



**Economic Analysis of Proposed Planned Development Zoning District in Treasure Island**

Prepared for the City of Treasure Island

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by

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## **Economic Analysis of Proposed Planned Development Zoning District in Treasure Island**

### **I. Introduction**

Height and density restrictions in the Land Development Regulations in the City of Treasure Island are creating a disincentive for redevelopment efforts along the City's waterfront hotel and motel areas. A majority of hotels and motels along the waterfront were built in the 1940s, 1950s and 1960s and, for various reasons, are unable to adapt or upgrade to meet the changing needs of today's tourists. This has led to a noticeable negative impact on the hotels and motels themselves, as well as nearby tourism-related businesses, which has ultimately led to a decrease in tourism-related tax revenues. As a result of decreased commercial tax revenues, Treasure Island residents bear an increasingly larger share of the tax burden necessary to maintain public services.

To ease the burden on residents, City staff have proposed adopting a Planned Development (PD) zoning district. The PD is intended to provide an optional land development procedure to permit site design flexibility in order to encourage new development at appropriate locations, in accordance with the goals, objectives, policies, and other criteria of the Comprehensive Plan. The PD provides for flexible design and encourages new development to ensure compatibility with adjacent and nearby lands and activities. As currently proposed, PD zoning would provide the potential for a strictly regulated increase in both the height and density for hotels, motels, and similar transient lodging uses and related tourist-oriented commercial uses. The proposed PD zoning would be permitted only in two small, clearly delineated target areas. The first area is the west side (beachfront) of Gulf Boulevard, between 104th Avenue on the south and 119th Avenue on the north, comprising approximately 17.5 acres. It excludes the St. Petersburg Municipal Beach Parking lot. The second area totals approximately 9.7 acres located on either side of Gulf Boulevard north of 127th Avenue, fronting on the Gulf and John's Pass.

Specifically, the PD zoning district would allow building height to increase from a maximum height of 5 living levels within a maximum of 60 feet above base flood elevation plus 2 feet of freeboard, to up to 7 living levels within a maximum of 84 feet above base flood elevation plus 2 feet of freeboard. It would also permit an increase in density from 50 hotel, motel, and condo-hotel units per net acre to up to 75 hotel, motel, and condo-hotel units per net acre in areas designated in the Comprehensive Plan as *Resort Facilities High* Land Use category. The

density permitted for commercial properties designated in the Comprehensive Plan as *Commercial General* Land Use Category could increase from 22 hotel, motel, and condo-hotel units per net acre to up to 60 hotel, motel, and condo-hotel units per net acre.

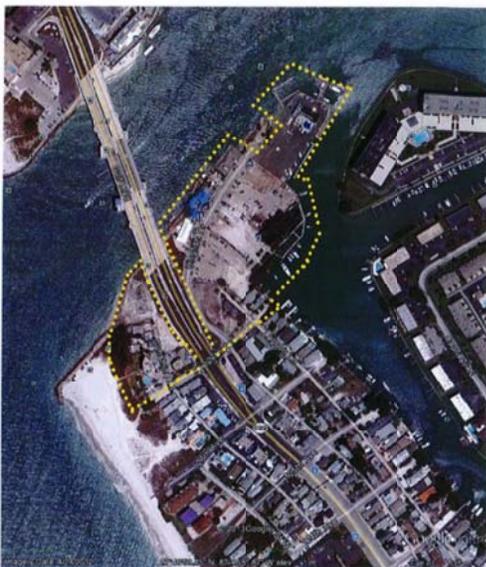
To aid in the evaluation of the proposed PD zoning district, City staff asked faculty from the Economics Department of the Kate Tiedemann College of Business at the University of South Florida St. Petersburg to perform an economic analysis. The analysis consists of two parts – potential increased tax revenues and the economic impact on the local economy.

## II. Study Area

The study area consists of two distinct areas as defined in the proposed PD ordinance. The first area is located in the northern end of the City of Treasure Island, specifically north of 127th Avenue. This area is further defined as the parts west or east of Gulf Boulevard. Figure 1 depicts an aerial view of these northern parts.

Thirteen parcels comprise the east side which includes Gators Café & Saloon, John's Pass Marina, a partially vacant metal building being used for office activities, a few residential properties, and vacant land. The west side of Gulf Boulevard consists of six parcels, including Nordvind condominiums/timeshare properties, some single-family attached units (duplex, triplex) and vacant land. The PD zoning district allows for changes to both transient lodging properties as well as commercial properties in this area.

Figure 1. Northern Study Area



Source: City of Treasure Island, Draft Ordinance 16-05, March 2016.

The second part of the study area is located along a portion of the Central Beach Trail, specifically the west side of Gulf Boulevard bounded by 104th Avenue on the south (Gulf Front Park) and 119th Avenue on the north. Figure 2 depicts this area. This Central Beach area is comprised of twenty-seven parcels, including several small, older hotel/motel establishments (e.g., Thunderbird) and residential condominiums, timeshare properties, and condo-hotels, as well as several restaurants, the St. Petersburg Municipal Beach Park, and vacant land.

The Comprehensive Plan Future Land Use Element land use category for this area is entirely *Resort Facilities High* with the exception of the two municipal parks. None of the parcels in this area has a land use category of *Commercial General*. The PD zoning district for this area only applies to properties designated with the *Resort Facilities High* land use category.

**Figure 2. Central Beach Study Area**



Source: City of Treasure Island, Draft Ordinance 16-05, March 2016.

### **III. Parcel Inventory**

In order to evaluate the proposed PD zoning district, the research team first compiled an inventory of parcels located within the two study areas. The inventory list includes owner name, site address, parcel number, lot size, existing land use, future land use, assessed value, year built, and number of units. A variety of sources was used to gather the data including the Pinellas County Property Appraiser, Pinellas County GIS, Treasure Island Future Land Use Element updated 2012, Pinellas Planning Council Countywide Future Land Use Plan 2004 and field research. A condensed list of the original parcels is in Appendix A.

The team culled the list to only include those parcels with the highest likelihood of redeveloping, should the proposed PD zoning district proceed. Removed parcels include municipal properties, properties with numerous owners (i.e., condominiums or timeshare properties), and properties recently developed. Some adjacent parcels were combined, creating a larger developable area and more realistic outcome. Figure 3 provides the final list of the parcels most likely to redevelop under the proposed PD zoning district.

### **IV. Analysis**

To complete the tax and economic analyses, it was assumed that under the proposed PD zoning district, nine separately owned parcels will redevelop (*namely, Thunderbird, Tahitian, Treasure Island Ocean Club, Arvilla, Algiers, Tropic Terrace, Treasure Island Beach Club, Sea Chest, and The Sands, some of which own more than one individual parcel*) and two parcels will be created by combining existing adjacent parcels. One of these newly combined parcels is the recently-approved development of 77 units on the adjacent vacant parcels owned by Treasure Island, LLC. The three southernmost parcels (comprised of the Bilmar, Page Terrace, and Windjammer hotels) are treated as one larger site which sums up to 3.4 acres, after preserving the existing 0.17 acres for a restaurant. Thus, following the maximum allowable density under the proposed PD zoning district, all sites will redevelop at 75 units per acre.

**Figure 3. Final List of Parcels likely to Re-develop under PD Zoning District**

<b>Central Beach Area</b>		
<b>Business/Owner Name</b>	<b>Address</b>	<b>Current Use</b>
Windjammer	10450 Gulf Blvd	Hotel/Motel (49 units or less)
Page Terrace	10500 Gulf Blvd	Hotel/Motel (49 units or less)
Bilmar	10650 Gulf Blvd	Hotel/Motel (50 units or more)
Thunderbird	10700, 10750 Gulf Blvd	Hotel/Motel (50 units or more)
Treasure Island, LLC	Vacant Lots 6,7,8, 9 & 10	Vacant
Tahitian	11290, 11300, 11320 Gulf Blvd	Hotel/Motel (49 units or less)
Treasure Island Ocean Club	11440, 11500 Gulf Blvd	Hotel/Motel (50 units or more)
Arvilla	11580 Gulf Blvd	Hotel/Motel (49 units or less)
Algiers	11600 Gulf Blvd	Hotel/Motel (49 units or less)
Tropic Terrace	11730 Gulf Blvd	Co-op/Hotel
Treasure Island Beach Club	11750 Gulf Blvd	Timeshare
Sea Chest	11780 Gulf Blvd	Hotel/Motel (49 units or less)
The Sands	11800 Gulf Blvd	Hotel/Motel (49 units or less)
<b>Northern Area – West side of Gulf Blvd</b>		
<b>Business/Owner Name</b>	<b>Address</b>	<b>Current Use</b>
J P Beach Holdings LLC	12717 Sunshine Lane	Residential
J P Beach Holdings LLC	12721 Sunshine Lane	Residential
J P Beach Holdings LLC	12765 Sunshine Lane	Residential
<b>Northern Area – East side of Gulf Blvd</b>		
<b>Business/Owner Name</b>	<b>Address</b>	<b>Current Use</b>
Pass Investment Holdings, LLC	110 127th Avenue	Vacant
Daniel Betz	112 127th Avenue	Residential
Pass Investment Holdings, LLC	12725 Gulf Blvd	Vacant Commercial
Gators on the Pass Holdings, LLC	12766 Kingfish Drive	Restaurant
John's Pass Marina Investment	12795 Kingfish Drive	Marina
Gators on the Pass Holdings, LLC	12783 Kingfish Drive	Vacant Commercial
Gators on the Pass Holdings, LLC	12781 Kingfish Drive	Commercial
Richard London Pass Investment Holdings LLC	12714 Lagoon Lane	Vacant Residential
Pass Investment Holdings LLC	12704 Lagoon Lane	Residential
Pass Investment Holdings LLC	12700 Lagoon Lane	Residential
Pass Investment Holdings LLC	Lagoon Lane	Vacant Residential

The analysis treats all parcels on the west side of the northern area as one large site of 1.6 acres, redeveloping at 75 units per acre. On the east side, all parcels are treated as one large site, with the exception of 1.5 acres reserved for a restaurant and marina, leaving 5.6 acres. It is assumed this site will redevelop as *Commercial General* at 60 units per acre, following the maximum allowable density under the proposed PD zoning district.

Each parcel was evaluated as described above, which resulted in an increase of 757 units. To estimate the additional days tourists would visit the area, the following calculation is used:

*(additional units) times (the annual occupancy rate of seventy percent<sup>1</sup>) times  
(360 days).*

This calculation results in 190,764 additional tourist days. Figure 4 provides a summary.

**Figure 4. Summary of PD Zoning District Scenario**

Central Beach Area	Nine separately-owned parcels will redevelop. The southernmost parcels (comprised of the Bilmar, Paige, Windjammer hotels) are treated as one larger site summing up to 3.4 acres. All sites are assumed to redevelop at 75 units per acre.
Northern Area – West of Gulf Blvd	All parcels treated as one site, totaling 1.6 acres. This area is assumed to redevelop at 75 units per acre.
Northern Area – East of Gulf Blvd	All parcels treated as one site, with the exception of 1.5 acres reserved for a restaurant and marina. This 5.6 acre site is assumed to redevelop as <i>Commercial General</i> at 60 units per acre
Change in Number of Transient lodging units	757 units
Change in Number of Tourist Days	190,764 tourist days

**A. Tax Analysis**

Given the scenario mentioned in the previous section, the research team analyzed two tax revenue streams. First, if the maximum allowable build-out takes place under the PD zoning district proposal, property values for each renovated property will increase, leading to an increase in property tax collections. While this tax is collected at the County level, the analysis only considered the portion of the tax (3.3368 mill per \$1,000) that returns to the City of Treasure Island. The second change in tax revenue comes from an increase in the tourist development tax, commonly known as the bed tax, as it is a 6% tax on transient lodging stays.

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<sup>1</sup> The annual occupancy rate of 70% is estimated from the Annual 2013 Visitor Profile prepared for the Pinellas County Board of Commissioners and Visit St. Petersburg/Clearwater by Research Data Services.

This tax revenue is also collected at the County level and is used for projects that promote tourism in Pinellas County (e.g., beach re-nourishment, promotional marketing). While it does not all return to Treasure Island directly, it still provides an important source of funds to support Treasure Island’s tourism industry.

*i. Property Tax Analysis*

An average market value of properties similar to the maximum build-out scenario was estimated based upon information gathered from existing comparable properties, the Pinellas Property Appraisers Office and local commercial real estate agents. Existing comparable market values ranged from \$7.5 million to \$22 million. Estimates of brand new Gulf front hotel/motels currently range from \$200,000-\$250,000 per unit. This means a 75 unit hotel would have a market value of between \$15 and \$18.75 million. Considering all this information, a conservative average value of \$200,000 per unit was used in the property tax analysis.

That average was applied to the estimated potential units for each parcel/site, thereby generating a new assessed (taxable) value. The difference between the current assessed value and the new assessed value was calculated. Treasure Island’s current millage rate of 3.3368 was multiplied by the difference to estimate the additional property tax revenue generated from each parcel/site.

The scenario creates an increase of over \$210 million in taxable value, generating an additional \$702,154 in property tax revenue to the City.

*ii. Tourist Development Tax (Bed Tax) Analysis*

The potential increase in the tourist development tax created under the scenario also was estimated. The current six percent tax was multiplied by an average room rate of \$115 and by the estimated additional annual tourist days in each scenario. This results in an additional \$1.1 million in bed tax collections. Figure 5 summarizes the results of the tax analysis.

**Figure 5. Summary of Tax Analysis**

Increased Property Assessed Value	\$210,427,393
Additional Property Tax revenues	\$702,154
Additional Tourist Development Tax revenues	\$1,096,893

Although maximum build-out scenarios were used, the estimated increased revenue is based on a conservative analysis using only the most likely parcels to redevelop under the proposed PD zoning district ordinance. Revenues could be significantly higher if all parcels within the PD zoning district were developed. Further, this analysis does not consider any changes to Treasure Island's millage rate which would affect the result. Other considerations, such as additional retail or tourist-related activity, also could generate additional tax revenue.

## **B. Economic Impact Analysis**

### *i. REMI Model*

The economic impact analysis consists of estimating how an increase in tourism translates into economy-wide changes. An increased number of tourists in the area implies an increase in direct spending by those tourists (on items such as accommodations, food, retail, etc.) as well as the “multiplier” or secondary effects of that spending. These secondary effects are two-fold; first, “indirect” effects take place as hotels and other tourist-supporting industries increase the purchases of inputs needed to operate their businesses. For example, restaurants need to purchase more food from their suppliers to prepare for the increased number of customers. Second, “induced” effects account for the increase in spending by local business owners and workers as they receive extra income from tourists. For example, restaurant wait staff receive extra income which increases their own spending (which then turns into someone else's income to spend, and so on). A complete economic impact analysis of the PD zoning district must take all of these effects into account.

With assistance from the Tampa Bay Regional Planning Council, the team used the well-established REMI model to estimate the economy-wide impacts of an increase in tourism following the implementation of the PD zoning district. The REMI model captures the inter-linkages in an economy such that an increase in spending in one area flows through all areas of an economy, including output markets, population and labor supply, labor and capital demand, wages, costs and prices, and market shares. The “Tourism” module of REMI was used for the purposes of this analysis. See Appendix C for more details on the REMI model.

The REMI model was run under the PD zoning district scenario described previously. The team started from the point of how many extra tourist-days resulted. The number of extra tourist-days

was multiplied by the conservative average room rate of \$115, to get the change in accommodations expenditures. From here, the researchers derived the change in expenditures by tourists in four other major sectors where tourists spend most of their money locally: food and drink, retail, entertainment, and ground transportation. These amounts were calculated by determining the shares of each in a typical St. Petersburg/Clearwater tourists' budget, as reported in the 2013 Annual Visitor Profile as well as the Federal per diem rates for the area. The changes in expenditures, which were used as inputs into the REMI model, are shown in Figure 6. Given the timeline for redevelopment to occur, new tourism, and thus new expenditures, were assumed to begin in the year 2018.

**Figure 6. Changes in Tourism Expenditures**

Accommodations	\$21,937,860
Food & Drink	\$7,473,746
Retail	\$3,311,594
Entertainment	\$11,210,618
Ground Transportation	\$1,907,640
<b>TOTAL CHANGE</b>	<b>\$45,841,458</b>

*ii. Results*

It must be noted that while the inputs to the REMI model were Treasure Island-specific, that is, dependent on the expenditures of new tourists to the City, REMI is a regional model, so the outputs cannot be attributed to just Treasure Island. Nonetheless, given the nature of the types of expenditures, we can assume some of the changes take place locally. Here we report on the results for the first year that establishments that have redeveloped under the PD zoning district are open and operating (2018 for analysis purposes). Figure 7 provides a summary of these results and Appendix B shows ten years of results.

- Employment: 526 jobs are created in the first year. Approximately 25 percent of jobs are in the accommodations and food sector industries, which is largely made up of the local hotels and motels, but may include restaurants outside of Treasure Island. The largest increase in jobs is in the Arts, Entertainment and Recreation industries, accounting for 48 percent of new jobs. This might include beach activities on or near Treasure Island,

but likely also includes area sporting arenas, movie theaters, live entertainment, museums, etc.

- Gross Domestic Product (GDP) for the Region: \$30.1 million is generated in regional GDP.
- Personal Income: Personal income, that is, the money received by individuals, less contributions for government social insurance, totals \$13.9 million.

**Figure 7. Results from REMI Model** (for 2018, reported in 2014 dollars)

<b>Category</b>	
Total Employment	526 jobs
Gross Domestic Product	\$30.1 million
Personal Income	\$13.9 million

## **V. Conclusions**

Our analysis suggests that if the proposed PD zoning district ordinance comes to fruition and transient lodging builds out to its maximum, as described above, the City stands to gain at least \$702,154 in increased property tax revenues, while the County will gain about \$1.1 million in increased bed taxes (some of which will return to Treasure Island in the form of beach renourishment and tourism support). Overall, we anticipate about 526 jobs created in the County, with an increase in Regional Gross Domestic Product of \$30.1 million in the first year.

### *i. Caveats*

There are other, non-economic impacts associated with the PD zoning district, which cannot be ignored. Thus it is important to point out that the carrying capacity of the roads is currently underutilized (at a “B/C” level) and so there is room for additional traffic resulting from more tourism. Similarly, municipal sewers are at just 55% capacity, and increased pressure on water and storm water management does not appear to be an issue. While the analysis cannot account for non-tangible items such as aesthetics or city identity, the proposed PD zoning district is still consistent with the County’s Comprehensive Plan.

### *ii. Areas for Further Study*

The estimates presented here should be considered lower-bounds for the proposed PD zoning district. Indeed, if the current lodging establishments rebuild or renovate, they will be able to charge a higher per-night rate than the county-wide average rate of \$115 that was used in this

analysis. That implies a higher bed tax revenue than what was estimated. Similarly, the estimate of the value of the properties was purposefully conservative, using the lowest comparable rate of \$200,000 per room.

Furthermore, the analysis has not considered how the PD zoning district may also impact other commercial establishments in Treasure Island. It is not a stretch to suggest that redeveloped larger hotels and motels will attract tourists from a higher socio-economic background than currently, who will have more disposable income to spend while visiting the City. Thus, it is reasonable to assume that once the hotels rejuvenate, restaurants, retail and entertainment establishments will also undergo renovation and expansion. This will raise property values – and therefore property tax revenues – even more and generate even more economic activity.

In addition, the model does not include the economic impacts of the actual construction/renovation that would occur as properties take advantage of the PD zoning district. That job creation and economic activity would be short-term, but is significant nonetheless.

Addressing these issues was beyond the scope of the current research, but could certainly be part of a longer term study.

## Appendix A. Original Parcel Inventory

<b>Central Beach Area</b>			
<b>Ref. No.</b>	<b>Business/Owner Name</b>	<b>Address</b>	<b>Current Use</b>
1	City of Treasure Island	10400 Gulf Blvd	Municipal Parking Lot
2	Windjammer	10450 Gulf Blvd	Hotel/Motel (49 units or less)
3	Page Terrace	10500 Gulf Blvd	Hotel/Motel (49 units or less)
4	Bilmar	10650 Gulf Blvd	Hotel/Motel (50 units or more)
5	Bilmar - Sloppy Joes	10650 Gulf Blvd	Restaurant
6	Thunderbird	10700, 10750 Gulf Blvd	Hotel/Motel (50 units or more)
7	Treasure Island, LLC	Vacant Lots 6,7,8, 9 & 10	Vacant
8	Treasure Sands	11000 Gulf Blvd	Condo
9	Surf Beach Resort	11040 Gulf Blvd	Condo-Hotel
10	Municipal Beach	11260 Gulf Blvd	Public Beach Access
11	Venetian	11270 Gulf Blvd	Condo
12	Tahitian	11290, 11300, 11320 Gulf Blvd	Hotel/Motel (49 units or less)
13	South Beach	11360 Gulf Blvd	Condo-Hotel
14	Treasure Island Ocean Club	11440, 11500 Gulf Blvd	Hotel/Motel (50 units or more)
15	Arvilla	11580 Gulf Blvd	Hotel/Motel (49 units or less)
16	Algiers	11600 Gulf Blvd	Hotel/Motel (49 units or less)
17	Jamaican on the Gulf	11660 Gulf Blvd	Timeshare
18	Tropic Terrace	11730 Gulf Blvd	Co-op/Hotel
19	Treasure Island Beach Club	11750 Gulf Blvd	Timeshare
20	Sea Chest	11780 Gulf Blvd	Hotel/Motel (49 units or less)
21	The Sands	11800 Gulf Blvd	Hotel/Motel (49 units or less)
22	Voyager Beach Club	11860 Gulf Blvd	Timeshare
<b>Northern Area – West side of Gulf Blvd</b>			
	<b>Business/Owner Name</b>	<b>Address</b>	<b>Current Use</b>
23	Nordvind	12700 Gulf Blvd	Timeshare
24	AKE Eriksson Inc	Sunshine Lane	Timeshare Common Area
25	AKE Eriksson Inc	Gulf Blvd	Timeshare Common Area
26	J P Beach Holdings LLC	12717 Sunshine Lane	Residential
27	J P Beach Holdings LLC	12721 Sunshine Lane	Residential
28	J P Beach Holdings LLC	12765 Sunshine Lane	Residential
29	J P Beach Holdings LLC	Sunshine Lane	Vacant Commercial

Original Parcel Inventory, Con't.

<b>Northern Area – East side of Gulf Blvd</b>			
	<b>Business/Owner Name</b>	<b>Address</b>	<b>Current Use</b>
30	Pass Investment Holdings, LLC	110 127th Avenue	Vacant
31	Daniel Betz	112 127th Avenue	Residential
32	Pass Investment Holdings, LLC	12725 Gulf Blvd	Vacant Commercial
33	Gators on the Pass Holdings, LLC	12766 Kingfish Drive	Restaurant
34	John's Pass Marina Investment	12795 Kingfish Drive	Marina
35	Gators on the Pass Holdings, LLC	12783 Kingfish Drive	Vacant Commercial
36	Gators on the Pass Holdings, LLC	12781 Kingfish Drive	Commercial
37	Richard London Pass Investment Holdings LLC	12714 Lagoon Lane	Vacant Residential
38	Pass Investment Holdings LLC	12704 Lagoon Lane	Residential
39	Pass Investment Holdings LLC	12700 Lagoon Lane	Residential
40	Pass Investment Holdings LLC	Lagoon Lane	Vacant Residential

**Appendix B. 10 year results from REMI Model (in 2014 dollars). Data shows annual changes.**

<b>Scenario C</b>												
<b>Category</b>	<b>Units</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>2024</b>	<b>2025</b>	<b>2026</b>	<b>2027</b>	<b>2028</b>
Total Employment	Individuals (Jobs)	526	531	528	521	512	503	495	487	481	475	472
Gross Domestic Product	Millions of Fixed	30.1	31.4	31.9	32.0	31.9	31.7	31.4	31.2	31.2	31.1	31.3
Personal Income	Millions of Fixed	13.9	15.9	17.6	18.8	19.7	20.2	20.4	20.7	20.9	21.1	21.5

Notes:

Total Employment: Estimates of the number of jobs, full-time plus part-time, by place of work. Full-time and part-time jobs are counted at equal weight. Employees, sole proprietors, and active partners are included, but unpaid family workers and volunteers are not included.

Gross Domestic Product (GDP): The ("net") market value of goods and services produced by labor and property in the County.

Personal Income: Income received by persons from all sources, less contributions for government social insurance.

## **Appendix C. Details on REMI Model**

Contributed by Randy Deshazo, Principal Planner, Tampa Bay Regional Planning Council

### **I. About REMI Policy Insight**

Founded in 1980, Regional Economic Models, Inc. (REMI) constructs models that reveal the economic and demographic effects that policy initiatives or external events may cause on a local economy. REMI model users include national, regional, state and city governments, as well as universities, nonprofit organizations, public utilities and private consulting firms. A major feature of REMI Policy Insight is that it is a dynamic model which forecasts how changes in the economy and adjustments to those changes will occur on a year-by-year basis. The model is sensitive to a very wide range of policy and project alternatives and to interactions between the regional and national economies. By pointing and clicking, you can answer the toughest “What if...?” questions about federal, state, local or regional economies.

### **II. Model Introduction**

Tampa Bay Regional Planning Council’s REMI Policy Insight includes a REMI model that has been built especially for the Tampa Bay region version of the model and for a state model. The model-building system uses hundreds of programs developed over the past two decades to build customized models for each area using data from the Bureau of Economic Analysis, the Bureau of Labor Statistics, the Department of Energy, the Census Bureau and other public sources. The REMI model is a structural model, meaning that it clearly includes cause-and-effect relationships. The model shares two key underlying assumptions with mainstream economic theory: households maximize utility and producers maximize profits. Since these assumptions make sense to most people, the model can be understood by intelligent lay people as well as trained economists.

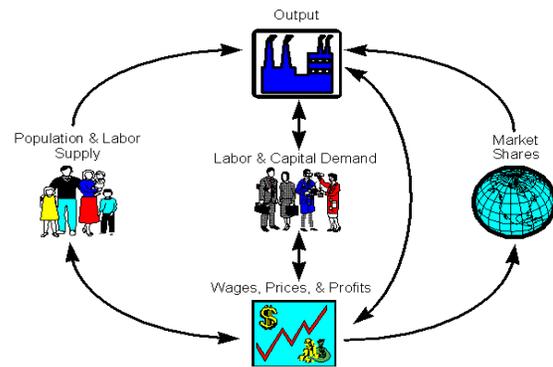
In the model, businesses produce goods to sell to other firms, consumers, investors, governments and purchasers outside the region. The output is produced using labor, capital, fuel and intermediate inputs. The demand for labor, capital and fuel per unit of output depends on their relative costs, since an increase in the price of any one of these inputs leads to substitution away from that input to other inputs. The supply of labor in the model depends on the number of people in the population and the proportion of those people who participate in the

labor force. Economic migration affects the population size. More people will move into an area if the real after-tax wage rates or the likelihood of being employed increases in a region.

Supply and demand for labor in the model determine the wage rates. These wage rates, along with other prices and productivity, determine the cost of doing business for every industry in the model. An increase in the cost of doing business causes either an increase in price or a cut in profits, depending on the market for the product. In either case, an increase in cost would decrease the share of the local and U.S. market supplied by local firms. This market share combined with the demand described above determines the amount of local output. Of course, the model has many other feedbacks. For example, changes in wages and employment impact income and consumption, while economic expansion changes investment and population growth impacts government spending.

### III. Model Overview

A pictorial representation of the model is adjacent. The Output block shows a factory that sells to all the sectors of final demand as well as to other industries. The Labor and Capital Demand block shows how labor and capital requirements depend both on output and their relative costs. Population and Labor Supply are shown as contributing to demand and to wage determination in the product and labor market.



The feedback from this market shows that economic migrants respond to labor market conditions. Demand and supply interact in the Wage, Price and Profit block. Once prices and profits are established, they determine market shares, which along with components of demand, determine output.

The REMI model brings together all of the above elements to determine the value of each of the variables in the model for each year in the baseline forecasts. The model includes all the inter-industry relationships that are in an input-output model in the Output block, but goes well beyond the input-output model by including the relationships in all of the other blocks shown in the figure.

In order to broaden the model in this way, it was necessary to estimate key relationships. This was accomplished by using extensive data sets covering all areas in the country. These large data sets and two decades of research effort have enabled REMI to simultaneously maintain a theoretically sound model structure and build a model based on all the relevant data available.

The model has strong dynamic properties, which means that it forecasts not only what will happen but when it will happen. This results in long-term predictions that have general equilibrium properties. This means that the long-term properties of general equilibrium models are preserved without sacrificing the accuracy of event timing predictions and without simply taking elasticity estimates from secondary sources.