Economic Development RESEARCH GROUP

Economic Impact Analysis for MoDOT STIP 2016 - 2020

August 25, 2015

SUMMARY OF IMPACTS

MoDOT contributes to the economy in the areas of job creation, personal income growth and new value added to the economy. Based on the 2016-2020 STIP investment of $3,040.8 million, an analysis estimates that on average, each year the plan creates 2,836 jobs, $150.5 million in new personal income and $188.1 in new value added in the economy (Table 11 in the Appendix). By comparison, the analysis of the 2015-2019 STIP investment of $3,468.1 million estimates an annual addition of 3,946 jobs, $203.1 million in new personal income and $247.8 million in new value added to the economy. This difference is driven by the reduction in expenditures between the two STIPs and changes in the transit program performance impact methodology.

Table 1 presents the investments of the 2016-2020 STIP. The first column presents total outlays. The following two columns present the portion of investment, which supports spending, and performance impacts, respectively. Spending impacts are construction stimulus effects that occur in the economy due to the hiring of workers and the purchase of materials to support infrastructure maintenance or upgrades. Spending impacts are driven by total outlays net of expenditures on land acquisition (which is a transfer within the economy and has no economic impact).

Column three in Table 1 reports the portion of spending that specifically supports long-term performance outcomes for each of the major programs. The investment that supports assessed performance impacts is a subset of the total outlays, which drive spending impacts. For highways and bridges, performance impacts derive from spending on bridge and pavement preservation. This spending improves the quality of pavement, thus reducing operating costs for vehicles, and helps to avoid bridge closures and resulting diversions of traffic (which result in increased travel time and cost). Airport performance impacts are derived from an analysis of three major capacity investments that will increase volumes of inbound traffic and therefore increase visitor spending in the state. Transit investments in bus replacements support performance impacts by maintaining access to employment opportunities for some transit dependent individuals. Finally, capital investments in rail and waterway port infrastructure support efficiency effects for those modes of transport.

Table 1 2016-2020 STIP Investments (dollars are in undiscounted millions)

Program	Total Investment	Investments Supporting Spending Impacts[1]	Investment Supporting Performance Impacts[2]
Highway & Bridge Program	$2,658.6[3]	$2,618.6	$1,534.1[4]
Airport	$152.2	$129.1	$13.2[5]
Transit	$141.8	$141.8	$141.8
Rail, Waterways, and Freight	$88.1[6]	$86.5	$37.2[7]
Total	**$3,040.7**	**$2,976.0**[8]	**$1,726.3**[9]

Table 2 summarizes the impacts of the STIP including both the long-term performance impacts by program area as well as the stimulus impacts of spending the construction dollars in Missouri's economy. The dollar value impacts in terms of business output, value added, and wage income are presented in cumulative terms, summed across the 20-year analysis period. This enables a comparison between total dollars of impact generated and the outlays that drive the impact.

Each of the indicators (output, Gross Domestic Product (GDP), wage income, and jobs) represent different ways of quantifying the same overall changes in economic activity. For example: improved pavement quality resulting from investments in preservation will enable shippers and carriers to save money on transport costs. This in turn allows businesses that rely on the movement of goods or people (e.g. a vehicle parts manufacturer that ships goods by truck and relies on the roads for efficient business travel) to produce more and increase sales (business output), hire more people (jobs), and pay additional workers (wage income). The increase in sales in turn generates additional demand for material and services consumed by those businesses (resulting in more sales/business output and additional wages to workers in supplier industries). Worker wages are also recirculated in the economy as people purchase consumer goods, thus supporting sales and jobs within, for example, the retail and service sectors. GDP is a measure of overall value added to the economy and represents total sales (output) net of material and transportation input costs.

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[1] Spending impacts are driven by total outlays net of expenditures on land acquisition (which is a transfer within the economy and has no economic impact).

[2] Column reports the subset of investment supporting assessed performance impacts.

[3] Total highway & bridge available funds, net of payments (because these generally apply to prior work, and thus do not drive impacts for the 2016-2020 STIP).

[4] Construction awards spent on highway or bridge preservation.

[5] Performance effects analyzed based on visitor spending increases for three airport projects at Springfield/Branson National, Camdenton, and Lee's Summit.

[6] Inclusive of rail, waterways, and freight enhancements.

[7] Only capital expenditures drive the calculation of performance impacts (excludes operations). The stimulus impact of operations is accounted for within the spending analysis.

[8] Total available funds net of payments and property acquisition.

[9] Note that the outlays used to calculate performance impacts ($1,726.4 M) are a subset of the total outlays driving spending impacts ($2,976.0 M). Thus the total amount driving economic impacts in terms of both performance and spending effects is $2,976.0 million.

Table 2 Performance and Spending Impacts of the 2016-2020 STIP (dollars are in undiscounted millions)

Performance Impacts of the STIP by Program (2016-2035)				
	Cumulative Impacts[10]			
Program	**Business Output**	**GDP(Value Added)**	**Wage Income**	**Average Annual Jobs**
Highway & Bridge Preservation	$1,492.5	$720.2	$519.8	549
Airport	$57.6	$33.4	$22.3	36
Transit	$82.5	$50.3	$36.1	36
Rail, Waterways, and Freight	$0.64	$0.31	$0.19	0
Total Performance Impact	**$1,633.2**	**$804.2**	**$578.4**	**621**
Spending Impacts of the STIP (2016-2035)				
Construction & Related Activity	**$5,615.1**	**$2,957.1**	**$2,432.0**	**2,215**
TOTAL IMPACT (Performance +Spending)	**$7,248.3**	**$3,761.3**	**$3,010.4**	**2,836**

KEY INDICATORS: Based on the above results, the key indicators for the MoDOT Tracker are calculated as follows: Average annual employment over a 20-year period is **2,836 jobs** based on the sum of performance impacts and spending impacts related to construction and operations during the five-year STIP. Dollars of output per dollar spent is the ratio of total cumulative business output over the 20-year period (from both performance and spending effects) divided by total expenditures driving impacts (i.e. total available funding net of payments and land acquisition): ($7,248.4 M / $2,976.0 M) = **2.44 dollars output per dollar spent**.

The return in terms of jobs and output in the economy is less in the current estimates, when compared to the previous year's estimates, even after adjusting for the reduction in total outlays (see **Table 3**). This difference is driven by the following changes in the performance assumptions for the transit program:

1) For each bus replaced by the transit program capital expenditures, it is assumed that only 10% of those buses would have been removed from service had the STIP funding not been available for new vehicles (compared to 20% in the previous year's analysis).

2) For each bus that would have been removed from service without STIP funding, it is assumed that 23.8% of the riders would forego the trip, while 76.2% would find alternate means of transportation. Of the 23.8% who forego trips, 34.2% are assumed to be work travelers, which means only 8% of total bus travelers would be forced to forego labor market participation buses are not replaced. These numbers represent a considerable downwards adjustment of the number of

[10] Sum of impacts across the 20-year analysis period.

transit-dependent commuters supported by vehicle replacements, based on the nature of rural transit service supported by STIP expenditures.

Finally, note that the total return on investment (from combined spending and performance effects) for the transit program is slightly higher than the highway and bridge preservation program. This is due to the nature of transit expenditures, which tend to support more labor-intensive activities and therefore yield higher economic multiplier effects than expenditures on highway infrastructure.

Table 3 Comparison of Key Economic Indicators

	2015-2019 STIP	2016-2020 STIP	Percent Change from Prior Year
Jobs per year (20 year average)	3,946	2,836	-28%
Jobs per year per $B spent[11]	1,164	953	-18%
Cumulative 20-year Output per $ spent[12]	2.97	2.44	-18%
Total Outlays ($M)	$3,468.10	$3,040.8	-12%
Total Outlays Supporting Impacts ($M)	$3,389.70	$2,976.0	-12%

Table 4 Output per Dollar Spent by Program (dollars in millions)

Program	Total Outlays Driving Impacts[13]	Cumulative Business Output[14]	Total Output per Dollar
Highway & Bridge	$2,618.6	$6,316.0	$2.41
Airport	$129.1	$286.0	$2.22
Transit	$141.8	$432.7	$3.05
Rail, Waterways, & Freight	$86.5	$213.6	$2.47
Total	**$2,976.0**	**$7,248.3**	**$2.44**

[11] Job per year (20 year average) divided by total expenditures driving impacts (i.e. total available funding net of payments and land acquisition). For the 2016-2020 STIP: (2,836 jobs) / ($2,976.0 M) * 1,000 = 953 Jobs per $1 B spent.

[12] Dollars of output per dollar spent is the ratio of total cumulative business output over the 20-year period (from both performance and spending effects) divided by total expenditures driving impacts (i.e. total available funding net of payments and land acquisition)

[13] Total available STIP funds net of payments and property acquisition. Note that the outlays used to calculate performance impacts ($1,726.4 M) are a subset of the total outlays driving spending impacts ($2,976.0 M). Thus the total amount contributing to economic impacts in terms of both performance and spending effects is $2,976.0 M million.

[14] Includes both performance and spending impacts, by program.

APPENDIX

Performance Impact by Program

The following tables summarize performance impacts by year and by program.

Table 5 Performance Impacts of Highway Preservation Program

Highway Preservation				
Year	*Output ($M)*	*GDP ($M)*	*Wage Income ($M)*	*Jobs*
2016	41.541	22.571	16.595	355
2017	41.957	22.797	16.761	359
2018	42.376	23.025	16.928	363
2019	42.800	23.255	17.098	366
2020	43.228	23.488	17.269	370
2021	37.725	20.498	15.070	323
2022	38.102	20.703	15.221	326
2023	38.483	20.910	15.373	329
2024	38.868	21.119	15.527	332
2025	39.256	21.330	15.682	336
2026	39.649	21.543	15.839	339
2027	40.046	21.759	15.997	343
2028	40.446	21.976	16.157	346
2029	40.850	22.196	16.319	349
2030	41.259	22.418	16.482	353
2031	41.672	22.642	16.647	356
2032	42.088	22.869	16.813	360
2033	42.509	23.097	16.982	364
2034	42.934	23.328	17.151	367
2035	43.364	23.562	17.323	371
TOTAL	**$819.153**	**$445.086**	**$327.234**	**-**
Average Annual	**$40.958**	**$22.254**	**$16.362**	**350**

Table 6 Performance Impacts of Bridge Preservation Program

Bridge Preservation				
Year	*Output ($M)*	*GDP ($M)*	*Wage Income ($M)*	*Jobs*
2016	39.317	16.066	11.247	232
2017	39.710	16.227	11.359	235
2018	40.107	16.389	11.473	237
2019	40.508	16.553	11.587	239
2020	40.913	16.719	11.703	242
2021	29.371	12.002	8.402	173
2022	29.664	12.122	8.486	175
2023	29.961	12.243	8.570	177
2024	30.261	12.366	8.656	179
2025	30.563	12.489	8.743	181
2026	30.869	12.614	8.830	182
2027	31.178	12.740	8.918	184
2028	31.489	12.868	9.008	186
2029	31.804	12.997	9.098	188
2030	32.122	13.127	9.189	190
2031	32.444	13.258	9.281	192
2032	32.768	13.390	9.373	194
2033	33.096	13.524	9.467	195
2034	33.427	13.660	9.562	197
2035	33.761	13.796	9.657	199
TOTAL	**$673.333**	**$275.150**	**$192.609**	**-**
Average Annual	**33.667**	**13.758**	**9.630**	**199**

Table 7 Performance Impacts of Transit Investment Program

Transit (Bus Replacements)				
Year	*Output ($M)*	*GDP ($M)*	*Wage Income ($M)*	*Jobs*
2016	1.566	0.954	0.684	14
2017	2.460	1.499	1.075	21
2018	3.131	1.907	1.369	27
2019	3.802	2.316	1.662	33
2020	4.473	2.725	1.955	39
2021	4.473	2.725	1.955	39
2022	4.473	2.725	1.955	39
2023	4.473	2.725	1.955	39
2024	4.473	2.725	1.955	39
2025	4.473	2.725	1.955	39
2026	4.473	2.725	1.955	39
2027	4.473	2.725	1.955	39
2028	4.473	2.725	1.955	39
2029	4.473	2.725	1.955	39
2030	4.473	2.725	1.955	39
2031	4.473	2.725	1.955	39
2032	4.473	2.725	1.955	39
2033	4.473	2.725	1.955	39
2034	4.473	2.725	1.955	39
2035	4.473	2.725	1.955	39
TOTAL	**$82.527**	**$50.276**	**$36.070**	**-**
Average Annual	**4.126**	**2.514**	**1.804**	**36**

Table 8 Performance Impacts of 3 Major Airport Improvement Projects

Airports				
Year	*Output ($M)*	*GDP ($M)*	*Wage Income ($M)*	*Jobs*
2016	0.000	0.000	0.000	0
2017	0.000	0.000	0.000	0
2018	0.000	0.000	0.000	0
2019	0.000	0.000	0.000	0
2020	0.000	0.000	0.000	0
2021	3.842	2.228	1.486	48
2022	3.842	2.228	1.486	48
2023	3.842	2.228	1.486	48
2024	3.842	2.228	1.486	48
2025	3.842	2.228	1.486	48
2026	3.842	2.228	1.486	48
2027	3.842	2.228	1.486	48
2028	3.842	2.228	1.486	48
2029	3.842	2.228	1.486	48
2030	3.842	2.228	1.486	48
2031	3.842	2.228	1.486	48
2032	3.842	2.228	1.486	48
2033	3.842	2.228	1.486	48
2034	3.842	2.228	1.486	48
2035	3.842	2.228	1.486	48
TOTAL	**$57.630**	**$33.420**	**$22.290**	**-**
Average Annual	**$2.882**	**$1.671**	**$1.115**	**36**

Table 9 Performance Impacts of Capital Investments in Rail, Waterways, and Freight

Waterways & Rail				
Year	*Output ($M)*	*GDP ($M)*	*Wage Income ($M)*	*Jobs*
2016	0.006	0.003	0.002	0
2017	0.011	0.006	0.003	0
2018	0.017	0.008	0.005	0
2019	0.022	0.011	0.007	0
2020	0.028	0.014	0.008	0
2021	0.037	0.018	0.011	0
2022	0.037	0.018	0.011	0
2023	0.037	0.018	0.011	0
2024	0.037	0.018	0.011	0
2025	0.037	0.018	0.011	0
2026	0.037	0.018	0.011	0
2027	0.037	0.018	0.011	0
2028	0.037	0.018	0.011	0
2029	0.037	0.018	0.011	0
2030	0.037	0.018	0.011	0
2031	0.037	0.018	0.011	0
2032	0.037	0.018	0.011	0
2033	0.037	0.018	0.011	0
2034	0.037	0.018	0.011	0
2035	0.037	0.018	0.011	0
TOTAL	**$0.639**	**$0.312**	**$0.190**	**-**
Average Annual	**$0.032**	**$0.016**	**$0.010**	**0**

Spending Impacts

Table 10 Spending Impacts from Capital and Operations across All Programs

Spending Impacts				
Year	*Output ($M)*	*GDP ($M)*	*Wage Income ($M)*	*Jobs*
2016	1,556.078	798.199	654.235	12,057
2017	1,047.142	555.912	457.471	8,315
2018	1,008.443	536.079	441.371	8,004
2019	1,003.723	534.265	440.062	7,972
2020	999.717	532.653	438.819	7,948
2021	0.000	0.000	0.000	0
2022	0.000	0.000	0.000	0
2023	0.000	0.000	0.000	0
2024	0.000	0.000	0.000	0
2025	0.000	0.000	0.000	0
2026	0.000	0.000	0.000	0
2027	0.000	0.000	0.000	0
2028	0.000	0.000	0.000	0
2029	0.000	0.000	0.000	0
2030	0.000	0.000	0.000	0
2031	0.000	0.000	0.000	0
2032	0.000	0.000	0.000	0
2033	0.000	0.000	0.000	0
2034	0.000	0.000	0.000	0
2035	0.000	0.000	0.000	0
TOTAL	**$5,615.103**	**$2,957.108**	**$2,431.958**	**-**
Average Annual	**$280.755**	**$147.855**	**$121.598**	**2,215**

Total Impacts

Table 11 Total spending and performance impacts of the 2016-2020 STIP

Total Impacts				
Year	*Output ($M)*	*GDP ($M)*	*Wage Income ($M)*	*Jobs*
2016	1,638.508	837.793	682.763	12,658
2017	1,131.280	596.441	486.669	8,930
2018	1,094.074	577.408	471.146	8,631
2019	1,090.855	576.400	470.416	8,610
2020	1,088.359	575.599	469.754	8,599
2021	75.448	37.471	26.924	583
2022	76.118	37.796	27.159	588
2023	76.796	38.124	27.395	593
2024	77.481	38.456	27.635	598
2025	78.171	38.790	27.877	604
2026	78.870	39.128	28.121	608
2027	79.576	39.470	28.367	614
2028	80.287	39.815	28.617	619
2029	81.006	40.164	28.869	624
2030	81.733	40.516	29.123	630
2031	82.468	40.871	29.380	635
2032	83.208	41.230	29.638	641
2033	83.957	41.592	29.901	646
2034	84.713	41.959	30.165	651
2035	85.477	42.329	30.432	657
TOTAL	**$7,248.385**	**$3,761.352**	**$3,010.351**	**-**
Average Annual	**362.419**	**188.068**	**150.518**	**2,836**