

1. Introduction

Presented herein are the estimated economic impacts resulting from the planned construction/capital investments to the Louisville –Southern Indiana Ohio River Bridges Project. Impacts are presented for the defined study area, by economic impact measure and type, year, and project alternative.

A five-county western-portion of the Kentuckiana Regional Planning and Development Agency (KIPDA) nine-county jurisdiction defines the study area; comprised of Bullitt Co., KY, Jefferson Co., KY, Oldham Co., KY, Clark Co., IN, and Floyd Co., IN. Impact measures presented include *employment*, *income*, *value-added*, *output*, and *taxes*; and, the two impact types include *direct* and *total* (i.e., *direct* plus *multiplier*) impacts. Employment is presented in job-year terms, while the remaining monetized measures are presented in constant 2011 dollar terms. Impacts are estimated for the scheduled project time horizon, spanning the eleven years from 2012 through 2022 (inclusive).

Impacts are estimated for two considered alternatives reflecting both the I-65 Downtown Bridge and the I-265 East End Bridge, with their respective approaches:

1. a full-build alternative; and,
2. a tolled alternative with a reduced infrastructure footprint (with correspondingly reduced expenditures).

Capital infrastructure expenditures on surface transportation projects, such as for the two Ohio River bridge spans, support the creation of new (and retention of existing) jobs and contribute to economic activity within the impacted economy. Such infrastructure spending leads to *direct* construction-related jobs, and through the economic interdependencies of various industries within the study area, the bridge expenditures yield *indirect* jobs as well, related to the suppliers of construction materials and equipment, and related services. In turn, these *direct* and *indirect* jobs, and associated earned income, support additional jobs (*induced* impacts), all of which in combination generate a boost to the regional economy.

Based on estimated project expenditures, the economic impacts are derived through an application of the economic impact assessment modeling software program: IMPLAN[®] Professional 3.0.

Presented in the subsequent subsections are descriptions of the methodology employed in the impact estimations, the expenditures that serve as economic modeling inputs, and the ensuing impact results¹.

2. Methodology

Provided with estimated expenditures over the project time horizon², by expenditure type/category and alternative, the resulting economic impacts are calculated utilizing the social accounting and impact analysis computer software, developed by the Minnesota IMPLAN Group, Inc.; the IMPLAN Professional 3.0 model (IMPLAN[®]).

¹ Note that this analysis does not take into consideration economic impacts to the study area that may stem from land-use, accessibility, and travel-pattern changes likely to consequentially occur post-construction of the two river spans, and focuses exclusively on the economic impacts consequential of the expenditure activities only.

² Source: Community Transportation Solutions (CTS)

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Impact results are a direct function of the magnitude and pattern of the estimated expenditure inputs, and the geographic extent of the defined study area. Consequently, any changes to the estimated expenditures amounts, spending patterns, and assumptions would potentially heavily influence the economic impact findings.

Estimated expenditures are inputted separately into IMPLAN[®] by expenditure category to calculate the respective economic impacts, and then aggregated to provide a project-wide snapshot of the potential economic ramifications of such spending. All inputted data are applied to the internal social account matrix, which accounts for the industry sector interdependencies in the study area economy.

2.1. IMPLAN[®] Model Description

IMPLAN[®] Professional 3.0 is an economic modeling, input-output based, social account matrix software with the capability of estimating the economic impacts to a defined geography ensuing from expenditures in an industry or group of industries (or, commodity, or group of commodities). A social account matrix reflects the economic interrelationships between the various industries, households, and governments in an economy and reflects such interdependency through impact multipliers. Impact multipliers are internally developed within IMPLAN[®], derived from the regional purchase coefficients, production functions, and socioeconomic data for the defined economy, for each of the economic impact measures and are geographically-specific.

IMPLAN[®] is a static model, with the economic impacts estimated only for a specific time period. It is incapable of estimating changing economic impacts beyond the duration of the expenditure intervals. Additionally, as a static “snapshot” social accounting software, the model does not encapsulate dynamic feedbacks that may have additional iterative ripple effects beyond the statically-derived input-output based results.

2.2. Expenditure Inputs

Project expenditure estimates were provided as economic modeling inputs by CTS engineers, by alternative, year, general expenditure category (e.g., engineering and design, construction, right-of-way, etc.), and project subcomponent (e.g., I-65 Downtown Bridge, the Kennedy Bridge/“Spaghetti Junction” Interchange, etc.). Such expenditure inputs as-received were processed and aggregated for economic modeling purposes.

In aggregate across the economically-applicable expenditure categories³ and across the eleven project years from 2012 through 2022, the Louisville – Southern Indiana Ohio River Bridge Project is estimated to amount to \$2.92 billion and \$2.10 billion for the full-build and reduced-footprint (tolled) alternatives, respectively. Of these aggregate economically-applicable cumulative totals, the actual construction expenditure category (including contingency and construction administrative/inspection functions) constitute a vast majority for the two alternatives, at 90% and 87%, respectively, with the remaining residual percentages encompassing all remaining general expenditure categories (i.e., design and engineering, design program management, hazardous materials removal, utilities, ROW, and historical enhancements/mitigation).

³ For applicable economic modeling purposes, the aggregate expenditures presented include only 10% of ROW, as reflective of the real estate transaction fees/taxes/etc; the remaining ROW dollar amounts reflect only the value of the asset transfer and, resultantly, do not spur economic activity/employment by itself and thus, have no measureable economic impact.

2.3. Impact Measures and Types

All categorical expenditure inputs are run through the internal social account matrix in IMPLAN[®], coupled with the internally-applied regional purchase coefficients (RPC)⁴. Industry-specific expenditures (model inputs), in whole or part (depending on RPC), are applied within the study area and circulated throughout based on industry interdependencies within the IMPLAN[®] model. Spending and the circulation of such expenditures in the study area result in economic impacts that are presented by various measures and types. Impact *measures* include *employment*, *income*, *value-added*, *output*, and *taxes*, while the impact *types* reflect who within the study area economy is affected, either as *direct*, *indirect*, *induced* or a combined *total*.

Impact Measures:

- *Employment* – as presented in job-years⁵
- *Labor Income* – wage/salary earnings paid to the impacted employment
- *Value-Added* – net economic activity (i.e., total output less gross intermediate inputs), synonymous with GRP (gross regional product) or GSP (Gross State Product); includes employee and proprietor income, other income types, indirect business taxes, etc., as contributive to the production of final goods and services
- *Output* – total sales value associated with all levels of economic activity (comprised of gross intermediate inputs *and* value added, combined)
- *Taxes* – inclusive of various taxes, fines, fees, licenses, permits, etc. resulting from economic activity (e.g., Dividends Tax (for Corporations), Social Ins. (employee and employer contributions), Indirect Business Taxes (incl. sales taxes, property taxes, motor vehicle licenses, severance taxes, excise taxes, customs, and others), Personal (incl. income tax, fines, fees, motor vehicle license, property, and others), Corporate Profits, etc.).

⁴ RPCs reflect the percent of an industry-specific expenditure that is retained within a defined impact area, based on the geographically-constrained ability of the industry to supply the expenditure demand. A 100% RPC indicates that the entirety of the industry expenditure remains within the analysis-defined impact area, while an RPC below 100% indicates that there are expenditure leakages; that is, a portion of the expenditures are exported to purchase goods and services from beyond the impact region because the local economy either does not, or insufficiently, supplies the industry demand.

⁵ Employment impacts are presented in *job-years*, and the cumulative total employment impact over the analysis period does not necessarily reflect the total number of employed *persons* impacted resulting from the transportation developments. Because IMPLAN[®] is a static model, the impacts are a snapshot in time (i.e., one-year snapshots) and thus, the model cannot identify which precise employment impacts carry from one year to the next. Consequently, the periodical employment impacts, in *job-years*, may be accounting for the same employed person over multiple years in the analysis, or alternatively, the same job with personnel turnover. Impacts in terms of the number of total employed persons resulting from transportation developments are below the estimated total *job-years*, because invariably some of the employed persons are employed for more than one year.

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Impact Types:

- *Direct* – impacts that affect only the specific industry in which expenditures are spent or job-years generated; i.e., the direct impacts resulting from construction expenditures occur only within the construction industry
- *Indirect* – impacts associated with the suppliers that provide intermediate goods and services to the *directly* impacted industries
- *Induced* – impacts associated with the re-spending of earned labor income from both the *direct* and *indirect* industries
- *Total* – aggregated *direct*, *indirect*, and *induced* impact types

Often, the *indirect* and *induced* impacts are conjointly referred to as *multiplier* impacts. As such, the *total* impacts are the *direct* plus the *multiplier* impacts. Only the *direct* and *total* impacts are explicitly presented herein (*multiplier* impacts are implicit, via the differential between the *direct* and *total*).

3. Impacts Findings

Impacts are calculated via the IMPLAN[®] model for the infrastructure expenditures once the expenditures estimates are applied to the appropriate industry sectors and the model run. Presented below are those associated expenditures-related economic impacts across multiple dimensions, which include impacts by measure, type, project alternative, and year for all measures except taxes (which instead is presented with a Federal versus State/Local detailed split).

3.1. Employment

In terms of employment, the eleven-year *direct-type* cumulative impacts amount to 23,550 and 16,780 job-years for the full-build and reduced-footprint (tolled) alternatives, respectively. Incorporating the *multiplier-type* impacts (i.e., *indirect* plus *induced*), the *total-type* cumulative employment impacts jump to 42,390 and 30,380 job-years, respectively. On an average annual basis across those eleven years spanning 2012 through 2022, the employment impacts are estimated to amount to 2,140 and 1,530 *direct-type* jobs, with 3,850 and 2,760 *total-type* jobs for the full-build and reduced-footprint alternatives, respectively.

Exhibit 1: Employment Impacts

Alt.	Type	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Cumulative Total	Avg. Ann.
1	Direct	380	1,670	3,770	4,330	3,270	2,570	2,480	2,220	1,460	1,030	390	23,550	2,140
	Total	830	3,090	6,770	7,760	5,850	4,580	4,410	3,950	2,600	1,850	710	42,390	3,850
2	Direct	220	2,320	2,680	2,620	3,210	1,370	1,190	1,180	1,180	410	410	16,780	1,530
	Total	450	4,270	4,910	4,770	5,740	2,440	2,120	2,110	2,110	740	740	30,380	2,760

Source: Wilbur Smith Associates' application of the IMPLAN[®] v3 model

*note: Employment results are expressed in job-years and rounded to the nearest ten -- totals may not sum due to the rounding

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3.2. Labor Income

In terms of the labor income earned by the abovementioned employment, the eleven-year *direct-type* cumulative impacts amount to \$1.09 billion and \$787 million for the full-build and reduced-footprint (tolled) alternatives, respectively (expressed in constant 2011 dollars). Aggregating the *multiplier-type* impacts with the *direct-type*, the *total-type* cumulative labor income impacts are \$1.88 billion and \$1.35 billion, respectively. On an average annual basis across those eleven years, the labor income impacts are estimated to amount to \$99 million and \$72 million (*direct-type*), with \$170 million and \$123 million (*total-type*) impacts for the full-build and reduced-footprint alternatives, respectively.

Exhibit 2: Labor Income Impacts

Alt	Type	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Cumulative Total	Avg. Ann.
1	Direct	\$25	\$82	\$174	\$198	\$150	\$117	\$112	\$101	\$66	\$47	\$18	\$1,090	\$99
	Total	\$42	\$140	\$299	\$341	\$257	\$201	\$193	\$173	\$114	\$81	\$31	\$1,875	\$170
2	Direct	\$13	\$113	\$129	\$124	\$147	\$62	\$54	\$54	\$54	\$19	\$19	\$787	\$72
	Total	\$22	\$193	\$221	\$213	\$252	\$107	\$93	\$93	\$92	\$32	\$32	\$1,353	\$123

Source: Wilbur Smith Associates' application of the IMPLAN® v3 model
*note: Labor Income results are expressed in millions of dollars (2011)

3.3. Value-Added

In terms of value-added, the eleven-year *direct-type* cumulative impacts amount to \$1.26 billion and \$909 million for the full-build and reduced-footprint (tolled) alternatives, respectively (expressed in constant 2011 dollars). Aggregating the *multiplier-type* and *direct-type* impacts, the *total-type* cumulative value-added impacts are \$2.62 billion and \$1.88 billion, respectively. On an average annual basis, the value-added impacts are estimated as \$115 million and \$83 million (*direct-type*), with \$238 million and \$171 million (*total-type*) for the full-build and reduced-footprint alternatives, respectively. Again, value-added is equivalent to gross regional product (or, gross state product/gross domestic product) metrics.

Exhibit 3: Value-Added Impacts

Alt	Type	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Cumulative Total	Avg. Ann.
1	Direct	\$34	\$100	\$202	\$227	\$171	\$133	\$128	\$115	\$76	\$54	\$21	\$1,262	\$115
	Total	\$64	\$201	\$418	\$474	\$357	\$278	\$268	\$240	\$159	\$113	\$44	\$2,615	\$238
2	Direct	\$16	\$135	\$152	\$142	\$167	\$71	\$62	\$61	\$61	\$22	\$22	\$909	\$83
	Total	\$31	\$274	\$311	\$295	\$349	\$148	\$129	\$128	\$128	\$45	\$45	\$1,882	\$171

Source: Wilbur Smith Associates' application of the IMPLAN® v3 model
*note: Value-Added results are expressed in millions of dollars (2011)

3.4. Economic Output

Regarding economic output, the *direct-type* cumulative project-horizon impacts amount to \$2.85 billion and \$2.03 billion for the full-build and reduced-footprint (tolled) alternatives, respectively (expressed in constant 2011 dollars). Combining the *multiplier-* and *direct-type* impacts, the *total-type* cumulative economic output impacts are \$5.17

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billion and \$3.70 billion, respectively. On an average annually, the economic output impacts are estimated as \$259 million and \$184 million (*direct-type*), with \$470 million and \$336 million (*total-type*) impacts for the full-build and reduced-footprint alternatives, respectively. Again, economic output is the end sales-price value of the economic activity (i.e., the gross intermediate production inputs *plus* the value-added metrics) and is not directly comparable to gross regional product metrics.⁶

Exhibit 4: Economic Output Impacts

Alt.	Type	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Cumulative Total	Avg. Ann.
1	Direct	\$55	\$211	\$455	\$519	\$392	\$308	\$297	\$266	\$175	\$124	\$47	\$2,848	\$259
	Total	\$105	\$383	\$825	\$943	\$712	\$557	\$537	\$481	\$317	\$225	\$86	\$5,172	\$470
2	Direct	\$26	\$288	\$330	\$315	\$384	\$164	\$142	\$141	\$141	\$49	\$49	\$2,029	\$184
	Total	\$52	\$526	\$602	\$578	\$696	\$297	\$257	\$256	\$256	\$89	\$89	\$3,698	\$336

Source: Wilbur Smith Associates' application of the IMPLAN[®] v3 model
*note: Economic Output results are expressed in millions of dollars (2011)

3.5. Taxes

Regarding taxes, the *direct-type* cumulative project-horizon government collections equal \$231 million and \$167 million for the full-build and reduced-footprint (tolled) alternatives, respectively (expressed in constant 2011 dollars). *Total-type* cumulative taxes are \$537 million and \$387 million, respectively. Such project-horizon cumulative taxes are incorporative of both Federal and State/Local taxes. Regardless of the project alternative, the relative split is approximately 76% and 24% for Federal and State/Local, respectively for the *direct-type* taxes, and 64% and 46% for the *total-type*.

In any year, the simple-average combined Federal and State/Local taxes are estimated to be \$21 million and \$15 million (*direct-type*), with \$49 million and \$35 million (*total-type*) for the full-build and reduced-footprint alternatives, respectively.

Exhibit 5: Taxes Impacts

Alt.	Type	Federal	State/Local	Cumulative Total	Avg. Ann.
1	Direct	\$177	\$54	\$231	\$21
	Total	\$344	\$193	\$537	\$49
2	Direct	\$127	\$39	\$167	\$15
	Total	\$248	\$139	\$387	\$35

Source: Wilbur Smith Associates' application of the IMPLAN[®] v3 model
*note: Taxes results are expressed in millions of dollars (2011)

3.6. General Trends/Comparisons

Temporal Distribution – Although the simple-average annual impacts are presented within the preceding exhibits and narrative descriptions, the annual distribution of impacts (for all impact measures) is uneven. A heavier concentration occurs during the

⁶ This nuance is reiterated here because value-added and economic output impact measures are often erroneously referenced as substitutable terms, which they are not (value-added is a component of economic output); this is a common mistake when comparing to GSP/GDP metrics.

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middle years (roughly 2014 through 2016), during which time the actual physical construction activities relatively peak and many of the remaining expenditure categories overlap. At the tail-ends of the project horizon, expenditures are either just beginning or winding-down, and thus relatively smaller impacts are realistically associated with the relatively smaller spending patterns (compared to the peak spending pattern in the middle-years).

Alternatives Comparison – Generally, the economic impacts for the reduced-footprint (tolled) alternative (i.e., “Alt. 2”) are between 71% and just over 73% of the economic impacts estimated for the full-build alternative (i.e., “Alt. 1”), depending on the impact measure and type considered. Such relativity is intuitive, given that the cumulative period-total, economically-applicable expenditure inputs for the reduced-footprint alternative are 72% of the full-build alternative. Both alternatives exhibit relatively similar spending patterns across time and expenditure categories.

Direct vs. Total Type Impacts – Relativity between the *total-type* and *direct-type* economic impacts (regardless of impact measure) is commonly referred-to as an “effective multiplier”, which typically adheres within a reasonably standardized range between 1.5 and upwards-of 3.0. In the case of the presented impact measures, the effective multipliers fall well within that reasonable range. However, the effective multipliers vary by measure, with the lowest effective multiplier occurring within the labor income (1.72), and the highest effective multiplier pertaining to taxes (2.33).

4. Conclusions

In summary, the construction-related expenditures associated with the development of the two proposed Louisville – Southern Indiana Ohio River Bridges are estimated to have an economic impact on the five-county study area located in the western half of the KIPDA planning region.

In the full-build alternative, the \$2.92 billion (in 2011 dollars) in economically-applicable expenditure categories, cumulatively from 2012 through 2022, are estimated to yield \$2.85 billion in *direct-type* economic output, with an associated \$1.26 billion in value-added activity, produced by 23,550 job-years that are paid \$1.09 billion in labor income. Such *direct-type* impacts also are estimated to yield \$231 million in Federal, State, and Local taxes. Incorporating the *multiplier-type* impacts to the *direct* encapsulates the *total-type* impacts, which are estimated as \$5.17 billion in economic output, with an associated \$2.62 billion in value-added activity, produced by 42,390 job-years that are paid \$1.88 billion in labor income; and, \$537 million in taxes.

In the reduced-footprint (tolled) alternative, the cumulative \$2.10 billion in economically-applicable expenditure categories are estimated to yield \$2.03 billion in *direct-type* economic output, with an associated \$909 million in value-added activity, produced by 16,780 job-years that are paid \$787 million in labor income. Such *direct-type* impacts are also estimated to yield \$167 million in taxes. Incorporating the *multiplier-type* impacts, the *total-type* impacts are estimated as \$3.70 billion in economic output, with an associated \$1.88 billion in value-added activity, produced by 30,380 job-years that are paid \$1.35 billion in labor income; and, \$387 million in taxes.

Such cumulative period-total impacts are not evenly distributed across the eleven analysis years, but rather relatively concentrated within the middle-years that roughly encompass 2014 through 2016.