Westport Waterfront TOD Cost Benefit Analysis

Prepared for the Westport Waterfront TOD TIGER application
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STV

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Location Strategies for Business and Economic Development

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Executive Summary
Westport Waterfront TOD - Cost Benefit Analysis

STV, Inc, Redevelopment Economics, and CWS Consulting

The City of Baltimore Department of Transportation (Baltimore DOT) is requesting a $16.28 million Transportation Investment Generating Economic Recovery II (TIGER II) grant to complete the funding package for a $39.8 million project that will repair and enhance a network of roads, bridges, railroad crossings, transit stations, and shared-use trails necessary to support the $1.2 billion Westport Waterfront Transit-Oriented Development (Westport Waterfront TOD). This includes:

- Replacing structurally deficient, functionally obsolete bridge elements at the Waterview Avenue/Annapolis Road MD 295 interchange including a pedestrian bridge
- Improving signalization, turn-lanes, and bike and pedestrian facilities along Annapolis Road and Waterview Avenue to reduce congestion and enhance pedestrian accessibility
- Constructing John Moale Boulevard providing two travel lanes, two parking lanes, wide sidewalks and a 16' wide dry swale system to access the 19 development parcels within the TOD
- Building a pedestrian bridge connecting the TOD to an existing Light Rail station
- Replacing an unsafe and deficient on-street bike lane with a two-mile off-road extension of the 15-mile Gwynns Falls shared use trail
- Ensuring safety along an active freight line by adding new safety measures at three at-grade crossings and building a pedestrian overpass

Westport Waterfront TOD Area

Westport Waterfront is being designed as a mixed use/walkable/transit-oriented development (TOD) community, consistent with sustainable development principles. Set on the shores of the Middle Branch of the Patapsco River, Westport will offer residents and businesses a model green community one mile south of downtown with immediate access to light rail and the Gwynns Falls shared use trail.

The design will maximize sustainable development objectives – the master plan has been designed to achieve a platinum rating under the US Green Building Council's new LEED for Neighborhood Development program, and individual buildings will meet a minimum LEED Silver rating. Densities are very urban – about seven times typical suburban densities, with one result being that the entire development area is within ¼ mile of the Westport Light Rail station. Extensive internal shared use trails will link to the City's 15-mile Gwynns Falls Trail.

Westport Phase I. The TIGER application is proposed to fund the major infrastructure improvements needed to facilitate the first phase of development within the TOD (Westport Phase I). Phase I will accommodate 4,000 jobs in an exciting mix of:

- 796 residences
- 900,000 sq ft office space
- 91,500 sq ft retail space

Longer term Development - Westport Phase II and Middle Branch Corridor. While not counted in the cost-benefit analysis, there are substantial, even transformative, long range plans that the proposed TIGER improvements will assist.

In 2008 Baltimore finalized the Middle Branch Master Plan, available at http://www.middlebranchbaltimore.com/Portals/0/MiddleBranchMasterPlan_full.pdf. The plan envisions an interlinked system of shared use trails, restored wetlands and urban parks that provide a unique "green" setting for six mixed use redevelopment nodes at key waterfront parcels. A variety of public and private development proposals are already under discussion for these sites, which can accommodate significant growth. According to the Baltimore City Department of Planning, these sites can accommodate:

- 7,300 to 12,300 new households
- 13.1 to 21.1 million sq ft of mixed-use development;
- 17,900 to 21,900 jobs;
- $2.7 billion to $4.1 billion in new investment.

These areas include: Westport Waterfront Phase II, the Waterview Avenue TOD, West Covington, the National Aquarium's proposed environmental research center; Port Covington waterfront mixed use development area, and the Celebration Casino, at the Gateway South area on the Upper Middle Branch.

Benefits

State of Good Repair

Two major interchanges serve the Westport Waterfront TOD. The bridge elements supporting the Waterview Avenue/Annapolis Road interchange are severely deteriorated, structurally deficient and functionally obsolete, with Bridge Sufficiency Ratings (BSR) as low as 42.9. In addition there is an important pedestrian bridge that provides a key access point to the Westport Waterfront TOD across MD 295. All three bridges currently suffer from serious issues including deteriorated areas of concrete, heavy rusting, severe map cracking, and failing paint systems. The bridges are approaching the end of their service life and currently require the investment of significant funds to restore adequate long-term structural integrity. TIGER II funds will be used to replace the three bridges (Waterview Avenue over MD 295 (BC-5402), Annapolis Road over Waterview Avenue (BC-5407), and Maisel Street Pedestrian Bridge over MD 295 (BC-5001)) and reconstruct the ramp geometry to meet today's safety standards and strategically increase roadway capacity. A lifecycle cost analysis was conducted comparing the recurring cash outlays needed after reconstruction of the bridges versus those that would be required to maintain the bridges at their current level including performing significant concrete repairs, steel repairs, cleaning and painting, deck overlay/replacement, and traffic safety upgrades. The lifecycle cost analysis was based on the cost of maintaining the existing bridges, which would require a $1.35 million investment every four years, versus the cost of maintaining the replacement bridges that would be built by the grant funds, which would require a $1 million investment every ten years. A 40 year analysis period was assumed, which is conservative, given the expected service life of 70 to 100 years for new bridges. Over the 40 year analysis period, the total monetary benefit to State of Good Repair, based on the assumptions outlined above, would be $3,401,887. See table 1-i.

Jobs and Economic Growth - Economic Distress and Low-mod Benefit (Economic Competiveness) – Westport Phase I will accommodate 4,000 permanent jobs, 1,700 temporary construction jobs and a total direct and indirect economic output of $1.8 billion, a massive stimulus for Baltimore as a distressed city that suffers high unemployment, high poverty rates, and a continuing erosion of the city's manufacturing

base. Westport Waterfront's immediate neighbors - Westport, Mount Winans, Lakeland and Cherry Hill - are together some of the City's most economically distressed areas. Of the roughly 15,000 residents, the current median household income in the area is $28,665. Twenty-four percent of residents are living in poverty.[1]

The developer and the community have formed the Westport Community Partnership, which is designed to maximize the positive benefits of the project for the surrounding community. Given these priorities, a conservative assumption is that the nearby residents of the distressed neighborhood will gain at least 5 percent of the temporary and permanent jobs and related earnings activities. This results in a projection of benefit to these under-served populations:

- 85 construction jobs
- 198 permanent jobs
- $11.6 in household earnings (gross)
- $1.3 million in net new earnings benefit, which has a 20-year net present value of $13.6 million

Baltimore Housing and the developer have committed to make 15 percent of rental units or 130 units affordable to those households earning between 30 and 80 percent of Area Median Income. These low-moderate income households will gain from the same livability benefits as the other residents. For example, residents are projected to spend 40 percent less on transportation (relative to regional norms), which computes to $4,800 saved per family annually. The 20-year net present value of these benefits for the 20 percent low-mod families is $8.4 million See Table 1-a.

Jobs and Economic Growth – Gains for the US Economy **(**Economic Competiveness**) -** While the majority of Westport Waterfront's economic impacts will be regional (with particular benefits to distressed areas), some of the benefits are likely to be national, with gains in productivity and in attraction of businesses that represent US presence in the international economy.

There are three gains for the national economy, all linked to the established theory that mixed use/TOD/sustainable communities provide dynamic and efficient work environments that translate into economic gains.

- Knowledge spillover effect. There are productivity gains connected to urban density and what has been termed the "knowledge spillover" effect. Studies have linked increases in patents, as well as general worker productivity, to increasing density.
- Green buildings. Studies have also linked greater worker productivity to green buildings. Lower absenteeism, fewer building-related medical problems, as well as natural light contribute to worker productivity gains.
- International Businesses and Exporting Services. Many new economy businesses want to locate in stimulating mixed use environments, partly because these locations are appealing to their "creative class" workforce. Some of these businesses are international and are involved in exporting services - they can therefore be counted as net gains to the US economy. In Baltimore there are five such international companies that have been attracted to mixed use waterfront locations. These five businesses provide a total of 2,200 jobs and comprise 20 percent of the non-CBD mixed use/waterfront office district.

The conservative conclusion is that Westport should be credited with at least a 1 percent increase in total output from a combination of efficiency gains and likely international export activity. The 20-year net present value of this 1 percent gain is $348 million. See Table 1-b.

[1] In the interest of brevity, sources are not cited in the summary – see the full cost-benefit analysis

Lower VMTs and Lower Travel Costs (Economic Competitiveness and Livability)**.** One finding is that Westport residents will reduce VMTs by 40 to 45 percent relative to regional norms. This conclusion follows a plethora of research on the relationship between density, TOD, mixing uses, mode splits, and VMTs all leading to the conclusion that it is exactly Westport-type development projects that correlate with the greatest VMT reduction.

The financial side of that equation is that residents of mixed use, walkable, and TOD communities spend significantly less on transportation than either the average American family or those living in auto-dependent suburban areas. One analysis, which took into account both fuel and auto ownership-related expenses, concluded that spending on transportation among those in "transit-rich" neighborhoods was 53 percent less than the average family and about 65 percent lower than the "auto-dependent ex-urbs." If one assumes a more modest 40% reduction in transportation-related costs for Westport residents relative to the US average, Westport residents are projected to:

- Save $4,750 per household on transportation costs relative to the US average;
- Save a total of $3.8 million on transportation costs relative to the US average (represents 792 households).

The 20-year net present value of these travel cost savings is $42.2 million. See Table 1-b. See Table 1-d.

Travel Times. (Economic Competitiveness and Livability) **-** Nationally, trips generated within mixed use communities average 17 percent "internal capture," i.e. that 17 percent of all trips generated involve origin and destination within the mixed use community. For a project like Westport, the best assumption would be that nearly 100 percent of internal capture trips would be via walking and involve 5 to 10 minute travel time. Urban trips, even those outside a mixed use zone, tend to be of shorter duration – the average trip in Baltimore City takes 18 percent less time than the regional norm.

Conservatively, Westport should be credited with lowering trip times by 15 percent. Applying this finding to residents' commute times, results in the findings that:

- 40 hours gained annually per household (40 less hours commuting time)
- When time is monetized vis-à-vis the federal guidelines, the 20-year net present value of commuting time gained is $5.5 million. See Table 1-g

Commute Trips "Saved" – Employees Commuting to Westport (Economic Competitiveness and Livability) – Limited national research leads to the conclusion that commuters to dense TOD-oriented mixed use employment centers also save VMTs relative to regional norms, but the reduction is somewhat less than for residents of those types of centers. For Westport the projection is a 30 to 35 percent savings relative to the norm. Using the lower end of that range, results in projections that

- Commuters to Westport jobs will save an average of 1,859 VMTs annually relative to regional norms;
- The monetized value of those "saved VMTs" is the value of gasoline saved. The 20-year net present value of gas saved by those commuting to Westport is $14.1 million. See Table 1-c.

Property Value Increases (Economic Competitiveness and Livability)**.** One measure of the livability benefits of a TOD walkable community is the higher property value associated with the convenience and amenities gained. A comprehensive review of the literature concluded that the incremental increase in property value for TOD areas was between 10 an 20 percent. However, because the Westport proposed improvements are enhancements to an existing transit station, this analysis used a much more conservative 1 percent as the incremental increase in property value attributable to the proposed TIGER

improvements. The 20-year net present value of a 1 percent gain in property values is estimated to be $52.9 million.

Note that the land value increase has been "netted out" of the summary table of economic benefits because it may be duplicative of travel cost and time savings. See Table 1-h.

CO_2 Reduction due to VMT reduction (Sustainability) **-** Previously cited findings drew the conclusion that Westport residents would generate between 40 and 45 percent less VMTs and Westport employees would generate between 30 and 35 percent less VMT's, both relative to Baltimore regional norms. Using a conversion factor of 0.437 metric tons of CO2 per 1,000 miles driven leads to the following estimates of CO_2 "saved :"

- Westport households will generate 3.99 to 4.49 fewer metric tons of CO_2 from their travel activities, relative to regional norms
- Westport employees will generate 0.81 to 0.94 fewer metric tons of CO2 from their commuting activities, relative to regional norms
- Using federal guidelines these CO_2 reductions have been monetized and a 20-year net present value of the reduced CO_2 is estimated to be $2.2 million (calculated for the lower of end of the percentage reductions). See Table 1-d.

CO2 Reduction due to Green Buildings. Westport Waterfront will require buildings to meet at least the LEED Silver requirements. Experience has shown that LEED Silver buildings will save energy at an average of 30 percent relative to conventional construction. For Westport Phase I, 1.9 million sq ft of space that meets the 30 percent energy reduction will save approximately 2, 829 metric tons of CO2.

Total CO2 Reduction. Adding together the VMT-related GHG savings with the green building efficiencies results in total CO2 savings attributable to the greening elements of Westport Waterfront of between 9,220 and 10,154 metric tons CO2 "saved" relative to norms.

Safety

Safety benefits were quantified based on the expected reduction in the number of vehicular crashes as a result of the development and associated improvements. The vehicular crash reduction is two-fold: first, a reduction in the existing crashes will be realized due to specific improvements constructed within the local roadway network and, second, benefits will be realized as a result of the mixed-use, transit oriented, urban nature of the proposed development which will result in a lower amount of total vehicular miles traveled generated by the development, compared to what would be expected in a typical suburban stand alone development of the same size (the regional norm). The resulting benefits are as follows:

	Annual Number of Crashes Eliminated	Total Crashes Reduced Over 20 Year Period	Saving over 20 years NPV
Improvements over Baseline	6	117	$2,585,882
Improvements due to TOD	14	277	$24,480,902

reduction			
TOTAL	**20**	**394**	**$27,066,784**

The total monetary benefit due to the two types of crash reductions, existing and because of the nature of the development, is $27,066,784, NPV, with a reduction of about 394 crashes expected over the 20 year analysis period. See Table 1-h.

No-Build Alternative

Lacking the infrastructure investments that are necessary to facilitate the Westport Waterfront project, the operative assumption would be that development will go to suburban sprawl development patterns.

From national research on smart growth and sprawl and from the analysis above, the following conclusions can be drawn.

- ***Land Consumption***. Comparable suburban development would require a land area seven times the land area of Westport Phase I , i.e. 25 acres of previously used brownfield sites for Westport verse 175 acres of farmland or greenfields for suburban sprawl development;
- ***Auto-dependence***. Where Westport has been projected to achieve a 30 percent non-auto mode share, Baltimore regional norms are 11.8 percent non-auto mode share and suburban sprawl development can be assumed to be even lower.
- ***Infrastructure Spending.*** Most research points to higher infrastructure related spending needed to support sprawl development relative to compact urban development. One comprehensive review of the literature pegged the differential at between 20 and 50 percent. Another source analyzed Operations and Maintenance (O&M) costs for three alternative development patterns and found that O&M was 42 percent more costly in the spread development option relative to the most dense and centralized option. Thus, from a life cycle point of view, investing in Westport, as a dense urban walkable community, will reap rewards in long-term efficiencies.
- ***VMTs and CO2.*** The findings above conclude that Westport will reduce VMTs and CO2 by 40 – 45% relative to regional norms. The reverse would also be true – if development goes to sprawl patterns, VMTs and CO2 would be above regional norms.
- ***Inaccessible jobs.*** The alternative would also be that jobs would follow sprawl development patterns and go to less accessible locations without transit service. The residents of distressed areas in Baltimore City and near Westport would be far less likely to capture those jobs.
- ***Water Quality Worsens.*** EPA data indicates a strong correlation between low density and higher run-off - "With more dense development of eight houses per acre, runoff rates per house decrease by about 74 percent from one house per acre."

Conclusion

The total net benefits - $448 million – outweigh the costs - $16.3/federal and $39.8 total funds required.

Summary of Economic Benefits, Westport Waterfront TOD Phase I

Table 1-a. Regional and Distressed Area Impacts

Total jobs and Economic Output *- Westport Phase I, annual. These total impacts, although not national, will boost the economy of a distressed neighborhood in a distressed city.*

	office	retail	total
Square feet	900,400	91,533	991,933
Permanent jobs:			
- Total employees	3,782	173	3,955
- Indirect jobs	6,583	25	6,608
- Total direct and indirect jobs	10,364	197	10,561
temporary jobs due to construction			
- jobs due to infrastructure			655
- Jobs due to development			1,035
- Total temporary jobs			1,690.00
Direct earnings, annual	$ 227,290,463	$ 3,810,606	$ 231,101,069
Total earnings, annual	$ 490,345,152	$ 4,787,489	$ 495,132,641
Direct output, annual	$ 1,089,075,513	$ 7,497,849	$ 1,096,573,361
Total economic output, annual	$ 1,740,236,142	$ 10,192,938	$ 1,750,429,081

Distressed Area Benefit: *Given that there are agreements in place to assure that residents of the distressed neighborhoods will gain access to both temporary and permanent jobs, a conservative assumption would be that residents will gain at least 5% of jobs and earnings*

Resident/distressed area temporary jobs due to construction			
- jobs due to infrastructure			33
- Jobs due to development			52
- Total temporary jobs			85
Permanent Jobs gained by residents (5% of direct jobs)	189	9	198
Earnings gained by residents (5% of direct earnings)	$ 11,364,523	$ 190,530	$ 11,555,053
positions assumed to be 10% of earnings gains	$ 1,136,452	$ 19,053	$ 1,155,505
20-year NPV of earnings gains, residents of distressed area			$ 13,624,084

Economic Benefit Category	Monetized Net Benefit
	(not counted)
Economic Distress	$ 13,624,084

Table 1-b. Benefits to the US Economy due to International Businesses/Exports and Productivity Gains in Westport Office Space, 20 years.

A one percent gain in economic growth, net new to the US Economy, is projected from the Westport office sector: This comes from 3 factors: international businesses/service exporters; productivity gains due to density, and productivity gains due to green buildings		Economic Competitiveness	$ 348,047,228
	Office		
Total earnings, 20 years, 2010 $$	$ 98,069,030		
Direct Economic Output, 20 years. 2010 $$	$ 217,815,103		
Total economic output, 20 years, NPV, 2010 $$	**$ 348,047,228**		

Table 1-c. Employee Benefits of Reduced Commuting Costs (employees working at Westport)

Employees working at Westport are projected to lower VMTs by 30 - 35% relative to regional norms. Using the lower 30% estimate results in:		Economic Competitiveness and Livability	$ 14,105,051
VMTs "saved" per commuter, annual	1,850		
Aggregated VMTs "saved" by commuters annually relative to regional norms	7,236,979		
20-year NPV of fuel costs saved	$ 14,105,051		

Table 1-d. Westport Resident HH Benefits of Lower VMTs and Lower Travel Costs

Westport residents are projected to generate 40 - 45% lower VMTs relative to regional norms. Research indicates that residents of "transit rich" neighborhoods spend 53% less on travel relative to the US norm. Using a conservative 40% differential results in:		Economic Competitiveness and Livability	$ 42,168,584
VMTs saved per HH, annual @40% reduction relative to regional norms	9,138		
VMTs saved, aggregated for Westport HH @40% reduction	$ 7,236,979		
Resident HH $$ saved per HH, annual	$ 4,750		
Aggregated $$ saved, all Westport HH, 20 year NPV in 2010 $$,	**$ 42,168,584**		

Table 1-e. Lowered CO2 due to Fewer VMTs			
Westport residents are projected to generate 40 - 45% lower VMTs relative to regional norms and commuters to Westport businesses are projected to reduce VMTs by 30-35% relative to regional norms. Less driving directly correlates to lowered CO2 levels. using the lower end of both ranges results in:		Sustainability	$ 2,221,667
Total VMTs saved, annually, Westport residents and commuters to Westport	14,631,587		
Lowered CO2 per HH, annual, Westport residents (metric tons)	3.99		
Lowered CO2 each commuter to Westport, annual, metric tons	0.81		
Aggregated lower CO2, all HH and commuters, annual, (metric tons)	6,391		
Monetized value of CO2 reduction, NPV, 2010 $$	**$ 2,221,667**		
Table 1-f, Times saved due to "Internal Capture" and Lower Commute Times			
In a mixed use environment at least 17% of all trips are internally captured through short walking trips. Additionally, residents of Baltimore City average 18% shorter duration commute trips relative to regional norms. Using a conservative 15% reduction in travel times results in:		Economic Competitiveness and Livability	$ 5,546,306
Time savings per HH Westport annually, hours	40.3		
Time savings all Westport HH - hours, annual	31,933		
Monetized value of time saved, 20 years, NPY, 2010 $$	**$ 5,546,306**		
Table 1-g. Property Value Increases (as a measure of Livability)			
Literature indicates TOD areas gain 10 - 20% in property value over similar non-TOD areas. Because Westport is already transit-served and the TIGER improvements are enhancements, a conservative assumption would be that the enhancements will produce a 1 percent gain in property value		Economic Competitiveness and Livability	$ 52,863,205
projected 2015 property values in 2010 $$	$ 519,761,682		
1% attributable to TIGER infrastructure	$ 5,197,617		
200-year NPV of 1% increase in property value	$ 52,863,205		

Table 1-h, Safety Improvements *Safety benefits are attributable to 1) direct results of intersection improvements; 2) VMT reduction in comparison to alternative development* Number of crashes reduced due to intersection improvements, annual: 5.83 Number of crashes reduced due to VMT savings in comparison to alternative development: 13.7 Annual fatal crashes reduced due to VMT savings in comparison to alternative development: 0.16 20-year VPV of reduction in crashes and fatalities due to both intersection improvements and VMT reduction: $ 27,066,784		Safety	$27,066,784
Table 1-i State of Good Repair - Value of Avoided Maintenance *The proposed project includes replacing structurally deficient, functionally obsolete bridge elements at three major MD 295 interchanges. There are avoided maintenance costs which constitute a net benefit of the project* **20-year NPV of avoided maintenance costs on MD 295 bridge/interchanges: $ 8,954,599**		State of Good Repair	$8,954,599
Total Economic Benefit			$514,597,508
Less Property Value Increase which may double-count travel cost savings and travel time savings			$(52,863,205)
Less distressed area earnings benefit which is not net new to the US economy			$(13,624,084)
Net Benefit to the US economy			**$ 448,110,219**

I. PROPOSED INFRASTRUCTURE INVESTMENTS

The Westport Waterfront TOD's success hinges on the prompt completion of the transportation infrastructure program to capitalize on existing private investment and funding commitments. Specific projects included in this application can be implemented individually or holistically, depending on the extent of TIGER II funding obtained. The Westport Waterfront TOD elements described below represent a range of highway, bridge, transit, and bicycle and pedestrian projects necessary to advance transit-oriented development in the Middle Branch. The first phase of improvements includes the elements described below.

MD 295 Improvements

MD 295 is a major regional parkway connecting Baltimore to I-95, Anne Arundel County, and Washington, DC. The parkway was constructed in the 1950s and currently averages 80,000 cars per day. Two major interchanges serve the Westport Waterfront TOD. The bridge elements supporting these interchanges are structurally deficient and functionally obsolete. The Monroe Street bridge at the ramp off of MD 295 has a Bridge Sufficiency Rating (BSR) of 53.0 with deteriorated areas of concrete in the bottom face of the bridge deck, along the top face of the west traffic barrier, and throughout the substructure, and heavy rusting on all elements underneath the roadway joints. The Annapolis Road bridge over MD-295, has a BSR of 35.2, with deteriorated concrete along the curbs, severe map cracking on the light pilasters, and a paint system exposing heavy rust, pack rust, and severe section loss on most steel bridge elements. Sections of one steel joint angle have been removed due to severe rusting.

Hazardous geometry and operating conditions currently result in back-ups on the mainline of MD 295. TIGER II funds will be used to replace the bridges and reconstruct the ramp geometry to meet today's safety standards and strategically increase roadway capacity. In addition, more generous sidewalks and bicycle lanes will enhance connectivity between communities on both sides of MD 295 and help heal the divide caused by the parkway's initial construction. Without TIGER II funding, Synchro/Sim Traffic analysis shows that by 2018, these interchanges will fail to handle the projected volume of new traffic generated by TOD development causing back-ups on MD 295 and into the community.

Local Circulation and Safety Improvements

Local circulation and safety improvements will link redevelopment sites to the existing community and larger, regional roadway network. This project will involve improving signalization, turn-lanes, medians, and bicycle and pedestrian facilities at major intersections along Annapolis Road and Waterview Avenue to reduce congestion, and enhance pedestrian safety and accessibility.

Construction of 1,800 linear feet of John Moale Boulevard from Waterview Avenue to Wenburn Street will provide critical access to 19 development parcels within the 50-acre Westport Waterfront TOD and will include two traffic lanes, two parking lanes, a bike lane and wide sidewalks. A system of 16-foot wide dry swales will treat storm water run-off before it enters the Chesapeake Bay, making John Moale Boulevard one of the greenest street in Maryland. The

boulevard will be raised out of the floodplain to allow capping of on-site contamination and construction of underground parking on adjacent parcels.

Transit Improvements

The Westport Light Rail Station is a vital asset that connects the existing community and the proposed development to the larger regional transit network. The Westport Station is just one stop south of the MARC commuter rail's Camden Station, and a 20-minute ride to Amtrak and the Baltimore-Washington International Thurgood Marshall Airport (BWI). The 30-mile light rail system also provides access to Baltimore's subway line and to key employment centers throughout the region, including The Johns Hopkins Hospital and the University of Maryland, Baltimore. Current plans to expand the system with the 14.5-mile Red Line are projected to significantly increase ridership from 29,000 to more than 100,000 riders by 2030. Investment in and along the light rail is part of a key strategy to link City residents to job opportunities, since less than 50 percent of the population drives a car.

In its current state, physical barriers, small platforms, and limited amenities impede the Westport Station's function. TIGER II funds will be used to expand the station and create a more welcoming, safe, and accessible transit experience. The new 50-acre Westport Waterfront TOD will transform the station into a central civic amenity. A new, elevated pedestrian bridge will tie the station to the waterfront. The pedestrian bridge will be elevated over an active freight line, greatly enhancing pedestrian safety. The bridge will also overcome a significant elevation change that would otherwise prohibit pedestrian and handicapped access to the station.
The Westport Station will be upgraded with larger platforms and shelters that will protect riders from the elements. Taken together, these improvements are essential to the project's goal of tripling current light rail ridership and achieving a 30 percent transit share/mode split within the Westport Waterfront TOD to reduce automobile use (see Sustainability section for more information).

Bicycle and Pedestrian Improvements

Gwynns Falls Shared-Use Trail. The 15-mile, shared-use Gwynns Falls Trail is a main artery in Baltimore's regional bicycle network that connects the Westport Waterfront TOD to west Baltimore, the central business district, and Baltimore County. In addition, it is the primary bicycle access point from on-road paths that connect to a State trail in Anne Arundel County. The Westport portion of the trail is the only section of the 15-mile network that is **not** off road. Its substandard condition — narrow widths, embedded rail lines, at-grade rail crossings, and high-speed truck and car traffic — detracts from the trail's overall functionality as the preferred bicycle route linking downtown Baltimore to Anne Arundel County. TIGER II funds will be used to convert 1,600 linear feet of existing industrial roadway along Kloman Street to a dedicated shared-use path and green buffer. The Kloman Street portion of the Gwynns Falls Trail will join a new Waterfront Trail to create a two-mile loop that connects all buildings within the Westport Waterfront TOD. The trail will be lit to improve rider and pedestrian safety. The Waterfront Trail will utilize porous paving to mitigate storm water impacts. This is particularly important, as the trail borders newly created wetlands along the shoreline.

Kent Street. With low traffic volumes, Kent Street serves as the ideal central pedestrian spine connecting the Westport Waterfront TOD to the existing neighborhood, light rail station, shared-use trail, and bus routes. A new "Kiss and Ride" plaza and streetscape improvements, combined with the aforementioned transit improvements, will transform the Westport Station into a central focal point and Kent Street into the major pedestrian access point that knits the neighborhood and the TOD together.

MD 295

TIGER II funds will also be used to improve pedestrian access across MD 295 by replacing a narrow, 50-year old, severely deteriorated pedestrian bridge. The replacement bridge's designed incorporates landscaping, lighting, and artwork that will enhance safety and strengthen community identity. Pedestrian improvements will better integrate the bridge with the community's Main Street, Annapolis Road to the east, and public K-8 school, Westport Academy, to the west.

Rail Safety Improvements

An existing CSX freight line bisects Westport requiring new safety measures at three at-grade crossings to better protect pedestrians, and bicyclists. This will include coordinated signalization between the three rail crossings to coordinate access for all modes and new fencing along the CSX tracks to prevent trespassing on freight rail tracks.

Table 1. Funding Sources and Uses

Project Costs	**Cost/Funding**
#1 - MD 295 Improvements	$14,000,000
#2 – Local Circulation and Safety Improvements	$16,220,000
#3 - Transit Improvements	$3,500,000
#4 - Bicycle and Pedestrian Improvements	$4,670,000
#5 - Rail Safety Improvements	$1,380,000
Total Project Budget	**$39,770,000**
Match	
Tax Increment Financing Bond Proceeds	$12,550,000
City of Baltimore	$2,080,000
State of Maryland	$1,000,000
Private Developer Equity	$2,710,000
Total Match	**$18,340,000**
Match Ratio	**46%**
Other Leveraged Funds	
FHWA Formula Funds	$4,338,000
FTA Bus Grant	$510,000
FY 2009 earmark (THUD Appropriations)	$302,000
Total Leveraged Funds	**$5,150,000**
Total Match and Leveraged Funds	**$23,490,000**
Resulting TIGER II Grant	**$16,280,000**
Match Ratio with Leveraged Funds	**59%**

II. SUMMARY DESCRIPTION OF WESTPORT AND MIDDLE BRANCH – SUSTAINABLE DEVELOPMENT OPPORTUNITY

Westport Waterfront TOD Area

Westport Waterfront is being designed as a mixed use/walkable/transit-oriented development (TOD) community, consistent with sustainable development principles. Set on the shores of the Middle Branch of the Patapsco River, Westport will offer residents and businesses a model green community with immediate access to both Baltimore's light rail system and the Gwynns Falls greenway/hike/bike trail system.

Westport Waterfront, LLC (Turner Development) has assembled this 50-acre site from abandoned brownfield sites (primarily a mothballed BGE power plant and the closed Carr-Lowery glass plant) bordering the economically distressed communities of Westport and Mt Winans. The development team has invested more than $40 million in site acquisition, demolition, site preparation, and cleanup. The project enjoys the backing of the City of Baltimore, which has committed substantial funding (primarily tax increment financing for infrastructure) and ranked the project as the City's top priority in the 2008 Comprehensive Economic Development Strategy (CEDS). The State of Maryland has made Westport a priority, both in terms of funding, and by designating Westport as a "BRAC zone," (a district designated as a receiving area for base re-alignment-related growth). The project also benefits from partnerships and support from the current neighborhoods of Westport and Mt. Winans.

There is an approved development plan, and commitments have been made to begin vertical development. The last hurdle - the subject of this application - is infrastructure funding.

Westport Phase I. The TIGER application is proposed to fund the major infrastructure improvements needed to facilitate Westport Phase I. Phase I will create will provide space for 4,000 employees in an exciting mix of:

- 796 residences
- 900,000 sq ft office space
- 91,500 sq ft retail space

Much of the planned Phase I development is under contract or is in advanced negotiations. Parcels where vertical development is imminent include:

- Parcel L – Landex Corporation is under contract to build 200 luxury apartments;
- Parcel N and Q - Westport Development is in the final stages of contract negotiations with K. Hovnanian Homes for the purchase of Lots N and Q and construction of 72 townhomes.
- Parcel R - Westport Development is in active negotiations with a joint venture partner to construct and manage a 200-unit, waterfront apartment building including approximately 16,500 square feet of ground floor retail.

- Parcel O - Westport Development has been negotiating with a quasi-State agency to be the lead tenant for Parcel O, which will include approximately 280,000 square feet of office space and 20,000 square feet of ground floor retail.

The design will maximize sustainable development objectives – the plan is being submitted for LEED-ND platinum, and individual buildings will meet a minimum of LEED silver. Densities are very urban – about seven times typical suburban densities, with one result being that the entire Phase I development area is within ¼ mile of the Westport Light Rail Station. Extensive internal walking trails will link to the City's 22-mile Gwynns Falls Greenway.

The timeframe for vertical development of Phase I is 2011 – 2015.

Westport Phase II. The plan is for Phase II to commence in 2015, with build-out by 2020. Phase II will continue the mixed use theme, adding:

- 1.7 million sq. ft, office space;
- 185,000 sq ft of retail space;
- 786 DU's
- 500-room hotel

Note the costs and benefits of Phase II are not directly counted in the cost-benefit analysis.

Population Affected - Surrounding Neighborhood/Distressed Communities

The communities surrounding the Westport Waterfront TOD including Westport, Mount Winans, Lakeland and Cherry Hill are together some of the City's most economically distressed areas. Of the City's 55 designated neighborhoods, these communities rank in the bottom third of more than half of City's key health indicators including life expectancy (40) and homicide (43). The neighborhoods are also in the lower half for infant mortality rate (27).[2] Of the roughly 15,000 residents, the current median household income in the area is $28,665. As of August 2010, unemployment is high at 12.9% when compared to 9.4% nationally with 39.1% of residents not participating in the labor force at all. Twenty-four percent of residents are living in poverty. In addition to high unemployment, the community suffers from declining home-ownership and increased vacancy, with a 22.2% vacancy rate, representing an 119% increase since the 1990 Census.[3]

Middle Branch Area Plan and Development Opportunities

In 2008 Baltimore finalized the Middle Branch Master Plan, available at http://www.middlebranchbaltimore.com/Portals/0/MiddleBranchMasterPlan_full.pdf. The plan establishes a sustainability theme in its opening statement:

> Through the Middle Branch planning process it is our goal to highlight and capitalize on the uniquely green character of the Middle Branch estuary to build a model community

[2] Baltimore City Health Department, http://www.baltimorehealth.org/info/ neighborhood/55%20Westport.pdf.
[3] Information compiled by Towson University from Sitereports.com, 8/10/10.

> based on sustainable principles. These sustainable principles include economic prosperity, environmental improvement and social equity….
> The Middle Branch's unique qualities as an environmental oasis, located minutes from downtown and surrounded by challenged communities, create a perfect opportunity to employ these principles.

Westport Waterfront and the proposed TIGER grant are key contributing elements, helping implement this ambitious vision. As just one example (to be amplified later), the plan sets out an objective to "Create new tidal marshes." Westport Waterfront is committed to recreating tidal wetlands by partnering with the National Aquarium, Westport Academy, and the Chesapeake Bay Trust to rebuild the shoreline and plant 16,000 marsh plants, providing a hands-on learning opportunity for local youth.

Complimentary development plans. The Master Plan also calls for intense redevelopment at six development nodes, generally promoting mixed use, walkable communities at certain opportunity areas where the transportation infrastructure is in place and the land is currently under-utilized. The areas where development is projected include: the Cherry Hill TOD zone, the National Aquarium's proposed environmental research center; Port Covington waterfront mixed use development area, and the Celebration Casino, slated for the Gateway South area on the Upper Middle Branch.

Appendix 2 is the Proposed Future Land Use Map from the Middle Branch Master Plan.

The proposed TIGER grant for Westport will upgrade the infrastructure for the entire Middle Branch corridor by alleviating congestion, expanding the off-road hike-bike trail system, improving access to light rail, and replacing structurally deficient, functionally obsolete bridge elements. Further, by increasing the chance of success at Westport, the TIGER funds will be indirectly assisting other corridor redevelopment projects by helping establish the market.

The Baltimore City Department of Planning provided the development scenarios for the Middle Branch development nodes – see appendix 1, and summary tables 1 and 2.

Of particular note, the Middle Branch development opportunity areas can accommodate significant growth, including:

- 7,300 to 12,300 new households
- 13.1 to 21.1 million sq ft of space;
- 17,900 to 21,900 jobs located in smart growth areas;
- $2.7 billion to $4.1 billion in new investment.

Given that all of these planned projects are in smart growth locations and each is being planned as a mixed use, walkable center, the TIGER grant would contribute toward sustainable development objectives for the entire Middle Branch corridor.

Table 2. Development Potential and Resulting Jobs and Investment, six Middle Branch Development Areas

Measure	acres	type of space	Low Density		High Density	
			Units	Variable	Units	Variable
		Research	180,000	Sq. Ft.	180,000	Sq. Ft.
		Retail	1,044,710	Sq. Ft.	1,693,420	Sq. Ft.
		Office	2,874,000	Sq. Ft.	3,194,000	Sq. Ft.
		Hotel	1,960	Rooms	3,120	rooms
		Hotel**	1,568,000	sq ft	2,496,000	sq ft
		Residential	7,252	DU's	12,322	DU's
		Residential***	7,252,000	sq ft	12,322,000	sq ft
		Casino	250,000	sq ft	250,000	sq ft
Total space	**210**	**All uses**	**13,168,710**	**sq ft**	**20,135,420**	**sq ft**
Total Investment****		**All uses**	**$ 2,712,754,260**	**dollars**	**$ 4,147,896,520**	**dollars**
Total Jobs						
- Research jobs @ 2.4 per 1,000 sq ft		Research	432	Jobs	432	jobs
- retail jobs @2.4 per 1,000 sq ft		Retail	2,507	Jobs	4,064	jobs
- Office jobs @ 4.2 per 1,000 sq ft		Office	12,071	Jobs	13,415	jobs
- Hotel jobs @ 1 per room		Hotel	1,960	Jobs	3,120	jobs
- Casino jobs per press account		Casino	900	Jobs	900	jobs
Total Jobs		**all uses**	**17,870**	**Jobs**	**21,931**	**jobs**

Source: Baltimore City Department of Planning (for area development projections), and Redevelopment Economics (for economic impact conversions), August 2010.

III. PROJECT SUSTAINABILITY CHARACTERISTICS – ENERGY EFFICIENT LOCATION

Note on report organization. A recurring theme of the cost-benefit analysis is that Westport has strong sustainability and energy-efficient location benefits that should be taken into account in several of the cost-benefit categories. In order to reduce duplicative information (relative to each of the benefit categories), the project's sustainability characteristics are described here and will be cross-referenced from other sections. Also note the project's environmental design elements are addressed in the

Sustainability Characteristics with Reference to Transportation and Energy-Efficient Locations. Westport is being designed to be a mixed use/walkable/TOD community. Mixed

use/walkable communities are often cited in the literature as promoting sustainable development patterns, transportation efficiencies, greater non-auto mode shares, and lowered greenhouse gases. The urban form characteristics that are associated with these sustainability factors are (generally in rank order):[4]

1. ***Residential density*** – Westport Phase I is planned to include 796 residences on 27.5 acres of land,[5] or 28.9 DU per ac, which is approximately 7 times typical suburban densities. High residential densities are strongly correlated with higher non-auto mode splits and lower vehicle miles traveled (VMTs). Some analysts use residential densities as the only variable in models that predict lower VMTs and lower greenhouse gases.[6]
2. ***Proximity/access to job centers*** – Westport Phase I will accommodate 1.05 million sq ft of commercial space, generating 4,000 jobs, a job density of 153 jobs per ac, which compares to typical suburban business park densities of 10 to 15 employees per acre. Westport will be connected to downtown and the BWI airport business zone via light rail. For those commuters who continue to travel by car, trip distances and times should benefit from proximity, as Westport enjoys convenient access to both downtown (106,000 jobs, 2.3 miles) and suburban employment centers, such as, Brooklyn Park/Linthicum (25,000 jobs, 4.5 miles) and the BWI airport area business park areas (32,000 jobs, 8.2 miles).
3. ***Mixing uses*** – Westport Phase I includes:
    - 796 residences
    - 900,000 sq ft office space
    - 91,500 sq ft retail space
    - 63,000 sq ft hotel space

    Mixing uses produces transportation and energy efficiencies because many trips are "internal capture" via walking.
4. ***Access to transit and the degree to which transit connects to important job and activity centers*** – One of the proposed TIGER projects is to enhance the connection to the Westport light rail station by building a pedestrian bridge. All of Westport Phase I is within ¼ mile of the Westport light rail station. The light rail line currently connects to downtown Baltimore (106,000 jobs), Penn Station, the stadium complex, the BWI airport area business center (32,000 jobs), and the Metro/subway, which connects to John Hopkins Medical Institutions. A new east-west light rail line, now in advance planning, will provide access to the Woodlawn employment center, activity nodes in Fells Point and Canton, and the Hopkins-Bayview Medical Center.
5. ***Connectivity of streets and pedestrian facilities*** – Westport is planned as a traditional grid street urban center in order to maximize connectivity. Westport will also be directly

[4] Urban Land Institute, Smart Growth America, the Center for Clean Air Policy, and the National Center for Smart Growth, "Growing Cooler: Evidence on Urban Development and Climate Change," Washington, D.C. January 2008 http://www.smartgrowthamerica.org/gcindex.html; and Holtzclaw, John Robert Clear, Hank Dittmar, David Goldstein and Peter Haas, "Location Efficiency: Neighborhood and Socio-Economic Characteristics Determine Auto Ownership and Use," *Transportation Planning and Technology*, Vol. 25(1), pp 1-27, March 2002.

[5] Acreage includes public/non-developable space

[6] See: http://www.sflcv.org/density/

served by a 22 mile hike bike trail which connects to downtown, several regional parks, and the Camden Yards stadium complex.

IV. STATE OF GOOD REPAIR

Consistency with Local Efforts To Maintain Facilities in a State of Good Repair

Since 2008, Baltimore DOT has approached asset management by prioritizing transportation investments based on asset condition and criticality to future economic growth[7]. Utilizing this approach the City has developed the Middle Branch Transportation Plan to identify operational, safety, and capacity deficiencies in the transportation network that must be improved to reposition existing assets to contribute to a robust regional economy and ensure the critical movement of goods and services. For a copy of the plan, see www.middlebranch.com.)
This TIGER II request directly addresses the State of Good Repair objective by including funding for:

- Reconstructing three structurally deficient and functionally obsolete bridges along the heavily traveled MD 295 as described in the Project Description section above
- Making pedestrian improvements to industrial-era roadways within the TOD and the community to provide disadvantaged and handicapped residents with improved access to jobs, amenities, and goods and services
- Converting a deteriorated on-street, shared-use path along an industrial access road in to a dedicated off-road path to improve bicycle mobility along the 15-mile Gwynns Falls Trail

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Upgrade Surface Transportation Conditions that Threaten Future Economic Growth.

Like many urban areas in the U.S., the lack of investment in the built environment in Westport and the Middle Branch has fostered a perception of disinterest and decline that is compounded by 1950s-era transportation assets that were designed for industrial traffic at the expense of other

[7] For a copy of the City's Asset Management Report see www.baltimorecity.gov/government/transportation/tiger.php.
[8] For a copy of the City's Asset Management Report see www.baltimorecity.gov/government/transportation/tiger.php.

modes. The City's comprehensive strategy to reinvest in the neighborhood's transportation infrastructure is the critical first step in unlocking the enormous potential of vacant waterfront property for significant economic activity. In Baltimore, this strategy has been successfully employed to help transform declining industrial neighborhoods into high density, mixed-use, pedestrian-friendly communities. Transportation investments over the last 15 years have resulted in significant commercial and residential redevelopment that has helped the City retain and attract new headquarter firms, diversify the City's economic base, and stem the tide of significant population loss.

Minimizes life cycle costs within the regional transportation system and within the Middle Branch.

The planned transportation improvements reflect a comprehensive and coordinated approach to infrastructure investment to meet long-term redevelopment goals and ensure that maintenance and operating resources are efficiently and effectively used.

The proposed TIGER II-funded investments will not only catalyze the Westport Waterfront TOD redevelopment, but will also prevent future road closures and delays caused by failing infrastructure. For example, delays caused by failing infrastructure at the Westport interchanges of MD 295 could result in additional roadway capacity and maintenance projects across the region to accommodate the more than 80,000 drivers who use MD 295 each day. In addition, recent research has found that investment in urban redevelopment helps reduce local government expenditures by up to 11.8 percent for road building costs, up to 6 percent for water and sewer costs, and up to 3.7 percent for recurring annual operations and maintenance costs.[9] Another source analyzed Operations and Maintenance (O&M) costs for three alternative development patterns and found that O&M was 42 percent more costly in the spread development option relative to the most dense and centralized option.[10] Thus, from a life cycle point of view, investing in Westport, as a dense urban walkable community, will reap rewards in long-term efficiencies.

These savings are projected to be even greater at the Westport Waterfront TOD, where green building requirements and green infrastructure will reduce dependence on local infrastructure by curtailing storm water, water, wastewater, and energy use.

Quantifiable Benefit

The primary quantifiable benefit to State of Good Repair results from the savings in maintenance costs that would be realized by making a onetime large investment to replace the bridges, rather than spending a greater amount of funds every few years to perform significant maintenance and repairs to the structures. Quantification of these benefits is based on a lifecycle cost analysis of the cash outlays that would be required to maintain the bridges at their current level including performing significant concrete repairs, steel repairs, cleaning and painting, deck

[9] Munro, M., and R. Puente, *Investing in Better Future: A Review of the Fiscal and Competitive Advantages of Smarter Growth Development Patterns*, The Brookings Institution Center on Urban and Metropolitan Policy. 2004

[10] Pamela Blais, *The Economics of Urban Form*, in Appendix E of *Greater Toronto*, Greater Toronto Area Task Force (Toronto), December 1995.; cited in Todd Littman, "Understanding Smart Growth Savings," Victoria Transport Policy Institute, December, 2004

overlay/replacement, and traffic safety upgrades. Grant funds would be used to replace three bridges: Waterview Avenue over MD 295 (BC-5402), Annapolis Road over Waterview Avenue (BC-5407), and Maisel Street Pedestrian Bridge over MD 295 (BC-5001). Information from the Baltimore City Department of Transportation regarding their recurring cash outlays for maintenance of the three affected bridges was acquired. The total cost of maintenance was estimated to be about $1.35 million occurring every four to five years. The proposed use of TIGER funds to reconstruct / replace the structures would "restart" the clock on their respective service lives, providing functioning bridges for 70 to 100 years into the future. For purposes of this analysis, it was assumed that maintaining the existing bridges would require a $1.35 million investment every four years, while maintaining new replacement bridges would require a $1 million investment every ten years. A 40 year analysis period was assumed, which is conservative, given the expected service life of 70 to 100 years for new bridges.

The total monetary benefit to State of Good Repair, based on the assumptions outlined above, is $3,401,887.

V. ECONOMIC COMPETITIVENESS

Employment and Economic Growth Opportunity

The Economic Alliance of Greater Baltimore – the regional economic development cooperative organization marketing the region for inward investment – has identified eight key industry clusters already well-established in the region which also form the basis for additional business attraction efforts:[11]

- Education – Educational services, including universities, training, and related services
- Entrepreneurship – Small or start-up businesses started through collaboration with the region's research institutions or other business partners
- Finance – All functions of investment banking and wealth management companies
- Government – Federal and state agencies. (These are of course not truly free in their location choices and are not considered in the remainder of this report)
- Healthcare – Both the provision of care in institutional settings and the development of medical regimes through bioscience, pharmaceutical science, or medical devices
- Headquarters – Head office functions of all industry types
- Non-Profits – Charitable organizations, particularly those concentrating in education, grant writing, performing arts, hospitals and museums/historic sites
- Professional, Scientific and Technical Services - IT, defense contracting, management consulting, biotech and scientific research, law, accounting, architecture, and engineering firms

Each of the above has a different location profile, but each emphasizes:

- The ability to attract entrepreneurial talent, necessitating a high quality of life
- Access to a strong primary, secondary, and university educational system
- A strong professional services and technical workforce

[11] http://www.greaterbaltimore.org, referenced August 8, 2010

Westport as a Business Location: Westport will provide quality a quality, transit-oriented, waterfront business location with access to world-class regional business partners and a high-potential labor force. The development's location along mass-transit, its provision of live-work-shop opportunities, and its natural location along the vibrant and revitalizing Baltimore waterfront should satisfy location requirements for financial services, professional services, technical, and similar companies, and will further be a draw for attracting entrepreneurial talent to the area.

According to CB Richard Ellis, the Baltimore office real estate market has remained relatively stable during the economic downturn (retaining a vacancy rate of roughly 16%). This is largely due to defense, professional services, and technical employment growth related to consolidation and growth at Fort Meade and the Aberdeen Proving Ground.[12] These activities have placed some unusual strain upon the regional real estate market, particularly for office.

As a result of this, the proposed development will take more of its employment impact from net new growth rather than displacing or relocating it from other parts of the region or, indeed, the nation.

National Economic Benefits

While the majority of Westport's economic impacts will be regional (with particular benefits to distressed areas), some of the benefits are likely to be national, with gains in productivity and in attraction of businesses that represent US presence in the international economy.

These estimates and projections are set out in a separate document – see separate memo, "Projection for Net Economic Benefit to the US Economy due to Productivity Gains and International Businesses," See Appendix 1. The summary is as follows.

There are three gains for the national economy, all linked to the established theory that mixed use/TOD/sustainable communities provide stimulating environments for work and that translates into economic gains. (See separate memo for sources)

- Urban Density and Knowledge spillover effect. There are productivity gains connected to urban density and what has been termed the "knowledge spillover" effect. Studies have linked increases in patents, as well as general worker productivity, to increasing density.
- Green buildings. Studies have also linked greater worker productivity to green buildings. Lower absenteeism, fewer building-related medical problems, as well as natural light contribute to worker productivity gains.
- International Businesses and Exporting Services. Many new economy businesses want to locate in stimulating mixed use environments, partly because these locations are appealing to their "creative class" workforce. Some of these businesses are international and are involved in exporting services - they can therefore be counted as net gains to the US economy. In Baltimore there are five such international companies that have been attracted to mixed use (non-downtown) waterfront locations. These five businesses

[12] CB Richard Ellis Market View, Baltimore Office, Second Quarter 2010

provide a total of 2,200 jobs and comprise 20 percent of the non-downtown mixed use/waterfront office space.

The conservative conclusion is that Westport should be credited with at least a 1 percent increase in totalt output from a combination of efficiency gains and likely international export activity. The 20-year net present value of this 1 percent gain is $348 million.

Regional Jobs and Economic Benefits - Economically Distressed Area, Low-Moderate Income Populations

Regional Impacts. Westport Phase I will support 4,000 permanent jobs, 1,700 temporary construction jobs and a total direct and indirect economic output of $1.8 billion, a massive stimulus for Baltimore as a distressed city that suffers high unemployment, high poverty rates, and a continuing erosion of the city's manufacturing base.

Regional impacts are projected as follows:

Table 3. Economic Impacts, Baltimore City and Baltimore Region

	office	retail	total
Square feet	900,400	91,533	991,933
Permanent jobs:			
- Total employees	3,782	173	3,955
- Indirect jobs	6,583	25	6,608
- Total direct and indirect jobs	10,364	197	10,561
temporary jobs due to construction			
- jobs due to infrastructure			655
- Jobs due to development			1,035
- Total temporary jobs			1,690
Direct earnings, annual	$227,290,463	$3,810,606	$231,101,069
Total earnings, annual	$490,345,152	$4,787,489	$495,132,641
Direct output, annual	$1,089,075,513	$7,497,849	$1,096,573,361
Total economic output, annual	$1,740,236,142	$10,192,938	$1,750,429,081

Source: Muni-Cap Projection Number 21, Westport Waterfront TOD, adjusted for the current phasing by CWS Consulting. Original source for earnings and output: IMPLAN

Neighborhood Stats. The Westport TOD is located in one of Baltimore City's most distressed areas. Decades of disinvestment and the loss of thousands of manufacturing jobs have placed the surrounding neighborhoods at the bottom third of more than half of City's key health indicators including life expectancy (40) and child asthma (43). Only 26% of the housing units are owner occupied compared to 43% for the rest of Baltimore City. Unemployment is high at 14.4% compared to 9.4% nationally in June 2009, and 43.8% of the population over the age of 16 are not part of the labor force at all; 37% of residents are living in poverty. The neighborhood is

severely underserved in terms of employment centers and basic goods and services.[13] The injection of 4,000 permanent retail and office jobs and 1,700 temporary construction jobs associated with the Westport TOD will directly benefit the surrounding neighborhoods. The addition of 792 market rate and 130 affordable housing units, combined with the City's investment in the existing housing stock will rejuvenate the area's struggling housing market, and ensure that area residents can participate in the economic revitalization of their neighborhood.

Community Partnership. A growing public/private partnership – the Westport Community Partnership - has embraced the surrounding community and is developing a human capital strategy to ensure that existing residents thrive alongside the new development. Working with Baltimore City Department of Employment Development, the Westport TOD includes a Workforce Development Center which will provide a wide range of services including job readiness and skills training, and long-term job retention and follow-up support. From this base of locally-developed capital, the TOD developer and its contractors have made a strong commitment to give residents a first opportunity for jobs created through the City's "Resident's First" program and Project Jumpstart will provide job training and placement support. The project also represents a commitment to diversity, having self-established a goal for minority- and women-owned business enterprise participation in site development of 30% MBE/10% WBE – higher than the City's usual goals for infrastructure contracts. Taken together, all of these components demonstrate a significant investment in local, disadvantaged residents in order to develop the community to its fullest potential.

Income Opportunity. The proposed development could produce an estimated 3,700 additional office-based jobs within five years. Sample median annual salaries as of 2009 for typical full-time office-based positions in the region's targeted industries are as follows:

Table 4. Earnings in Office Settings

Occupation	**Median Annual Earnings[14]**
Business and financial operations occupations	$68,340
Computer support specialists	60,256
Database administrators	96,990
Community and social services occupations	33,280
Education, training, and library occupations	60,941
Sales and related occupations	34,133
Office and administrative support occupations	37,613

These should be compared against the current area per capita income of $13,803 and a median household income of $28,655.[15]

Capture of Jobs and Economic Growth in Distressed Neighborhood. Westport Phase I will generate 4,000 permanent jobs, 1,700 temporary construction jobs and a total direct and indirect

[13] Sources: Baltimore City Health Department and 1990/2000 Census Data, CB Richard Ellis 2008

[14] Washington–Baltimore–Northern Virginia, DC–MD–VA–WV National Compensation Survey, April 2009

[15] Nielsen Site Reports for Brooklyn, MD. Generated on August 10, 2010

economic output of $1.8 billion, a massive stimulus for Baltimore as a distressed city that suffers high unemployment, high poverty rates, and a continuing erosion of the city's manufacturing base. Westport Waterfront's immediate neighbors - Westport, Mount Winans, Lakeland and Cherry Hill - are together some of the City's most economically distressed areas. Of the roughly 15,000 residents, the current median household income in the area is $28,665. Twenty-four percent of residents are living in poverty.[16]

The developer and the community have formed the Westport Community Partnership, which is designed to maximize the positive benefits of the project for the surrounding community. Given these priorities, a conservative assumption is that the nearby residents of the distressed neighborhood will gain at least 5 percent of the temporary and permanent jobs and related earnings activities. This results in a projection of benefit to these under-served populations:

- 85 construction jobs;
- 198 permanent jobs;
- $11.6 in household earnings (gross);
- $1.3 million in net new earnings benefit, annually, relative to alternative positions, assumed to be 10% of earnings gains;
- *This net earnings for lower income residents of the distressed area has a 20-year net present value of $13.6 million*

Table 5. Quantified Benefits to Distressed Neighborhoods, based on Neighborhood residents capturing 5 percent of generated economic activity

	Office	Retail	Total
	All estimates are 5% of jobs and earnings from Table 3		
Resident/distressed area temporary jobs due to construction			
- jobs due to infrastructure			33
- Jobs due to development			52
- Total temporary jobs			85
Permanent Jobs gained by residents (5% of direct jobs)	189	9	198
Earnings gained by residents (5% of direct earnings)	$11,364,523	$190,530	$11,555,053
Net benefit to residents relative to alternative positions assumed to be 10% of earnings gains	$1,136,452	$19,053	$1,155,505
20-year NPV of earnings gains, residents of distressed area			$13,624,084

Affordable Housing - The developer has also committed to 20 percent or 130 units of affordable housing. These low-moderate income households will gain from the same livability benefits as

[16] In the interest of brevity, sources are not cited in the summary – see the full cost-benefit analysis

the other residents. For example, residents are projected to spend 40 percent less on transportation (relative to regional norms), which computes to $4,800 saved per family annually. *The 20-year net present value of these benefits (lower HH spending on transportation) for the 20 percent low-mod families is $8.4 million*

Other Benefits. Other ways these distressed communities will benefit from the project includes:

- Residents will also benefit from enhanced transportation choices, particularly in that the proposed TIGER projects will improve access to the light rail system and fund one component of the hike-bike trail.
- Residents will benefit from rising property values, producing expanded owner equity, and lowering the likelihood of housing abandonment and neighborhood decline.

Reduced Travel Time and Lower Commuting Costs

Resident's Commuting Costs. The analysis below under "Vehicle Miles Traveled savings for Westport residents" finds the Westport households will drive 40 to 45 percent less than regional norms.

Generally, residents of residents of mixed use, walkable, and TOD communities spend significantly less on transportation than either the average American family or the those living in auto-dependent outer suburban areas. One analysis concluded that residents of TOD areas save $1,400 annually just on fuel costs.[17] Another analysis, which took into account both fuel and auto ownership-related expenses, concluded that spending on transportation among those in "transit-rich" neighborhoods was 53 percent less than the average family and about 65 percent lower than the "auto-dependent ex-urbs." (See Table 6.) These findings are supported by an analysis which found that, in Baltimore, 75 percent of those living in "transit zones" had one or less vehicles, compared to a metropolitan average of 45 percent having one or less cars per household.[18]

Table 6. Percentage of HH Income Spent on Transportation, Housing, and Other Expenditures[19]

	Transit rich neighborhoods	Ave American family	Auto-dependent ex-urbs
Transportation	9%	19	25
Hsg	32	32	32
Other	59	49	43

[17] Linda Bailey (2007), *Public Transportation and Petroleum Savings in the U.S.: Reducing Dependence on Oil*, ICF International for the American Public Transportation Association (www.apta.com); at www.apta.com/research/info/online/documents/apta_public_transportation_fuel_savings_final_010807.pdf.

[18] Re-Connecting America, "Transit-Oriented Development Decision-Making: One Size Does Not Fit All," 2009

[19] Re-Connecting America, "Expanding Housing Opportunities Near Transit -Re-connecting America," http://www.reconnectingamerica.org/public/display_asset/rtp3. Original Source: Center for TOD, Transportation Affordability Index, 2004 Bureau of Labor Statistics.

If one assumes a more modest 40% reduction in transportation-related costs for Westport residents relative to the US average, consistent with the projected VMT reduction, Westport residents are projected to:

- Spend 11.4% of HH income on transportation, relative to the US average of 19 percent;
- Save $4,750 per household on transportation costs relative to the US average;
- Save $8,500 per household on transportation costs relative to the "auto-dependent Ex-urbs;"
- Save a total of $3.8 million on transportation costs relative to the US average (represents 792 households);
- Save a total of $6.7 million on transportation costs relative to the "auto-dependent Ex-urbs" (represents 792 HH).
- The 20 year net present value of these travel cost savings for Westport residents is $42.2 million.

Appendix 3 contains the estimates and projections for lower resident travel costs.

Travel Times. In a paper prepared for the Surface Transportation Policy Project, analysts related commuting costs and delays to economic competitiveness:

> "The average American spent 443 hours behind the wheel of a car, or 55 eight-hour workdays. In a study of 68 cities, the Texas Transportation Institute (TTI) estimated that the total congestion "bill" for the areas studied in 1999 came to $78 billion, which was the value of 4.5 billion hours of delay and 6.8 billion gallons of excess fuel consumed."[20]

The average commute time (home-based work trip) in the Baltimore area is[21]

- 21 minutes for the metropolitan area
- 22.1 minutes for residents residing outside Baltimore City
- 17.3 Minutes for residents of Baltimore City (17.6 percent below the regional norm and 21.7 percent below the suburban norm)

Nationally, trips generated within mixed use communities average 17 percent "internal capture," i.e. that 17 percent of all trips generated involve origin and destination within the mixed use community.[22] For a project like Westport, the best assumption would be that nearly 100 percent of internal capture trips would be via walking and involve 5 to 10 minutes time.

Between these two factors (internal capture and lower average commute times for city-dwellers), a conservative assumption would be that travel times for Westport residents will be 15 percent lower than regional averages.

Applying this only to commute times results in a gain for Westport residents of:

[20] See: http://www.transact.org/library/factsheets/prosperity.asp
[21] Baltimore Metropolitan Council, Regional Transportation Survey, 2001
[22] Reid Ewing, "Travel Generated by Mixed Use Developments, A six-Region Study," Unpublished, 2010.

- 40 hours gained annually per household (40 less hours commuting time);
- Almost 32,000 hours gained annually for all Westport households;
- When time is monetized vis-à-vis the federal guidelines, the 20-year net present value of commuting time gained is $5.5 million.

Appendix 4 contains the estimates and projections for travel time savings.

Commute Trips "Saved" – Employees Commuting to Westport

Limited national research leads to the conclusion that commuters to dense TOD-oriented mixed use employment centers also save VMTs relative to regional norms, but the reduction is somewhat less than for residents of those types of centers. For a full discussion of this issue see the section below under Livability - Commute VMTs "Saved" – Employees at Westport.

For Westport the projection is a 30 to 35 percent savings relative to the norm. Using the lower end of that range, results in projections that:

- Commuters to Westport jobs will save an average of 1,859 VMTs annually relative to regional norms;
- The monetized value of those "saved VMTs" is the value of gasoline saved. The 20-year net present value of gas saved by those commuting to Westport is $14.1 million. See Table 1-c.

See appendix 5. Note Appendix 5 also presents a calculation for fuel cost savings for Westport resident households;, however those results are not used in the benefit analysis, because they would be double-counted in resident household travel costs.

Modal Diversion

Walk-bike for commuting **-** According to the 2000 census, 2.98 percent of commute trips in the Baltimore-Washington area were in the walk-bike category. In an analysis of 11 cities with 102 transit-oriented development (TOD) zones, the average walk-bike mode split for was 11.2% of commuting trips, with several cities (e.g. Portland) in the 20% range for walk-bike mode split.[23]

Research generally points to the importance of residential density, mixing uses, and access to job centers as the three greatest determinants of walk-bike mode split. Westport's residential density is seven times typical suburban densities. Further, with extensive mixing of uses, including 1.1 million sq ft of commercial space (projecting to more than 4,000 jobs in Phase I); there is a significant potential for residents to live and work within the same complex. Lastly, the hike-bike trail will connect to the downtown job center. Conclusion: Westport will meet or exceed the reported average to TOD zones – 11.2% of commute trips by walk-bike, which is almost triple the national average for commute trips.

Walk-bike for Non-Commute Trips and Internal Capture – Nationally, non-commuting trips outnumber commuting trips by about four to one. Also nationally, the walk-bike share of non-

[23] "The Effects of TOD on Housing Parking and Travel," TCRP report 128

commuting trips is almost triple the walk-bike share for commute trips – or approximately 9 percent of all trips.[24] For comparison, analyses of dense urban mixed use areas in Denver and Sacramento peg the walk-bike percentage at 44 percent and 32 percent, respectively, of all non-commute trips. In Portland, the walk-bike share was 29 percent of all trips in neighborhoods that were classified as having "good transit and mixed use."[25] An analysis of mixed use development projects found an average "internal capture rate" of 17 percent, meaning that 17 percent of all trips are within the mixed use zone and most of those trips are on foot.

The research again supports the importance of density and mixing uses as the key determinants of non-commute walk-bike trip shares. As noted above Westport meets/exceeds these criteria. Also note that Westport will have direct access to an extensive hike-bike trail system that will connect to downtown, several regional parks, and Baltimore's stadium complex. *Conclusion: conservatively assume that Westport will achieve a 24 percent walk-bike mode share for non-commute trips, roughly in between the national average and the rates reported for dense mixed use neighborhoods elsewhere.*

Transit Mode-split for commuting - According to a 2005 Baltimore Metropolitan Council commuter survey, 9 percent of Baltimore commuters use public transit. In a review of the literature for the Transit Cooperative Research Program (TCRP), the average transit share of commuting trips in eleven metropolitan areas was 7.1 percent. The TCRP report also reviewed data from multiple studies related to transit-oriented development, representing 102 TOD zones. The average transit mode share in these TOD zones was 17.6 percent.[26]

Generally, research supports the following factors as positively affecting transit mode split: residential density, proximity to the transit station, the extent of the transit network, and the degree to which the transit line connects to important job and activity centers. Westport meets/exceeds each of these criteria except the extent of the transit network, which will be largely remedied assuming the planned Red Line is implemented. *Conclusion: conservatively assume that the transit share of Westport commute trips will be 17.6 percent, the same as that found generally for TOD areas.*

Transit Mode-split for non-commuting trips – The transit share of non-work trips for metropolitan populations is lower than commuting trips, generally only about 3 percent (the national average is only 1.8% for all trips).[27] The above-cited TCRP report found the transit capture rate in 102 analyzed TOD zones was 8 percent of all non-work trips.

The literature reveals less data related to the factors that affect non-work transit shares, but the assumption is that the same factors referenced above, with the same advantages accruing to Westport, are applicable. *Conclusion: conservatively assume that the transit share of Westport non-commute trips will be 8 percent (the average for TOD areas) when the Red Line opens.*

Total Non-auto Modal Diversion. Westport residents are projected to use non-auto means of travel for 30 percent of non-work trips and 28.8 percent of work trips.

[24] National Travel Data Survey
[25] The Effects of TOD on Housing Parking and Travel," TCRP report 128…
[26] "The Effects of TOD on Housing Parking and Travel," TCRP report 128
[27] US Census, 2000.

Table 7. Summary Table for Mode Split and VMT reduction - Trips Generated by Westport Residents

	Norm[28]	Projection for Westport	Westport projection as a multiple of the norm
Non-auto Mode split categories			
Walk-Bike share of commute trips	3.0%	11.2%	3.76
Walk-Bike share of non-work trips	9.0%	22.0%	2.44
Transit share of commute trips	8.0%	17.6%	2.20
Transit share of non-work trips	3.0%	8.0%	2.67
Total commute trips by non-auto means	11.0%	28.8%	2.64
Total non-work trips by non-auto means	12.0%	30.0%	2.45
Weighted average all trips by non-auto means	11.8%	29.8%	2.49

VI. LIVABILITY

A number of aspects of livability were addressed under "Economic Competitiveness" with the following projections and conclusions:

- Westport residents and employees will enjoy the advantages transit and walking alternatives to auto dependence, and a non-auto mode share of 30 percent was estimated (see "Modal Diversion")
- Westport residents will save an average of $4,800 annually on commuting costs relative to regional norms (see Travel Time and Commuting Cost Savings);
- Westport residents will save at least 15 percent in travel time due to the efficiencies of "internal capture" of trips within the mixed use community and shorter commuting times relative to norms. (See Travel Time and Commuting Cost Savings)

Number of Persons Gaining Access to Non-Auto Means of Travel

Westport Phase I includes 792 dwelling units - with 1.6 persons per DU, the total Phase I population would be 1.267. All would be within ¼ mile of the Westport light rail station (superior transit proximity given that most TOD areas count populations within ½ mile).

[28] Norms are from the Baltimore Metropolitan Council, Regional Travel Data Surveys, 2005 and 2008; and US Travel Data Survey

Westport Phase I also includes 990,000 sq ft of office and retail space, which will accommodate 4,000 employees. Most of these employees will also have access to non-auto means of transport to their work site.

The 15,000 current residents of Westport area neighborhoods will also gain access to improved transit and pedestrian facilities.

Vehicle Miles Traveled "Savings" for Westport Households

In the Baltimore metropolitan area, the annual Vehicle Miles Traveled (VMT) per capita is 9,481. With an average household size of 2.42, that converts to 22,944 VMT per household.[29]

The analysis above under "Modal Diversion" suggests a total non-auto share of 30 percent for Westport household-generated trips. VMT reduction would take that into account, as well as shorter trip distances generally associated with urban/dense development areas.

The urban form has been documented in the literature to have a very significant affect on VMT's. New "compact development" (generally double the density of "sprawl development") has been shown to reduce VMTs by 20 to 40 percent relative to sprawl.[30] However Westport, which is seven times more dense than sprawl development, is likely to exceed that 20 to 40% reduction based on the following:

- The TCRP TOD report, referenced above, cites an analysis of 17 TOD areas and concludes that "TOD-housing projects generated around 47% less vehicle traffic than that predicted by the ITE manual (3.55 trips per dwelling unit for TOD-housing versus 6.67 trips per dwelling unit by ITE estimates)."[31]
- One analysis concluded that VMTs are reduced by 20-25 percent for every doubling of residential density, which would suggest that Westport's VMTs could be more than 50 percent below norms.[32]
- Highly urbanized dense, walkable, transit-served communities have been documented to reduce VMTs by as much as 73 percent (Atlantic Station, Atlanta)[33] to 75 percent (Knob Hill, San Francisco).[34]
- In Portland, VMT per capita per day dropped from a regional average of 21.2 to 9.8 for "mixed use/good transit service communities." [35]

[29] Baltimore Metropolitan Council, "Shaping the Future of Transportation in the Baltimore Region, Factors that Impact Travel Behavior," 2008.

[30] Urban Land Institute, Smart Growth America, the Center for Clean Air Policy, and the National Center for Smart Growth, "Growing Cooler: Evidence on Urban Development and Climate Change," Washington, D.C. January 2008 http://www.smartgrowthamerica.org/gcindex.html; .

[31] "The Effects of TOD on Housing Parking and Travel," TCRP report 128, August, 2008

[32] Holtzclaw, John Robert Clear, Hank Dittmar, David Goldstein and Peter Haas, "Location Efficiency: Neighborhood and Socio-Economic Characteristics Determine Auto Ownership and Use," *Transportation Planning and Technology*, Vol. 25(1), pp 1-27, March 2002

[33] Unpublished report from Atlantic Station to EPA, 2008

[34] Holtzclaw, John, "Convenient Cities, The Relationship Between Transportation Energy, Land Use, and Urban Form," September 1995, http://www.sierraclub.org/sprawl/community/cities.asp

[35] Victoria Transport Policy Institute, "Transit Oriented Development,

- According to the Baltimore Metropolitan Council, residents of Baltimore City drive an average of 14.2 VMT/day, about one-half the rate of the suburban jurisdictions, which is 28.1 VMT/person/day.[36]
- Analysts entered the data for Westport into the following GHG calculator - http://www.sflcv.org/density/ - and the model predicted that Westport residents would drive 49 percent less than an alternative 3-DU per acre sprawl development.

The literature supports the same five factors referenced above (under "project sustainability characteristics") as being the primary determinants of VMT reduction, giving the greatest weight to residential density. Per the above discussion Westport Phase I residential densities are seven times typical suburban densities and Westport meets/exceeds each of the other four criteria. Conclusion: conservatively assume that Westport VMTs will be 40 to 45 percent below regional norms, marginally higher than the VMT reduction associated with compact development, but lower than the VMT reduction associated with highly urbanized dense mixed use communities.

Commute VMTs "Saved" – Employees at Westport

As noted above, Phase I includes 1.05 million square feet of commercial space that will accommodate 4,000 jobs with corresponding commute trips generated to Westport. Generally, there is less research available with respect to commuting patterns for those working in and commuting to mixed use walkable communities. The available data finds significant non-auto mode split gains and VMT reductions for employees in mixed use developments but the increments (the percentage changes relative to the norm) are lower than those found on the residential side.

Transit. The previously noted TOD TCSP report cites a California analysis of 10 predominantly suburban office buildings near California rail stations where the transit share averaged 12 percent, which is a 50 percent increase in transit share relative to the metro area norm. The previously referenced Atlantic Station report found that 20% of those traveling to Atlantic Station did so by transit.

Walk-Bike – The previously noted TOD TCSP report also surveys within Houston's suburban employment centers showed that 20 percent of all trips (to the centers) were made on foot. Walk mode shares in mixed use locales of Seattle were double comparison areas (for the trip to the employment center).

Commuting VMTs. The previously referenced report for Atlantic Station in Atlanta found that commuting VMTs for those working in Atlantic Station were 35 percent less than regional norms. Note this was half the differential for those living in Atlantic Station (Atlantic Station resident's VMTs were 73 percent less than regional norms).

Even for those commuters who continue to travel by car, trip distances and times should benefit from proximity, as Westport enjoys convenient access to both downtown (106,000 jobs, 2.3

Using Public Transit to Create More Accessible and Livable Neighborhoods,"TDM Encyclopedia

[36] Baltimore Metropolitan Council, Factors Affecting Travel Behavior, for the Transportation 2030 Project.

miles) and suburban employment centers, such as, Brooklyn Park/Linthicum (25,000 jobs, 4.5 miles) and the BWI airport area business park areas (32,000 jobs, 8.2 miles).

Conclusion. With limited data, a conservative conclusion would be that there is a substantial differential between Westport and the norm but the predicted reductions in VMTs would be somewhat less for those commuting to Westport relative to those residing in Westport. Conservatively assume that the VMT savings for persons commuting to Westport is 30 to 35 percent below regional norms.

Application of VMT Reduction Findings

The VMT reduction findings are summarized in Appendix 6. The projections include the following findings:

- The typical Westport household will save between 9,100 and 10,300 VMTs annually relative to regional norms;
- Westport Phase I households in aggregate (792 DUs) will save between 7.2 million and 9.0 million VMTs annually relative to regional norms;
- Westport employees will save between 1,800 and 2200 VMTs annually in their work commutes relative to regional norms:
- Westport Phase I employees in aggregate (4,000) will save between .7.7 million and 9.0 million VMTs relative to regional norms.
- Summing it all up, Westport residents and employees are projected to save a total of between 14.9 million and 17.1 million VMTs compared to regional norms.

See Appendix 6 for detail.

Land Value
(Note this section also relates to Economic Competitiveness)

One measure of the livability benefits of a TOD walkable community is the higher property value associated with the convenience and amenities gained. The proposed Westport TIGER infrastructure improvements will create considerable land value as the literature supports greater land values in both TOD areas and in "new urbanist" communities:

- TOD tends to increase land value partly because of the greater convenience of living near transit and partly because living near transit allows individual households to spend less on transportation and more on other things, including housing. One review of the literature concluded that the incremental increase in property value for TOD areas was between 10 an 20 percent.[37]

- A study by the Urban Land Institute found that homes in bicycle/pedestrian friendly, "New Urbanist" communities sold for an average of $20,189 more than otherwise comparable homes in more conventional communities, an 11% increase in value.[38]

[37] Victoria Transport Policy Institute, Transit-oriented Development, "Using Public Transit to Create More Accessible and Livable Neighborhoods," June, 2010.
[38] Eppli and Tu, 1999

While the literature supports quite sizable property value increases; however, because the Westport proposed improvements are enhancements to an existing transit station, this analysis uses a much more conservative 1 percent as the incremental increase in property value attributable to the proposed TIGER improvements. *The 20-year net present value of a 1 percent gain in property values is estimated to be $52.9 million.*

See Appendix 7.

Note that the land value increase has been "netted out" of the summary table of economic benefits because it may be duplicative of travel cost and time savings.

VII. ENVIRONMENTAL SUSTAINABILITY

See also "No-Build Alternative" for information with respect to other environmental issues impacted by Westport, particularly in that, if the proposed improvements are not adopted, sprawl related environmental issues will worsen.

Westport Waterfront as a Model Green Community

Westport Waterfront is being planned as a LEED-ND Platinum project and individual buildings will be expected to achieve LEED Silver or higher.

The Westport TOD employs aggressive brownfield clean up, habitat restoration, wetlands creation, and an innovative storm water management program to reverse the significant environmental degradation of the Middle Branch, a tributary of the imperiled Chesapeake Bay. This approach will lead to positive long-term environmental benefits, helping the City achieve its goal of making the Middle Branch swimmable and fishable by 2020.

The Middle Branch serves as a drainage basin for a 930-acre urban watershed in west Baltimore. About 75 percent of the area is covered with impervious surfaces. Open space is fragmented and unevenly distributed. The area does not support an urban forest ecosystem and has a tree canopy cover of just 5.9 percent, compared to a citywide average of 20 percent. Water quality scores over the past 20 years have been consistently poor, rating at D-.[39]

To strategically improve the health of the Middle Branch, the TOD is applying a comprehensive array of stormwater management, water quality enhancement and habitat restoration techniques. This includes the following:

- To address storm water in a comprehensive manner, a system of dry swales, bio swales, green roofs, and tidal wetlands have been designed to clean and filter run-off from the development before it enters the Middle Branch.

- To address non-tidal flooding in the north half of the TOD, floodwaters and upstream impacts were avoided by raising the development site up to 10 feet in elevation, and

[39] *The Bay Health Index.* NOAA Chesapeake Bay Office and the University of Maryland Center for Environmental Sciences (UMCES). For more information on the health of the Middle Branch, see: www.eco-check.org/reportcard/chesapeake/2008/summaries/patapsco_back_rivers/.

widening an existing, trash-strewn drainage ditch by 75 feet. The widened swale will be replanted to enhance water quality and wildlife habitat. It will terminate in 26,000 square feet of newly created tidal wetland that will filter sediment before it enters the Middle Branch.

- To recreate tidal wetlands, the TOD developer is partnering with the National Aquarium, Westport Academy, and the Chesapeake Bay Trust to rebuild the shoreline and plant 16,000 marsh plants, providing a hands-on learning opportunity for local youth.

The Westport Waterfront TOD's approach to reducing nitrogen, phosphorous, and sediment pollutants from entering the Middle Branch includes the following benefits:

- Capping and removing on-site contaminants from past industrial uses
- Restoring marine habitat by stabilizing approximately 1,200 linear feet of existing eroding shoreline and creating new tidal wetlands to filter contaminants
- Restoring coastal habitat by creating more than eight acres of dedicated forest and habitat conservation areas, and planting more than 70,000 native trees, plants, and shrubs
- Constructing one of the greenest streets in Maryland by using a dry swale system to prevent storm water from entering the Middle Branch
- Using pervious paving for the shared-use trail along the shoreline
- Using green roofs on key buildings that outfall to open space to maximize water quality benefits
- Installing a trash interceptor at the Smith Cove outfall that is expected to remove upwards of 17,400 pounds of solid waste trash per year, which represents 17 percent of the total trash debris entering the Middle Branch

Reduction of Carbon Dioxide

CO_2 Reduction due to Smart Growth/Energy Efficient Location. Previously cited findings in the Livability Section drew the conclusion that Westport residents would generate between 40 and 45 percent less VMTs and Westport employees would generate between 30 and 35 percent less VMT's, both relative to Baltimore regional norms. Using a conversion factor of 0.437 metric tons of CO_2 per 1,000 miles driven leads to the following estimates of CO_2 "saved :"

- Westport households will generate 3.99 to 4.49 fewer metric tons of CO_2 from their travel activities, relative to regional norms
- Westport households, aggregated (792 HH) will generate between 3,100 and 3.600 fewer metric tons of CO_2 relative to regional norms;
- Westport employees will generate 0.81 to 0.94 fewer metric tons of CO_2 from their commuting activities, relative to regional norms
- Westport employees, aggregated (4,000 employees) will generate between 3,280 and 3,768 fewer metric tons of CO_2 due to commuting, relative to regional norms;

- Westport residents and employees total between 6,391 and 7,325 metric tons of CO_2 "saved" relative to regional norms.

CO_2 Reduction due to Green Buildings. Westport Waterfront will require buildings to meet at least the LEED Silver requirements. Experience has shown that LEED Silver buildings will save energy an average of 30 percent relative to conventional construction. For Westport Phase I, 1.9 million sq ft of space that meets the 30 percent energy reduction will save approximately 2, 829 metric tons of $CO2_2$

Total CO_2 Reduction. Adding together the VMT-related GHG savings with the green building efficiencies results in total CO_2 savings attributable to the greening elements of Westport Waterfront of between 9,220 and 10,154 metric tons CO_2 "saved" relative to norms.

Monetized Value of $CO2_2$Reduction. The federal guidance with respect to monetizing the social cost of carbon represents a range of base rates ($5, $25, $35, and $65 per metric ton in 2007 dollars) and a variety of discount rates ranging from 2.5% to 5%.[40] Using the middle two base rate values and a 3% discount rate produces an estimate of the value of CO_2 reduction in 2015 (the year of build-out for Phase I), as follows:

- The value of 6,391 and 7,325 metric tons of CO_2 "saved" relative to regional norms due to energy efficient location/VMT reduction - $208,000 to $335,000, annually.
- *20-year net present value of the reduced CO_2 is estimated to be $2.2 million (calculated for the lower of end of the percentage reductions and using the lower $25 per metric ton conversion).*

See Appendix 6 for the estimates of VMT and CO_2 reduction.

VII. SAFETY

Safety benefits were quantified based on the expected reduction in the number of vehicular crashes as a result of the development and associated improvements. The vehicular crash reduction is two-fold: first, a reduction in the existing crashes will be realized due to specific improvements constructed within the local roadway network and, second, benefits will be realized as a result of the mixed-use, transit oriented, urban nature of the proposed development which will result in a lower amount of total vehicular miles traveled generated by the development, compared to what would be expected in a typical suburban stand alone development of the same size (regional norms).

The reduction in the existing number of vehicular crashes is a function of proposed improvements at several intersections around the development, a list of which can be found in Appendix B of the separate STV memo. Benefits based on these improvements were quantified using the Desktop Reference for Crash Reduction Factors; Report No. FHWA-SA-08-011 which provides specific crash reduction factors based on the type of improvement. The expected number of reduced crashes per year was calculated and a total annual benefit was determined

[40] See http://www1.eere.energy.gov/buildings/appliance_standards/commercial/pdfs/sem_finalrule_appendix15a.pdf

based on the average cost per crash at each intersection. Supporting tables for all calculations can be found in Appendix B. The final overall reduction in crashes and the resultant benefit over a 20-year period was calculated based on the Department of Transportation's guidance on the value of life and injuries. The table below shows that approximately 5.83 existing crashes would be eliminated annually, or about 117 crashes over a 20 year span, resulting in savings of $2,585,882 over 20 years, discounted to present value.

Table 8. Summary of Crash Reduction Benefits due to Intersection Improvements

Off-Site Improvements	Annual Number of Crashes Eliminated	Initial Crash Savings	Savings over 20 years (NPV)
Annapolis Road at Manokin Street	0.49	$20,167	$228,605
Annapolis Road at Monroe Street	0.61	$54,448	$617,200
Annapolis Road at Clare Street	0.42	$20,797	$235,746
Annapolis Road at Wenburn Street	0.74	$6,087	$68,943
BW Parkway/ Russell Street (0.87 mi roadway segment)	3.57	$126,608	$1,435,177
TOTAL	**5.83**	**$228,103**	**$2,585,882**

The total number of crashes reduced as a result of the mixed-use, transit oriented, urban nature of the proposed development and the resultant reduction expected in the number of total vehicular miles traveled, compared to what would be expected in a typical suburban stand alone development of the same size (the regional norm) should also be considered as a benefit. Experts on the effects of this type of development have determined that the Westport Development would likely lead to a reduction of 14,942,216 annual vehicle miles traveled compared to regional norms. (Westport Environmental and Energy Benefits Memorandum) Assuming the statewide average rates for fatality crashes (1.1 per 100 million vehicle miles traveled) and injury crashes (93.3 per 100 million vehicle miles traveled) an expected annual reduction in crashes due to the nature of the development can be calculated as follows: (Maryland Traffic Safety Facts 2008, Table 3)

- 14,942,216 annual vehicle miles traveled * 1.1 fatalities per 100,000,000 vehicles miles traveled = 0.16 annual fatal crashes reduced

- 14,942,216 annual vehicle miles traveled * 93.3 injuries per 100,000,000 vehicles miles traveled = 13.7 annual injury crashes reduced

Based on the Department of Transportation's guidance on the value of life and injuries and assuming a seven percent discount rate, the total monetary benefit due to the mixed-use, transit oriented urban nature of the development would be $24,480,902. The total number of crashes reduced over a twenty year period would be 3.2 fatality crashes, and 274 injury accidents. Appendix B contains the supporting tables and documentation (see separate STV Memo).

The total monetary benefit due to the two types of crash reductions, existing and because of the nature of the development, is $27,066,784, with a reduction of about 394 crashes expected over the 20 year analysis period.

IX. NO-BUILD ALTERNATIVE

There are two aspects to the "no-build alternative" – the transportation aspects and the development aspects.

Transportation Aspects of the No-Build alternative

STV analyzed the implications of not making the MD 295 bridge and intersection improvements and concluded "the total cost of maintenance was estimated to be about $1.35 million occurring every four to five years."

STV projected that building the recommended roadway improvements would prevent 5.83 crashes annually, and the reverse would also be true.

Development Pattern Implications of the No-Build Alternative

Lacking the infrastructure investments that are necessary to facilitate the Westport Waterfront project, the operative assumption would be that development will go to suburban sprawl development patterns.

From national research on smart growth and sprawl and from the analysis above, the following conclusions can be drawn

- ***Land Consumption***. Comparable suburban development would require a land area seven times the land area of Westport Phase I , i.e. 25 acres of previously used brownfield sites for Westport vs 175 acres of farmland or greenfields for suburban sprawl development;
- ***Auto-dependence***. Where Westport has been projected to achieve a 30 percent non-auto mode share, Baltimore regional norms are 11.8 percent non-auto mode share, and suburban sprawl development can be assumed to be even lower.
- ***Infrastructure Spending.*** Most research points to higher infrastructure related spending needed to support sprawl development relative to compact urban development. One comprehensive review of the literature pegged the differential at between 20 and 50 percent.[41] Another source analyzed Operations and Maintenance (O&M) costs for three alternative development patterns and found that O&M was 42 percent more costly in the spread development option relative to the most dense and centralized option.[42] Thus, from a life cycle point of view, investing in Westport, as a dense urban walkable community, will reap rewards in long-term efficiencies.

[41] Robert Burchell, David Listokin, Anthony Downs, et. Al, "Costs of Sprawl Revisited." National Academy of Sciences/ National Research Council. Transportation Research Board TCRP H-10. 1998.
[42] Pamela Blais, *The Economics of Urban Form*, in Appendix E of *Greater Toronto*, Greater Toronto Area Task Force (Toronto), December 1995.; cited in Todd Littman, "Understanding Smart Growth Savings," Victoria Transport Policy Institute, December, 2004

- ***VMTs and CO_2.*** The findings above conclude that Westport will reduce VMTs and CO_2 by 40 – 45% relative to regional norms. The reverse would also be true – if development goes to sprawl patterns, VMTs and CO_2 would be above regional norms.
- ***Inaccessible jobs.*** The alternative would also be that jobs would follow sprawl development patterns and go to less accessible locations without transit service. The residents of distressed areas in Baltimore City and near Westport would be far less likely to capture those jobs.
- ***Water Quality.*** EPA data indicates a strong correlation between low density and higher run-off - "With more dense development of eight houses per acre, runoff rates per house decrease by about 74 percent from one house per acre."[43]

SENSITIVITY ANALYSIS AND ASSUMPTIONS.

In each case this analysis has used the more conservative of all assumptions and scenarios. We also conservatively chosen not to count the benefits that would derive from the larger Middle Branch area, because the relationship is less direct and the many of the redevelopment plans are more long term.

Obviously, the largest component of the projected benefits is the one related to increasing productivity and international business investment, accounting for $348 million out of $448 million in benefits. That number corresponds to a 1% increase in total output derived from a combination of productivity gains and export related international activity. If the real number is 2 percent the $383 million double and the total benefits almost double as well. If the real number is "0," there is still a positive benefit cost ratio of $100 million.

[43] Richards, Lynn, "Water and the Density Debate," Planning Magazine, June 2006, APA http://www.epa.gov/smartgrowth/water_density.htm

Appendices

Appendix 1 – Memo Redevelopment Economics and CWS Consulting RE: TIGER Investments – Projection for Net Economic Benefit to the US Economy due to Productivity Gains and International Businesses

Appendix 2. Middle Branch Map – Proposed Future Land Use

Appendix 3. Westport Travel Cost Savings for Westport Residents

Appendix 4. Westport Travel Time Savings – Commute Trips from Westport HH

Appendix 5. Fuel Cost Savings due to Lower VMTs

Appendix 6. VMT Reduction and Resulting CO_2 Reduction

Appendix 7 – Increases in Property Values Attributable to TIGER Investments

Appendix 1

Memo Redevelopment Economics and CWS Consulting RE: TIGER Investments – Projection for Net Economic Benefit to the US Economy due to Productivity Gains and International Businesses

Redevelopment Economics

CWS Consulting Group LLC©
Location Strategies for Business and Economic Development

From: Evans Paull, Principal, Redevelopment Economics
Chris Steele, President, CWS Consulting

To Amy Bonitz, Westport Waterfront TOD

Memo re:
TIGER Investments – Projection for Net Economic Benefit to the US Economy due to Productivity Gains and International Businesses

Date: August 19, 2010

This memo isolates – to the extent possible - the benefits to the US economy relative to TIGER infrastructure improvements and the likelihood that these improvements will lead to net new economic activity from the perspective of the U.S as a whole[44].

While the majority of Westport's economic impacts will be regional (with particular benefits to distressed areas), some of the benefits are likely to be national, with gains in productivity and in attraction of businesses that represent US presence in the international economy.

The Creative Economy: Waterfront mixed use redevelopment projects enable communities to attract and retain "creative class" businesses which value the stimulating environment of mixed use/TOD/waterfront communities.

Essentially there are three arguments that would support the case for net new economic benefit to the US economy:

1. That urban density is linked to greater productivity. Studies have found that:
    - For every doubling of employment density, the number of patents per capita increases, on average, by 20 to 30 percent. This is termed the "Knowledge Spillover" effect[45].
    - Doubling urban population density has been documented to produce approximately 6% increase in productivity.[46] The cited study confirms earlier work by Ciccone and Hall, 1996.

[44] Note that this analysis is based upon assumptions of future corporate decision making behavior based upon previous trends. We believe this to be a reasonable expectation of future probability, but not an exact prediction of future events.
[45] Carlino, Gerald. 2001. "Knowledge Spillovers: Cities' Role in the New Economy." Business Review Q4: 17-24.. Available at www.phil.frb.org/files/br/brq401gc.pdf
[46] Harris and Ioannides, "Productivity and Metropolitan Density," Tufts University, May, 2002. http://ase.tufts.edu/econ/research/documents/2000/papers16.pdf

- One reason that productivity increases as density increases is that less time is spent commuting. Research by the Surface Transport Policy Project finds that long commute times can decrease productivity through time wasted behind the wheel in traffic. The STPP notes that, as of 1995, the average American spends 443 hours or 55 8-hour workdays commuting[47]. As cited elsewhere in this economic benefit analysis, Westport residents will enjoy the benefits of both "internal capture" (origin and destination in the same complex) and shorter trips overall, estimated to be at least 15 percent savings relative to regional norms.

With Westport being planned as seven times more dense than suburban development, any productivity gains that are attributable to density should accrue to this project.

2. Green buildings increase productivity. Improved indoor air quality, natural light, improved ventilation, better temperature control, and the elimination of VOCs and toxics in office furniture, carpeting, etc. is linked to productivity gains. Research supports the case that green buildings boost productivity by 1 – 5% based on fewer sick days and lowered absenteeism.[48] Westport is being submitted as a LEED-ND Platinum site and individual buildings will be minimum LEED Silver.

3. New economy businesses with an international presence often locate in mixed use/TOD areas because these areas are appealing to their "Creative Class" workforce. Jones Lang LaSalle in their "Property Futures Journal" found that 77 percent of "New Economy" companies rated access to mass transit as an extremely important factor in selecting corporate locations.[49]

   In Baltimore recent business attraction and retention successes provide examples of international businesses that were attracted to mixed use redevelopment areas along Baltimore's waterfront.

   - **Morgan Stanley** - The international banking and finance giant chose Baltimore in 2003 for its Securities Processing Unit, as the result of an international competition. The company is currently expanding and moving to 1300 Thames, Harbor Point, part of the Harbor East mixed use/waterfront development between downtown and Fells Point.. Employment is currently at 600 in 140,000 sq ft, and is expected to expand to 1,500 by 2015. As an indication of its international presence, 35 of its 50 offices are located oversees.
   - **Under Armor -** This Baltimore headquartered company employs 800 employees in 125,000 sq ft at Tide Point (on the South Baltimore waterfront), and provides 1,500 jobs statewide[50] and 10% of all sales are international.[51]
   - **RTKL –** The international headquarters for RTKL is located at Bond Street Wharf in Fells Point, where the architectural firm employs 300 of its 700 world wide employees in

[47] http://www.transact.org/library/factsheets/prosperity.asp
[48] Miller, Norm G. and David Pogue, "Green Buildings and Productivity," see: http://catcher.sandiego.edu/items/business/Productivity_paper_with_CBRE_and_USD_Aug_2009-Miller_Pogue.pdf and Greg Katz, 'The Costs and Financial Benefits of Green Buildings: for the California Commission on Sustainability, 2003.
[49] Cited in: http://www.detroittransit.org/cms.php?pageid=44
[50] See: http://www.gov.state.md.us/pressreleases/100706.asp
[51] Under Armor Annual Report, 2008

a 220,000 sq ft historic building. Bond Street Wharf was a waterfront brownfields redevelopment project undertaken in 2002. As an indication of their international presence, RTKL has nine offices, four located in other countries.

- **Advertising.com -** This international AOL subsidiary occupies 99,000 sq ft at Tide Point (on the South Baltimore waterfront) with an estimated employment of roughly 400.
- **DAP Products, Inc –** DAP, the world's largest manufacturer of sealants and adhesives, moved their world headquarters to Baltimore in 1998, occupying 40,000 sq ft and employing 110 people in the American Can brownfield redevelopment project near the Canton waterfront.

Just these five companies account for 2.200 jobs in 600,000 sq ft of space. This represents approximately 20 percent of the total office space in Baltimore's non-downtown mixed use/waterfront redevelopment areas (see table 1). Each project is an example of the creative class/new economy and the value such businesses place on locating in urban areas that offer stimulating surroundings and convenient access.

More detailed information is required to determine if these businesses are net exporters, but this brief profile strongly suggests that a continuation of these waterfront redevelopment activities at Westport could lead to export-related gains to the US economy.

Findings and Projections - A conservative conclusion is that the Westport Waterfront office sector will generate a 1 – 2 percent increase in total output relative to norms, attributable to productivity gains (associated with urban density and green buildings), and the likely attraction of "creative class" international businesses that will export services. The projections are as follows:

- Overall economic impacts (mostly regional – see table 2), which are:
  - Near-term/Westport Phase I office sector - total output of $1.7 billion, annually;
  - Long-term/Middle Branch Plans, office sector – total output of $5.6 billion, annually;
- Net benefit to the US economy - for the near term induced development – Westport Phase I (Table 3):
  - Near Term/Westport Phase I – 20-year projected total output, net benefit to US of $348 million to $696 million (NPV 2010 $$);
- Net benefit to the US economy - for the longer term induced redevelopment of the Middle Branch (Table 4)
  - Long-term Middle Branch Plans - 20-year projected total output, net benefit to US of $1.11 billion to $2.22 billion (NPV, 2010 $$).

Conclusion*: Only Westport Phase I and only the more conservative 1 percent gain have been used in the Cost Benefit analysis. Thus, we conclude that the TIGER infrastructure improvements will generate at least $348 million in total economic output for the US economy over a 20-year period due to the strong likelihood that Westport will attract office users that operate internationally and export services.*

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Table 1. International Businesses – Presence in Baltimore's Mixed Use Development Projects

Baltimore's non-downtown mixed use/waterfront redevelopment projects that include office space	
	sq ft
Harbor East:	
1000 Lancaster	134,559
1001 Fleet	227,295
650 Exeter	210,000
720 Aliceanna	33,000
Bond St Wharf	210,000
1300 Thames	240,000
Legg Mason	544,000
Total Harbor East	1,598,854
American Can	180,000
Tide Point	400,000
Brewers Hill	500,000
Canton Crossing	300,000
Total	**2,978,854**

International businesses in mixed use waterfront development			
Business	location	sq ft	employment
Morgan Stanley	1300 Thames	140,000	600
Under-Armor	Tide Point	125,000	800
RTKL	Bond st wharf	200,000	300
Advertising.com	Tide Point	99,000	400
DAP	American Can	40,000	110
Total		**604,000**	**2,210**

International business sq ft as a percent of all sq ft in mixed use projects **20.3%**

Source: Redevelopment Economics

Table 2. Overall Economic Benefit of Westport Phase I and Middle Branch Redevelopment (Primarily Regional Impacts)

	Westport Phase I – Near- Term Benefits	Middle Branch Redevelopment - Longer Term Benefits
Office square feet	900,400	2,874,000
Office employees per 1,000 sq. ft.	4.2	4.2
Total office employees	3,782	12,071
Office operating revenue[3] - direct economic output	$ 1,089,075,513	$ 3,476,236,144
Total cost of labor (Direct Earnings)	$ 227,290,463	$ 725,491,772
Average office wage -- annual	$ 60,103	$ 60,103
Multiplier for office wages	2.2	2.2
Total earnings	$ 490,345,152	$ 1,565,139,900
Indirect earnings	$ 263,054,688	$ 839,648,128
Multiplier for office jobs	2.7	2.7
Total jobs	10,364	33,081
Total jobs	6,583	21,011
Multiplier for office output	1.6	1.6
Total economic output	$ 1,740,236,142	$ 5,554,685,332
Indirect output	$ 651,160,629	$ 2,078,449,188

Source: Muni-cap projection for Westport TIF, TIF Scenario 21, with adjustments to account for modifications to Phase I by CWS Consulting. Wages, earnings, multipliers, and output based on IMPLAN software

Table 3. Near Term Benefits - Westport Phase I Net Benefits to the US Economy

	Total Impacts	Net benefits to the US economy from Westport office users	
		low est	high est
Assumptions - Calculation of net benefits to the US economy from Westport office users - Percentage increase in total output		1.0%	2.0%
One-year Impacts:			
Direct jobs	3,782	38	76
Total jobs	10,364	104	207
Direct earnings, annual, 2010 $$	$227,290,463	$2,272,905	$4,545,809
Total earnings, annual, 2010 $$	$490,345,152	$4,903,452	$9,806,903
Direct Economic Output, annual, 2010 $$	$1,089,075,513	$10,890,755	$21,781,510
Total economic output, Annual, 2010 $$	$1,740,236,142	$17,402,361	$34,804,723
20-year impacts			
Direct jobs	3,782	38	76
Total jobs	10,364	104	207
Direct earnings, 2010 $$	$4,545,809,268	$45,458,093	$90,916,185
Total earnings, 2010 $$	$9,806,903,036	$98,069,030	$196,138,061
Direct Economic Output, 2010 $$	$21,781,510,258	$217,815,103	$435,630,205
Total economic output, 2010 $$	$34,804,722,844	$348,047,228	$696,094,457

NOTE: All calculations are in 2010 dollars. 20-year impacts were inflated by 3%, but then discounted by 3% (the rate for items where the alternative is use of public funds), which are offsetting calculations.
Source: Redevelopment Economics

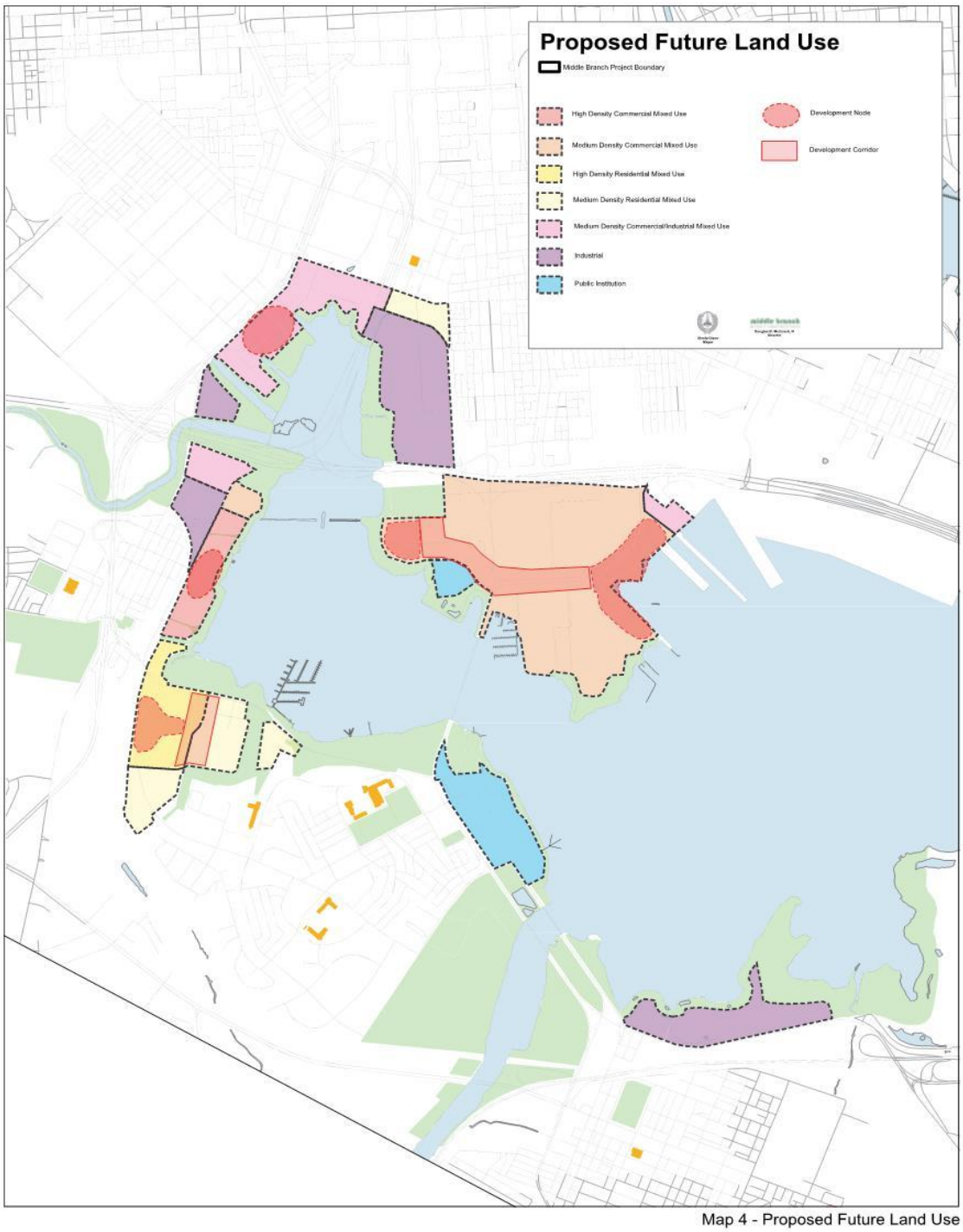
Table 4. Longer Term Benefits - Middle Branch Redevelopment Net Benefits to the US Economy

	Total Impacts	Net benefits to the US economy from Middle Branch office users	
		low est	high est
Assumptions - Calculation of net benefits to the US economy from Middle Branch office users - Percentage increase in total output		1.0%	2.0%
One-year Impacts:			
Direct jobs	12,071	121	241
Total jobs	33,081	331	662
Direct earnings, annual, 2010 $$	$227,290,463	$ 2,272,905	$ 4,545,809
Total earnings, annual, 2010 $$	$490,345,152	$ 4,903,452	$ 9,806,903
Direct Economic Output, annual, 2010 $$	$3,476,236,144	$ 34,762,361	$ 69,524,723
Total economic output, Annual, 2010 $$	$5,554,685,332	$ 55,546,853	$ 111,093,707
20-year impacts			
Direct jobs	12,071	121	241
Total jobs	33,081	331	662
Direct earnings, 2010 $$	$4,545,809,268	$45,458,093	$90,916,185
Total earnings, 2010 $$	$9,806,903,036	$98,069,030	$196,138,061
Direct Economic Output, 2010 $$	$69,524,722,880	$695,247,229	$1,390,494,458
Total Economic Output, 2010 $$	$111,093,706,635	$1,110,937,066	$2,221,874,133

NOTE: All calculations are in 2010 dollars. 20-year impacts were inflated by 3%, but then discounted by 3% (the rate for items where the alternative is use of public funds), which are offsetting calculations.
Source: Redevelopment Economics

Appendix II – Middle Branch Plan – Proposed Future Land Use

Appendix 2 - Middle Branch Master Plan – Proposed Future Land Use



Map 4 - Proposed Future Land Use

Appendix 3. Westport Travel Cost Savings for Westport Residents

Appendix 3

Travel cost savings for Westport Residents

Percentage of HH earnings spent on travel*

	Transit rich neighborhoods	Ave American family	Auto-dependent ex-urbs
Transportation	9%	19%	25%
Hsg	32%	32%	32%
other	59%	49%	43%

Findings applied to Westport:

Median HH income, Balto Metro area**	$ 62,500				
Percentage spending on transportation, US average	19%				
Percentage spending on transportation, Ex-urbs	25%				
assume Westport residents spend 40% less than average HH	40%				
Percentage spending on transportation, Wesport residents	11.4%				
Discount Rate	7.0%				
Wesport residents spending on transportation per HH	$ 7,125				
US average HH spending on transportation	$ 11,875				
Auto dependent Ex-Urbs HH spending on transportation	$ 15,625				
Westport savings per HH relative to US average	$ 4,750				
Westport savings per HH relative to Auto-dependent Ex-urbs	$ 8,500	(note spreadheet contains hidden columns)			
Westport residents	792	2014	2033	**Total 20-year value of lowered Commuting costs**	
Discount Rate	7%				
Total HH spending "freed up" due to Westport transport efficincies, relative to US average	$ 3,762,000	$ 3,874,860	$ 6,794,590	**$ 104,118,939**	
Discounted 2010 Present Value		$ 2,956,112	$ 1,433,298	**$ 42,168,584**	
Total HH spending "freed up" due to Westport transport efficincies, relative to Auto-dependent Ex-urbs average	$ 6,732,000	$ 6,933,960	$ 12,158,741	**$ 186,318,102**	
Discounted 2010 Present Value		$ 5,289,885	$ 2,564,848	**$ 75,459,572**	
20-year NPV value of HH spending "freed up" due to Westport transport efficincies, relative to US average, 2010 $$	$ 42,168,584				
20-year NPV of HH spending "freed up" due to Westport transport efficincies, relative to Auto-dependent Ex-urbs average, 2010 $$	$ 75,459,572				

* Source: Center for TOD + Transportation Affordibility Index, 2004 Bureau of Labor Statistics

** source: Baltimore Metropolitan Council, 2008 Regional Transportation Survey, 2008 data inflated to 2010

Appendix 4. Westport Travel Time Savings – Commute Trips from Westport HH

Appendix 4

Westport Travel time savings, commute trips from Westport HH					
Baltimore City residents commuting time vs region*					
Baltimore city residents ave commute trip in minutes	17.3				
Baltimore region - residents ave commute trip in minutes	21.0				
Baltmore suburbs - residents ave commute time	22.1				
Baltimore city percentage differential relative to region	-18%				
Baltimoire City percentage differential relative to suburbs	-22%				
internal capture, % of all trips (presumed to be short walking trips)	17%				
Projections for Westport					
Assumed travel time differential, Westport vs region	15%				
Westport DU/HH	792				
Westport minutes per trip	17.85				
Minutes per trip gain for westport	3.2				
Persons per HH	1.6				
Time savings per HH per day, minutes	10.1				
time savings all westport HH per day, minutes	7,983.4				
time savings all westport HH per day, hours, annual	133.1				
time savings per HH westport annually, hours, annual	40.3				
time savings all westport HH per day, hours, annual	31,933.4				
Monetizing the projection:					
		(Note - contains hidden ciolumns)			
federal guidance on value of travel time saved, 2000	$ 11.20	**2014**		**2033**	**total 20-year value**
value of travel time savings 2010 $$	$ 14.18	$ 15.96		$ 27.99	
Value of time gained per HH	$ 572	$ 643		$ 1,128	**$ 17,291**
Value of time gained all HH	$ 452,816	$ 509,649		$ 893,672	**$ 13,694,449**
Discount Rate	7%				
Discounted 2010 Present Value		$ 388,808		$ 188,517	**$ 5,546,306**

* Source Baltimore Metropolitan Council, 2005 Regional Travel Survey

** Reid Ewing, “Travel Generated by Mixed Use Developments, A six-Region Study,” Unpublished, 2010.

Appendix 5

Fuel Cost Savings Due to Lower VMTs

Commuters to Westport

VMT savings, based on the conservative estimate of 30 percent reduction relative to regional norms						
- VMT savings per commuter	1,850					
- aggregated VMT savings, all commuters, annual	7,394,608					
MPG ave (2007 - FHWA)	20.4					
gallons of gas used	362,481			(note contains hidden columns)		
		2010	2015	2015	2034	**20-year totals**
$$ "saved" @ $3.00 per gallon, annual, 2010	$ 1,087,442	$ 1,087,442	$ 1,260,644	$ 1,298,463	$ 2,276,863	**$ 36,150,832**
Discount rate	7%					
Discounted NPV of gas saved, 2010 $$			$ 898,822	$ 925,786	$ 448,876	**$ 14,105,051**

Westport HH						
VMT savings, based on the conservative estimate of 40 percent reduction relative to regional norms	7,236,979					
MPG ave (2007 - FHWA)	20.4					
gallons of gas used	354,754			(note contains hidden columns)		
		2010	2015	2015	2034	**20-year totals**
$$ "saved" @ $3.00 per gallon, annual, 2010	$ 1,064,262	$ 1,064,262	$ 1,233,771	$ 1,270,784	$ 2,228,328	**$ 35,380,215**
Discount rate	7%					
Discounted NPV of gas saved, 2010 $$			$ 879,662	$ 906,051	$ 439,307	**$ 13,804,377**

Note Fuel cost savings to Westport HH not counted in Benefit analysis because it would alreadty be counted in travel cost savings

Appendix 6. VMT Reduction and Resulting CO_2 Reduction

Appendix 6

VMT Reduction and Resulting CO2 Reduction Projections

Summary Table for Reduction of VMTs and GHGs for Westport Waterfront

		norm	Westport % reduction relative to the norm	Westport projected reduction relative to the norm	
VMTs				**low estimate**	**high estimate**
Household based - residents of Westport (792)					
	annual VMT per HH	22,944	40 - 45%	9,138	10,280
	VMTs aggregated all Westport HH	18,092,448	40 - 45%	7,236,979	8,141,602
Employment based - employee commute to Westport					
	VMTs per employee commute to Westport	22,944	30 - 35%	1,850	2,158
	VMTs aggregated, all Westport employees	24,648,694	30 - 35%	7,394,608	8,627,043
Totals		42,741,142		14,631,587	16,768,644

CO2 - travel-related

Household based - residents of Westport (792)					
	annual CO2 per HH (metric tons)	9.98	40 - 45%	3.99	4.49
	CO2 aggregated all Westport HH (metric tons)	7,903	40 - 45%	3,161	3,556
Employment based - employee commute to Westport					
	CO2 per employee commute to Westport (metric tons)	2.69	30 - 35%	0.81	0.94
	CO2 aggregated, all Westport employees (metric tons)	10,767	30 - 35%	3,230	3,768
Totals		18,670		6,391	7,325

Federal guidance on value of CO2 reduction						
Value of CO2 savings in 2007 $$	$ 25.00	per metric ton CO2				
Value CO2 savings in 2010 $$	$ 26.29	per metric ton CO2				
Discount Rate	7%					
CO2 reduction projection (using the lower CO2 reduction %):				Note Contains hidden columns		
		Metric tons CO2	Monetized, 2010 $$	2015	2034	**20-year total**
Westport projected reduction of CO2 relative to the norm		6,391	$ 168,030	$ 218,439	$ 383,034	**$ 5,869,531**
Discounted 2010 Present Value				$ 155,744	$ 75,514	**$ 2,221,667**

Appendix 7 – Increases in Property Values Attributable to TIGER Investments

Appendix 7

Westport Property Value

Projected value of improvements in 2015	$ 594,693,000				
inflation factor (1 plus)	12.6%				
2015 improvements discounted to NPV, 2010	$ 519,761,682				
literature indicates TOD areas gain 10 - 20% in property value over similar non-TOD areas					
Because Westport is already transit-served and the TIGER improvements are enhancing the TOD community, a conservative assumption would be that the enhancements will produce a 1 percent gain in property value	1%				
			(note - contains hidden Columns)		
2010 NPV of TIGER induced property value gains	$ 5,197,617		2015	2034	**20 year totals**
20 year induced property value gains , inflated @ 3%			$ 5,197,617	9,114,053	**$ 139,661,910**
Discount rate	7%				
20-year values, discounted for NPV to 2010			$ 3,705,829	$ 1,796,805	**$ 52,863,205**