

Phase I Report

Transit Suitability Analysis: A GIS-based approach to identifying the unrealized potential of Pinellas Suncoast Transit Authority (PSTA) transfer points

Pinellas County, Florida

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1. INTRODUCTION

As the Metropolitan Planning Organization (MPO) for Pinellas County, Forward Pinellas is committed to working with local, regional, and state partners to improve the accessibility of destinations for residents and visitors alike. Across the country there are numerous examples of the variety of benefits that can be realized when strategic transit investments are made to serve land uses that are compact, diverse, and accessible by various modes of travel. It is the intent of this project to make recommendations to the Pinellas Suncoast Transit Authority (PSTA) that, if implemented, will result in an increased level of walking, biking, and transit use which are essential elements to improving the livability of a place, corridor or area.

This report is the first phase of a multi-step examination conducted by Forward Pinellas, as part of the agency's Transit Suitability Analysis project. The Transit Suitability Analysis project will provide PSTA, its partner agencies, and member local governments with a methodology to identify opportunities to better position transit service in areas with supportive land use patterns, existing riders & potential choice riders, and prospects for better integration of transit access with the built environment in Pinellas County.

1.1 Purpose

The purpose of the Transit Suitability Analysis project is threefold:

- a) To develop a geographic information system (GIS)-based methodology for identifying opportunities for improving multimodal accessibility throughout Pinellas County;
- b) To apply this methodology at a countywide scale and identify locations within PSTA's service area where changes in transfer point location (stop locations or transfer centers where two or more routes converge) or amenities could result in enhanced walkability and increased transit usage; and
- c) To make recommendations to further evaluate up to six transfer points, with the ultimate goal of advancing these locations to more detailed conceptual design for future public outreach, project planning and implementation.

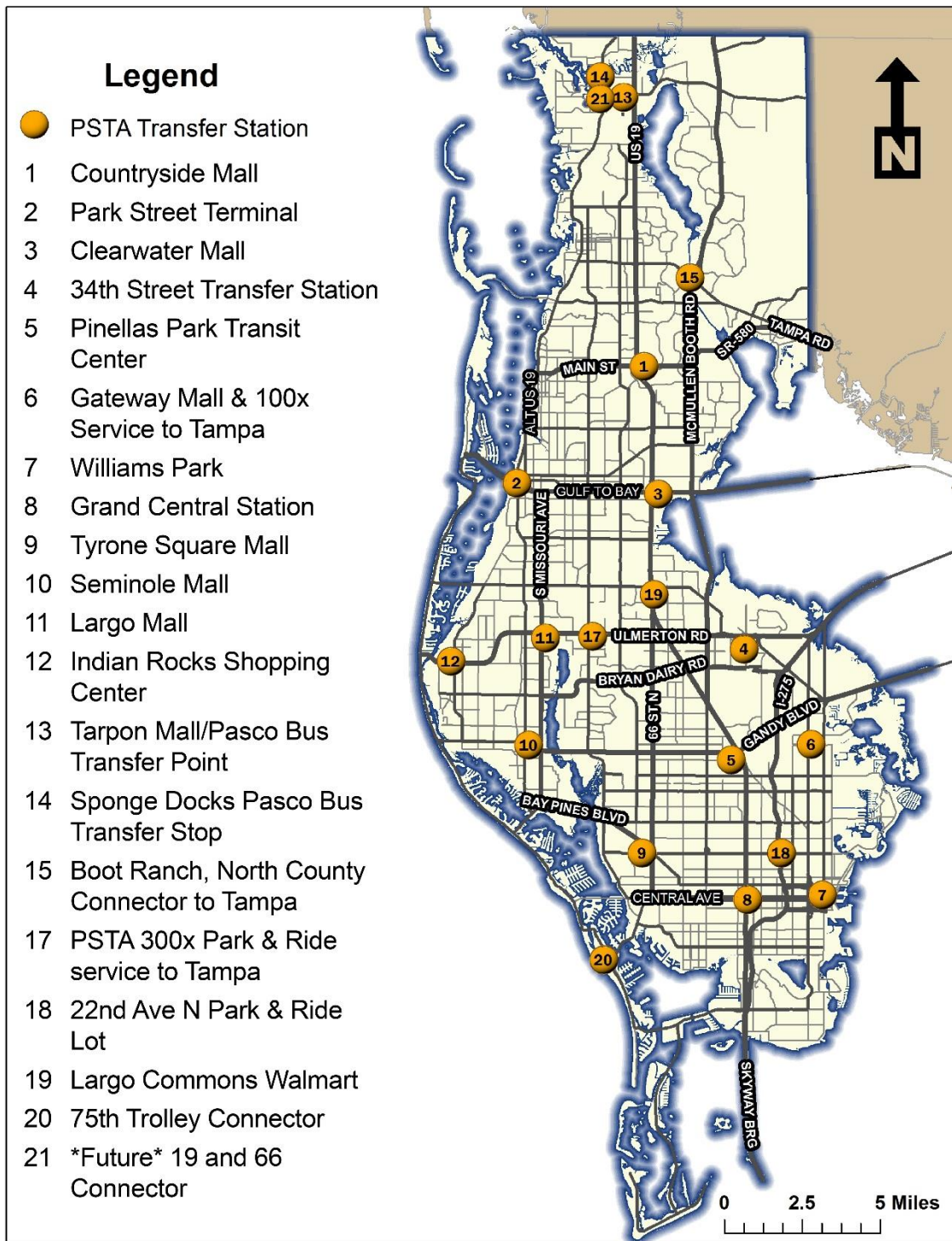
The project approach entailed an evaluation of 20 PSTA transfer points (see Figure 1), analyzing each using GIS datasets to identify where adjustments in "Density," "Diversity," and "Design" can improve transit usage. Each transfer point was analyzed and scored, in consultation with the study management team, to balance quantitative and qualitative perspectives. The selected transfer points will advance to a conceptual planning phase that will be performed later, and will provide a land use-transportation planning foundation for the development of the Forward Pinellas 2045 Long Range Transportation Plan.

1.2 Objectives and Outcomes

The primary objective of the Transit Suitability Analysis project is to identify opportunities to improve transfer points that will enhance the transit experiences and attract more people to use transit through increased accessibility, comfort, and system efficiency. Other desired outcomes include maximizing the redevelopment potential through land use and transit integration, recognizing transfer points as "multimodal hubs" that provide a seamless transition between travel

modes, and reducing conflicts between pedestrians, bicyclists, and motorists through the identification of safe, direct pathways to desired destinations.

Figure 1 - Map of PSTA Transfer Locations



2. METHODOLOGY

ArcGIS is a scalable, comprehensive software tool that Forward Pinellas uses to manage, analyze, and display numerous datasets that model various transportation, land use, and economic information. For this project, a geodatabase was created to analyze and identify areas around Pinellas County, aggregated in half-mile grids, that may be suitable for additional transit investment based on metrics applied in the categories of “Density,” “Diversity,” and “Design.” This approach was developed in close consultation with the study management team, which included PSTA staff, the Technical Coordinating Committee (TCC), the Planners Advisory Committee (PAC), and the Transportation Mobility Management Advisory Committee (TMMAC), who provided input and guidance throughout this phase of the project.

2.1 Density

Density measures the compactness, or concentration of variables in a defined area. It is a generally accepted view that fairly dense urban development is essential to successful transit operations. For this analysis, population, employment, future land use, poverty, and minority concentrations were assigned a point value and mapped within ½ mile grid squares as shown below and in Figure 2.

Population (0-3) - Strengthening traditional population centers and supporting targeted growth throughout Pinellas County is one way to support transit. Dense and diverse residential typologies, located in close proximity to transit service provides residents with another travel option for their daily needs.

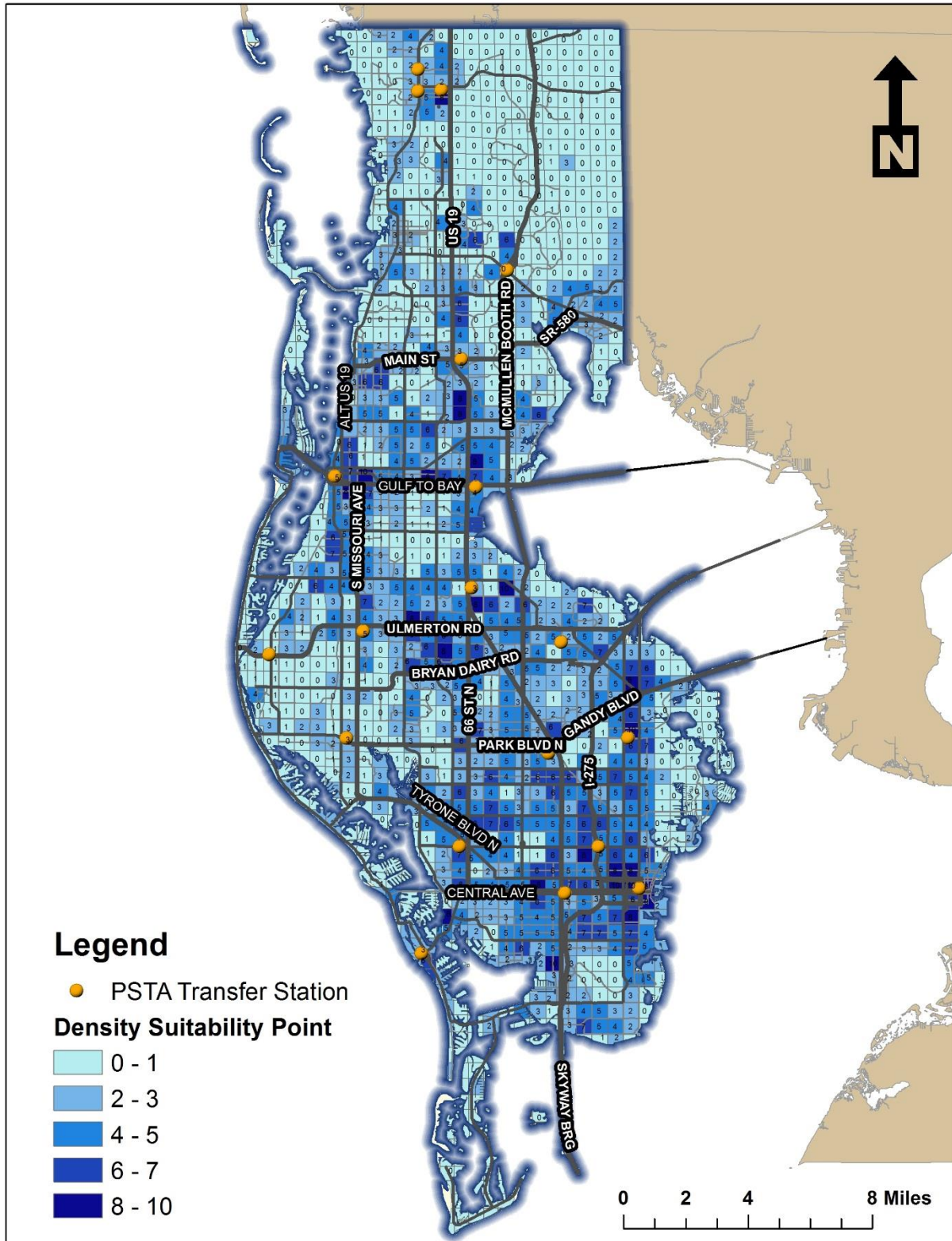
Employment (0-3) - Employment hubs, places where manufacturing, office, and research/development are concentrated, are key elements that align with transit in order to move people to and from jobs. Areas of the county that are developed or appropriate to be developed, in a cohesive pattern received a higher score in the matrix.

Policy (0-2) - The Countywide Plan directs densities and intensities to centers of business, cultural, and residential activity. The Plan classifies varying types of Activity Centers and Multimodal Corridors and designates these as areas of future growth which should be well-served by transit.

Poverty & Minority (0-2) - A key factor in this effort is providing current and historically transportation disadvantaged populations with due consideration based on their need to use to transit to access jobs and services. Areas with a higher proportion of the population that fall below the poverty line and/or are located in predominately minority communities were included in the analysis.

Density Scoring Matrix (population + employment + policy + poverty & minority)	
Very Low	0-1
Low	2-3
Medium	4-5
High	6-7
Very High	8-10

Figure 2 - Map of Density Scores



2.2 Diversity

Highly accessible areas have a rich mix of complementary uses in close proximity to one another which reduces the need to travel by car for daily needs. The ease with which various types of people can reach goods, services, and activities directly impacts the travel choices that are made every day. Mixed-use destinations are a key factor that influence an area’s walkability and household transportation costs. A mix of land uses, including residential, with access to the shops and services required for daily living that is well integrated with transit, will be supported as the concentration and diversity of activity increases. Unfortunately, a majority of the development activity in Pinellas County occurred during the post-World War II time period and reflects a Euclidean-based approach to zoning by separating uses. If transit is to be successful, the built environment must change to conform to current land development regulations that encourage a development pattern that is more reflective of the pre-World War II time period. The age and/or value of buildings are other factors that influence the likelihood of redevelopment due to market pressures. The diversity metric quantifies the variability of the land use characteristics of Pinellas County as well as the propensity for redevelopment in terms of mix of land uses, building-to-land value, and age of structure. Below is an outline of the diversity scoring and Figure 3 shows how this information was mapped in ArcGIS.

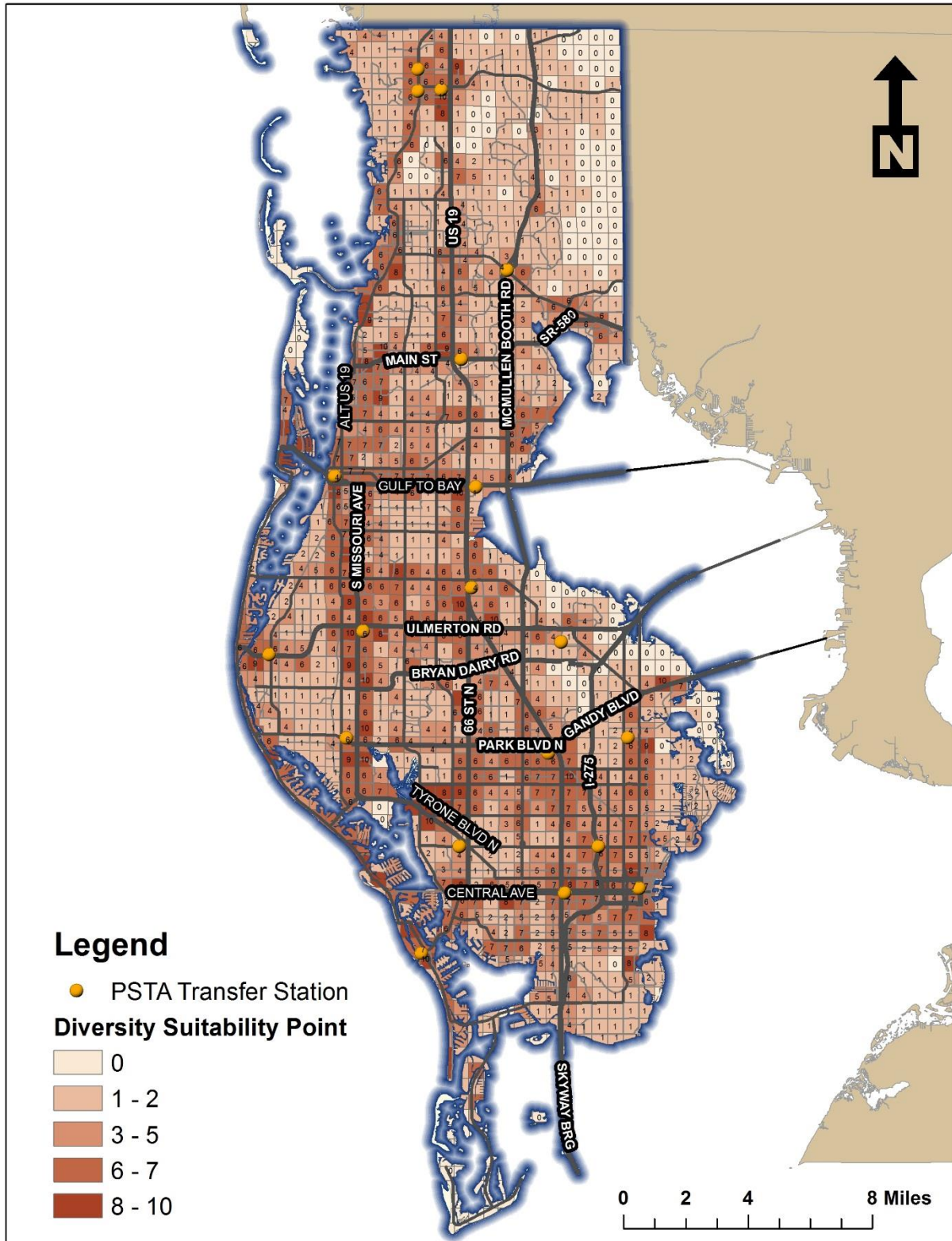
Mix of Land Uses (0-5) - A bustling, mixed-use center contains a combination of uses with a small footprint which can be effectively served by transit. Identifying these centers around Pinellas County which may be in established downtowns or emerging mixed-use areas, at a density/intensity that is favorable to transit use, was a major consideration of this effort.

Building-to-Land Value (0-3) - Land and building value indicators show how market forces can impact the potential for land uses to redevelop. Properties where the value of the structure is less than the value of the land is an indicator of strong market pressure. In this analysis, a property with a high land value and a low building value were scored higher.

Structure Age (0-2) - The structure age can determine its readiness for redevelopment, and coupled with the “effective age” can demonstrate the likelihood of future investment to enhance the value of a building. Buildings that are ripe for redevelopment typically have an effective age of between 1945 and 1980.

Diversity Scoring Matrix (mix of land uses + employment + building-to-land value + structure age)	
Very Low	0
Low	1-2
Medium	3-5
High	6-7
Very High	8-10

Figure 3 - Map of Diversity Scores



2.3 Design

Urban centers and corridors are essential to increased socio-economic diversity and attractive public places. Access to jobs and services is increased and there is a greater likelihood of social interactions occurring on the street when walking is safe, comfortable, and convenient. Low density residential neighborhoods or suburban business parks, are typically underutilized during long periods of time and have low levels of accessibility because of inefficient road networks, large building setbacks, etc. On the other hand, an urban environment with good roadway connectivity, short block lengths, and building entrances that relate to the street are often used around-the-clock, all days of the week, during all seasons, and are accessible by various modes of travel. The design metric spatially quantifies the density of the road network, average block size, building setbacks, the density of intersections, and the link-node ratio as shown in Figure 4.

Road Density - The linear miles of roadways were measured, and a higher number indicates increased connectivity and transit readiness. Places with more roads, that are dense and more connected received a higher score.

Block Size - Smaller blocks, with shorter distances between blocks are ideal for pedestrians, bicyclists, and transit users. An area with smaller blocks received a higher score.

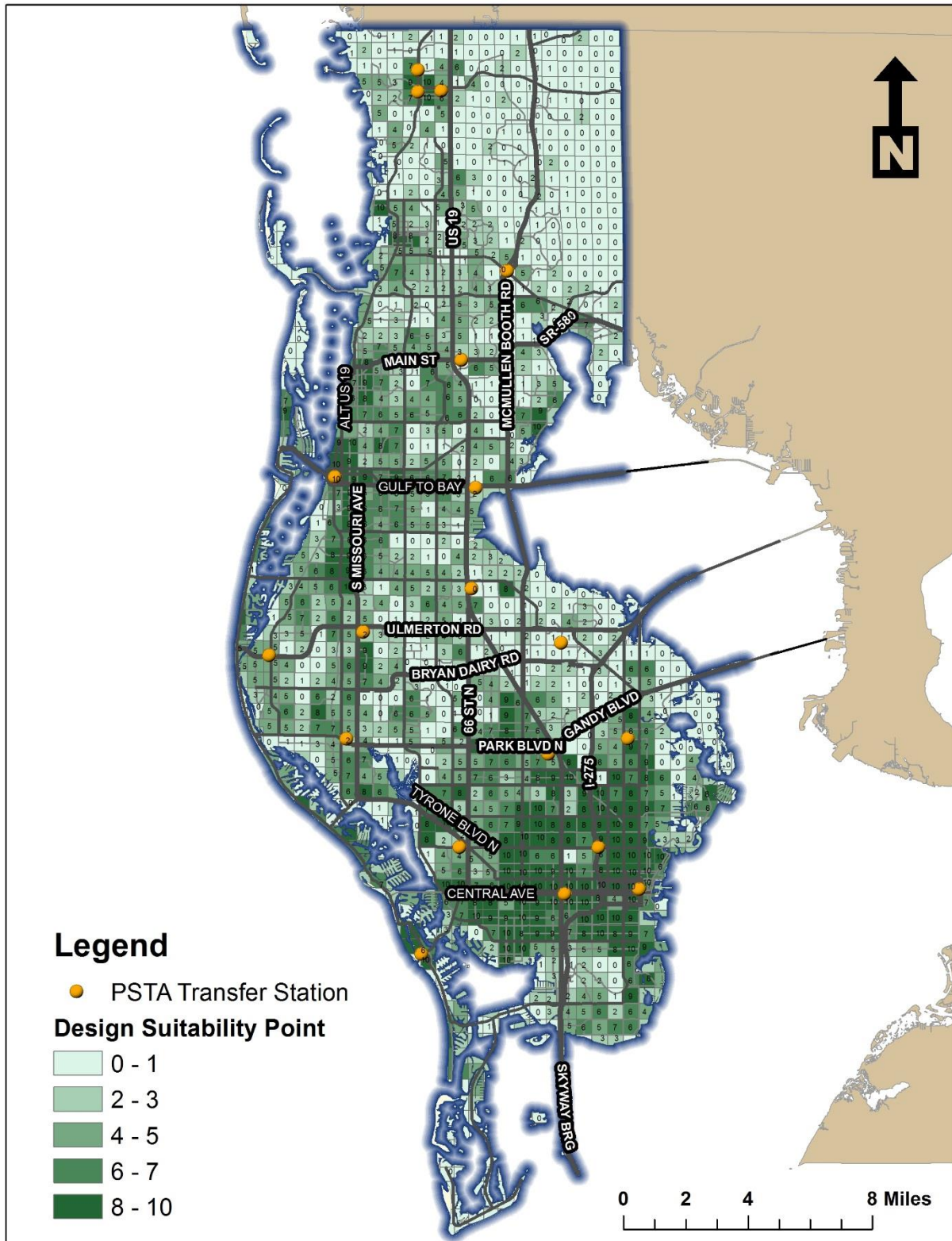
Building Setbacks - Building placement and orientation is critical to enhancing the character of a community or development and promotes pedestrian activity. Buildings should be oriented toward streets and have easily recognizable and accessible primary entries. For this effort, the distance between the centerline of the road and the façade of the building was measured and areas with a well-defined street wall received a higher score.

Intersection Density - A higher number of intersections indicates shorter travel distances and a greater number of routes to jobs and services. Smaller blocks with more intersections and shorter distances between destinations are correlated with higher levels of walkability and received a higher score.

Link-Node Ratio - A balanced ratio between roadways and intersections indicates a connected network, and more available direct route options. Paths are traveled easier if roadways have more options to change direction and access their destination in the quickest, most direct route. For this analysis, a balanced link-node ratio received a higher score.

Design Scoring Matrix (road density + block size + building setbacks + intersection density + link-node ratio)	
Very Low	0-1
Low	2-3
Medium	4-5
High	6-7
Very High	8-10

Figure 4 - Map of Design Scores



3. SUITABILITY ANALYSES

Areas with high potential suitability for increased transit usage were identified through a heat mapping exercise that allocated “points” as described above. These factors help determine locations with the potential to be focal points of mixed-use development and are fit for transit-supportive redevelopment. For example, while population density is itself a factor, as it would be for most transportation demand analyses, equal weight was given to employment density, as well as “policy-driven” designations as outlined in the Countywide Plan. The scoring was further modified in order to adequately account for existing and planned densities that could result in a higher level of transit usage. The results of the “Density,” “Diversity,” and “Design” exercise are discussed in further detail below. Not surprisingly, the analysis shows most transit suitability concentrated in the existing downtown areas of Pinellas County as well as some of the barrier island communities. The fact that these areas generally are not contiguous and are relatively spread out from one another represents an ongoing challenge to provide robust transit service that connects existing riders & potential choice riders to their destinations.

The key to further understanding the potential for increased transit suitability is to use this quantitative heat mapping analysis as a first screen of PSTA’s transfer points. Depending on the location, size, and other factors, many of PSTA’s transfer points are located in areas that received a high suitability score, have a higher level of amenities, and are integrated with the surrounding land uses. For example, the Park Street Terminal in downtown Clearwater and Grand Central Station in St. Petersburg both received scores in the mid-20s, supporting the current and planned investment in those areas. Outside of these downtown areas, the other areas receiving higher scores could benefit from further analysis to identify how the areas could be enhanced to improve accessibility and safety. Review of the results of the heat mapping exercise with PSTA staff also revealed several transfer points that received lower scores but could experience higher ridership with low-cost improvements to or modifications of the transit infrastructure and/or service in certain areas.

3.1 Density Analysis

Across the board, the Density score reveals that downtown areas throughout Pinellas County have a favorable environment for transit. Downtown Clearwater, Largo, and St. Petersburg performed exceptionally well, along with major corridors like State Road 60 (Gulf to Bay Boulevard), East/West Bay Drive, and 4th Street North. These areas contain a denser population, access to a greater amount of jobs, and are within close proximity to the transportation disadvantaged. Population densities are concentrated around the traditional centers of St. Petersburg, Clearwater, and Largo, along major corridors like 4th Street North and 54th Avenue North. Employment follows suit and has a strong presence in the larger cities as well as in the Gateway and Carillon areas where manufacturing, services, and industrial employers tend to concentrate. The policies contained in the Countywide Plan direct densities towards Activity Centers, Employment Centers, and Multimodal Corridors that have both employment and residential activity and are served by transit. These areas are positioned around the County roughly from downtown Clearwater, south towards Largo, east towards the Gateway area, throughout downtown St. Petersburg, and along corridors like U.S. Highway 19.

Consistent with the 2040 Long Range Transportation Plan (LRTP), low income and minority individuals are recognized as populations in need of strong transit accessibility. Concentrations of people with a greater need of transit access are located throughout the County but are more concentrated in dense urban settings such as Clearwater and downtown St. Petersburg.

3.2 Diversity Analysis

Mixed-use developments are usually compact and allow for multiple modes of travel, and a growing number of local codes require transit friendly elements. Downtown areas, like St. Petersburg, Clearwater, Largo, and St. Pete Beach are good examples of this, containing many diverse land uses within a small area footprint with a high level of transit amenities.

Similarly, land and building characteristics reveal readiness for redevelopment. The ratio between land and building value, where the value of the structure is less than the value of the underlying land, shows market demand and signs of redevelopment potential. A great example of this occurs in Pinellas County's barrier island beach communities, where land is at a premium, and developers are likely to see a return on their investment from improvements to certain properties.

Priority scoring was given where a significant number of properties had a favorable land-to-building value ratio, and these areas include portions of Largo, St. Petersburg, Palm Harbor, Safety Harbor, and all along Gulf Boulevard from Clearwater Beach to St. Pete Beach.

Effective age, or the year a building was renovated last, is a good metric for showing market demand. Areas ripe for redevelopment, as determined by effective building age, are located throughout the county. The effective building age can help determine redevelopment potential. For example, large swaths of land in Clearwater, Pinellas Park, St. Petersburg and Dunedin were built mid-century, and determined to be redevelopment-ready.

3.3 Design Analysis

Designing our environment and roadways to be more transit supportive and pedestrian friendly is important so that more people can travel safely and efficiently. Transit supportive areas include those established in the Pre-World War II time period and exhibit a tight grid of streets where people are within a short walking-distance of their daily needs. Areas with smaller block sizes and building setbacks that are close to the road also lend themselves well towards transit. For example, the Pass-a-Grille community has very short block sizes due to its constrained geography and has a high level of resident and visitor pedestrian activity. Counter to this, areas with large lots and large building setbacks make travelling by foot to destinations difficult. Conflicts arise when vehicular traffic compete with other modes of transportation, making pedestrian activities like crossing the street, dangerous.

Most of Pinellas County's traditional downtown areas performed exceptionally well in the design analysis portion, as they exhibit features like small block sizes and building setbacks close to the road, in a dense, grid network. Cities like Tarpon Springs, Safety Harbor, and Dunedin serve as destinations and contain a lot of walkable features where people can travel by foot to reach restaurants, retail, and service uses. This trend is continued on a larger scale in downtown Clearwater, Largo, and St. Petersburg which exhibit the characteristics for transit supportive design. Further, the barrier island beach communities yielded higher scores because of their

compactness and varied, walkable destinations. The City of St. Pete Beach performed best of all the beach communities for several reasons including, small block sizes, narrow building setbacks, and high intersection density.

4. RECOMMENDATIONS

People and goods can move more efficiently as accessibility increases in our communities. Pinellas County has very few vacant, developable parcels of land, but continues to urbanize, and is projected to add as much as 67,000 persons to its population by the year 2040. That projection is already appearing to be low, and a new 2045 projection will likely show higher population totals as the Tampa Bay region continues to grow. Expanding the travel options for residents and visitors gives the region the ability to respond to growth pressures while maintaining the quality of life many have come to expect.

As described earlier, transit accessibility was screened using the “Density,” “Design,” and “Diversity” criteria. First, Pinellas County was divided into a series of half-mile grids, and weighted criteria and point values were assigned to each cell. The three composite scores from each section measuring densities, land use diversity, and urban design criterion were compiled resulting in a final composite map (see Figure 5) showing where transit is likely to perform best. Next, the Forward Pinellas and PSTA staff conducted a review of the combined scores paying special attention to areas that have a high likelihood of better transit usage if modifications were made to the infrastructure and/or land use character.

4.1 Transfer Points Recommended for Further Study

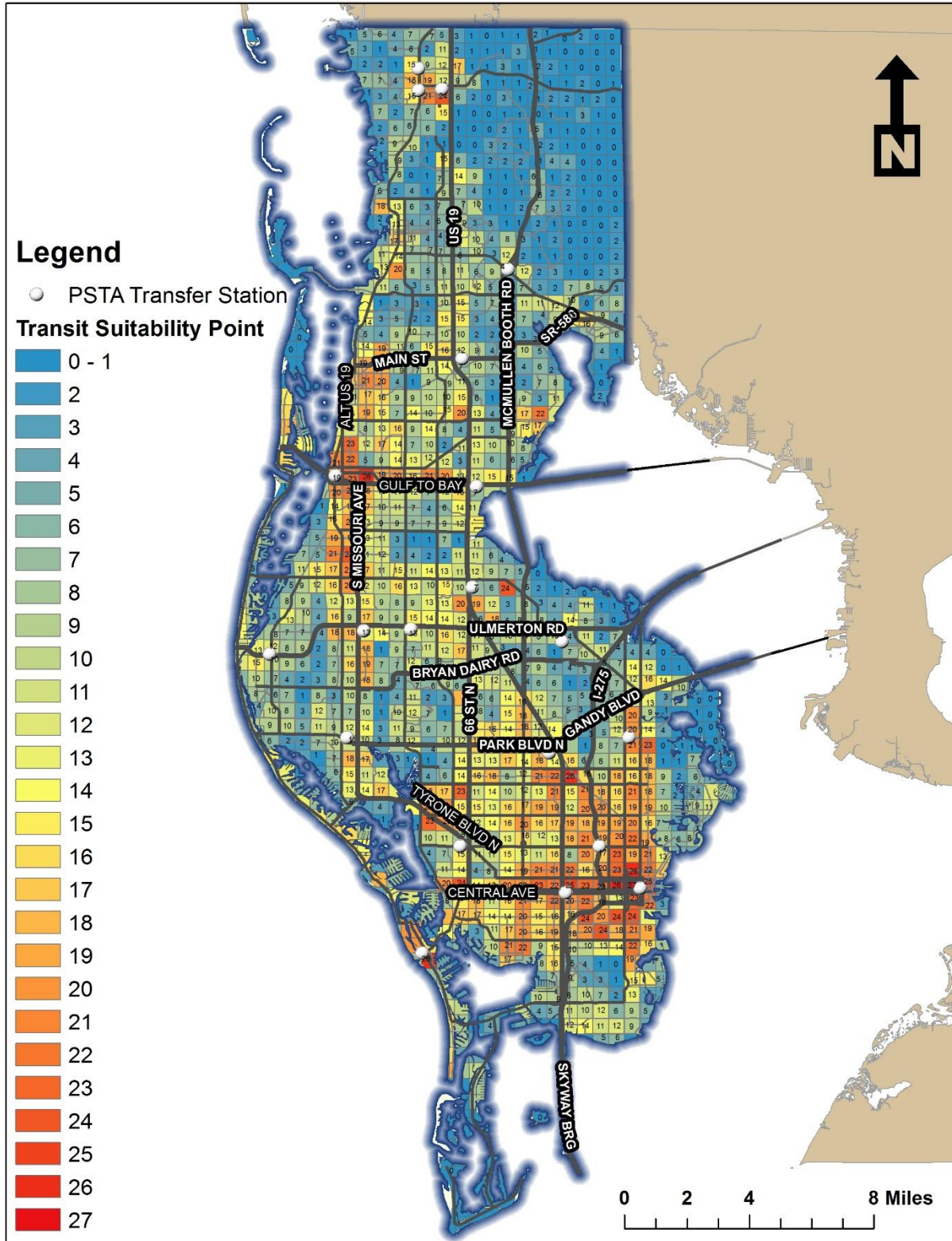
Figure 5 shows how the various half-mile grid squares fared in the composite analysis of the criterion outlined in the previous sections of this report. The red “hot spots,” are areas in Pinellas County that exhibit supportive transit characteristics, and are likely to be more walkable, dense, close to employment, have a diversity of land uses, and are more favorable to redevelopment. Areas shown in blue, however, exhibit the least supportive transit characteristics, and show land uses typical of suburban development patterns. Areas that performed in the middle range of scores (yellow) show where the built environment should adopt more transit supportive design in order to increase the ability to reach goods, services, and activities using a variety of transportation modes.

Based on the results of the mapping exercise and input from the study management team, the following transfer points were recommended to advance to Phase II of this effort:

- Countryside Mall
- Clearwater Mall
- Largo Mall
- Downtown Largo
- Tarpon Springs
- Downtown Oldsmar

Below lists the PSTA transfer points and review of each location in further detail.

Figure 5 - Composite Map of Density, Diversity, and Design Scores



A. Countryside Mall

Converging Routes: 19, 61, 62, 67, 76, 78, North County Connector

Composite ½ Mile Grid Score: 7

Transit Stop Amenities: Shelters, Trash Receptacles, Bicycle Racks, Real-Time Info. Kiosk

Existing Activity Center/Multimodal Corridor: Yes

Number of Employers within ½ Mile: 432

Number of People within ½ Mile: 2,075



B. Clearwater Mall

Converging Routes: 19, 60

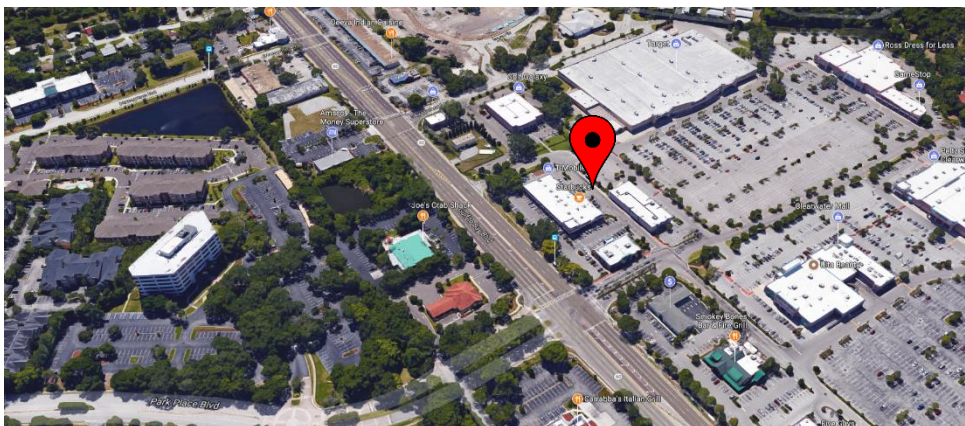
Composite ½ Mile Grid Score: 7

Transit Stop Amenities: Shelter, Trash Receptacle, Bicycle Rack

Existing Activity Center/Multimodal Corridor: Yes

Number of Employers within ½ Mile: 241

Number of People within ½ Mile: 2,712



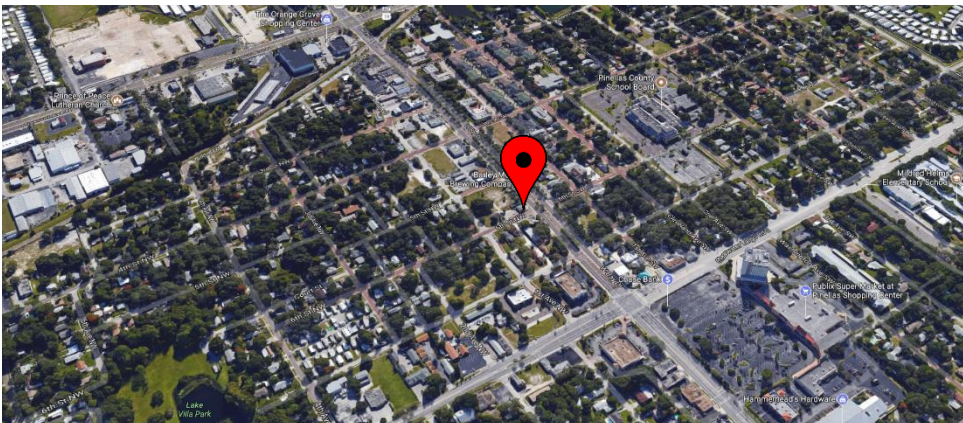
C. Largo Mall

Converging Routes: 52, 98, 73
Composite ½ Mile Grid Score: 13
Transit Stop Amenities: Bench, Trash Receptacle
Existing Activity Center/Multimodal Corridor: Yes
Number of Employers within ½ Mile: 233
Number of People within ½ Mile: 3,102



D. Downtown Largo (there is no existing transfer point but one could be established)

Routes Serving the Area: 52, 98, 73
Composite ½ Mile Grid Score: 20-21
Transit Stop Amenities: No
Existing Activity Center/Multimodal Corridor: Yes
Number of Employers within ½ Mile: 253
Number of People within ½ Mile: 2,721



E. Tarpon Springs

Converging Routes: 19, 66

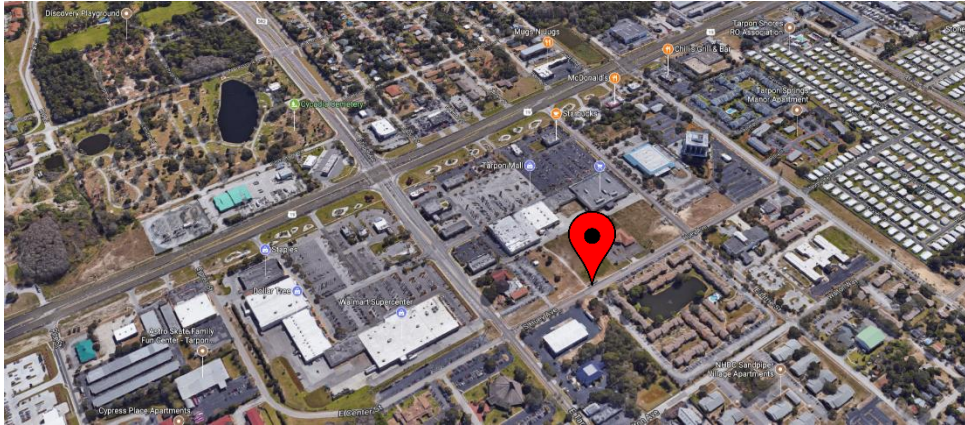
Composite ½ Mile Grid Score: 24

Transit Stop Amenities: Shelters, Trash Receptacles, Bicycle Racks

Existing Activity Center/Multimodal Corridor: No

Number of Employers within ½ Mile: 246

Number of People within ½ Mile: 3,257



F. Downtown Oldsmar (there is no existing transfer point but one could be established)

Routes Serving the Area: 67, 62

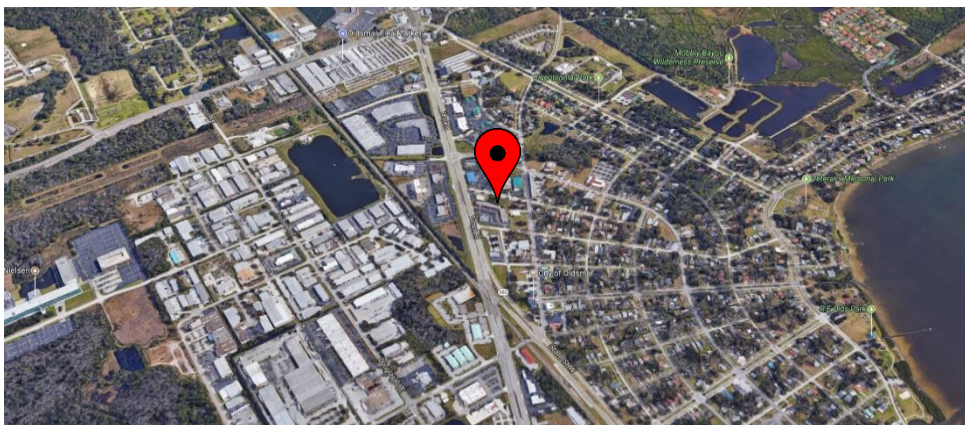
Composite ½ Mile Grid Score: 15-16

Transit Stop Amenities: No

Existing Activity Center/Multimodal Corridor: Yes

Number of Employers within ½ Mile: 379

Number of People within ½ Mile: 1,154



5. CONCLUSIONS AND NEXT STEPS

Using ArcGIS, Forward Pinellas developed a geodatabase to evaluate the suitability of 20 PSTA transit stops where two or more routes converge at a single location. Through this study of transfer points and the surrounding built environment, we found that most of the locations are suitable for successful transit operations. However, there are several transfer points that should be further evaluated to identify transit improvements or land use strategies that can be employed to have a broader impact on sustained economic growth in communities across Pinellas County.

As stated earlier, the transfer points recommended for further conceptual planning in Phase II are:

- Countryside Mall
- Clearwater Mall
- Largo Mall
- Downtown Largo
- Tarpon Springs
- Downtown Oldsmar

In a larger context, this project also presents a methodology to analyze the land use and transportation characteristics of a place, corridor or area. Since the data is acquired automatically using readily available data sets, it is possible to easily construct the geodatabase and analyze other transit networks for similar goals and objectives.

As this project moves into subsequent phases and guides development of the Long Range Transportation Plan, continuing to strengthen partnerships between PSTA, local governments, chambers of commerce, neighborhood associations, and others will be necessary to implement the final recommendations to improve transfer point accessibility. With many stakeholders working together to improve these transfer points in Pinellas County, the opportunity for achieving the goal of a more economically diverse and accessible place to live, work, and play is on the horizon.

Appendix A. Transfer Suitability Analysis Point Scoring

DENSITY	Measure	Point	Max Point
Population Density (County Average: 3,347 per sq. Mile)	< -0.75 - 0.25 Std. Dev. (0 - 753)	0	3
	0.25 - 1.3 Std. Dev. (754 - 1339)	1	
	1.3 - >2.3 Std Dev. (1339 - 3127)	3	
Employment Density (County Average: 340)	<-.0.25 - 0.25 Std. Dev. (0 - 536)	0	3
	0.25 - 1.3 Std. Dev. (536 - 1309)	1	
	1.3 - > 2.3 Std. Dev. (1309 - 8112)	3	
Areas of Countywide Significance Does it sit in an AC, EC, MMC?	No	0	2
	Yes	2	
Impoverished Populations	<20%	0	2
	>20%	2	
Minority Populations	<21.06	0	2
	>21.06	2	
DIVERSITY	Measure	Point	Max Point
Mix of Land Uses County Average: 6 per half mile	< -1.2 - 0.25 Std. Dev. (0 - 6)	0	6
	0.25 - 1.3 Std. Dev.(7 - 8)	3	
	1.3 - 2.7 Std. Dev. (9 - 14)	6	
Building to Land Value Cells with higher concentrations of prime redevelopment buildings	Under 100 Properties	0	3
	0.5 - 1.0	1	
	<0.5	3	
Structure Age Effective Year Built	Pre-1946	0	2
	1982-2000	1	
	1946-1981	2	

DESIGN	Measure	Point	Max Point
Road Density County Average: 0.0029	< -1.2 - 0.25 Std. Dev.(0 - 0.0033)	0	2
	0.25 - 0.75 Std. Dev. (0.0033 - 0.0043)	1	
	0.75 - > 2.3 Std Dev. (0.004301 - 0.026)	2	
Block Size (Cumulative Mileage of Block Segments) Mean : 13	< -1.3 - 0.25 Std. Dev. (6.26 - 14.71)	0	2
	0.25 - 1.3 Std. Dev. (14.71 - 23.17)	1	
	1.3 - 2.7 Std. Dev. (23.17 - 35.37)	2	
Setback Mean : 24	< -0.25 - 0.25 Std. Dev. (0 - 38)	0	2
	0.25 - 0.75 Std. Dev. (39 - 66)	1	
	0.75 - > 2.8 Std. Dev. (67 - 673)	2	
Intersection Density Mean : 24	< - .75 - 0.25 Std. Dev. (0 - 28.9)	0	2
	0.25 - 0.75 Std. Dev. (28.9 - 39.43)	1	
	0.75 - > 2.8 Std. Dev. (39.44 - 96)	2	
Link To Node Ratio (County Average: 1 to 1 Perfect Grid Ratio: 1 to 2.5)	0- 1	0	2
	1.25- 1.5	1	
	1.51- 2.5	2	