in **Figure 14**, there are several communities along the corridor that do not have good walking access (1½ mile) to a health care clinic or hospital. These communities include near the border of Boynton Beach and Hypoluxo, northern Lake Worth, Riviera Beach, and the communities along the long stretch of US 1 between Juno Beach and Jupiter.



**FIGURE 14: HOSPITAL AND HEALTH CARE CLINIC ACCESS ALONG THE US 1 CORRIDOR**



## ACCESS TO HEALTHY FOOD SOURCES

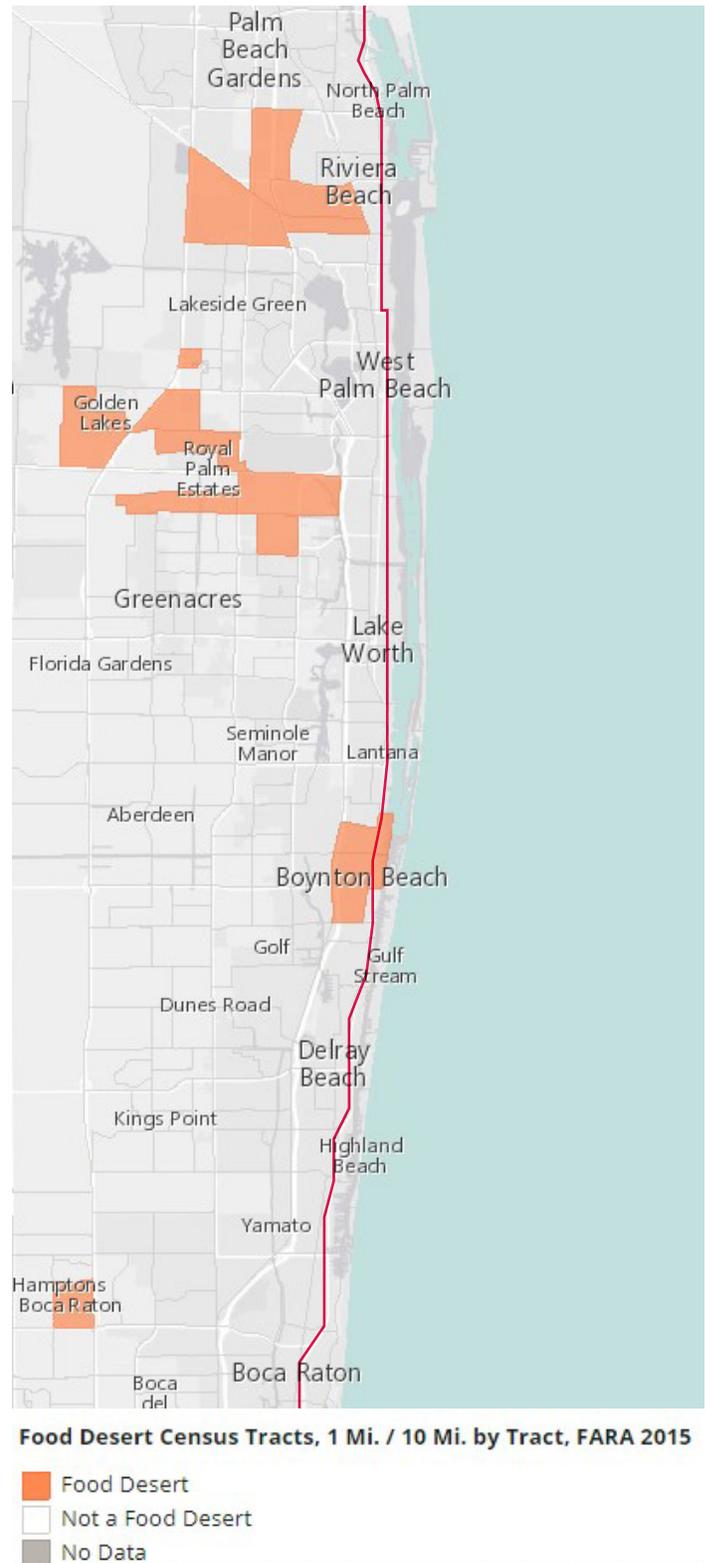
According to the Victoria Transport Policy Institute, high quality public transportation can increase access to healthy food sources, especially for physically or economically disadvantaged.<sup>7</sup> Transit has an opportunity to provide better access to pockets of communities without good access to healthy food sources.

The Transit and Quality of Life Survey showed that 75% of respondents are within 15 minutes (or ¾ mile walk) to their nearest healthy food source. Food desert identification information suggests that there are some communities whose healthy food access can be greatly improved to meet generally accepted urban area standards. The map in **Figure 15**, created by *Community Commons*, shows the location of food deserts along the US-1 Corridor based on conditions in 2015.

According to the Healthy Food Financing Initiative (HFFI) Working Group to qualify as a food desert either (1) at least 33% of a given census tract's population, or (2) a minimum of 500 residents within a given census tract must have low access to a supermarket or large grocery store. Some census tracts that contain supermarkets or large grocery stores may meet the criteria of a food desert if a substantial number of people within that census tract is more than 1 mile (urban areas) or 10 miles (rural areas) from the nearest supermarket. Some residents of food desert census tracts may live within 1 or 10 miles of a supermarket. In such cases, these residents are not counted as low access and thus not counted in the total.

The food deserts along the US-1 Corridor are the census tract surrounding Boynton Beach Boulevard (SR 804) in Boynton Beach, and the census tract to the west of US-1 in Riviera Beach.

**FIGURE 15: FOOD DESERTS ALONG THE US-1 CORRIDOR**



<sup>7</sup> Litman, "Evaluating Public Transportation Health Benefits," June 2010.

# HOW TRANSIT AND COMPLETE STREETS CAN INFLUENCE PHYSICAL ACTIVITY

In partnership with the HIA Working Group, physical health indicator data was obtained from the CDC 2013 Behavioral Risk Factor Surveillance System (BRFSS). This information was available at the census tract level, through a log of self-reported surveys. In order to get down to a manageable geographic segmentation, the analysis used a weighted average for the section/city along the corridor.

The HIA survey reported that approximately 88% of respondents consider themselves to be in “good” current health, with 9% in “fair” current health, and 3% in “poor” current health. Specific physical health indicators are evaluated in the following sections.

## OBESITY AND OBESITY-RELATED CHRONIC ILLNESS

Obesity is a condition in which an individual has excess body fat, quantified as a Body Mass Index or BMI of 30 or greater.<sup>8</sup> This body composition can be harmful to an individual’s health and is often caused by social and environmental factors and/or genetic disposition. Obesity-related health conditions include diabetes, asthma and certain types of cancer – some of which were also selected as primary health indicators as part of this study.<sup>9+10</sup>

The prevalence of obesity has reached epidemic proportions in the United States with the national obesity rate doubling over the last 35 years – over one-third of American adults and 17% of youth in the U.S. are obese. The average American is 24 pounds heavier today than in 1960.<sup>11</sup> The direct and indirect economic costs of obesity total between \$190 and \$215 billion annually in the U.S.<sup>12+13</sup> This equates to approximately 21% of healthcare costs nationwide.

<sup>8</sup> Division of Nutrition, Physical Activity, and Obesity, National Center for Chronic Disease Prevention and Health Promotion, June 2016.

<sup>9</sup> Ogden, “Prevalence of Childhood and Adult Obesity in the United States, 2011-2012,” 2014.

<sup>10</sup> Shore, “Obesity and Asthma: Location, Location, Location,” 2013.

<sup>11</sup> APTA, “Millennials & Mobility: Understanding the Millennial Mindset,” 2013.

<sup>12</sup> Hammond, “The Economic Impact of Obesity in the United States,” 2010.

<sup>13</sup> Cawley, “The Medical Care Costs of Obesity: An Instrumental Variables Approach,” 2012.

The obesity rate on the US-1 Corridor (**Table 2**) is approximately 30%, estimated to affect approximately 75,000 adults in the study corridor. This prevalence of obesity is higher than county, state, and national averages. Some sections of the Corridor, including Riviera Beach (34%) and Lake Park (33%), are shown to have higher obesity rates.

**TABLE 2: OBESITY PREVALENCE ALONG THE US-1 CORRIDOR**

PERCENTAGE OF ADULTS REPORTING TO BE OBESE (A BODY MASS INDEX OF 30 OR GREATER)			
US-1 Corridor	Palm Beach County	Florida	U.S.
30%	20%	26%	29%

The diabetes rate on the US-1 Corridor (**Table 3**) is approximately 14%, affecting approximately 35,000 adults in the study corridor. This prevalence of diabetes is higher than county, state, and national averages. Some sections of the corridor, including Boynton Beach, Riviera Beach, Lake Park, and Juno Beach have a higher than 14% diabetes rate.

**TABLE 3: DIABETES PREVALENCE ALONG THE US-1 CORRIDOR**

PERCENTAGE OF ADULTS EVER DIAGNOSED WITH DIABETES			
US-1 Corridor	Palm Beach County	Florida	U.S.
14%	11%	13%	11%

The relationship between asthma and auto-oriented communities has been well documented. Motor vehicles contribute to more than 50% of air pollution in urban areas and reducing automobile trips by increasing mass transit use, carpooling, walking, and bicycling can help reduce air pollution, especially in urban areas.<sup>14</sup>

The asthma rate on the US-1 Corridor (**Table 4**) is approximately 8%, estimated to affect approximately 20,000 adults. This prevalence of asthma is higher than the county average but at or below state, and national averages. Some sections of the corridor, including Riviera Beach and Lake Park (+9%) have higher asthma rates.

**TABLE 4:  
ASTHMA PREVALENCE ALONG THE US-1 CORRIDOR**

PERCENTAGE OF ADULTS REPORTING TO HAVE ASTHMA			
US-1 Corridor	Palm Beach County	Florida	U.S.
8%	6%	8%	9%

## ENHANCED PUBLIC TRANSIT, WALKING, AND BIKING FACILITIES ARE A TOOL THAT CAN BE USED TO REDUCE OBESITY AND OBESITY-RELATED ILLNESS.

Health care professionals attribute a lack of physical activity, in addition to poor nutrition, as a major cause of obesity in adults. As a result, obesity rates tend to be inversely related to use of alternative modes (walking, cycling, public transit).<sup>15</sup> Auto-dependency in many urban areas similar to Palm Beach County has led to a decrease in the amount of walking and/or biking an individual does on a daily basis.



**Transit availability encourages an extra 20 blocks walked per month.**

Most Americans report an average of six minutes of walking per day, while public transit riders report an average of nineteen minutes of walking per day. Some research shows that transit availability can encourage an extra twenty blocks walked per month.<sup>16</sup> Physical activity such as walking or biking can help physically inactive populations attain the recommended level of daily physical activity and can begin to reverse the upward trend of obesity. People with safe places to walk within ten minutes of home are twice as likely to meet physical activity targets.<sup>17</sup>

In the HIA survey, most respondents (55%) indicated that they walk less than once per week along US-1. There is much potential for improvement for the prevalence of obesity along the US-1 Corridor. In order to make walking and biking more pleasant along US-1, respondents most commonly (over 50% of respondents) suggested safer pedestrian crossings, wider sidewalks, shade, separated bike facilities, and street furniture.



<sup>14</sup> Friedman, "Impact of Changes in Transportation and Commuting Behaviors During the 1996 Summer Olympic Games in Atlanta on Air Quality and Childhood Asthma," 2001.

<sup>15</sup> Litman, "If Health Matters," 2014.

<sup>16</sup> University of Cambridge, "Lack of Exercise Responsible for Twice as Many Early Deaths as Obesity," 2015.

<sup>17</sup> Day, "Does Bus Rapid Transit Promote Walking? An Examination of New York City's Select Bus Service," 2014.

# MENTAL HEALTH AND HYPERTENSION

Well-connected bicycling, walking, and transit safety and comfort features (including connected bike lanes, sidewalks, pedestrian crossing treatments, branded transit shelters, real-time route information boards, off-board ticketing, etc.) can contribute to increased rates of physical activity which can, in turn, contribute to lower rates of depression and anxiety issues.<sup>18</sup> Physical activity has also been shown to prevent mental disorders from occurring in the onset. A 2001 study showed that women who partook in little to no physical activity were twice as likely to have depressive symptoms than women with moderate to high levels.<sup>19</sup>

The depression rate (**Table 5**) on the US-1 Corridor is approximately 17% estimated to affect approximately 42,500 adults. This prevalence of depression is higher than the county average but at or below state, and national averages.

**TABLE 5: DEPRESSION PREVALENCE ALONG THE US-1 CORRIDOR**

PERCENTAGE OF ADULTS EVER DIAGNOSED WITH DEPRESSION			
US-1 Corridor	Palm Beach County	Florida	U.S.
17%	14%	17%	19%

Researchers have found that, compared with those who drove to work, participants who used public transportation are:

- 4% less likely to be overweight
- 34% less likely to have diabetes, and
- 27% less likely to have high blood pressure

A 2015 study suggests that moving from a low- to high-walkability neighborhood could result in a 42% lower risk of hypertension.<sup>20</sup>

The hypertension rate on the US-1 Corridor (**Table 6**) is approximately 43% which affects 107,500 adults in the Corridor. This prevalence of hypertension is much higher than the county, state, and national averages and serves as one of the most severe physical health issues along the corridor. Some sections of the corridor experience significantly higher hypertension rates including Delray Beach, Boynton Beach, Gulf Stream, Riviera Beach, North Palm Beach, and Juno Beach at nearly 45%.

**TABLE 6: HYPERTENSION PREVALENCE ALONG THE US-1 CORRIDOR**

PERCENTAGE OF ADULTS EVER DIAGNOSED WITH HIGH BLOOD PRESSURE (HYPERTENSION)			
US-1 Corridor	Palm Beach County	Florida	U.S.
43%	34%	35%	31%

## CHRONIC ILLNESSES, OBESITY, & PREVENTATIVE CARE

Transit availability encourages an extra **20 blocks** walked per month.

**Longer walking distances** are associated with **riding the BRT** versus the local bus.

Source: "Lack of Exercise Responsible for Twice as Many Early Deaths or Obesity," University of Cambridge, 2015.

Source: "Does Bus Rapid Transit Promote Walking?," Journal of Physical Activity and Health, 2014.

A daily brisk **20-minute walk** can reduce the risk of early death by 16-30%.

Source: "Lack of Exercise Responsible for Twice as Many Early Deaths or Obesity," University of Cambridge, 2015.

**Bicycling** has been linked to **increased cognitive function** and lower chances of developing depression and mental illness.

Source: "The Brain Science of Biking," Shape, 2015.

People who walk or bike a **less likely to develop cancer and heart disease.**

Source: "Association between active commuting and incident cardiovascular disease, cancer, and mortality: prospective cohort study," British Medical Journal, 2017.



<sup>18</sup> Atkinson, "The Mental Health Benefits of Walking," 2008.

<sup>19</sup> Kawachi, "Social Ties and Mental Health," 2001.

<sup>20</sup> Chiu, "Moving to a Highly Walkable Neighborhood and Incidence of Hypertension," 2015.

## QUALITY OF LIFE

Quality of life is defined by the World Health Organization as “an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns.”<sup>21</sup> Quality of life is affected by the degree that people have access to employment, health care, food sources, and educational facilities and that access influences the quality and quantity of lifestyle choices made.

Increasing transportation choices help residents participate in the communities and gives them essential and equitable access to goods, services, education, and employment. In addition, financial prosperity affects the emotional and mental well-being of individuals.<sup>22</sup> Aside from providing increased mobility to the transit-dependent population along the Corridor, the improvements proposed in the US-1 Multimodal Corridor Study could also provide a valuable alternative to automobile use for residents and workers which can consequently improve the quality of life in a community.

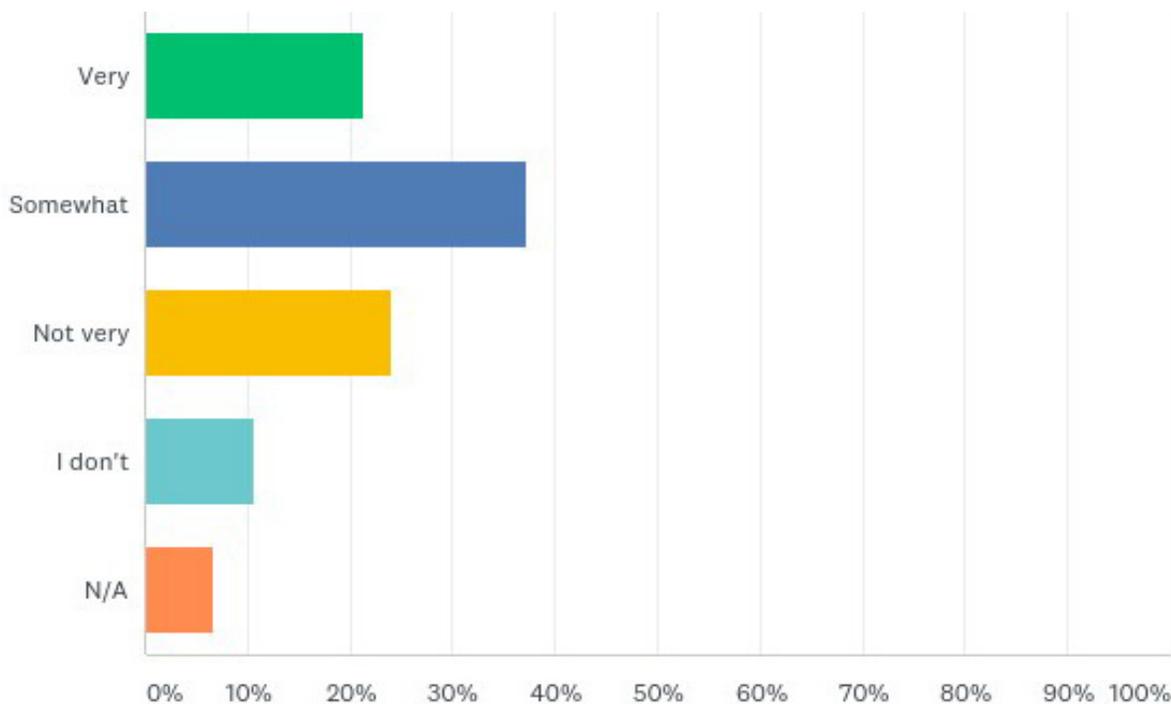
The Transit and Quality of Life Survey showed that approximately 35% individuals do not feel connected to their community and neighbors (**Table 7**). In addition, 20% of respondents have been “sometimes” or “often” unable to get to work or health care services along the US-1 Corridor due to public transportation issues (**Table 8**).

These results indicate a need for respondents to have multimodal options. Research shows that high quality public transit can reduce emotional stress by improving access to education and employment activities, improving community cohesion, improving access to social and recreational activities, and reduce stress levels of commuters that no longer need to drive.<sup>22</sup>



Researchers observed a **42% lower risk of hypertension** among those who moved from low- to high-walkability neighborhood.<sup>23</sup>

**TABLE 7: HOW CONNECTED DO RESPONDENTS FEEL TO THEIR COMMUNITY AND NEIGHBORS ALONG US-1?**



<sup>21</sup> World Health Organization, WHOQOL Instruments Description, 2018

<sup>22</sup> Litman, Victoria Policy Institute), "Evaluating Public Transportation Health Benefits," 2010

<sup>23</sup> Chiu, "Moving to a Highly Walkable Neighborhood and Incidence of Hypertension: A Propensity-Score Matched Cohort Study," 2015



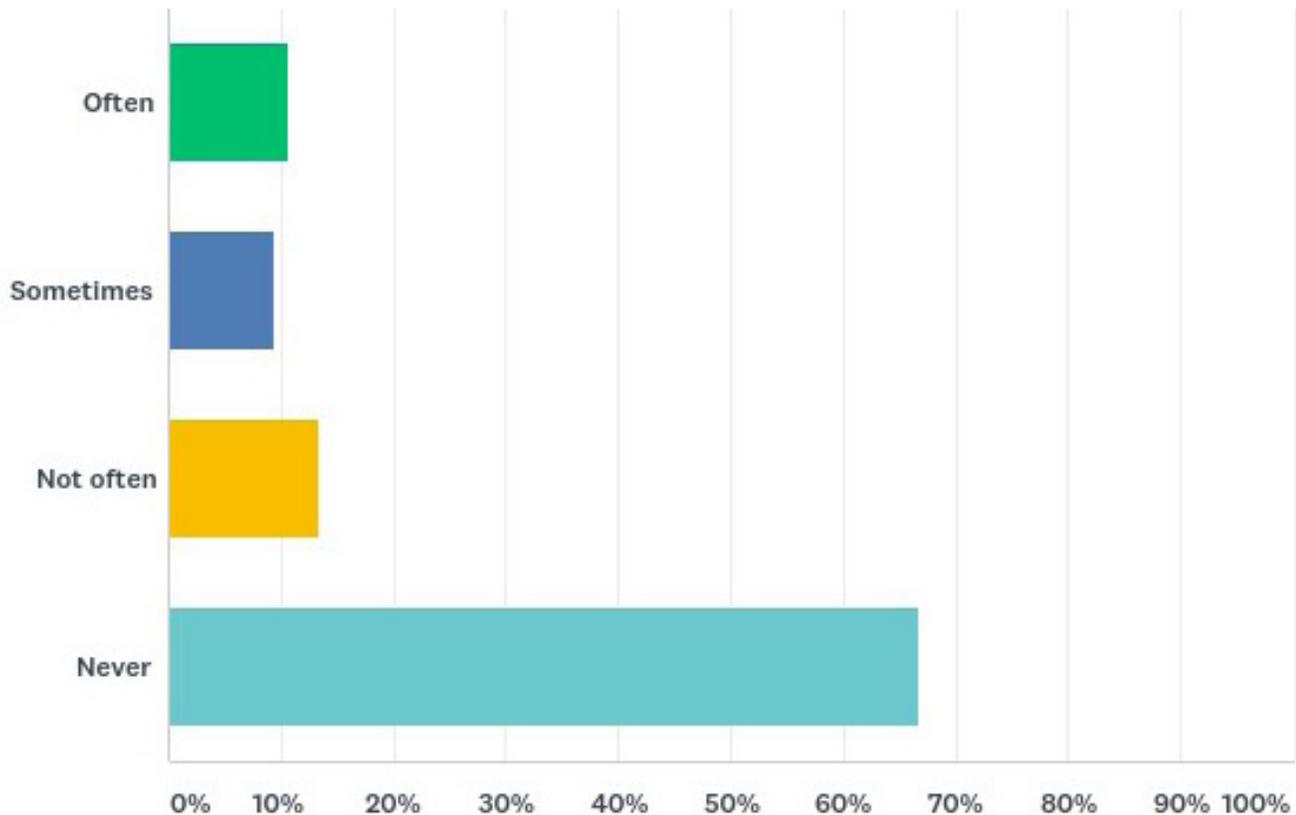
### PAT IN LAKE WORTH

Pat offers support and outreach to transit riders at the Palm Tran Route 1 Bus Stop adjacent to the CVS at North Dixie Highway and Lucerne Avenue in downtown Lake Worth. She noted that the accumulation of garbage and the perceived lack of stewardship at many bus stops gives a negative impression of "her" community. She and her friend, Eileen, bring trash bags to clean up the debris at various bus stops when they are out and about.

*"This is a thoroughfare where people come from outside our area and they see all this filth around the bus stops. That to me is a disgrace.*

*People come to these bus stops and they are looking at what Lake Worth is like, and the view leaves a bad taste in their mouth."*

**TABLE 8: HOW OFTEN HAVE YOU BEEN UNABLE TO GET TO WORK OR HEALTH CARE SERVICES ALONG US-1 DUES TO PUBLIC TRANSPORTATION ISSUES?**



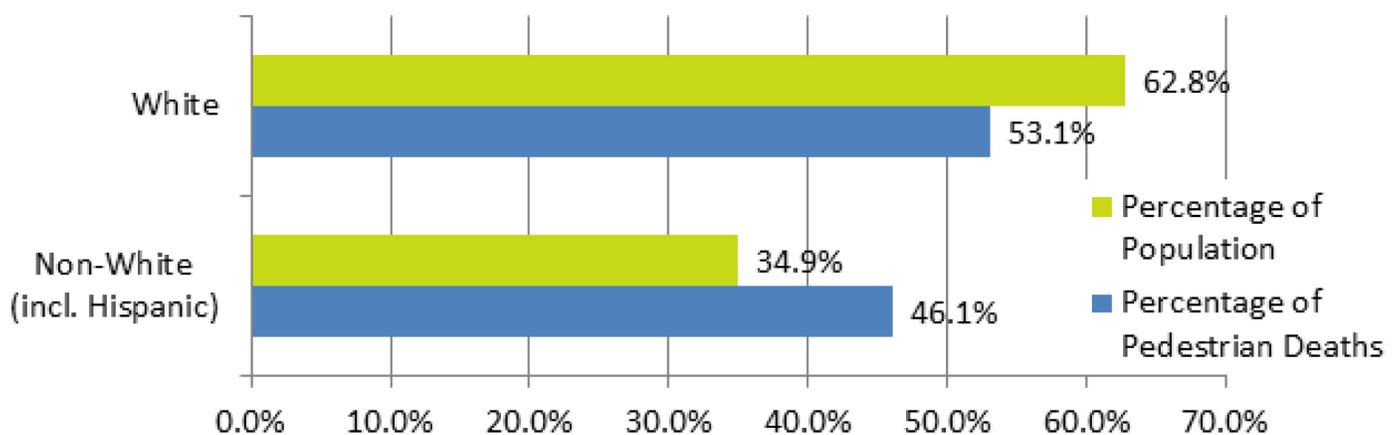
# HOW TRANSIT AND COMPLETE STREETS CAN INFLUENCE BIKE AND PEDESTRIAN SAFETY

Transit and complete streets improvements can lead to better pedestrian and bicycle safety outcomes. Complete street practices include implementation of protected bike lanes, wider sidewalks, and generally more comfortable environments for active transportation. In a Portland State University before and after study, 79% of bicyclists stated that protected bike lanes increased the perception of safety on the street.<sup>24</sup>

In addition to making it safer, these changes also lead to more pedestrians and bicyclists. When it's safe, convenient, and comfortable, more people decide to walk or bike. This, in and of itself, has been seen to lead to safer bicycling and walking. When more multimodal users are on the transportation system, motorists tend to pay more attention to them and adjust their behavior, making multimodal transportation safer.<sup>25</sup>

Historically underserved communities often face worse pedestrian safety outcomes compared to the entire population. A national study shows that non-white ethnicities experience a disproportionate amount of pedestrian deaths each year (**Table 9**). Historically underserved communities often do not have the necessary complete streets infrastructure to enable safe walking and bicycling. Additionally, residents of these communities often do not have access to personal vehicles, making walking, bicycling, and transit their only means of transportation. When multimodal transportation is a necessity for everyday life, ensuring its safety is of paramount importance.

**TABLE 9: DANGEROUS BY DESIGN REPORT (2016) SHOWS THAT NON-WHITE ETHNICITY PEDESTRIAN FATALITY RATES ARE A DISPROPORTIONATE SHARE OF FATALITIES WHEN COMPARED TO POPULATION**



<sup>24</sup> Monsere, "Lessons from the Green Lanes: Evaluating Protected Bike Lanes in the U.S.," 2014.

<sup>25</sup> Jacobsen, "Safety in Numbers: More Walkers and Bicyclists, Safer Walking and Bicycling," 2004.

**Figure 15** and **Table 10** show bicycle and pedestrian injury and fatality rates along the study corridor and listed by section. Segments with the highest number of pedestrian injuries and fatalities along the corridor are shown in red in **Figure 15**. Incidentally, most of the high injury and fatality segments reflect the areas with highest bike and pedestrian activity, with the exception of the Boca Raton section, which has a posted speed limit of 45 mph.

**TABLE 10: HIGHEST FREQUENCIES OF BIKE AND PEDESTRIAN FATALITIES NORMALIZED BY DISTANCE OF ROADWAY IN EACH CITY/SECTION**

CITY / SECTION	FATALITIES PER MILE	INJURIES PER MILE	INJURIES + FATALITIES PER MILE
Boca Raton	0.02	3.1	3.3
Lake Worth	0.02	3.7	3.8
West Palm Beach	0.02	2.9	3.1
Juno Beach	0.10	1.5	1.6



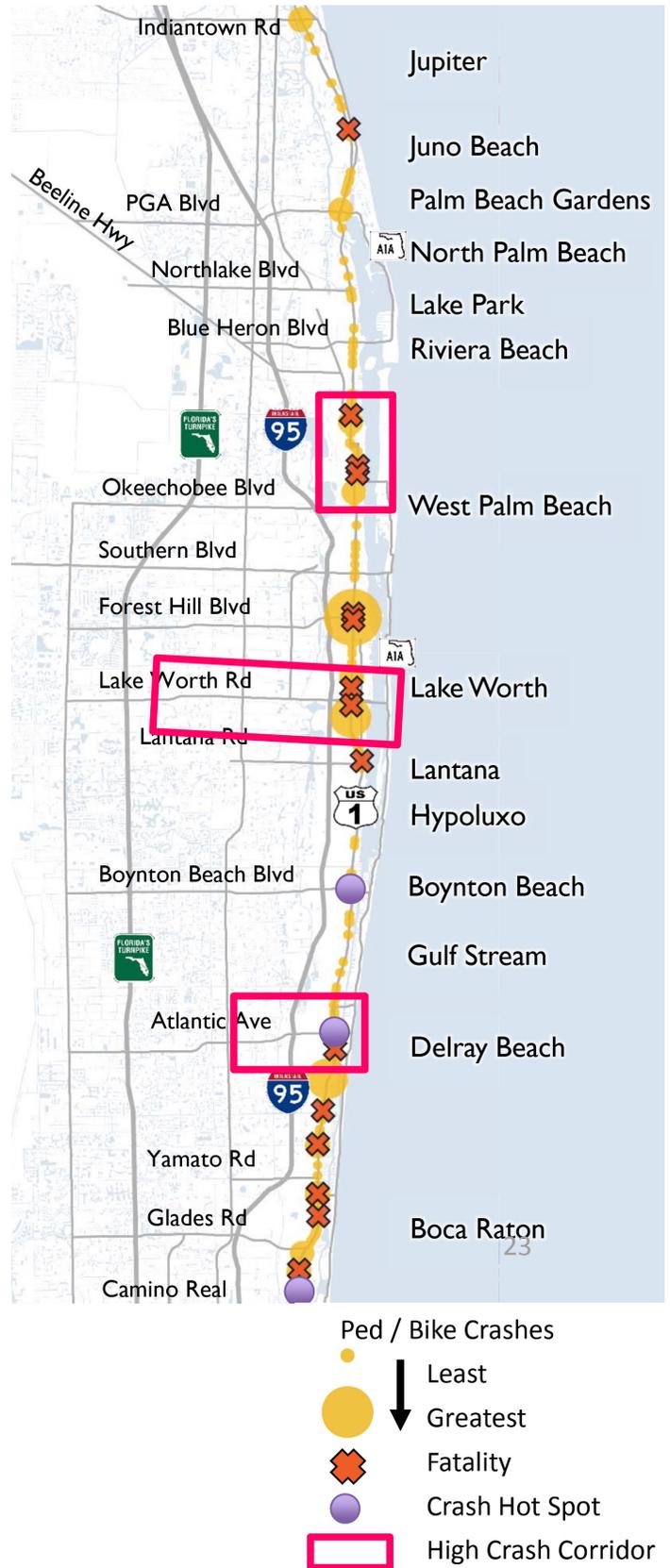
DREW

**DREW IN NORTH PALM BEACH & JUPITER**

A Jupiter resident, Drew works in North Palm Beach and commutes via bicycle. He feels US-1 is not safe for bicyclists and pedestrians because of the high-speed conditions and buildings that are set back from the roadway. He has nearly been hit by turning motorists, unaware of his presence in the bicycle lane or on the sidewalk.

Drew grew up in Jupiter but also lived in California, before returning to the area to build his life. While away, he was struck by the culture of “healthy living.” He noted many people bicycle and walk to work on a regular basis. He hoped that could eventually be the case in both Jupiter and North Palm Beach.

**FIGURE 15: BIKE AND PEDESTRIAN INJURY AND FATALITY RATES ALONG THE US-1 CORRIDOR**

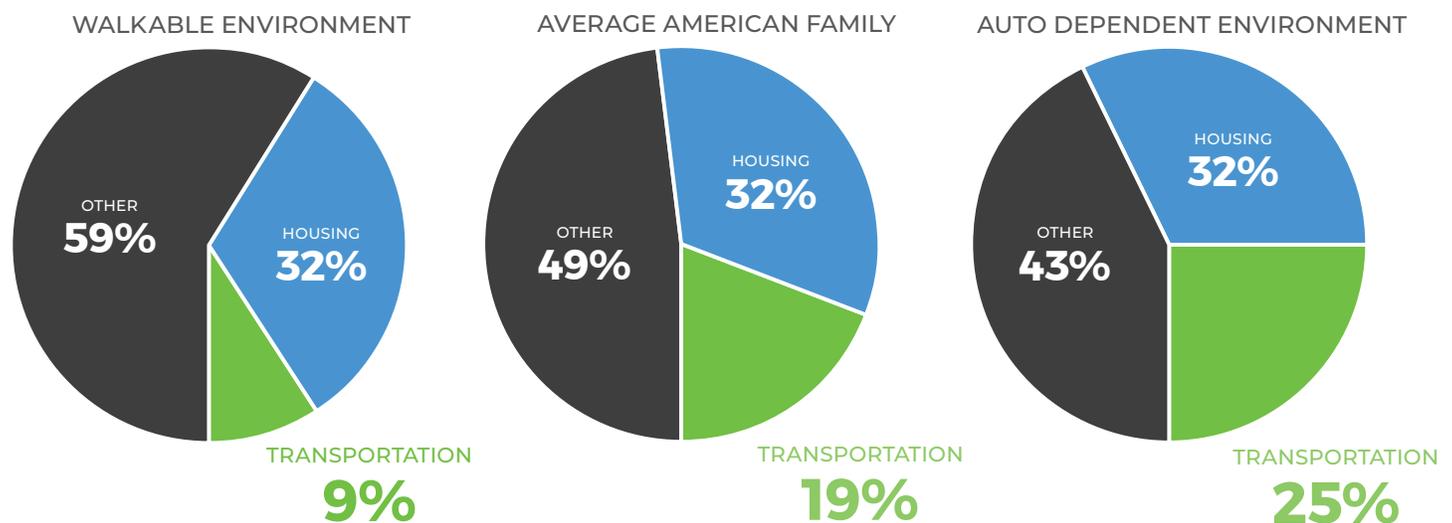


# HOW TRANSIT AND COMPLETE STREETS CAN INFLUENCE ECONOMIC HEALTH

Transportation and land use are related at their roots. Development patterns can affect a person's travel to/from commercial and employment centers, encourage physical activity, facilitate access to services, and provide recreational opportunities. It can also present obstacles to improved health, or even contribute to negative outcomes by subjecting individuals to unsafe streets and limiting access to goods and amenities. Zoning and land use policies can help either support or inhibit healthy lifestyles within a community. Furthermore, a successful public transit system requires well-developed areas with mixed land uses and significant population density.

An enhanced transit system can be a catalyst for redevelopment along the US-1 Corridor. Several studies have demonstrated the ability of premium transit projects in promoting economic development all across the county.

**FIGURE 16: HOW NEIGHBORHOOD FEATURES INFLUENCE TRANSPORTATION COSTS**



Source: Center for Transit Oriented Development (2008) "The Affordability Index Toolbox" (Oakland, CA: Reconnecting America).

<sup>26</sup> Carrigan, "Social, Environmental, and Economic Impacts of BRT Systems," 2013.

<sup>27</sup> Hook, "More Development for Your Transit Dollar: An Analysis of 21 North American Transit Corridors. New York: Institute for Transportation and Development," 2013.

<sup>28</sup> Petrie, "Bus Rapid Transit Means Rapid Economic Growth," *Mass Transit*, 2013.

<sup>29</sup> Center for Transit Oriented Development (2008) "The Affordability Index Toolbox" (Oakland, CA: Reconnecting America).

Policies and transportation infrastructure should allow for individuals to make the choice to incorporate healthy decisions (such as active commuting) into their daily routines. At the same time, communities that desire to see more and higher quality land development that could bring good paying jobs, increased property tax values, and commercial and housing revitalization, should have the appropriate transit-supportive zoning codes and economic development incentives in place. Communities should also be aware of the potential negative impact of increased land values in the form of low-income household displacement. Zoning code and comprehensive plans should include protections against displacement such as Inclusionary Zoning and Community Land Trusts.

## DEVELOPMENT AND REDEVELOPMENT ALONG US-1 CORRIDOR

The average taxable land value along the US-1 Corridor is shown to be just over \$400,000. **Figure 17** shows the average taxable land value in each municipality within the US-1 Corridor. Implementing bus rapid transit and complete streets projects throughout the corridor could increase the livability and vibrancy and lead to a rise in land value throughout the Corridor. These values should be monitored over time to evaluate the effect of enhanced transit and Complete Streets implementation.



**BEETHOVEN**

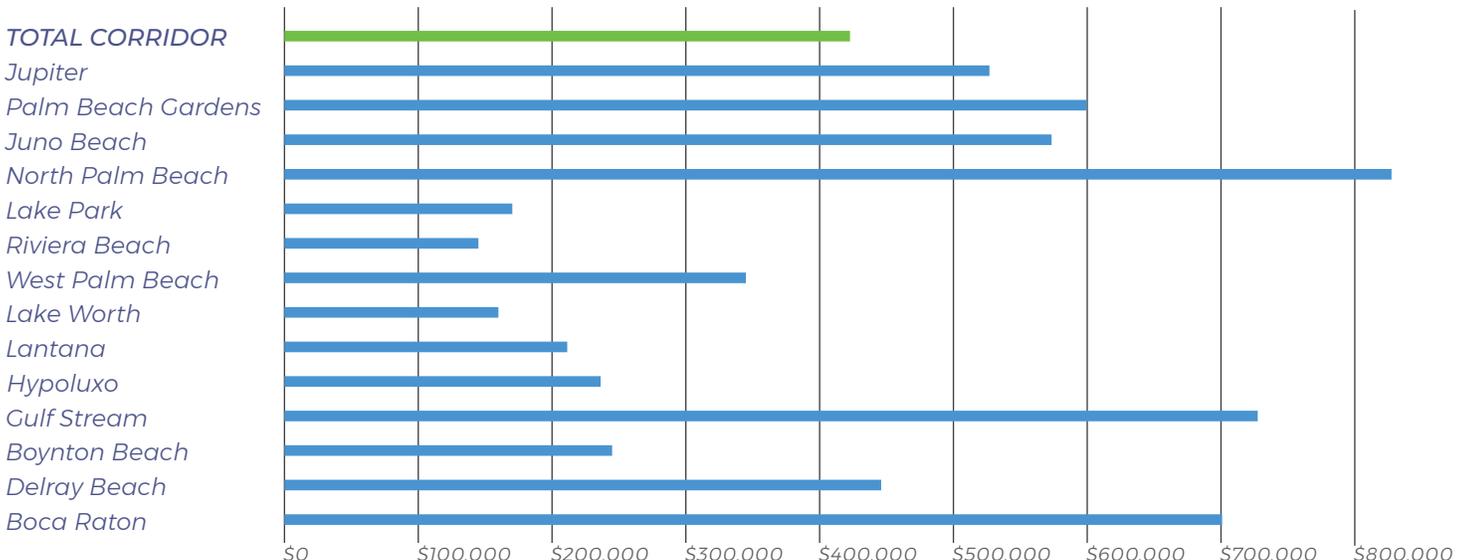
**BEETHOVEN IN RIVIERA BEACH**

Beethoven is the owner and operator of a popular cafe and co-working space in Riviera Beach. Relocating a few years ago from Connecticut, Beethoven is committed to being part of the "future renaissance" in Riviera Beach.

For Beethoven, the US-1 Corridor in Riviera Beach is the gateway to the City and an opportunity to enhance business development. He would like to see more on-street parking and better pedestrian crossings to support walkable access to local businesses that front US-1.

*"Man, this place is a destination! We need more people to **come to** Riviera Beach, **not through.**"*

**FIGURE 17: AVERAGE TAXABLE LAND VALUE ALONG THE US-1 CORRIDOR**



# VULNERABLE POPULATIONS

The lack of transportation options isolate many disadvantaged Americans from jobs and educational opportunities. The increased distances between housing and jobs, as well as educational opportunities, has created barriers for those disadvantaged groups. For the purposes of this HIA, those disadvantaged groups were clarified as vulnerable populations and defined as those who:

- **Live in households without access to automobiles / transit dependent**

Many racial and ethnic minorities see an underinvestment in public infrastructure (such as pedestrian and bicycle amenities) within their neighborhoods, leading to unsafe walking conditions.<sup>27</sup> Areas with a below average median household income see a higher than average rate of pedestrian fatalities on their streets. Although they account for just 35% of the U.S. population, minorities make up 46% of all pedestrian deaths.

- **Are in poverty**

Because of the sprawling nature of today's cities, an increasing number of jobs are inaccessible to those who cannot afford car ownership, especially among racial and ethnic minority populations. Research suggests that 19% of African Americans and 14% of Latinos lack access to automobiles. "Poverty complicates the problem as 33% of poor African Americans and 25% of poor Latinos lack automobile access."<sup>29</sup>

- **Are age 65 or older**

Poor job accessibility has been found to increase the duration of joblessness among lower-paid displaced workers specifically the elderly. One in five Americans over the age of 65 do not drive.<sup>30</sup>

- **Are disabled**

Adults over the age of 65 and people with disabilities are also at a higher risk of death while walking than the rest of the population.<sup>31</sup>

<sup>29</sup> Bell, "The Transportation Prescription," 2013.

<sup>30</sup> Andersson, "Job Displacement and the Duration of Jobless," 2014.

<sup>31</sup> Smart Growth America, "Dangerous by Design," 2016.

## BOYNTON BEACH

Boynton Beach, which is home to approximately 34,400 residents in the US-1 Corridor, experiences a number of physical health and socioeconomic factors that make it a vulnerable population:

- 18% of the population is in poverty
- High percentage of racial and ethnic minorities
- High percentage of residents over 65 years of age
- Relatively high percentage of people with disabilities.

These high percentages coupled with a high hypertension rate (46%) make this community potentially disproportionately affected by premium transit and/or Complete Streets improvements.

## LAKE WORTH

Lake Worth is home to approximately 43,200 residents in the US-1 Corridor. Lake Worth, which sits just to the south of West Palm Beach, shows one of the lowest average land values along the corridor (\$155,000).

- 21% of the population is in poverty
- High percentages of racial and ethnic minorities

Lake Worth also shows a high depression rate (19%), high obesity and diabetes rates of 31% and 14%, respectively. Lake Worth also shows a high frequency of bicycle and pedestrian injuries and fatalities per mile (3.8 injuries+fatalities/mile).

## RIVIERA BEACH

Riviera Beach is home to approximately 15,600 residents in the US-1 Corridor and shows the lowest average land value along the Corridor (\$150,000/parcel).

- 20% of the population is in poverty
- High percentages of racial and ethnic minorities
- High percentages of disabled population

Riviera Beach includes high prevalence rates of hypertension (46%), obesity (34%), and asthma (10%).

## WEST PALM BEACH

West Palm Beach is home to approximately 67,400 residents in the US-1 Corridor, making it the largest section of population in the Study Corridor and largest city in Palm Beach County. West Palm Beach is the most urban of the communities along the corridor and boasts the highest multimodal split of any community along the corridor (10% use biking, walking, or transit as primary commute mode).

- 21% of the population is in poverty
- High percentages of racial and ethnic minorities
- High percentages of transit dependent households.

West Palm Beach shows a high hypertension rate of 42% and shows a high frequency of bicycle and pedestrian injuries and fatalities per mile (3.1 injuries+fatalities/mile).

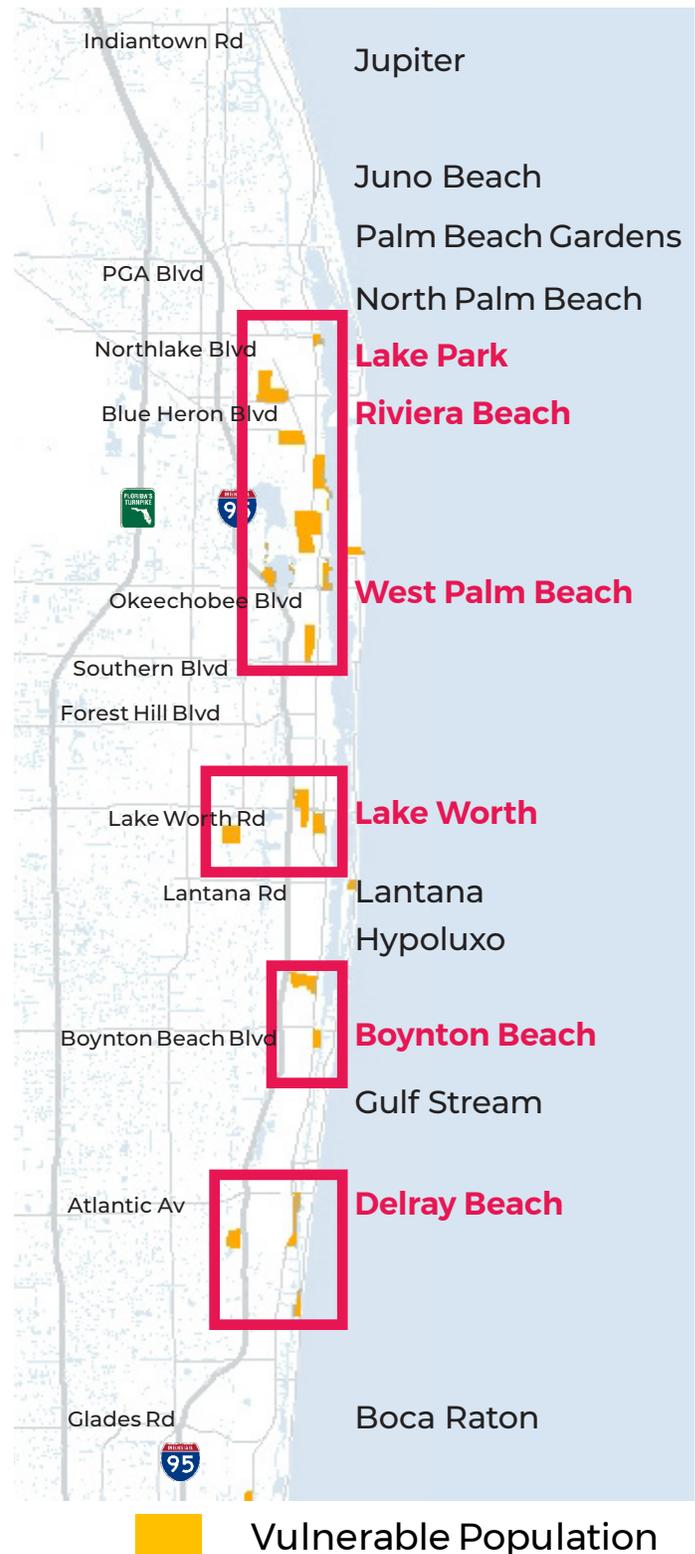
## LAKE PARK

Lake Park is home to approximately 7,400 residents in the US-1 Corridor. While this section only makes up a small sliver of the US-1 Corridor, it boasts one of the best multimodal splits along the US-1 Corridor at 9% using transit, walking, or biking as a primary mode. It shows a lower average land values (\$185,000/parcel).

- 20% of its population is in poverty
- High percentages of racial and ethnic minorities
- High percentages of disabled population

Lake Park includes high prevalence rates of obesity (33%) and asthma (9%).

**FIGURE 18: VULNERABLE POPULATIONS IDENTIFIED ALONG THE US-1 CORRIDOR**



# STATION DEMONSTRATION AREAS

Analyzing specific target demonstration areas in more detail can help provide insights on how the new transit investment and varying land use patterns can impact community health. The HIA Working Group and Study Team selected three station areas from the US-1 Transit Assessment based on a current lack of development and where the local agency lacked a master plan for the area.

For each demonstration area, the Study Team conducted a review of existing land use conditions, along with transit and demographic makeup and developed illustrative concepts of potential future land use scenarios within a half-mile of the potential station. Two future scenarios were developed for each target area: an interim, short-term scenario, and longer-term development scenario. The future scenarios illustrate how access to premium transit may influence development patterns and densities. Each target demonstration area was evaluated based on how well the various health indicators perform compared to current conditions.

The three target demonstration areas are:

## 1. US-1 and Northeast 20th Avenue (Boca Raton)

This area represents an opportunity to create smaller infill redevelopment within larger existing suburban commercial while providing new connections to surrounding neighborhoods and connections to existing park and open space. This intersection also has potential for a major transportation infrastructure investment – in the form of a two-lane roundabout on US-1 – that could drastically improve operations (west of the intersection is a major entrance to Florida International University), improve street crossings, and reduce fatal bicycle and vehicular accidents.

## 2. US-1 and West 13th Ave (Riviera Beach)

This area is adjacent to two existing redevelopment efforts by the City: Mariner's Village – a waterfront redevelopment and a TOD redevelopment connected to the Coastal Link Tri-Rail line adjacent to Barack Obama Highway. The demonstration area examines the area in between these two nodes and specifically identifies areas for neighborhood infill, new smaller streets that create neighborhood scale connections, and opportunities for increased open space within walkable distances to a majority of the housing in this area.

## 3. US-1 and Palm Beach Lakes Boulevard (West Palm Beach)

This area is defined primarily underdeveloped land owned by mostly by the Good Samaritan Hospital. To the west, the Community Redevelopment Agency (CRA) has been developing an urban design and land use plan to guide the future development. This area serves as the connector between the CRA invested land and the hospital as a major source of employment. Creating opportunities for redevelopment in a livable and walkable format between both of these catalysts will help grow the area in a sustainable fashion.

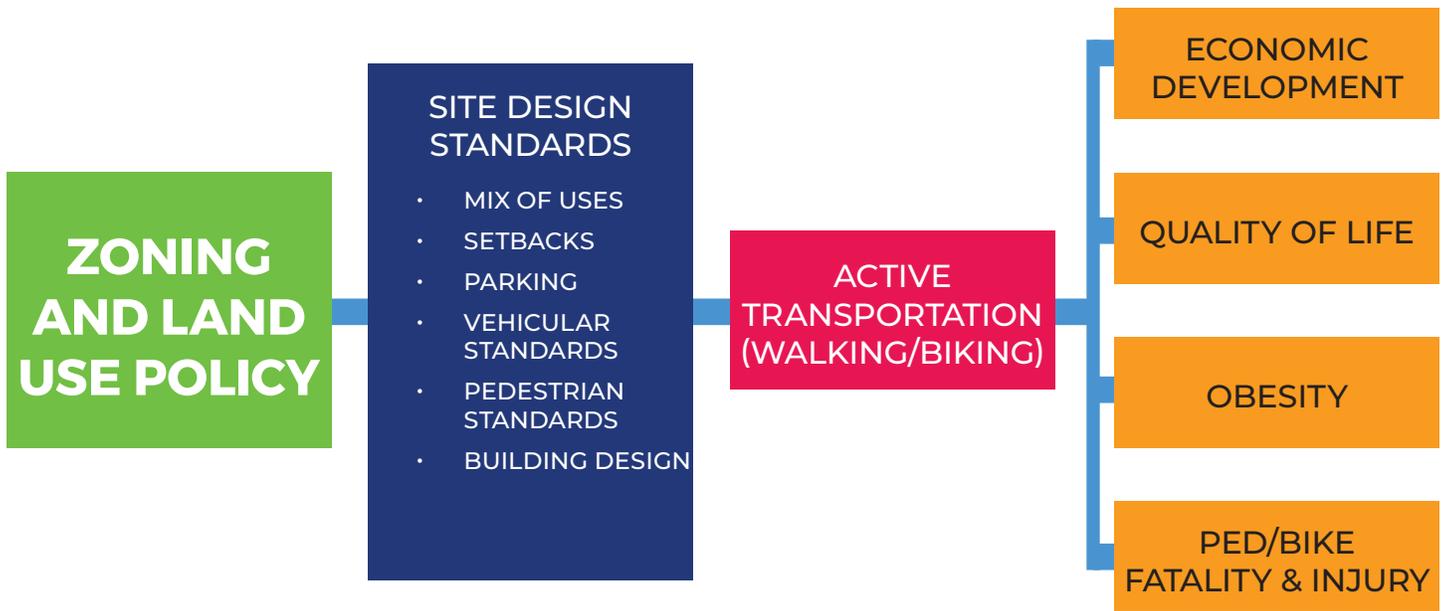
## POLICY REVIEW OF TARGET DEMONSTRATIONS AREAS

Zoning and land use policies can help support or inhibit the potential for the proposed BRT to influence the health indicators identified by the HIA. Existing policies can remove barriers, if any, to the establishment of a healthy growth pattern in a community or limit the establishment of unhealthy destinations within a community. For example, a more pedestrian-friendly environment connects to three of the four final indicators presented in the HIA: obesity and chronic illness, quality of life, and transit-supportive land uses (**Figure 19**). As part of the demonstration area evaluation, the Study Team researched the industry best practices for supportive TOD uses. The research revealed a consistent approach for the following regulatory standards:

- Land uses
- Roadway setbacks
- Parking requirements
- Vehicular standards
- Pedestrian standards
- Building features.

Each of these major categories can be regulated in a variety of ways to influence the overall health of the US-1 Corridor communities based on the health indicators identified for this HIA. A summary of those best practices are shown on the following page.

**FIGURE 19: EXAMPLE RELATIONSHIP OF ZONING & LAND USE POLICIES TO THE HEALTH INDICATORS**



## BEST PRACTICE REGULATORY STANDARDS

The following six regulatory standards were evaluated for specific influences on health:

### 1. LAND USES

- A mix of uses in an area provides for an environment that promotes walking and allows for a variety of activities to occur without the need to use an automobile.
- A municipality can encourage healthy related use/types by limiting uses that are not consistent with a healthy environment (i.e., auto-oriented uses, fast food restaurants, liquor stores) while permitting uses that support a healthy environment (i.e., farmers markets, urban farms, agriculture uses in residential areas).

### 2. ROADWAY SETBACKS

- How and where buildings are sited on a parcel provide the greatest site design opportunity to support the pedestrian network.
- The farther a building is setback from the roadway, the more challenging it is for a pedestrian and transit rider, in terms of general walkability and access, to surrounding land uses.

### 3. PARKING REQUIREMENTS

- In establishing maximum parking ratios, a development will not exceed typical “minimum” standards. High minimum parking standards are typically associated with more auto-oriented uses and does not encourage the use of other modes.
- Regulations that permit buildings to “face” a parking lot can prohibit and limit a pedestrian experience.
- On-street parking provides opportunities for a more walkable roadway design.

#### 4. VEHICULAR STANDARDS

- Regulating block size creates a walkable area that provides for safe pedestrian access and linkages to and from transit areas.
- Cross access between parcels can create a connected network of vehicular and pedestrian access that will allow for movement internal to adjacent sites without needing to access US-1.
- Landscape buffers features provide both comfort and safety from roadways and drive aisles for pedestrians.

#### 5. PEDESTRIAN STANDARDS

- Sidewalk placement and size will affect the pedestrian activity and access to transit.
- Continuous pedestrian networks within a development or connections to adjacent developments are important to access a transit stop.
- Well-lit pedestrian walkways and sidewalks improve pedestrian safety.
- Landscape plantings along pedestrian walkways can offer a sense of security and safety from vehicles.
- Trees providing shade for pedestrians.

#### 6. BUILDING FEATURES

- The design of a building can provide shelter, visual interest, safety, and can increase the legibility of the entire pedestrian network.
- Entryways that face the street, and or the pedestrian connections contribute to higher walkability.
- Increased building transparency make connections with the inside of the building (seeing people, various activities, window shop) with the pedestrians walking on the sidewalk.
- Providing “eyes” on the street and contributes to the walking environment of an area.
- Visually appealing facade treatments add interest to the walking and bicycling trip to access transit, and can entice people to walk or bicycle farther. Building awnings can also provide shelter to pedestrians.

The three target demonstration areas are located along the US-1 Corridor, within Boca Raton, West Palm Beach, and Riviera Beach.



*Credit: Adam Coppola Photography*

## US-1 AND NE 20TH STREET BOCA RATON DEMONSTRATION AREA

The following illustrates potential development scenarios for US-1 and NE 20th Street in Boca Raton.

**These scenarios are not meant to indicate any approved or proposed plans but to illustrate a possible and hypothetical development scenario and to understand how transit and transit-supportive development can influence the health of the community around the stations.**

**FIGURE 20: US-1 AND NE 20<sup>TH</sup> STREET DEMONSTRATION AREA**



As seen in **Figure 20**, the NE 20th station area has a limited street network with a limited amount of full intersections and through streets. The land uses are primarily single-use commercial with large shopping plaza parking lots facing the roadway. In addition, NE 20th Street creates a non-perpendicular intersection point leading to a challenging configuration of the current developable space. US-1 through this area has a wide cross section, exhibiting four 12' lanes with a

**FIGURE 21: US-1 AND NE 20<sup>TH</sup> STREET EXISTING BLOCK STRUCTURE**



wide center median, turn lanes and posted speed of 45 mph.

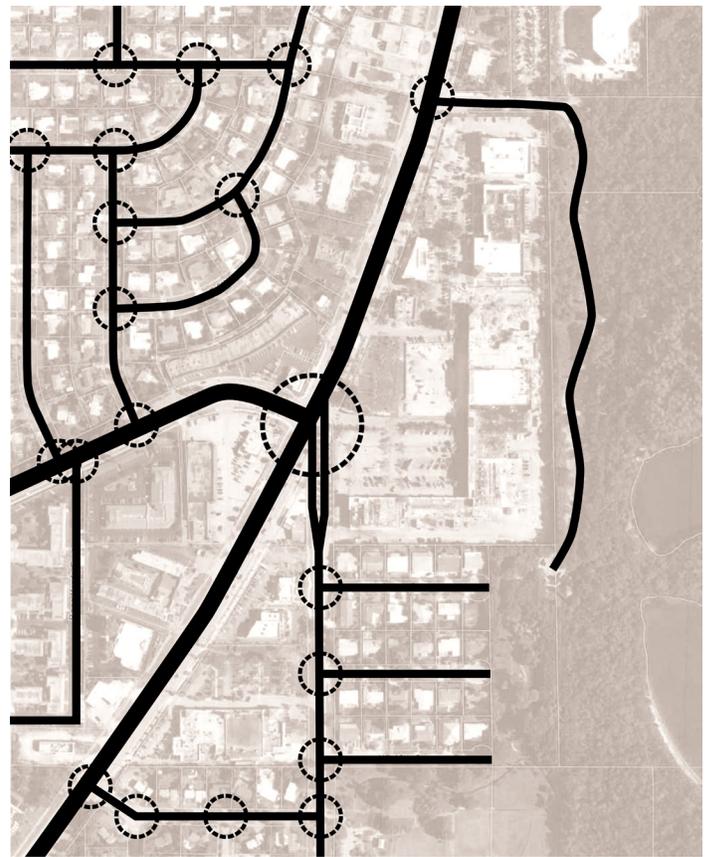
This makes for a difficult and often uncomfortable pedestrian environment through the heart of the station area. Block sizes along this sector are, on average, three times the size of standard blocks sizes with the largest blocks in the area being more than five times the size of a typical city block (**Figure 21**).

**FIGURE 22: US-1 AND NE 20<sup>TH</sup> STREET EXISTING STREETS**



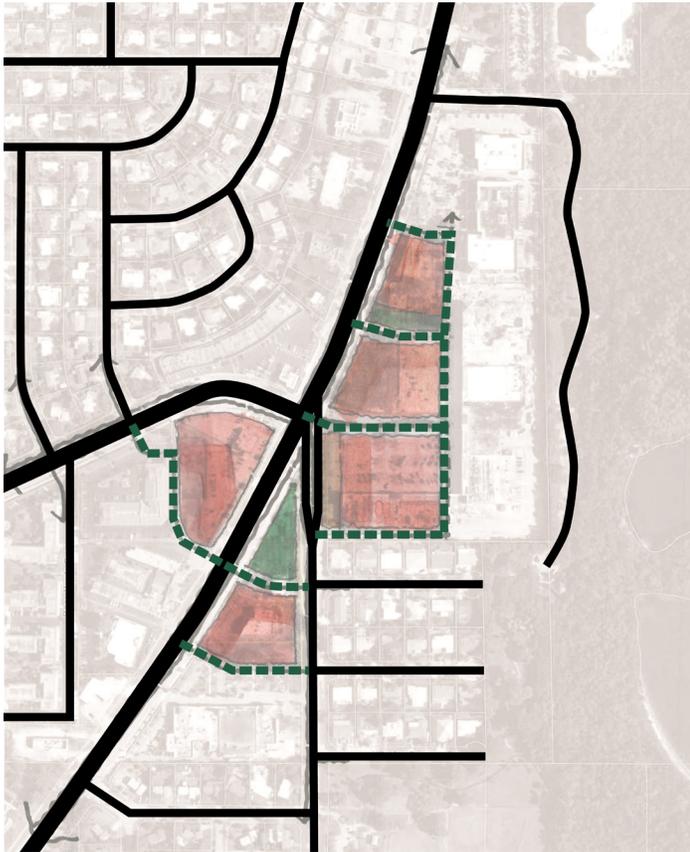
This existing street network is limited by historic suburban development and automotive-centric commercial land uses (**Figure 22**).

**FIGURE 23: US-1 AND NE 20<sup>TH</sup> STREET EXISTING INTERSECTIONS**



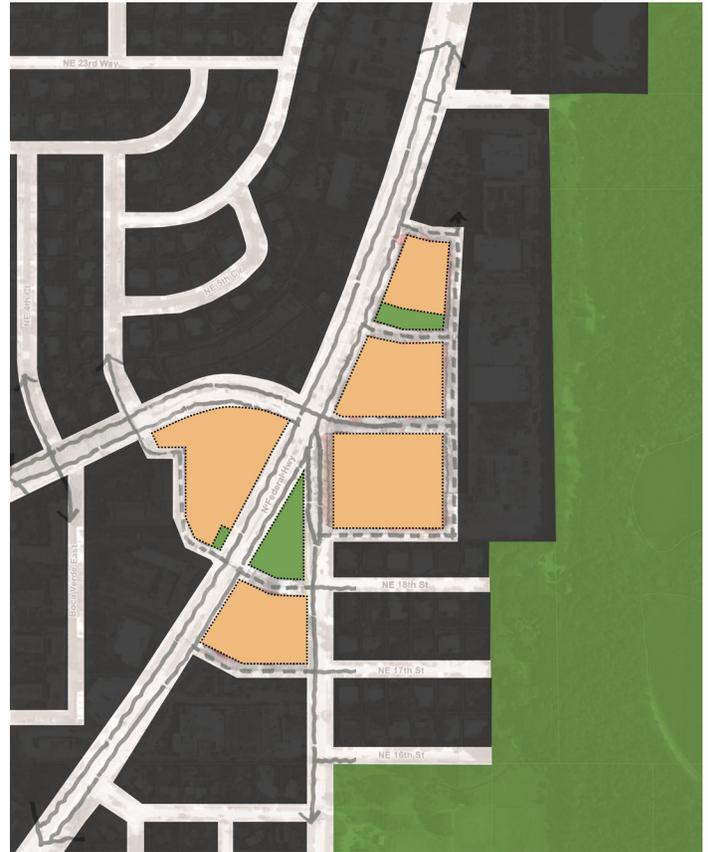
The limited intersections and an environment that encourages higher vehicular speeds have caused motorists and pedestrians to utilize parking aisles as “streets” to cut through the large blocks (**Figure 23**).

**FIGURE 24: US-1 AND NE 20<sup>TH</sup> STREET ILLUSTRATIVE INTERIM TRANSIT-ORIENTED DEVELOPMENT (TOD)**



In this scenario (**Figure 24**), NE 20th Street could be extended through the linear parking areas across the US-1 signalized intersection to the front of the existing shopping plaza. The existing character could be carried through, creating a park in the parcel adjacent to the south of the intersection. The fronting parcels would then be developed in configuration closer to the street. Redevelopment could occur in the short-term as individual infill of properties and likely on the underutilized parcels.

**FIGURE 25: US-1 AND NE 20<sup>TH</sup> STREET INTERIM TOD BLOCK STRUCTURE**



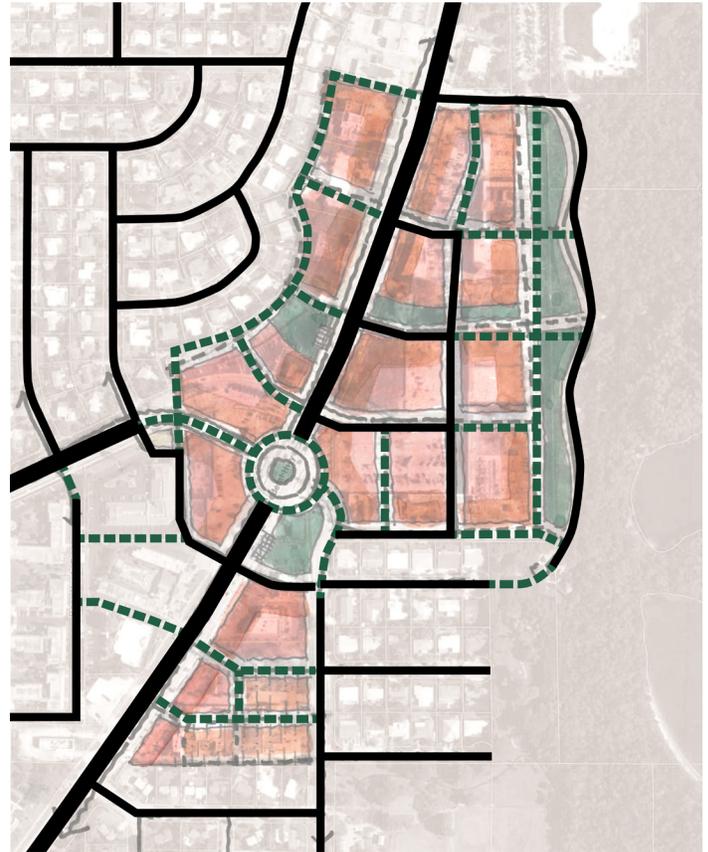
As redevelopment occurs (**Figure 25**), some of the parking aisles can be rebuilt as streets.

**FIGURE 26: US-1 AND NE 20<sup>TH</sup> STREET INTERIM TOD STREET NETWORK**



This will increase connectivity (**Figure 26**), break-up the large blocks, and improve overall walkability. The redevelopment could use this opportunity to create new shared community open space areas that could encourage increased physical activity.

**FIGURE 27: US-1 AND NE 20<sup>TH</sup> STREET ILLUSTRATIVE LONG-TERM TOD**



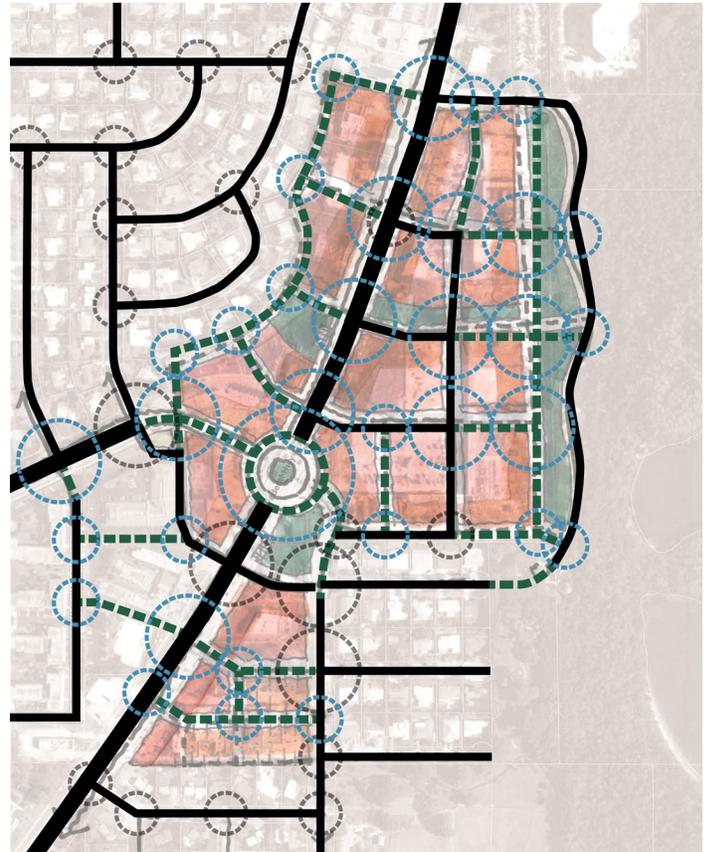
In the long-term (**Figure 27**), as redevelopment continues, the area may see additional streets connections and new intersections. The NE 20th Street intersection could be connected all the way through the site and reconfigured to have a roundabout to create a safer and more productive intersection.

**FIGURE 28: US-1 AND NE 20<sup>TH</sup> STREET LONG-TERM TOD BLOCK STRUCTURE**



The new development block structure (**Figure 28**) may incorporate shared green spaces of various sizes and may consist of a mix of uses, heights, and densities. Parking could be placed internal to the site, with street alleys serving various land uses.

**FIGURE 29: US-1 AND NE 20<sup>TH</sup> STREET LONG-TERM TOD STREET NETWORK**



The additional new streets (**Figure 29**) will create significantly smaller sized blocks, more typical of an urban environment, forming a more walkable development pattern.

## HIA INDICATOR MATRIX

The interim and long-term illustrative scenarios were evaluated to compare how each scenario influences the outcomes of the various health indicators. **Table 12** provides a summary of measures related to each health indicator when comparing the interim and long-term scenarios to the current conditions.

The interim and long-term scenarios resulted in significant increases in housing density, street connectivity, and green space; a significant decrease in average block size, and a modest traffic volume growth compared to the population and tax base added to the community. The development of a network of slower speed roads can also result in lower potential for bike and pedestrian crashes.

**TABLE 12: INDICATOR MATRIX FOR US-1 AND NORTHEAST 20TH STREET TOD SCENARIO**

INDICATORS	METRIC		SCENARIOS		
	TYPE	UNIT	EXISTING	INTERIM	LONG TERM
Economic Development / Redevelopment	Housing Density	(dwelling unit per acre)	1	7	14
	Employees	(amount)	370	3,400	2,600
	Housing Units	(amount)	65	320	660
	Public streets linking north-south direction	(linear ft)	10,400	11,600	15,100
	Public streets linking east-west direction	(linear ft)	5,400	6,500	9,300
	Peak hour trips generated (traffic volume generated during peak hour)	(trips)	630	4,500	3,100
	Overall street connectivity	(amount of intersections)	20	32	53
	Publicly accessible parks and open space	(acres)	2	3	5
Quality of Life / Social Cohesion	Diversity of land use types per building	(amt)	1	2	3
	Diversity of housing types	(amt)	1	2	3
	Average block size	(acres)	4.8	2.8	1.2
	Ability to allow land-use changes	(amount of blocks)	17	23	38
Obesity Rate	Average block perimeter (walkability)	(linear feet)	2,400	1,800	1,000
	Streets w/ ped bike facilities	(linear feet)	6,500	9,900	12,100
	Streets w/ fronting uses/street trees	(linear feet)	0	3,300	9,400
	Streets w/ 30mph or less	(amount)	8	16	22
Ped / Bike / Fatality / Injury	Percentage of network with high potential for ped/bike incidents (no bike lanes, high speeds)	(percentage)	30%	20%	15%
	Percentage of network with low potential for ped/bike incidents (bike lanes, lower speeds)	(percentage)	70%	80%	85%

## US-1 AND PALM BEACH LAKES BOULEVARD WEST PALM BEACH DEMONSTRATION AREA

The following illustrates potential development scenarios for US-1 and Palm Beach Lakes Boulevard station area.

**These scenarios are not meant to indicate any approved or proposed plans but to illustrate a possible and hypothetical development scenario and to understand how transit and transit-supportive development can influence the health of the community around the stations.**

**FIGURE 30: US-1 AND PALM BEACH LAKES BOULEVARD DEMONSTRATION AREA**



US-1 and Palm Beach Lakes Boulevard demonstration area (**Figure 30**) sits adjacent to Good Samaritan Hospital and Medical Center. Several of the parcels within the demonstration area are currently vacant or underutilized.

**FIGURE 31: US-1 AND PALM BEACH LAKES BOULEVARD EXISTING BLOCK STRUCTURE**



Block sizes along in this area are on average two times the size of standard block sizes (**Figure 31**).

**FIGURE 32: US-1 AND PALM BEACH LAKES BOULEVARD EXISTING STREETS**



The land uses are primarily single-use commercial with parking lots facing the roadway. The area has a well-connected street network (**Figure 32**).

**FIGURE 33: US-1 AND PALM BEACH LAKES BOULEVARD EXISTING INTERSECTIONS**



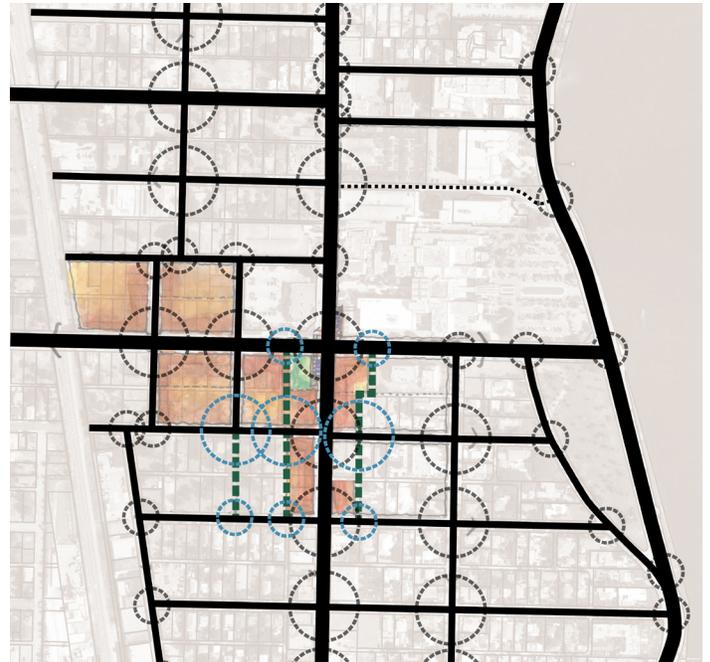
The limited connections and an environment that encourages higher vehicular speeds have caused motorists to drive completely by this area and stop only if needing to use the hospital. (**Figure 33**).

**FIGURE 34: US-1 AND PALM BEACH LAKES BOULEVARD ILLUSTRATIVE INTERIM TRANSIT-ORIENTED DEVELOPMENT (TOD)**



Redevelopment could occur in the interim (**Figure 34**) as individual parcels are assembled and infill development occurs.

**FIGURE 36: US-1 AND PALM BEACH LAKES BOULEVARD INTERIM TOD STREET NETWORK**



As redevelopment happens, there are opportunities to increase the street network connectivity (**Figure 36**) which will make the new areas of mixed-use residential more walkable and accessible to the BRT Station area.

**FIGURE 35: US-1 AND PALM BEACH LAKES BOULEVARD INTERIM TOD BLOCK STRUCTURE**



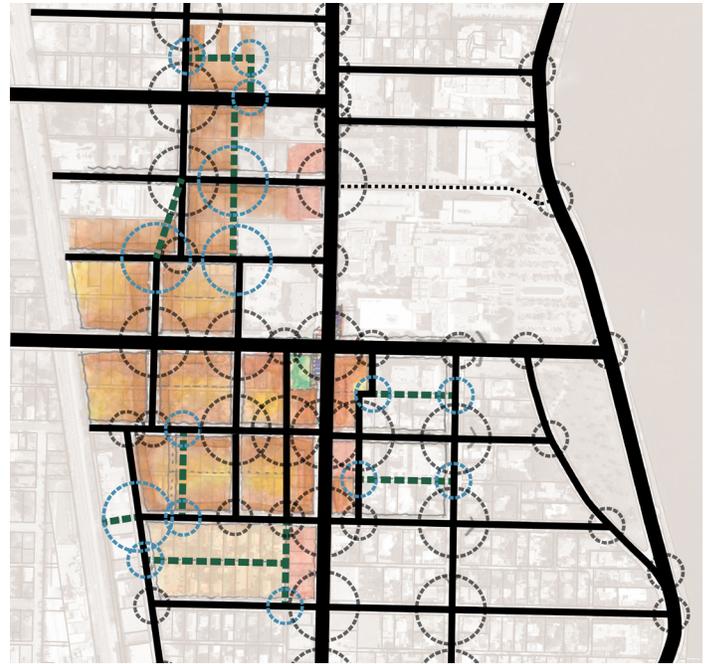
The redevelopment would focus on the core area around the BRT Station area (**Figure 35**) and add new park/open space areas in addition medium density residential project that could capitalize on the proximity to the Hospital and provide live/work housing.

**FIGURE 37: US-1 AND PALM BEACH LAKES BOULEVARD ILLUSTRATIVE LONG-TERM TOD**



In the long-term, the interim redevelopment will encourage additional redevelopment (**Figure 37**) - most likely in the form of smaller infill residential and office/commercial serving the Hospital.

**FIGURE 39: US-1 AND PALM BEACH LAKES BOULEVARD LONG-TERM TOD STREET NETWORK**



The new streets and intersections (**Figure 39**) will create smaller sized blocks forming a more walkable development pattern.

**FIGURE 38: US-1 AND PALM BEACH LAKES BOULEVARD LONG-TERM TOD BLOCK STRUCTURE**



The new development may incorporate shared green spaces of various sizes. (**Figure 38**) This new development could act as a catalyst to the surrounding area while promoting healthy activity and interactions.

## HIA INDICATOR MATRIX

The interim and long-term illustrative scenarios were evaluated to reflect how each scenario influences the outcomes of the various health indicators. **Table 13** provides a summary of measures related to each health indicator when comparing the interim and long-term scenarios to the current conditions.

The interim and long-term scenarios resulted in significant increases in housing density, street connectivity, and green space; a significant decrease in average block size, and a modest traffic volume growth compared to the population and tax base added to the community.

**TABLE 13: INDICATOR MATRIX FOR US-1 AND PALM BEACH LAKES BOULEVARD TOD**

INDICATORS	METRIC		SCENARIOS		
	TYPE	UNIT	EXISTING	SHORT TERM	LONG TERM
Transit Supportive Land Uses	Housing Density	(dwelling unit per acre)	1	6	8
	Employees	(amount)	1,546	3,552	4,489
	Housing Units	(amount)	68	288	389
	Public streets linking north-south direction	(linear ft)	5,063	5,761	6,394
	Public streets linking east-west direction	(linear ft)	8,022	8,035	11,643
	Peak hour trips generated (traffic volume generated during peak hour)	(trips)	797	1,195	1,742
	Overall Street connectivity	(amount of intersections)	18	21	33
Quality of Life / Social Cohesion	Publicly accessible parks and open space	(acres)	0.00	0.43	0.43
	Diversity of land use types per building	(amt)	1	2	3
	Diversity of housing types	(amt)	1	2	2
	Average block size	(acres)	4	3	3
	Ability to allow land-use changes	(amount of blocks)	14	16	25
Obesity Rate	Average block perimeter (walkability)	(linear feet)	1,568	1,385	1,385
	Streets w/ ped bike facilities	(linear feet)	9,553	10,264	14,506
	Streets w/ fronting uses/street trees	(linear feet)	0	0	6,918
	Streets w/ 30mph or less	(amount)	8	16	22
Ped / Bike / Fatality / Injury	Percentage of network with high potential for ped/bike incidents (no bike lanes, high speeds)	(percentage)	0%	0%	0%
	Percentage of network with low potential for ped/bike incidents (bike lanes, lower speeds)	(percentage)	100%	100%	100%

# US-1 AND WEST 13TH STREET RIVIERA BEACH DEMONSTRATION AREA

The following illustrates potential development scenarios for US-1 and West 13th Street demonstration area.

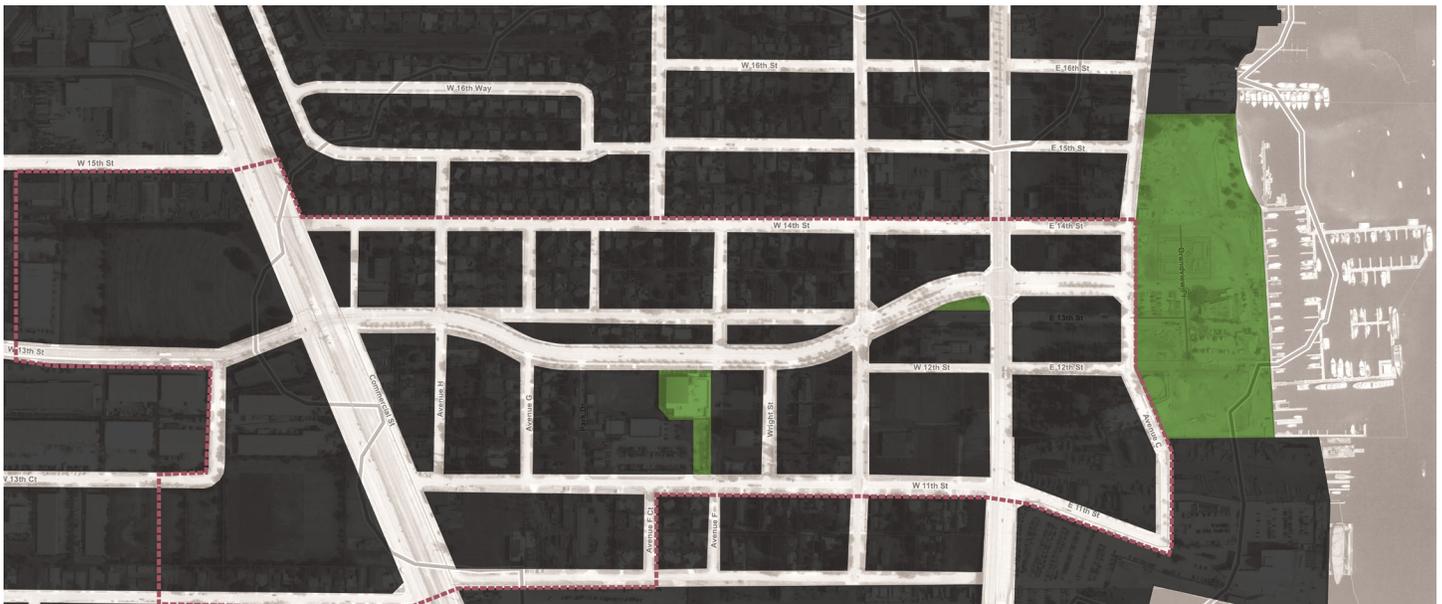
**These scenarios are not meant to indicate any approved or proposed plans but to illustrate a possible and hypothetical development scenario and to understand how transit and transit-supportive development can influence the health of the community around the stations.**

As seen in **Figure 40**, the West 13th Street area has a very limited street network with a limited amount of signalized intersections. The land uses are primarily single-use commercial with large parking areas to the east near the marina. Block sizes along this sector are, on average, three times the size of standard blocks sizes with the largest blocks in the area being more than six times the size of a typical city block (**Figure 41**).

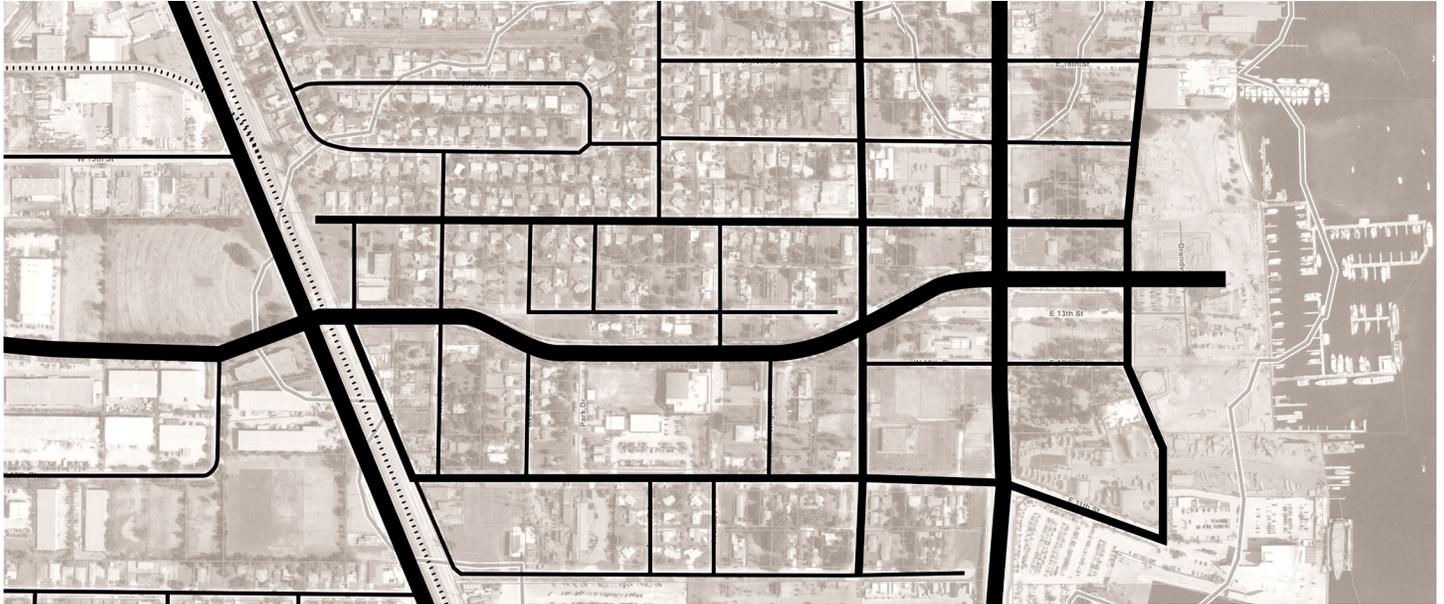
**FIGURE 40: US-1 AND WEST 13TH STREET DEMONSTRATION AREA**



**FIGURE 41: US-1 AND WEST 13TH STREET EXISTING BLOCK STRUCTURE**

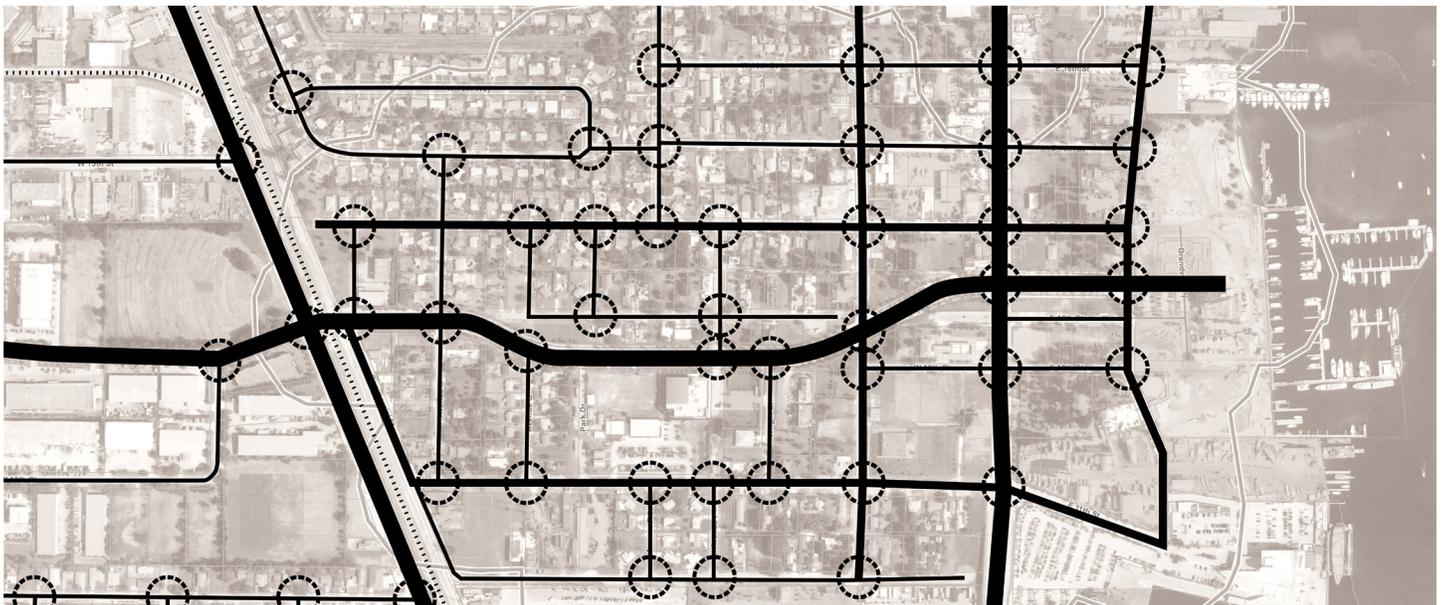


**FIGURE 42: US-1 AND WEST 13TH STREET EXISTING STREET NETWORK**



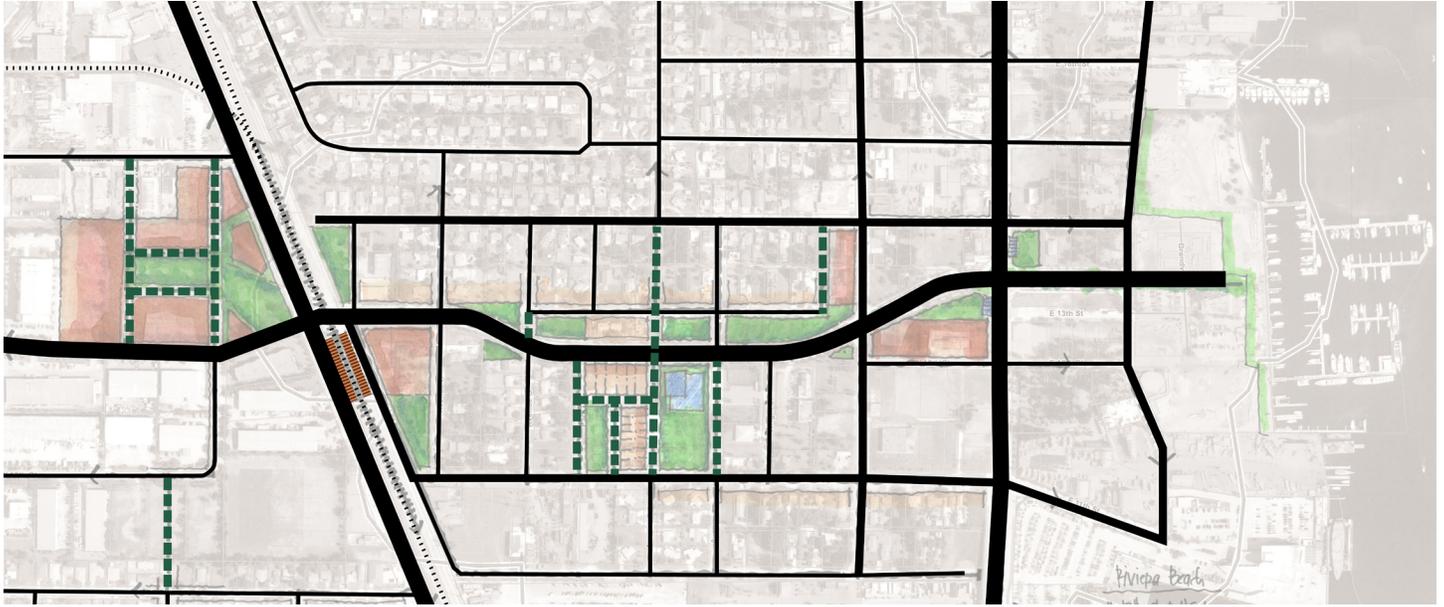
The existing street network (**Figure 42**) features streets that dead end and have been disconnected from the overall network. This makes for a difficult and often frustrating pedestrian environment.

**FIGURE 43: US-1 AND WEST 13TH STREET EXISTING INTERSECTIONS**



The limited street network also limits the amount of intersections within the demonstration area decreasing the overall walkability and safe crossing locations. (**Figure 43**)

**FIGURE 44: US-1 AND WEST 13TH STREET ILLUSTRATIVE INTERIM TRANSIT-ORIENTED DEVELOPMENT (TOD)**



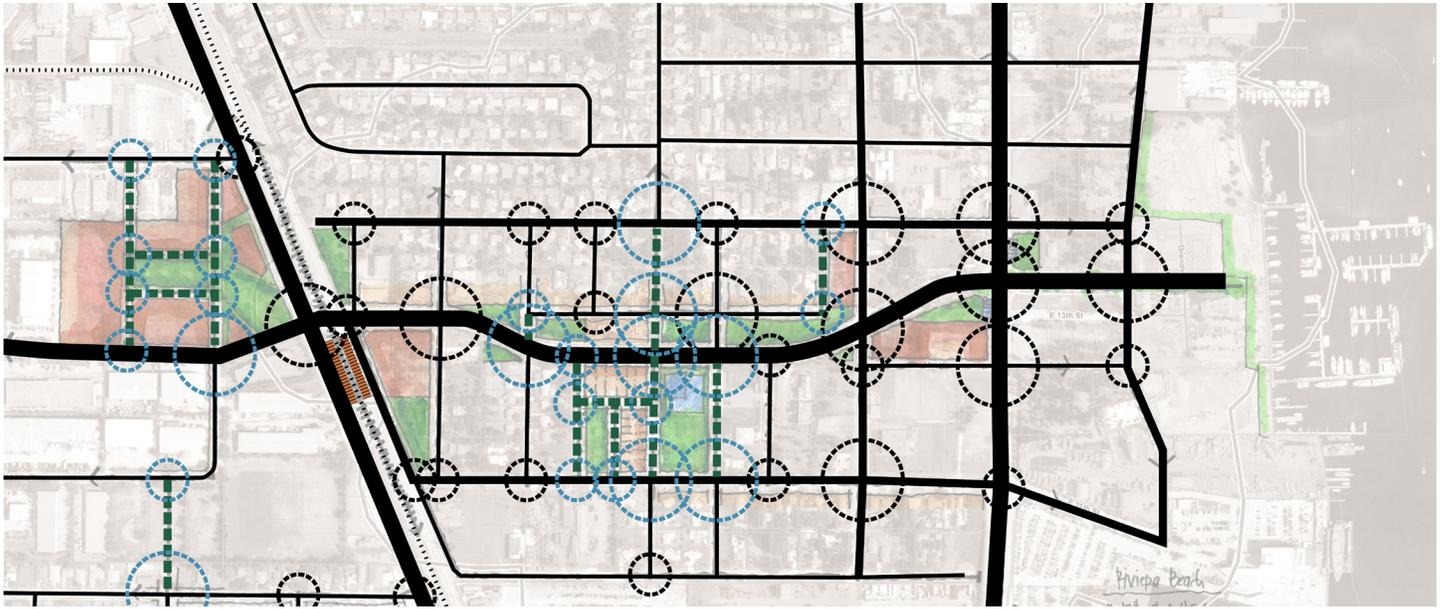
Redevelopment could occur in the interim (**Figure 44**) as individual parcels are assembled and infill development occurs. The redevelopment would focus on the core area around (1) the "drive-in" property adjacent to the future CoastLink Station, (2) a new connection adjacent to the Boys and Girls Club, and around the proposed BRT Station.

**FIGURE 45: US-1 AND WEST 13TH STREET INTERIM TOD BLOCK NETWORK**



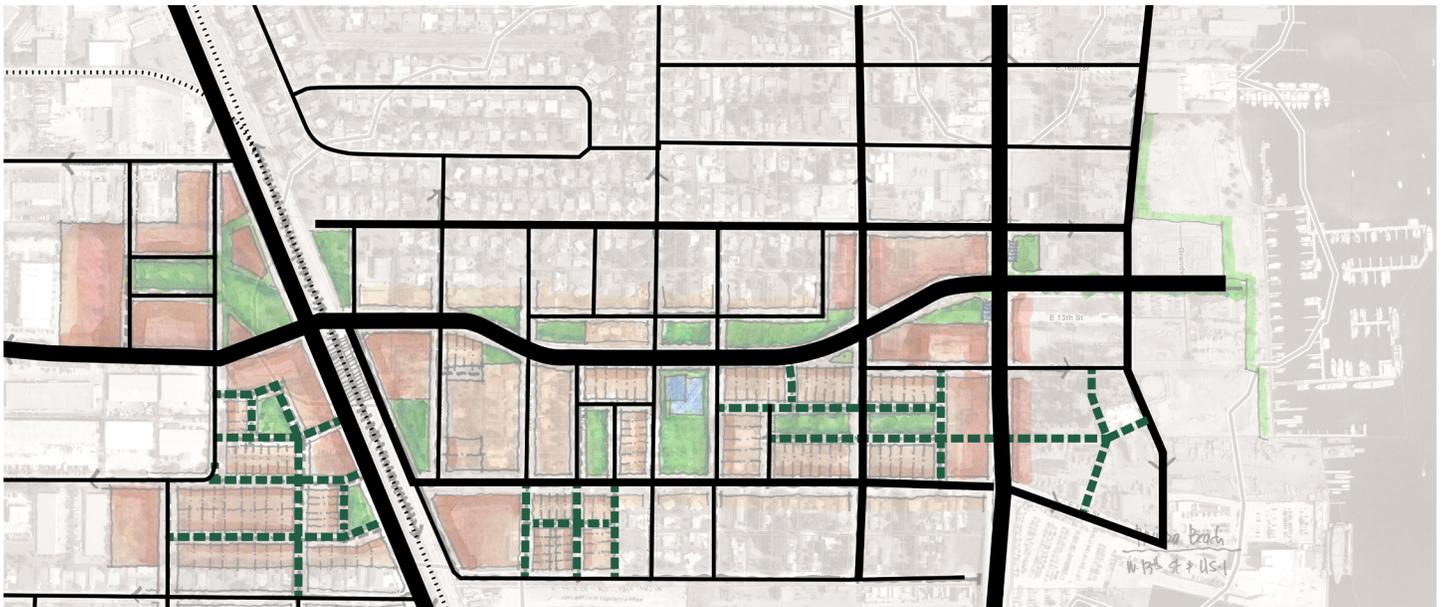
New park/open space areas (**Figure 45**) would thread the length W 13th Street, connecting the two transit stations. In the new blocks created, attainable, moderate density residential would be created to help offset any displacement from the new development.

**FIGURE 46: US-1 AND WEST 13TH STREET INTERIM TOD STREET NETWORK**



As redevelopment happens, there are opportunities to increase the street network connectivity (**Figure 46**) which will make the new areas of mixed-use residential more walkable and accessible to the BRT Station area.

**FIGURE 47: US-1 AND WEST 13TH STREET ILLUSTRATIVE LONG-TERM TOD**



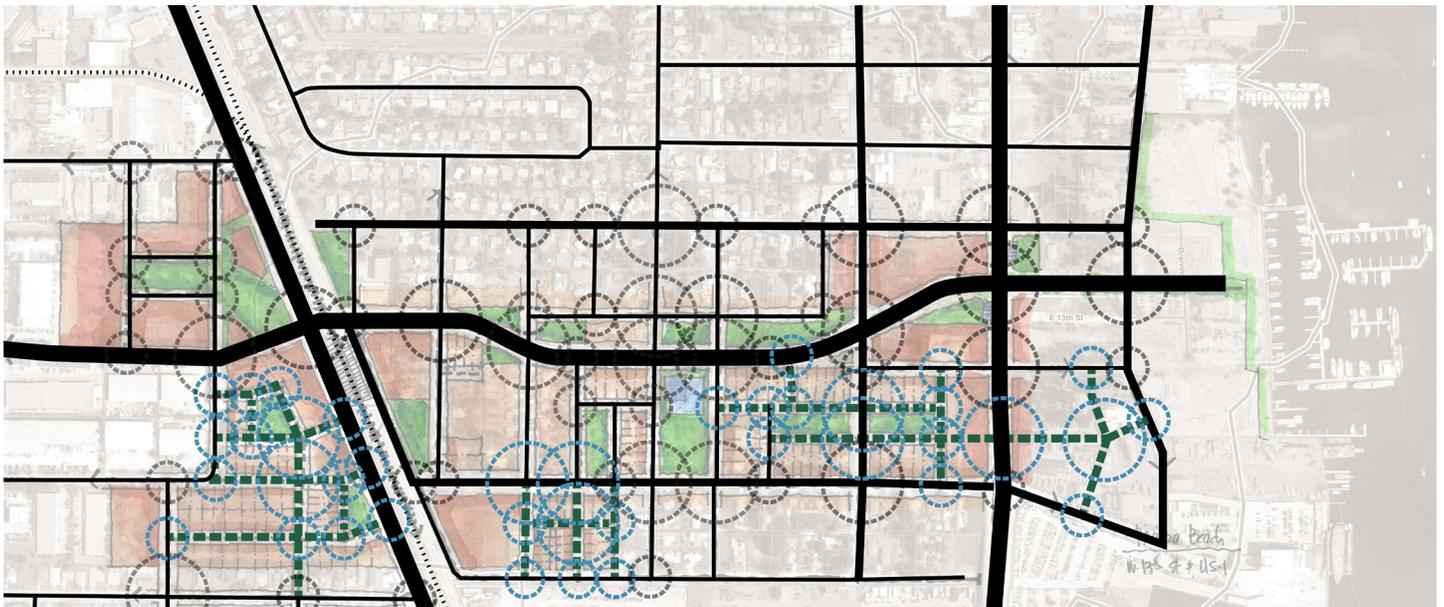
In the long-term, as redevelopment continues, the area would benefit from additional streets connections and new intersections (**Figure 47**). The green network established would continue to connect new development sites along West 13th Street and serve as neighborhood scale centers of social activity.

**FIGURE 48: US-1 AND WEST 13TH STREET LONG-TERM TOD BLOCK STRUCTURE**



Additional areas (**Figure 48**) for affordable, attainable housing would include the areas south of West 13th Street and west of Barack Obama Highway, as well as the area east of the Boys and Girls Club - eventually connecting to the current waterfront development. The creation of open space, storm water retention, and park space could add to the potential for physical activity and an improved quality of life.

**FIGURE 49: US-1 AND WEST 13TH STREET LONG-TERM TOD STREET NETWORK**



This mix of uses could create much shorter trips, and more trips internally to the site (**Figure 49**), potentially reducing vehicle trips and allow for the area in the marina to be a more active and utilized area on US-1.

## HIA INDICATOR MATRIX

The interim and long-term illustrative scenarios were evaluated to examine how each scenario can influence the outcomes of the various health indicators. **Table 14** provides a summary of measures related to each health indicator when comparing the interim and long-term scenarios to the current conditions.

The interim and long-term scenarios resulted in significant increases in housing density, street connectivity, mix of land uses and green space; a significant decrease in average block size, and a modest traffic volume growth compared to the population and tax base added to the community. The creation of slower speed roads results in a lower potential for severe bike and pedestrian incidents.

**TABLE 14: INDICATOR MATRIX FOR US-1 AND WEST 13TH STREET TOD**

INDICATORS	METRIC		SCENARIOS		
	TYPE	UNIT	EXISTING	SHORT TERM	LONG TERM
Economic Development / Redevelopment	Housing Density	(dwelling unit per acre)	1	7	14
	Employees	(amount)	370	3,400	2,600
	Housing Units	(amount)	65	320	660
	Public streets linking north-south direction	(linear ft)	10,400	11,600	15,100
	Public streets linking east-west direction	(linear ft)	5,400	6,500	9,300
	Peak hour trips generated (traffic volume generated during peak hour)	(trips)	630	4,500	3,100
	Overall Street connectivity	(amount of intersections)	15	20	40
	Publicly accessible parks and open space	(acres)	2	3	5
Quality of Life / Social Cohesion	Diversity of land use types per building	(amt)	1	2	3
	Diversity of housing types	(amt)	1	2	3
	Average block size	(acres)	4.8	2.8	1.2
	Ability to allow land-use changes	(amount of blocks)	11	17	34
Obesity Rate	Average block perimeter (walkability)	(linear feet)	2,400	1,800	1,000
	Streets w/ ped bike facilities	(linear feet)	6,500	9,900	12,100
	Streets w/ fronting uses/street trees	(linear feet)	0	3,300	9,400
	Streets w/ 30mph or less	(amount)	8	16	22
Ped / Bike / Fatality / Injury	Percentage of network with high potential for ped/bike incidents (no bike lanes, high speeds)	(percentage)	30%	20%	15%
	Percentage of network with low potential for ped/bike incidents (bike lanes, lower speeds)	(percentage)	70%	80%	85%

# ASSESSMENT SUMMARY

The Study Team summarized the health indicators and qualified the impact of proposed BRT and Complete Streets implementation on each of the indicators (**Table 15**) based on the literature review and baseline assessment, according to four factors:

1. **Direction** - Refers to if the improvement has potential to affect a positive or negative change in the indicator
2. **Magnitude** - Refers to the scope of impact, relative to population size. The indicator received a “low” rating if it affects less than 25% of the corridor population, “medium” if 25-50% of the corridor population, and “high” if over 50% of the corridor population.

3. **Likelihood** - Refers to the probably of the indicator being impacted by the improvements
4. **Distribution** - Refers to the geographic and socioeconomic extents of the potential impact

**TABLE 15: HEALTH INDICATOR ASSESSMENT SUMMARY**

HEALTH INDICATOR	DIRECTION	MAGNITUDE	LIKELIHOOD	DISTRIBUTION
Access to Health Care & Healthy Food	Positive	High	Likely	Relatively higher effect on vulnerable populations, children, elderly, people with disabilities; food deserts along corridor in Boynton Beach and Riviera Beach
Mental Health / Depression	Positive	Low	Possible	Relatively higher effect on elderly, auto-dependent communities
Chronic Illness (Diabetes, Hyper-tension, Asthma, etc)	Positive	Medium	Possible	Relatively higher effect on auto-dependent communities
Physical Activity / Obesity	Positive	High	Likely	Relatively higher effect on auto dependent communities and vulnerable populations
Bicycle & Pedestrian Injury / Fatalities	Positive	High	Possible	The entire corridor, especially high-speed areas; and vulnerable populations
Taxable Land Value	Positive & Negative	Medium	Possible	Relatively higher affect where development and redevelopment are most likely, areas of low land value, where supportive land use policy exists. Some displacement mitigation may be needed in areas of vulnerable populations



A decorative graphic in the top right corner of the page. It features several overlapping chevron shapes pointing towards the top right. The colors of these chevrons are red, blue, dark blue, green, and orange. A thin, light green circle is partially visible, overlapping the chevrons and extending towards the bottom right of the page.

# RECOMMENDATIONS

# RECOMMENDATIONS

The proposed US-1 Multimodal Corridor Study improvements could catalyze significant transportation, land use, education/enforcement and policy changes that can help address the access, health, safety, and economic challenges of the corridor.

Two primary actions must take place in coordination with additional secondary recommendations from the HIA. These recommendations, associated findings, and examples that support them are summarized below.

## PRIMARY RECOMMENDATIONS

- |  |   |
|--|---|
| <p>1. Palm Tran, Palm Beach TPA, and other funding partners should advance Bus Rapid Transit along the US-1 Corridor to implementation by funding capital and operations for the service</p> | <p>2. The Palm Beach TPA, FDOT, and other partnering agencies should implement Complete Streets enhancements (bike and pedestrian improvements) along the US-1 Corridor</p> |
| <p>A. Lead agency - Palm Tran<br/>B. Partnering agencies - Palm Beach TPA, FDOT, Palm Beach County, Municipalities along US-1 Corridor</p>   | <p>A. Lead agency - Palm Tran<br/>B. Partnering agencies - FDOT and municipalities along US-1 Corridor</p>  |

## WHY?

### Opportunity to increase economic development and redevelopment

The reductions in travel time and the improvements in quality of service associated with implementation of a new transit line [such as BRT] often get capitalized into land value, as residents and businesses are willing to pay a premium to be closer to transit stations.<sup>27</sup> In addition, for every dollar invested in public transportation, four dollars are generated in economic returns.<sup>28</sup> There are pockets of the US-1 Corridor that contain large clusters of vacant and underutilized land (where building on the land is worth less than 40% of land + building) that represent opportunities to enhance the walkability and economic development around US-1 BRT stations, as demonstrated by the station demonstration area assessments at US-1 and NE 20th Street (in Boca Raton), Palm Beach Lake Boulevard (in West Palm Beach), and W 13th Street (in Riviera Beach). In addition, low-wage households (earning \$20,000 to \$35,000) living far from employment centers spend 37% of their incomes on transportation. In neighborhoods well served by public transportation, families spend an average of 9%.

<sup>27</sup> Aileen Carrigan, "Social, Environmental, and Economic Impacts of BRT Systems," (2013).

<sup>28</sup> APTA, "Open for Business: The Business Case for Investment in Public Transportation," (2015).

<sup>29</sup> Aileen Carrigan, "Social, Environmental, and Economic Impacts of BRT Systems," (2013).

<sup>30</sup> Todd Litman, "Evaluating Public Transportation Health Benefits," (2010).

<sup>31</sup> Irwin Redlener, MD, "The Growing Health Care Access Crisis for American Children," (2006).

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**Opportunity to increase access to healthy food sources and health care**

Residents with greater access to supermarkets or a greater abundance of healthy foods in neighborhood food stores consume more healthy food and have lower rates of diet-related diseases than their counterparts in neighborhoods lacking food access.<sup>29</sup> High quality public transit increases access to healthy foods and goods, especially for physically or economically disadvantaged.<sup>30</sup> The vulnerable populations in Boynton Beach and Riviera Beach could greatly benefit from the addition of a BRT line by providing them faster access to the healthy food sources. Care should be taken to make sure the BRT stations placed in these areas can connect to these low food access tracts. Lack of access to transportation could reduce health care utilization among children, seniors, low-income people, and people with disabilities. In fact, 4% of US children (3.2 million in total) missed a health care visit or did not schedule a visit during the preceding year because of transportation restrictions.<sup>31</sup> As part of the US-1 BRT evaluation, health care access was considered and stations were placed in close proximity to major hospitals and health care clinic clusters along the corridor.

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**Opportunity to improve health outcomes like depression, chronic illness, and obesity**

Premium transit options (such as BRT) and Complete Streets improvements (such as connected sidewalks and bike lanes) have a high potential to affect physical activity habits, especially those of auto-oriented communities. As copious amounts of research suggests, increases in physical activity is associated with depression, diabetes, hypertension, and obesity.<sup>32</sup> While most Americans report an average of 6 minutes of walking per day, public transit riders report an average of 19 minutes of walking per day.<sup>33</sup> The enhanced nature of a BRT system also makes a difference, as BRT riders report higher average walking distances than local bus riders.<sup>34</sup> Research suggests that obesity, diabetes, hypertension, and obesity rates tend to be inversely related to use of alternative modes like walking, cycling, and public transit.<sup>35</sup> A 2001 study showed that women who partook in little to no physical activity were twice as likely to have depressive symptoms than women with moderate to high levels. Researchers have also observed a 42 percent lower risk of hypertension among those who moved from low- to high-walkability neighborhood.<sup>36</sup>

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**Opportunity to improve cyclist and pedestrian safety**

BRT and Complete Streets improvements have the potential to decrease cyclist and pedestrian injuries and fatalities. It is assumed that these improvements would result in increased walking and biking activity. Motorists have been seen adjust their behavior in the increased presence of people walking and bicycling.<sup>37</sup> A research report on the SAFETY effects of protected bike lanes in multiple locations around the country found that 79% of cyclists found the protected bike lanes to increase the safety of bicycling on the street.<sup>38</sup>

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<sup>32</sup> Mallory Atkinson, "The Mental Health Benefits of Walking," (June 2008).

<sup>33</sup> Todd Litman, "If Health Matters," (April 2014).

<sup>34</sup> K. Day, "Does Bus Rapid Transit Promote Walking? An Examination of New York City's Select Bus Service," (2014).

<sup>35</sup> Todd Litman, "If Health Matters," (April 2014).

<sup>36</sup> Maria Chiu, "Moving to a Highly Walkable Neighborhood and Incidence of Hypertension," (2015).

<sup>37</sup> P L Jacobsen, "Safety in Numbers: More Walkers and Bicyclists, Safer Walking and Bicycling," (April, 2004).

<sup>38</sup> Chris Monsere, "Lessons from the Green Lanes: Evaluating Protected Bike Lanes in the U.S.," (June 2014).

## SECONDARY RECOMMENDATIONS

Recommendations that related to each HIA goal area were created and categorized in four general categories. These categories included policy, transportation, land use, and education and marketing.

### TRANSPORTATION

#### ISSUE

- Over 100,000 employees work in the corridor, which makes up 19% of Palm Beach County jobs.
- Approximately 13,600 employees live and work within the US-1 Corridor.

#### RECOMMENDATION

Evaluate potential of extending transit services hours of Route 1.

*Responsible agencies: Palm Tran*

#### RECOMMENDATION

Leverage on-demand transit, and/or utilize other innovative mobility options to accommodate diverse schedules.

Examples of similar programs are located in Altamonte Springs, Maitland, and Lake Mary.

*Responsible agencies: Municipalities partnering with Uber and Lyft*

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**ISSUE**

- Approximately 20% of a sample of US-1 Corridor users indicated being unable to get to work or health care services along US-1 due to public transportation issues. Several communities along the Corridor do not have good walking access (30-minute walk) to a health care clinic or hospital.
- Poor access to health has a relatively higher effect on vulnerable populations, children, elderly, people with disabilities all throughout the corridor.

**RECOMMENDATION**

1A) Locate a BRT station near Good Samaritan Hospital, Bethesda Hospital, and Palm Beach Gardens Medical Center and implement a connecting service to Jupiter Medical Center and St. Mary's Medical Center.

*Responsible agencies: US-1 Corridor Study Team and implemented by Palm Tran, Jupiter Medical Center, and St. Mary's Medical Center.*

**RECOMMENDATION**

1B) Prioritize sidewalks, crosswalk improvements, and pedestrian site access from BRT stations to health clinics and hospitals in the vicinity of Good Samaritan Hospital, Bethesda Hospital, Palm Beach Gardens Medical Center.

*Responsible agencies: Palm Beach TPA in partnership with the FDOT (along state roads), cities and Palm Beach County (along local roads), and hospitals (on hospital property) for implementation.*

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**ISSUE**

- Non-drivers aged 65 and older (many of whom are disabled) take 15% fewer trips to the doctor, 59% fewer shopping trips and restaurant visits, and 65% fewer trips for social, family, and religious activities than those using an individual vehicle.
- Higher than average percentages of disabled population in Gulf Stream and Riviera Beach.

**RECOMMENDATION**

Ensure proper wheelchair and stroller access and maneuverability to bus stops/shelters along US-1. While the proposed BRT stops will be constructed with proper ADA accessibility features, existing bus stops should be evaluated for upgrade and prioritized based on vicinity to over 65 and high concentrations of people with disabilities.

*Responsible agencies: FDOT in partnership with Palm Tran.*

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**ISSUE**

- There are pockets of vulnerable, highly transit-dependent populations along the Corridor, especially in Boynton Beach, Lake Worth, West Palm Beach, and Lake Park.
- Since walking and bicycling are frequently used as means of accessing BRT stations, the presence of BRT frequently leads to active transportation.<sup>39</sup>
- Lack of bike racks at existing bus stops.

**RECOMMENDATION**

Ensure placement of bike racks and SkyBike bike share stations (in West Palm Beach) at BRT stations and high activity bus stops. Every transit rider begins and ends as a pedestrian or cyclist. To properly accommodate cyclist connections to transit, as the BRT preferred alternative advances into project development, conversation between municipalities, Palm Tran, and SkyBike should explore the potential of locating bike racks and bike share stations at BRT stations.

*Responsible agencies: Local municipalities collaborating with Palm Tran and SkyBike (in West Palm Beach)*

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<sup>39</sup> K. Day, "Does Bus Rapid Transit Promote Walking? An Examination of New York City's Select Bus Service," (2014).

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**ISSUE**

- Lack of transit shelters along the US-1 Corridor.
- Hypertension rates throughout Corridor are much higher than average (highest in Juno Beach, Gulf Stream, and Riviera Beach)

**RECOMMENDATION**

Ensure placement of functional shelters at BRT and high activity transit stop to provide protection from rain and sun. This is a critical element of the stress factor in taking transit. Having adequate BRT stations outfitted with proper shelter, lighting, and placement can reduce stress while traveling, especially on hot or rainy days.

*Responsible agency: Palm Tran*

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**ISSUE**

- All 15 of the pedestrian and cyclist fatalities along the US-1 Corridor occurred at night
- Vulnerable populations are disproportionately represented in pedestrian fatalities. These vulnerable populations along the corridor include Boynton Beach, Lake Worth, West Palm Beach, Riviera Beach, and Lake Park.

**RECOMMENDATION**

Provide adequate lighting on road, at bus stops/shelters, and crosswalks (potentially unique lighting identifier on BRT stations)

*Responsible agencies: FDOT and Palm Tran in partnership with cities and Palm Beach County.*

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**ISSUE**

- 82% of bicyclist crashes occurred in locations without a bike lane
- Streetscape and roadway improvements positively influence the propensity to walk, bicycle, and take the bus to transit stations, therefore combating physical activity related negative health outcomes

**RECOMMENDATION**

Provide continuous bike facilities and safe bike conflict strategies at intersections along US-1 Corridor.

*Responsible agencies: The Palm Beach TPA and FDOT in partnership with cities and Palm Beach County.*

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**ISSUE**

- Many of the cyclist/pedestrian injuries and fatalities along the corridor occurred in locations with higher posted speeds (45 mph or higher)
- Speed is exponentially related to the probability of cyclist/pedestrian death. Only 5% of pedestrians are likely to survive an accident with a vehicle traveling at 45 mph, 55% of pedestrians are likely to survive an accident at 30 mph, while 95% of pedestrians are likely to survive an accident at 20 mph.

**RECOMMENDATION**

Implement enhanced street design to discourage high speeds along corridor, especially at high injury/fatality locations in Boca Raton and Juno Beach.

*Responsible agencies: FDOT for implementation*

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## LAND USE

### ISSUE

- The average hypertension rate along the Corridor is 43%, which is 9%-12% higher than county, state, and national averages.
- Children living in urban environments with high levels of greenness had blood pressures that were 0.90 mmHG lower than children living in urban environments with low levels of greenness.<sup>40</sup>

### RECOMMENDATION

Preserve and promote green space and infrastructure near transit stops. There is potential to require developers around BRT stations to include green space and green infrastructure like rain gardens, pocket parks, and rooftop gardens as part of development plans.

*Responsible agencies: Local municipalities, Palm Beach County with support of developers*

### RECOMMENDATION

“Adopt a Stop” – residents / volunteers / frequent travelers to assist with station clean up and information to the transit commuters. Incentivize businesses in station area to “adopt a stop” as well.

*Responsible agencies: Palm Tran in partnership with the Palm Beach TPA, local municipalities, Palm Beach County, and FDOH.*

## MARKETING AND EDUCATION

### ISSUE

- Research suggests that obesity, diabetes, hypertension, and obesity rates tend to be inversely related to use of alternative modes like walking, cycling, and public transit.
- About 5% of Route 1 riders are full- or part-time college students

### RECOMMENDATION

Market existing transit connections to/from Florida Atlantic University, Palm Beach State College, Palm Beach Atlantic, and technical schools. Example: UF with RTS and University of Miami subsidy program.

*Responsible agencies: Palm Tran with support from colleges and universities near the corridor (Florida Atlantic University, Palm Beach State College, Palm Beach Atlantic, and technical schools)*

<sup>40</sup> Iana Larkevych, “A Cross-Sectional Analysis of the Effects of Residential Greenness on Blood Pressure in 10-Year Old Children, (May 2014).

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**RECOMMENDATION**

Market existing transit connections and future BRT transit connections between large employers along the Corridor. These employers include Next Era Energy, Bethesda Memorial Hospital, Good Samaritan Hospital, St. Mary's Medical Center, Boca Raton Resort and Club, and Hospice of Palm Beach County. Examples include supplying major employment centers with transit marketing material, marketing within BRT buses, and outreach efforts to large employers encouraging the incentivizing transit usage.

*Responsible agencies: South Florida Commuter Services (FDOT), Palm Tran, and large employers within the US-1 Corridor*

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**RECOMMENDATION**

Locate job training facilities near US-1 transit stations. Similar to the existing Palm Beach Training Centers, but located within the BRT TOD Station planned areas.

*Responsible agencies: Municipalities in partnership with organizations like Career Source and Palm Beach State College*

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**ISSUE**

- Approximately 20% of US-1 Corridor survey respondents indicated at least sometimes being unable to get to work or health care services along US-1 due to public transportation issues
  - Several communities along the corridor do not have good walking access (1½ mile) to a health care clinic or hospital. These communities include near the border of Boynton Beach and Hypoluxo, northern Lake Worth, Riviera Beach, and the neighborhoods along the portion of US-1 between Juno Beach and Jupiter.
- 

**RECOMMENDATION**

Market public transportation, and the future BRT service, to Bethesda Memorial Hospital, Good Samaritan Hospital, St. Mary's Medical Center, and adjacent health clinics.

*Responsible agencies: Palm Beach County Health Department with support from the Health Care District of Palm Beach County, American Heart Association, primary care clinics, and Palm Tran.*

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**ISSUE**

- The average hypertension rate along the Corridor is 43%, which is 9%-12% higher than county, state, and national averages.

**RECOMMENDATION**

Much of the stress associated with taking transit is related to uncertainty of on-time performance. Real-time transit apps might not have control over the actual wait time, but research suggests that it has a great effect on the "perceived" wait time of the rider. In order to drive riders to using such an app, it is recommended that marketing of the existing MyStop and/or Transit App be increased. If one application is preferred, a competition/vote for best real-time app can be held and the winning app can be marketed as the "official" app of Palm Tran in order to drive usage and enhance the rider experience.

*Responsible agencies: Palm Tran, supported by the Palm Beach TPA, with participation from private app developers.*

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**ISSUE**

- High frequency of bicycle and pedestrian injuries and fatalities along the Corridor (2-4 injuries/fatalities per mile over a 5 year period).
- Prevalence of obesity in the corridor (30%) is higher than county, state, and national averages. These issues are especially severe in Lantana and the vulnerable populations identified along the corridor.
- In the US-1 Corridor, survey, most respondents (55%) indicated that they walk less than once per week along US-1.
- A lack of physical activity, in addition to poor nutrition, is a major cause of obesity in adults. As a result, obesity rates tend to be inversely related to use of alternative modes (walking, cycling, public transit)<sup>41</sup>
- People with safe places to walk within ten minutes of home are twice as likely to meet physical activity targets.<sup>42</sup>

**RECOMMENDATION**

Increased speed enforcement officers in areas with high occurrences of bike and pedestrian fatalities / injuries. These locations include segments along US-1 from Camino Real to Hidden Valley Blvd; and Lantana Road to 59th Street.

*Responsible agencies: Palm Beach County Sheriff's Office in partnership with FDOT.*

**RECOMMENDATION**

Develop marketing and enforcement strategy around crosswalks to promote safe yielding and crossing behavior. Institute something similar to WalkSafe program (Miami-Dade County). The WalkSafe program, implemented in a single high-risk district, was shown to improve the pedestrian safety knowledge of elementary school children. A before and after research study was conducted, and the observational data demonstrated improved crossing behaviors.

*Responsible agencies: FDOT (Alert Today Alive Tomorrow) in partnership with Palm Beach TPA, School District, local police departments, Safe Kids Palm Beach County.*

**RECOMMENDATION**

Educate cities and Palm Beach County on benefits of TOD policies to promote increased network, density, walkability, street trees, shared parking, etc. This can be done through the use of workshops, trainings, etc.

*Responsible agencies: Palm Beach TPA in partnership with the cities, Palm Beach County, and FDOT.*

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<sup>41</sup> Todd Litman, "If Health Matters," (April 2014).

<sup>42</sup> K. Day, "Does Bus Rapid Transit Promote Walking? An Examination of New York City's Select Bus Service," (2014).

## POLICY

### ISSUE

- There are two food deserts along the corridor – the census tract surrounding SR 804 in Boynton Beach, and the census tract to the west of US-1 in Riviera Beach

### RECOMMENDATION

Coordinate with the United Way Food Insecurity project and other efforts to increase access to healthy foods in the US-1 Corridor, especially in food deserts. Explore the potential of locating healthy food sources in transit station areas, and provide incentives for healthy food establishments to locate in station areas (especially in food deserts).

*Responsible agencies: United Way partnering with Florida Department of Health (Community Services), Hunger Advisory Council, and other organizations part of the project.*

### RECOMMENDATION

Develop food zoning policies to encourage the development of community gardens, food trucks, etc. An example of this policy is in Lake Worth, where policies have been developed including sections dedicated to urban farms, community gardens, and promoting local food production. In Ft. Lauderdale, urban farms are permitted in most non-residential zoning and community gardens are permitted in most zoning districts.

*Responsible agencies: City of Riviera Beach and City of Boynton Beach, in coordination with the FDOH (Community Services) and Palm Beach County*

### ISSUE

- The reductions in travel time and the improvements in quality of service associated with implementation of a new transit line [such as BRT] often get capitalized into higher land value, as residents and businesses are willing to pay a premium to be closer to transit stations.<sup>43</sup>
- Some displacement mitigation may be needed in vulnerable population communities near proposed transit-oriented development sites, especially in areas of low land values including Lake Worth, Riviera Beach, Lake Park, and Lantana

### RECOMMENDATION

Preserve existing affordable housing within the US-1 Corridor through transit-oriented inclusionary zoning and Community Land Trusts (CLTs).

Inclusionary zoning requires developers to set aside a portion of their development as affordable; inclusionary zoning requirements in station areas could help prevent the pricing out of local landowners. CLTs are housing non-profit organizations that help provide permanently affordable housing. There are many examples in Palm Beach County. It is recommended that targeted efforts be focused at TOD areas proposed in the US-1 Multimodal Corridor Study.

*Responsible agencies: Local municipalities partnering with the Palm Beach County Department of Housing and Economic Sustainability*

<sup>43</sup> Aileen Carrigan, "Social, Environmental, and Economic Impacts of BRT Systems" (2013).

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**ISSUE**

- High frequency of bicycle and pedestrian injuries and fatalities along the Corridor (2-4 injuries/fatalities per mile over a 5 year period).
- Prevalence of obesity in the corridor (30%) is higher than county, state, and national averages. These issues are especially severe in Lantana and the vulnerable populations identified along the corridor.
- In the US-1 Corridor, survey, most respondents (55%) indicated that they walk less than once per week along US-1.
- People with safe places to walk within ten minutes of home are twice as likely to meet physical activity targets.<sup>44</sup>
- The average hypertension rate along the Corridor is 43%, which is 9%-12% higher than county, state, and national averages.
- Researchers observed a 42% lower risk of hypertension among those who moved from low- to high-walkability neighborhood.<sup>45</sup>

**RECOMMENDATION**

Institute TOD policies that promote increased network, density, walkability, street trees, shared parking, etc. Where possible, the design elements shown in the demonstration area assessments should be pursued to do so.

*Responsible agencies: Local municipalities and Palm Beach County partnering with TPA*

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<sup>44</sup> K. Day, "Does Bus Rapid Transit Promote Walking? An Examination of New York City's Select Bus Service," (2014).

<sup>45</sup> Maria Chiu, "Moving to a Highly Walkable Neighborhood and Incidence of Hypertension," (2015).



A decorative graphic in the top right corner of the page. It features several overlapping chevron shapes pointing towards the top right. The colors of these chevrons are red, blue, dark blue, green, and orange. A thin, light green circle is partially visible, overlapping the chevrons and extending towards the bottom right of the page.

# FUTURE ACTION ITEMS

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## EVALUATION AND FOLLOW-UP

As part of the Palm Beach TPA’s ongoing relationships with Palm Tran, the local partners along the US-1 Corridor, and the HIA Working Group, the TPA will track and document the impact of the US-1 Multimodal Corridor Study through implementation on the health indicators described in this report.

The Palm Beach TPA can also work with regional and local partners to incorporate priority recommendations from this HIA into decisions related to the Region’s enhanced transit system.

It is recommended that the Palm Beach TPA follow a monitoring plan that determines the following:

1. Which recommendations in this HIA have been enacted to promote and improve health along the US-1 Corridor?
2. As a direct result of the US-1 HIA’s Primary Recommendations, what is the evidence showing change in the overall community health along the US-1 Corridor?
3. As a direct result of the US-1 HIA’s Secondary Recommendations, what is the evidence showing change in the overall community health along the US-1 Corridor?

The following outlines baseline numbers referencing currently-available data. These statistics should be used as a baseline for monitoring the health conditions in the communities along the US 1 Corridor in the future.

1. Access to Health
2. Physical Health Indicators
3. Bike and Pedestrian Injuries and Fatalities
4. Economic Health

ACCESS TO HEALTH			
INDICATOR	STATISTICAL AGENCY	TIMING	BASELINE
Transit travel time along US-1 Corridor	Palm Tran	2 years	2.5-3 hours from Camino Real (Boca Raton) to The Gardens Mall (Palm Beach Gardens)
Transit travel time from low health care access locations to nearest hospital / health care clusters	Palm Tran	2 years	26-28 minutes (avg. AM/PM peak) from Gateway Boulevard to Bethesda Hospital East in Boynton Beach 39-50 minutes (avg. AM/PM peak) from Gregory Rd to Good Samaritan Medical Center in West Palm Beach 15-19 minutes (avg. AM/PM peak) from West 13th Street in Riviera Beach to Good Samaritan Medical Center in West Palm Beach No transit between Juno Beach and Jupiter
Number of food desert tracts within 1 mile of corridor	Palm Beach TPA	5 years	5 tracts in areas of Riviera Beach and Boynton Beach

## PHYSICAL HEALTH INDICATORS

INDICATOR	STATISTICAL AGENCY	TIMING	BASELINE
Percentage of adults with obesity (Corridor-wide)	Department of Health	Annual	29.5%
Percentage of adults with diabetes (Corridor-wide)	Department of Health	Annual	14.3%
Percentage of adults with hypertension (Corridor-wide)	Department of Health	Annual	43.0%
Percentage of adults with asthma (Corridor-wide)	Department of Health	Annual	8.4%
Percentage of adults with depression (Corridor-wide)	Department of Health	Annual	16.7%

## BICYCLE AND PEDESTRIAN SAFETY

INDICATOR	STATISTICAL AGENCY	TIMING	BASELINE
Bicycle crashes (last 5 years)	Palm Beach TPA	3 years	135 crashes (it is recommended that future stats be normalized with bicycle exposure data)
Pedestrian crashes (last 5 years)	Palm Beach TPA	3 years	186 crashes (it is recommended that future stats be normalized with pedestrian exposure data)
Bicycle and pedestrian fatalities (last 5 years)	Palm Beach TPA	3 years	15 fatalities
Bicycle and pedestrian fatalities occurring at night (last 5 years)	Palm Beach TPA	3 years	15 fatalities
Workers commuting by public transportation, walking, or biking	Palm Beach TPA	5 years	6.8%
Pedestrian activity	Palm Beach TPA	2 years	No Baseline
Bicyclist activity	Palm Beach TPA	2 years	No Baseline

## ECONOMIC HEALTH

INDICATOR	STATISTICAL AGENCY	TIMING	BASELINE
US-1 Corridor population density	Palm Beach TPA	2 years	6.7 persons/acre
Average taxable land value of properties immediately adjacent to the US-1 Corridor	Palm Beach TPA	5 years	\$752,000/acre
Average taxable land value within one (1) mile of the US-1 Corridor (excluding barrier island properties)	Palm Beach TPA	5 years	\$725,000/acre
Number of new businesses	Palm Beach TPA and Palm Beach County	Annual	No baseline
Workers commuting by transit, walking, or bicycling	Palm Beach TPA	5 years	3.0% Transit 2.5% Walk 1.3% Bicycle
Household units within inclusionary zoning boundaries or Community Land Trust	Palm Beach County and local Community Land Trust	2 years	XX Units



**US-1 MULTIMODAL CORRIDOR STUDY**  
Health Impact Assessment Appendix