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Memorandum

To: Live Baltimore

From: Econsult Solutions, Inc.

Date: March 5, 2024

RE: Live Baltimore – Economic Impact of Residents and Housing Activity – 2023 Update

Version: FINAL DRAFT

1 Introduction

The City of Baltimore (or Baltimore City) is in the midst of over 70 years of population decline. More recently, the City's population declined by 5.7 percent from 2010-2020, and by 2.7 percent from 2020-2022.[1] A city that is growing in population and economic activity sees healthy levels of investment in the form of new construction and major renovation of residential units to provide more and better housing options for existing residents and to support incoming residents. Conversely, a city that experiences sustained population loss and economic decline does not create as many economic opportunities for the construction sector and does not offer many attractive housing choices for existing or new residents, subsequently impacting the local economy and tax base. As the primary resident attraction and retention agency in Baltimore City, Live Baltimore plays a critical role in supporting the growth of the city.

In 2021, Live Baltimore commissioned a study by Econsult Solutions, Inc. (ESI) to measure the economic impact of Baltimore residents, underscoring the need for pro-growth strategies in the city and helping to justify municipal investment in Live Baltimore. This technical memorandum serves to update selected figures from the 2021 report, allowing Live Baltimore to incorporate up-to-date estimates of the economic impact of Baltimore residents in their advocacy work. Particularly, this analysis emphasizes the importance of adopting a holistic and comprehensive strategy for encouraging growth of the city's population—creating an equitable distribution of benefits for all Baltimore residents.

The following memorandum provides updated estimates alongside 2021 results.

[1] Baltimore City, Maryland QuickFacts, U.S. Census Bureau, https://www.census.gov/quickfacts/fact/table/baltimorecitymaryland/PST045222.

2 Impact from Investment in Housing

Using data from Baltimore City's Department of Housing and Community Development, and publicly available data on Consumer Price Index (CPI), an estimate of average aggregate investment in new construction and major renovation of residential units each year was developed. Citywide permit data from the last ten years was inflation-adjusted to current dollar terms ($2023), aggregated, and then averaged to arrive at an annual estimate of total construction and major renovation activity each year (2014 – 2023).[2]

Based on Baltimore City's permit activity data, investment in residential and non-residential new construction and renovation over the past ten years amounted to over $21 billion.[3] Combining land use data from the City, we can isolate the investment in residential renovations and new construction to 16 percent of the total construction and rehab activity in Baltimore City, over the past ten years. It is estimated that each year, on average, there is approximately $387.2 million in investment in new construction and major renovation of residential units in Baltimore City (see Figure 1 below). The average amount of annual investment in new construction and major renovation of residential units in Baltimore experienced a significant increase in 2023, as compared to investment in 2021.[4] This increased investment in construction, in part, may be due to several factors, including near-zero interest rates during 2021 and 2022.

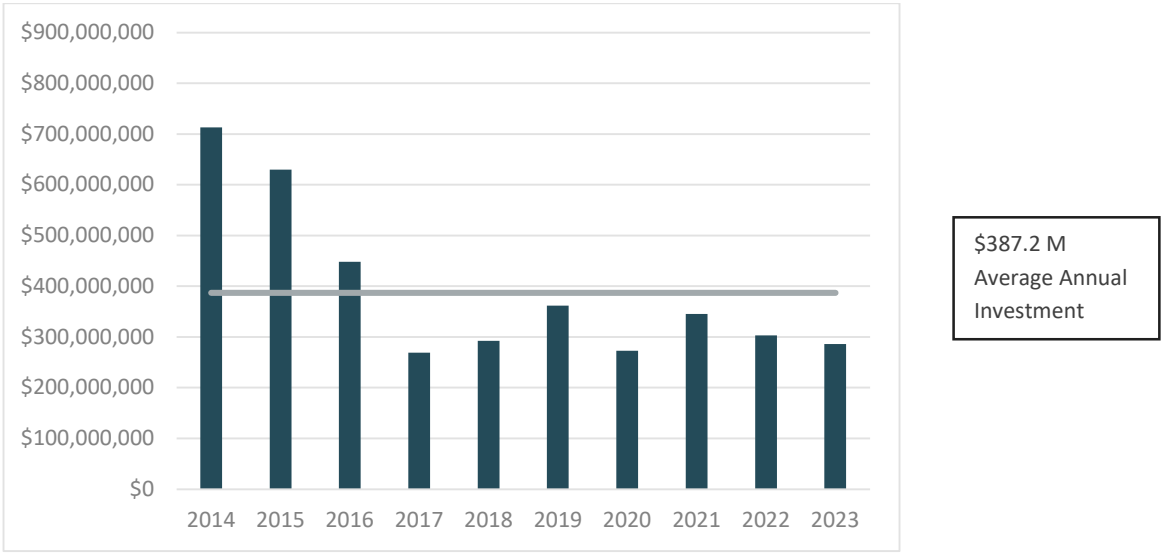
[2] Data received from Baltimore City DCHD was cleaned to remove duplicates of permits within the same years.

[3] In efforts to use consistent datasets between the current (2023) analysis and the previous (2021) analysis, permit activity data received from Baltimore City's DCHD only included permits that cost more than $10,000. These permits, according to the City, account for 97 percent of the total permitting cost in Baltimore, between 2014 and 2023.

[4] 2023 analysis is based on data provided by Baltimore City DHCD. A comparison between the 2023 and 2021 datasets shows a marginal difference of approximately $420 million in investment in new construction and renovation activities between the years 2014 and 2020. The difference in data may be explained by the City's efforts to collect more comprehensive data as efforts currently underway to overhaul the permit data system.

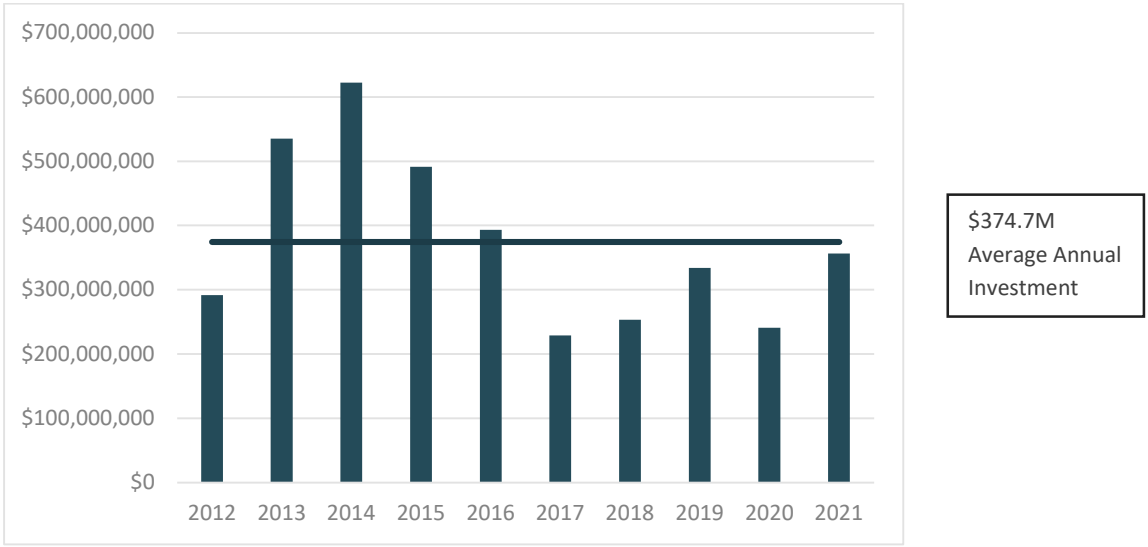
Estimated Amount of Aggregate Investment Represented by New Construction and Major Renovations

Figure 1: Investment in Residential Construction and Major Renovation, Baltimore City ($2023)[5]



Source: Baltimore City Department of Housing and Community Development (2023), Econsult Solutions (2023)

Figure 1a: Investment in Residential Construction and Major Renovation, Baltimore City ($2021)



Source: Baltimore City Department of Housing and Community Development (2021), Econsult Solutions (2021)

[5] The permit activity data from Baltimore City's DCHD shows that the higher aggregates in 2014 and 2015 can be attributed to a few large permits. Approximately one percent of residential construction and alterations permits in these two years are over $1 million each, with a couple of permits valued at over $120 million each.

In addition to public data on the city's housing stock from the U.S. Census Bureau, other variables from the city's permit data were included to apportion annual investment in residential units into three categories: construction of new single-family residential structures, construction of new multifamily structures, and maintenance and repair construction of residential structures.

Economic Impact from Investment in Housing

The current amount of aggregate new construction and major renovation projects circulate through the local economy via indirect and induced impact. Multipliers were used to account for these two effects, as well as standard input-output modeling methods to estimate that present levels of new construction and major renovation produce $505 million in annual impact on the local Baltimore economy, supporting approximately 1,900 jobs and an estimated $125 million in labor income (Figure 2).

Figure 2: Estimated Annual Economic Impact from New Construction and Major Renovation of Residential Units in Baltimore City[6]

Economic Impact	Baltimore City	State of Maryland
Direct Impact ($M)	$387.2	$387.2
Indirect and Induced Impact ($M)	$118.3	$247.7
Total Impact ($M)	**$505.5**	**$634.9**
Total Employment Supported (FTE)	1,900	2,500
Total Labor Income Supported ($M)	$124.9	$159.8

Source: IMPLAN (2021), Econsult Solutions (2023)

6 For economic impact results presented here and elsewhere in the report, because Baltimore City's economy is wholly contained within the state of Maryland economy, Baltimore City's economic impacts is included in the state of Maryland economic impacts, with the difference between the two representing the impact in the parts of the state outside the city.

Figure 2a: Estimated Annual Economic Impact from New Construction and Major Renovation of Residential Units in Baltimore City (2021 Results)

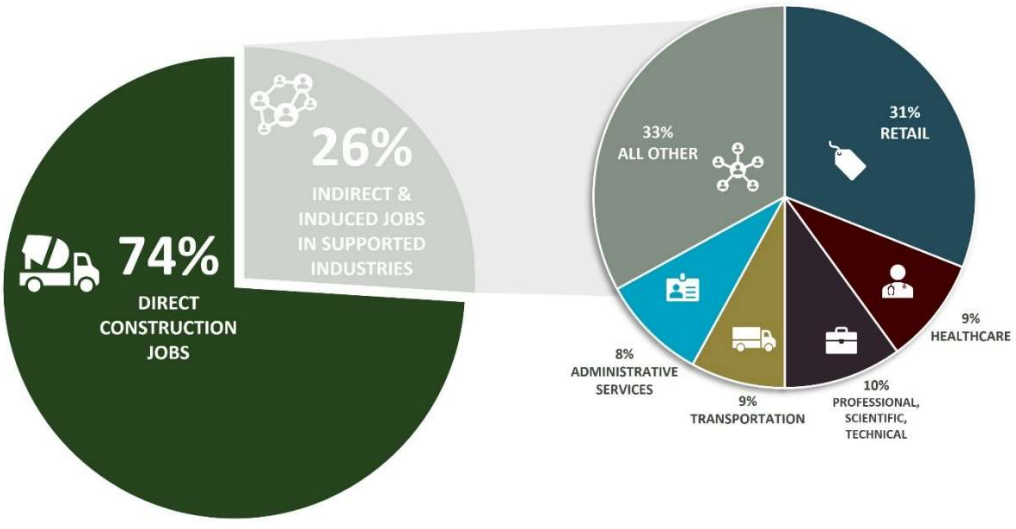
Economic Impact	Baltimore City	State of Maryland
Direct Impact ($M)	$374.7	$374.7
Indirect and Induced Impact ($M)	$132.7	$273.9
Total Impact ($M)	**$507.4**	**$648.6**
Total Employment Supported (FTE)	2,700	3,400
Total Labor Income Supported ($M)	$158.8	$195.4

Source: IMPLAN (2019), Econsult Solutions (2021)

Industry Distribution of Local Employment

The construction industry experiences the most significant positive economic impact from this activity. Still, the range of goods and services required for such projects, as well as the customary categories where households spend salaries and wages, helps to spread the impact across sectors. An estimated 26 percent of the local employment impact is dispersed across several sectors beyond construction, including retail trade; health care and social assistance; and professional, scientific, and technical services (see Figure 3).

Figure 3: Estimated Industry Distribution of Local Employment from New Construction and Major Renovation of Residential Units in Baltimore



Source: IMPLAN (2021), Econsult Solutions (2023)

Tax Revenue Impact from Resident Spending

These economic impacts become tangible, as they expand various local and state tax bases, thus yielding expanded tax revenues for both the governments of Baltimore City and the State of Maryland. Figure 4 displays estimated annual tax revenue impact caused by new construction and major renovation of residential units. This impact generates $1.3 million a year in tax revenues to Baltimore City and more than $6 million a year in tax revenues to the State of Maryland. However, with the recent decrease in the City and State's general population and available income tax base since 2021, the tax revenue impact from Baltimore City's resident spending on new residential construction and renovation is softened.

Figure 4: Estimated Annual Tax Revenue Impact from New Construction and Major Renovation of Residential Units in Baltimore City[7]

Tax Revenue Impact	Baltimore City	State of Maryland
Personal Income Tax Revenues ($M)	$1.3	$6.4
Sales Tax Revenues ($M)	-	$3.5
Business Tax Revenues ($M)	-	$13.1
Total Tax Revenues ($M)	**$1.3**	**$23.0**

Source: IMPLAN (2021), Econsult Solutions (2023)

Figure 4a: Estimated Annual Tax Revenue Impact from New Construction and Major Renovation of Residential Units in Baltimore City (2021 Results)

Tax Revenue Impact	Baltimore City	State of Maryland
Personal Income Tax Revenues ($M)	$1.9	$7.9
Sales Tax Revenues ($M)	-	$4.1
Business Tax Revenues ($M)	-	$9.6
Total Tax Revenues ($M)	**$1.9**	**$21.6**

Source: IMPLAN (2019), Econsult Solutions (2021)

[7] For tax revenue impact results presented here and elsewhere in the report, because Baltimore City and the State of Maryland governments are distinct, Baltimore City and State of Maryland tax revenue impacts are separate.

3 Impact from Resident Spending

Household spending is a major driver of local economies. In Baltimore, residents comprise an estimated aggregate $18 billion in annual household income of which a large portion is spent within the local economy during regular household spending activities and within various categories, including food, entertainment, and transportation. Economic opportunity is then created for local merchants and vendors who employ local residents, rely on local supply chains, and pay local taxes.

Determining the economic impact of resident spending in Baltimore first requires estimating the number of households in the city and their distribution by income level. Households with significantly different income levels also have different household spending profiles, as they typically spend and save their money differently, as well as in different spending categories. At present, there are about 245,000 households in Baltimore – a nearly 6,000 household increase in 2019. However, the percentage of households below the $50,000 income level has reduced to 46 percent in 2021 (from 50 percent in 2019) and the percentage of households above the $50,000 income level has increased to 54 percent in 2021 (from 50 percent in 2019) as seen in Figure 5 and Figure 5a. This change in percentage of households across different income categories is important to note for the broader context of this analysis, that explains the economic impact of resident spending in Baltimore City.

Figure 5: Estimated Number of Households in Baltimore by Income Level[8]

Income Range	# Households	% Households
Less than $15k	40,652	17%
$15 to $30k	31,959	13%
$30 to $40k	20,757	8%
$40 to $50k	20,018	8%
$50 to $70k	33,501	14%
$70 to $100k	34,824	14%
$100 to $150k	31,101	13%
$150 to $200k	14,449	6%
Greater than $200k	17,632	7%
Total	**244,893**	**100%**

Source: American Community Survey 5-year Estimates (2021), Econsult Solutions (2023)

[8] Household income data is drawn from the US Census Bureau's American Community Survey, table S1901 and represents the sum of a household's reported wage or salary income; net self-employment income; interest, dividends or net rental or royalty income or income from estates and trusts; Social Security or Railroad Retirement income; Supplemental Security Income (SSI); public assistance or welfare payments; retirement, survivor, or disability pensions; and all other income. The value of income "in kind" from food stamps, public housing subsidies, medical care, etc., is NOT included when determining total household income for this table.

Figure 5a: Estimated Number of Households in Baltimore by Income Level (as of 2021)

Income Range	# Households	% Households
Less than $15k	41,845	18%
$15 to $30k	35,628	15%
$30 to $40k	21,662	9%
$40 to $50k	19,706	8%
$50 to $70k	31,181	13%
$70 to $100k	33,620	14%
$100 to $150k	29,172	12%
$150 to $200k	12,195	5%
Greater than $200k	14,108	6%
Total	**239,116**	**100%**

Source: American Community Survey 5-year Estimates (2019), Econsult Solutions (2021)

Economic Impact from Resident Spending

The most recently available data from the Maryland State Comptroller (as of 2021) finds that households in Baltimore represent about $12.7 billion in taxable annual household income. Notably, this is a $1.4 billion increase from 2019. The economic impact caused by households spending is present at all income levels. As upper-income households make more money and have more money to spend, lower-income households spend a higher proportion of their income back into the local economy, causing a greater economic impact relative to their household income level.

Present annual household income levels in Baltimore are estimated to produce an approximate $8.5 billion impact on the local economy (represented in millions in the figure below). This impact supports over 39,000 jobs and approximately $2.8 billion in labor income (see Figure 6 below).[9] Household spending in Baltimore also spreads beyond the city's borders and leads to positive impacts in the rest of Maryland.

[9] The modeling approach undertaken explicitly accounts for the spending patterns of households of different income levels in the city. Inputs to the model are developed based on the relative amount of aggregate household income in the city derived from households in different income bands. The input-output modeling software IMPLAN establishes these income groupings and accounts for the spending patterns of households at different income levels in the modeling of economic impacts.

Figure 6: Estimated Annual Economic Impact from Household Spending by Residents of Baltimore City

Economic Impact	Baltimore City	State of Maryland
Direct Household Income ($M)	$12,681.7	$12,681.7
Total Impact ($M)	**$8,470.8**	**$9,730.8**
Total Employment Supported (FTE)	39,500	45,800
Total Labor Income Supported ($M)	$2,777.1	$3,133.5

Source: IMPLAN (2021), Econsult Solutions (2023)

Figure 6a: Estimated Annual Economic Impact from Household Spending by Residents of Baltimore City (2021 Results)

Economic Impact	Baltimore City	State of Maryland
Direct Household Income ($M)	$11,287.7	$11,287.7
Total Impact ($M)	**$8,210.1**	**$10,168.4**
Total Employment Supported (FTE)	40,700	50,200
Total Labor Income Supported ($M)	$2,564.6	$3,102.1

Source: IMPLAN (2019), Econsult Solutions (2021)

Tax Revenue Impact from Resident Spending

City residents represent a significant amount of tax revenue for Baltimore City and the State of Maryland – bringing revenue in from at least three sources. These three sources include: Baltimore residents paying personal income taxes to the City and the State; paying local property taxes benefitting the city and its public schools – and money being spent within the city and state — translating to economic opportunity through local and state taxes.

As noted earlier, it is estimated that in the aggregate, Baltimore households represent approximately $12.7 billion in taxable personal income. In FY2021, the Maryland State Comptroller reported that Baltimore City netted approximately $391 million in local personal income taxes and the State of Maryland netted an additional $584 million in state personal income taxes from Baltimore households. The tax revenue impact from households in Baltimore City was greater in 2021 than in 2019, both within Baltimore City and the greater State of Maryland.

Figure 7: Annual Local and State Personal Income Tax Revenue from Households in Baltimore City

Aggregate Taxable Income	Net Local Personal Income Taxes Paid to Baltimore City	Net State Personal Income Taxes Paid to State of Maryland
$12.7 billion	$390.9 million	$584.1 million

Source: Comptroller of Maryland (2022)

Figure 7a: Annual Local and State Personal Income Tax Revenue from Households in Baltimore City (2021 Results)

Aggregate Taxable Income	Net Local Personal Income Taxes Paid to Baltimore City	Net State Personal Income Taxes Paid to State of Maryland
$11.3 billion	$347.4 million	$516.3 million

Source: Comptroller of Maryland (2020)

A significant portion of the aggregate household income is spent back into the local and state economy, which supports economic activity in the city and state. As a result, this economic activity helps to support various local and state tax bases. At present, it is estimated that Baltimore resident's household spending generates economic activity that yields $28 million a year in tax revenues to the City and approximately $440 million a year in tax revenues to the State (See Figure 8).

Figure 8: Estimated Annual Tax Revenue Impact from Household Spending by Residents of the City of Baltimore

Tax Revenue Impact	Baltimore City	State of Maryland
Personal Income Tax Revenues ($M)	$28.3	$125.2
Sales Tax Revenues ($M)	-	$92.1
Business Tax Revenues ($M)	-	$222.1
Total Tax Revenues ($M)	**$28.3**	**$439.5**

Source: IMPLAN (2021), Econsult Solutions (2023), Maryland Department of Finance (2022)

Figure 8a: Estimated Annual Tax Revenue Impact from Household Spending by Residents of Baltimore City (2021 Results)

Tax Revenue Impact	Baltimore City	State of Maryland
Personal Income Tax Revenues ($M)	$30.5	$123.4
Sales Tax Revenues ($M)	-	$74.7
Business Tax Revenues ($M)	-	$174.6
Total Tax Revenues ($M)	**$30.5**	**$372.7**

Source: IMPLAN (2021), Econsult Solutions (2021), Maryland Department of Finance (2020)

Households in Baltimore also support the local property tax base, either directly through homeownership or indirectly through rental housing. Based on available property tax data, it is estimated that city residents represent $521 million in annual local property tax revenues to support Baltimore City (see Figure 9). While the estimated residential share has remained at 56 percent since 2019, there has been a slight increase in the aggregate local property taxes collected and paid by residents.

Figure 9: Local Annual Property Tax Revenue from Households in Baltimore City[10]

Aggregate Local Property Taxes Collected ($M)	Estimated Residential Share	Aggregate Local Property Taxes Paid by Residents ($M)
$933.8	56%	$521.5

Source: Baltimore City Department of Finance (2022)[11], Maryland Department of Assessments and Taxation (2022), Econsult Solutions (2023)

[10] The estimated residential share of local annual property tax revenue (56%) was estimated by ESI based on real property tax base by jurisdiction from Baltimore City's ACFR.
[11] Baltimore City Annual Comprehensive Financial Report 2022, https://finance.baltimorecity.gov/sites/default/files/ACFR%20CY%2022.pdf.

Figure 9a: Local Annual Property Tax Revenue from Households in Baltimore City (2021 Results)

Aggregate Local Property Tax Revenues Collected ($M)	Estimated Residential Share	Aggregate Local Property Taxes Paid by Residents ($M)
$887.5	56%	$493.3

Source: Baltimore City Department of Finance (2020), Maryland Department of Assessments and Taxation (2018), Econsult Solutions (2021)

In sum, these amounts total $912 million in local tax revenues generated and $898 million in state tax revenues generated by Baltimore residents (see Figure 10). These tax revenues are generated from personal income taxes directly paid by those households, sales and business tax revenues generated by spending by these households, or property taxes paid by these households.

Figure 10: Aggregate Local and State Tax Revenues Generated by Local Residents

	Baltimore City	State of Maryland
Local and State Personal Income Taxes Directly Paid by Baltimore Residents ($M)	$390.9	$584.1
State Sales and Business Tax Revenues Generated from Spending by Baltimore Residents ($M)	-	$314.3
Local Property Taxes Directly Paid by Baltimore Residents ($M)	$521.5	-
Total ($M)	**$912.4**	**$898.4**

Source: Econsult Solutions (2023), Comptroller of Maryland (2022), Maryland Department of Finance (2022), Maryland Department of Assessments and Taxation (2022), IMPLAN (2021)

Figure 10a: Aggregate Local and State Tax Revenues Generated by Local Residents (2021 Results)

	Baltimore City	State of Maryland
Local and State Personal Income Taxes Directly Paid by Baltimore Residents ($M)	$347.4	$516.3
State Sales and Business Tax Revenues Generated from Spending by Baltimore Residents ($M)	-	$249.2
Local Property Taxes Directly Paid by Baltimore Residents ($M)	$493.3	-
Total ($M)	**$840.7**	**$765.5**

Source: Econsult Solutions (2021), Comptroller of Maryland (2020), Maryland Department of Finance (2020), Maryland Department of Assessments and Taxation (2018), IMPLAN (2019)

4 Aggregate Local Economic Impact

In part, city governments evaluate public investments by how they enable economic vitality and promote fiscal sustainability. Economic vitality may be present in the form of commercial activities and employment opportunities, while fiscal responsibility may be considered generating more tax revenue than is spent on city services and operations. In this context, investing in residential growth offers a compelling return for Baltimore City.

In Fiscal Year 2024, the City invested approximately $1.15 million in Live Baltimore, the primary entity in the city that works on resident attraction and retention.[12] This report illustrates that the combined investment in residential units and the household spending of residents yields an economic impact far greater than the City's annual investment in Live Baltimore (see Figure 11 and Figure 12). For example, the total annual tax revenue gained to Baltimore City from these two categories is nearly 800 times the annual investment made by the City in Live Baltimore.

[12] Agency Detail – Volume I, Fiscal Year 2024, City of Baltimore, https://bbmr.baltimorecity.gov/sites/default/files/FY2024%20Agency%20Detail%20Volume%201%20Final_0.pdf.

Figure 11: Estimated Annual Economic Impact from New Construction and Major Renovation of Residential Units in Baltimore City

Economic Impact to Baltimore City	From Construction and Major Renovation of Residential Units	From Household Spending by Residents	Total
Direct Impact ($M)	$387.2	-	$387.2
Indirect and Induced Impact ($M)	$118.3	$8,470.8	$8,589.1
Total Impact ($M)	**$505.5**	**$8,470.8**	**$8,976.3**
Total Employment Supported	1,900	39,500	41,400
Total Labor Income Supported ($M)	$124.9	$2,777.1	$2,902.0

Source: IMPLAN (2021), Econsult Solutions (2023)

Figure 11a: Estimated Annual Economic Impact from New Construction and Major Renovation of Residential Units in Baltimore City (2021 Results)

Economic Impact to Baltimore City	From Construction and Major Renovation of Residential Units	From Household Spending by Residents	Total
Direct Impact ($M)	$374.7	-	$374.7
Indirect and Induced Impact ($M)	$132.7	$8,210.0	$8,342.7
Total Impact ($M)	**$507.4**	**$8,210.0**	**$8,717.4**
Total Employment Supported	2,700	40,700	43,400
Total Labor Income Supported ($M)	$158.8	$2,565	$2,723.4

Source: IMPLAN (2019), Econsult Solutions (2021)

Figure 12: Estimated Annual Tax Revenue Impact from New Construction and Major Renovation of Residential Units in Baltimore City and from Household Spending by Residents of Baltimore City

Tax Revenue Impact to Baltimore City Government	From Construction and Major Renovation of Residential Units	From Household Spending by Residents	Total
Personal Income Tax Revenues ($M)	$1.3	$390.9	$392.2
Property Tax Revenues ($M)	-	$521.5	$521.5
Total Tax Revenues ($M)	$1.3	$912.4	$913.7

Source: Econsult Solutions (2023), Comptroller of Maryland (2022), Maryland Department of Finance (2022), Maryland Department of Assessments and Taxation (2022), IMPLAN (2021)

Figure 12a: Estimated Annual Tax Revenue Impact from New Construction and Major Renovation of Residential Units in Baltimore City and from Household Spending by Residents of Baltimore City (2021 Results)

Tax Revenue Impact to Baltimore City Government	From Construction and Major Renovation of Residential Units	From Household Spending by Residents	Total
Personal Income Tax Revenues ($M)	$1.9	$347.4	$349.3
Property Tax Revenues ($M)	-	$493.3	$493.3
Total Tax Revenues ($M)	$1.9	$840.7	$842.6

Source: Econsult Solutions (2021), Comptroller of Maryland (2020), Maryland Department of Finance (2020), Maryland Department of Assessments and Taxation (2018), IMPLAN (2019)

5 Appendix

5.1 Input-Output Modeling

In an inter-connected economy, every dollar spent generates two spillover impacts:

- First, some amount of the proportion of that expenditure that goes to the purchase of goods and services gets circulated back into an economy when those goods and services are purchased from local vendors. This represents what is called the "**indirect effect**," and reflects the fact that local purchases of goods and services support local vendors, who in turn require additional purchasing with their own set of vendors.
- Second, some amount of the proportion of that expenditure that goes to labor income gets circulated back into an economy when those employees spend some of their earnings on various goods and services. This represents what is called the **"induced effect**," and reflects the fact that some of those goods and services will be purchased from local vendors, further stimulating a local economy.

To model the impacts resulting from the direct expenditures ESI developed a customized economic impact model using the IMPLAN input/output modeling system. IMPLAN represents an industry standard approach to assess the economic and job creation impacts of economic development projects, the creation of new businesses, and public policy changes within a county or its surrounding area.

IMPLAN has developed a social accounting matrix (SAM) that accounts for the flow of commodities through economics. From this matrix, IMPLAN also determines the regional purchase coefficient (RPC), the proportion of local supply that satisfies local demand. These values not only establish the types of goods and services supported by an industry or institution, but also the level at which they are acquired locally. This assessment determines the multiplier basis for the local and regional models created in the IMPLAN modeling system. IMPLAN takes the multipliers and divides them into 546 industry categories in accordance with the North American Industrial Classification System (NAICS) codes.

5.2 Glossary of Terms for Input-Output Models

Multiplier Effect – the notion that initial outlays have a ripple effect on a local economy, to the extent that direct output lead to indirect and induced output.

Economic Impacts – total expenditures, employment, and labor income generated.

Fiscal Impacts – local and/or state tax revenues generated.

Direct Output– initial outlays usually associated with the project or activity being modeled; examples: one-time upfront construction and related expenditures associated with a new or renovated facility, annual expenditures associated with ongoing facility maintenance and/or operating activity.

Direct Employment – the number of annual jobs associated with direct output (including full and part-time employment)

Direct Labor income– the salaries and wages earned by employees, contractors, and proprietors as part of the direct output.

Indirect Output– indirect and induced outlays resulting from the direct output; examples: vendors increasing production to meet new demand associated with the direct output, workers spending direct labor income on various purchases within the local economy.

Indirect/Induced Employment – the number of annual jobs associated with indirect/induced output (including full and part-time employment)

Indirect Labor income– the salaries and wages earned by employees, contractors, and proprietors as part of the indirect output.

Total Output– the sum total of direct output and indirect output.

Total Employment – the sum total of direct employment and indirect employment.

Total Labor income– the sum total of direct labor income and indirect labor income.

5.3 Fiscal Impact Modeling

IMPLAN only provides a rough estimate of the combined fiscal impact of increased economic activity on state and local governments. Consequently, ESI has constructed a model that takes the output from the IMPLAN model and generates detailed estimates of the increases in state and local tax collections that arise from the new project. Those revenues are in fact a part of the total economic impact of a new project that is often ignored in conventional economic impact analyses.

The ESI fiscal impact model combines IMPLAN outputs with the relevant tax types and tax bases associated with the jurisdiction or jurisdictions for which fiscal impact is being modeled. Specifically, the estimated labor income supported by the direct, indirect, and induced expenditures generated by the model are used to apportion the net increase in the relevant tax bases and therefore in those tax revenue categories. The resulting estimates represent the projected tax revenue gains to the jurisdiction or jurisdictions because of the increased business activity and its attendant indirect and induced effects.

5.4 Explanation of Multipliers

The use and application of multipliers are intuitive. Multipliers, in their most basic form, are the result of an algebraic analysis expressing how two inputs are interconnected in the production of an output. The result of the equation generates a multiplier that is broken down into direct, indirect, and induced effects. In a generalized example: if the multiplier for good “X” to good “Y” is 3, then the direct effect of good “X” on “Y” is 1, with indirect and induced effects of 2. Essentially, every unit of good “X” supports 2 units of good “Y”.

When implemented on a large complex scale, such as that of the US economy or any subsection of it, multiplier effects across industries can be complicated. However, the same general concept comes into play. Each industry has largely different and varied inputs into other industries. The quantity of the output is largely decided by the scale and efficiency of the industries involved. As a result, the sum of those inputs equates to an output product plus a value added/component. By arranging these inputs and outputs by industry in a matrix and performing some algebra to find the Leontief inverse matrix, each industry’s effect on final demand can be estimated. Additionally, the direct, indirect, and induced effects can also be determined. Direct effects include direct purchases for production, indirect effects include expenses during production, and induced effects concern the expenditures of employees directly involved with production. Using building construction as an example, the direct effects would include materials, brick, steel, and mortar, the indirect effects would involve the steel fabrication and concrete mixing, and the induced effects would consider purchases by construction workers using their wages. While impacts vary in size, each industry has rippling effects throughout the economy. By using an input-output model, these effects can be more accurately quantified and explained.

IMPLAN is one of several popular choices for regional input-output modeling. Each system has its own nuances in establishing proper location coefficients. IMPLAN uses a location quotient to determine its regional purchase coefficient (RPC). This represents the proportion of demand for a good that is filled locally; this assessment helps determine the multiplier for the localized region. Additionally, IMPLAN also accounts for inter-institutional transfers (e.g. firms to households, households to the government,

etc.) through its social account matrix (SAM) multipliers. IMPLAN takes the multipliers and divides them into industry categories in accordance with the North American Industrial Classification System (NAICS) codes, allowing a comprehensive breakdown of a region's multipliers by industry to be shown.

Despite the usefulness of input-output modeling, there are some shortcomings to the system. Notably, input-output models ignore economies of scale. Input-output models assume that costs and inputs remain proportionate through different levels of production. Further, multipliers are not generally updated on a timely basis; most multipliers are prone to be outdated with the current economy. If the multipliers are sourced from a year of a recession economy, the multipliers may not accurately represent the flows from an economic boom period. Additionally, multipliers may not capture sudden legal or technological changes which may improve or decrease efficiency in the production process. Regardless, I-O models still serve as the standard in the estimation of local and regional impacts.