INDUSTRY SCORECARD
PHOENIX CENTER FOR ADVANCED LEGAL & ECONOMIC PUBLIC POLICY STUDIES

The Economic Impact of the Natural Aggregates Industry: A National, State, and County Analysis

(April 2025)

EXECUTIVE SUMMARY

Natural aggregates—including crushed stone and sand and gravel—are a basic raw material used for residential, business, and government construction projects. Aggregates are also used in agriculture and chemical and metallurgical processes. The aggregates industry—literally the foundation of our nation's infrastructure—is a significant contributor to the economic wellbeing of the United States, generating nearly $40 billion in sales annually and employing over 100,000 mostly-skilled workers. Impacts are felt throughout the broader economy. The aggregates industry supports $171 billion in national sales, $55 billion in national earnings (*i.e.*, labor compensation), and nearly 729,000 jobs across a wide range of occupations and industries.

National Impact of the Aggregates Industry

	Aggregate Industry	Impact on Other Industries	Total Impact
Jobs	104,841	623,933	728,744
Earnings	$9.2 billion	$45.5 billion	$54.8 billion
Sales	$39.8 billion	$130.9 billion	$170.7 billion

At the national level, Input-Output analysis estimates that each job in the aggregates industry supports an additional 5.95 jobs throughout the economy. These jobs are widely spread across industries and occupations. Each dollar of earnings (*i.e.*, wages) creates another $4.95 of earnings in other sectors, and each dollar of sales in the industry produces another $3.29 of sales in other industries. The effect of the aggregates industry is both large and diverse. Sizable effects on employment and output are found also at the state and county levels. These estimates are likely understated, perhaps by as much as a factor of two, as Input-Output models ignore the necessary transportation of the materials to the use site.

Production in the aggregates industry is closely linked to the construction and maintenance of residential, commercial, and government buildings, as well as transportation infrastructure including roads, highways, bridges, and railroads. Industry sales rose sharply during the housing bubble of the mid-2000s and remained surprisingly stable during the Covid Pandemic. The Infrastructure Investment and Jobs Act of 2021 included over one-trillion dollars in infrastructure spending, with about a third of that funding for highways, streets and bridges, which should stimulate growth in the aggregates industry. As demonstrated here, the growth of the aggregates industry will positively and materially impact jobs, earnings, and sales in many sectors of the nation's economy.

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I. Introduction

According to the American Society of Civil Engineers ("ASCE"), the nation's roads and bridges are in a state of disrepair and decay.[1] By the ACSE's analysis, there is a backlog of $786 billion for road and bridge capital needs, requiring a 29% increase in federal and state current spending levels to maintain and modernize transportation infrastructure. The nation also has a shortage of residential housing, with some estimates indicating a housing shortfall of 3.2 million units, driving up housing prices in almost all housing markets.[2] While the Infrastructure Investment and Jobs Act set aside $1.2 trillion in infrastructure spending—of which approximately $350 billion is designated for highways, streets and bridges—by most accounts the legislation will fail to close the infrastructure funding gap and has little influence on the housing shortage. Still, the new funding targets a serious problem, and how those expenditures work their way through the economy is an interesting question.

Rising infrastructure expenditures will affect many industries. Activity in the construction aggregates industry (stone and sand), for instance, is closely linked to construction expenditures. According to the U.S. Geological Survey ("USGS"), natural aggregates (crushed stone, sand and gravel) accounts for 94%of the materials used in the construction of interstate highway, with cement (3%), asphalt (2.2%), and steel (0.4%) making up the rest.[3] A heavy use of aggregates is not limited to road construction. By volume, concrete is 60% to 75% natural aggregates, and concrete is essential to nearly every construction project. According to the USGS,

> Natural aggregates, which consist of crushed stone and sand and gravel, are among the most abundant natural resources and a major basic raw material used by construction, agriculture, and industries employing complex chemical and metallurgical processes. Despite the low value of the basic products, natural aggregates are a major contributor to and an indicator of the economic wellbeing of the Nation.[4]

Clearly, an increase in infrastructure spending, and especially spending targeting the nation's transportation infrastructure, will affect operators in the natural aggregates industry.

In this SCORECARD, an update to an earlier version in 2017, we again estimate the economic impacts on jobs and broader economic effects of the aggregates industry.[5] Our analysis is intended to be both descriptive and predictive, quantifying the current impact of the aggregates industry on the broader economy and shedding light on how an expansion of the industry,

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1 *ASCE's 2021 Infrastructure Report Card*, American Society of Civil Engineers (2021) (available at: https://infrastructurereportcard.org/cat-item/roads-infrastructure).

2 S. Sparber, *America's Housing Shortage Explained in One Chart*, Axios (December 16, 2023) (available at: https://www.axios.com/2023/12/16/housing-market-why-homes-expensive-chart-inventory).

3 D. E. Sullivan, *Materials in Use in U.S. Interstate Highways*, U.S. Geological Survey (2006) (available at: https://pubs.usgs.gov/fs/2006/3127/2006-3127.pdf).

4 V.V. Tepordei, *Natural Aggregates – Foundation of America's Future*, U.S. Geological Survey (1997) (available at: https://minerals.usgs.gov/minerals/pubs/commodity/aggregates/fs14497.pdf).

5 INDUSTRY SCORECARD: *The Economic Impact of the Natural Aggregates Industry: A National, State, and County Analysis* (March 2017) (available at: https://www.phoenix-center.org/scorecards/AggregatesIndustry2017ScorecardFinal.pdf).

through new infrastructure spending, might ripple through the economy more broadly. To do so, we employ a sophisticated and proprietary multiregional social accounting matrix developed by Lightcast (formerly Economic Modeling Specialists International).[6] This modeling system estimates the effects of one type of economic activity on the sales, jobs, earnings, and taxes at the county, state, or national level. In computing these "ripple effects," the model accounts for both supply-chain impacts (direct and indirect effects) and increases in household income (induced or spin-off effects).[7]

Our analysis begins with an overview of the aggregates industry, including recent and time series data on the size of the industry. Second, we turn to the quantification of the broad economic impacts of the aggregates industry. We present evidence on economic impacts at the national level, the state level (for all states), and the county level for several counties. Third, we go beyond the basic economic impact analysis to evaluate downstream effects in the transportation industry, an impact not directly quantified by the model. This analysis suggests that ignoring the necessary transportation of materials to the use site substantially understates the total impact of the aggregates industry. Fourth, we review the evidence on the effect of quarries on housing prices, a relationship that lies at the core of the "not in my backyard" campaigns ("NIMBY") against expanding or developing new quarries. Finally, we discuss how the aggregates industry impacts the economy in other ways, including the repurposing of quarries to provide both commercial and recreational benefits to the public, creating sustained economic benefits long after its quarry operations have ceased.

II. Overview of the Aggregates Industry

For our study, the aggregates industry is defined to include the economic sectors "Construction Sand and Gravel" and "Crushed Stone," and the economic impact analysis focuses more narrowly on crushed stone quarrying and sand and gravel mining. According to data published by the USGS, the primary components of the aggregates industry, as shown in Table 1, produced output valued at about $34.6 billion in 2023.[8] The aggregates industry has experienced production growth of about 1.4% per year on average, while total sales have grown by about 7.5%, on average, over the last five years. The average price (in nominal dollars) has risen at a rate of 6.1% annually since 2018, though much of the growth occurred during the last two years, which were characterized by abnormally high inflation rates that raised the cost of production. Labor productivity (production divided by employment) in the industry has been stable, if not increasingly slightly, over time at about 0.022 to 0.023 million metric tons per employee.

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[6] http://www.lightcast.io. Any errors in the use of Lightcast's materials are our responsibility alone.

[7] H. Galloway, *Lightcast's Input-Output Model Multipliers: A Brief Overview and Comparison with Other Major Models*, LIGHTCAST RESOURCE LIBRARY (October 2007) (available at: http://www.economicmodeling.com/wp-content/uploads/2007/10/ed_multiplier_methodology_comparison.pdf).

[8] *Minerals Commodities Summaries,* USGS (Multiple Years): Crushed Stone (available at: https://minerals.usgs.gov/minerals/pubs/commodity/stone_crushed) and Construction Sand and Gravel (available at: https://minerals.usgs.gov/minerals/pubs/commodity/sand_&_gravel_construction).

Table 1. The Aggregates Industry at a Glance

Statistic	2018	2019	2020	2021	2022	2023e
Production (million metric tons)	2,317	2,392	2,381	2,449	2,503	2420
Price (Avg/Ton)	$10.64	$11.31	$11.63	$12.10	$13.10	$14.31
Value ($ millions)	$24,710	$27,080	$27,760	$29,730	$32,700	34,624
Employment (mining, quarrying, office)	107,100	108,600	105,900	106,700	109,500	107,000
Production / Employment	0.022	0.022	0.022	0.023	0.023	0.023
Avg. Hourly Earnings	$26.28	$28.25	$28.50	$28.85	$28.65	$29.32
Avg. Hourly Earnings (Manufacturing)	$27.02	$27.68	$28.68	$29.65	$30.86	$32.43

(e) Estimated.

According to the USGS, employment in 2023 for the aggregates industry was 107,000. Many of these jobs are skilled, local and well paying. Wages in the industry for hourly labor are on par with manufacturing jobs.[9] The industry is also highly competitive, with thousands of private companies and government agencies in operation. Production occurs in all states, although half of the value of the industry is accounted for by Texas, California, Florida, Pennsylvania, North Carolina, Georgia, Tennessee, Ohio, Virginia, and New York.

The cost of transporting aggregates is very high, so the need for operations in every state, and multiple locations in every state, is a necessity. Bhagwat (2014) estimates that transportation costs are (mildly) non-linear in distance but across a wide range of distances average about $0.22 per mile, and today those costs are certainly higher with transportation costs having risen in recent years (about 3.5% annually between 2014 and 2023, or 41.4% in total).[10] The delivered price of a metric ton of sand and gravel doubles at about 23 miles and doubles for crushed rock at about 45 miles, a finding matching that of the earlier study by Robinson and Brown (2002).[11] In light of these high transportation costs, it is little surprise that 90% of aggregates are consumed within 50 miles of the place of extraction and that imports and exports are near non-existent amount to only about 1% of consumption and production.[12] The vast majority of import and exports are with Canada and Mexico. The aggregates industry is largely a local business, as are its economic impacts. Also, the industry's jobs and production activity are well insulated from globalization.

[9] Data available at: www.bls.gov (Series CEU1021231003, CEU3000000003).

[10] S.B. Bhagwat, *Cost of Transportation of Construction Aggregates in Illinois in 2014*, Illinois State Geological Survey, Circular 587 (2014) at pp. 3-4 (available at: https://www.isgs.illinois.edu/sites/isgs/files/files/publications/47th-Forum-Bhagwat_replacement%2012-3-15_one.pdf). Transportation price increases based on the Producer Price Index ("PPI") for truck transportation between June 2014 and June 2023 (https://fred.stlouisfed.org/series/PCU484484).

[11] G.R. Robinson Jr. and W.M. Brown, *Sociocultural Dimensions of Supply and Demand for Natural Aggregate – Examples from the Mid-Atlantic Region*, U.S. Geological Survey Open-File Reports 02-350 (2002) (available at: https://pdfs.semanticscholar.org/1ab0/7216ed1bd79d4dd0310542bd67e57d0cede2.pdf).

[12] *50 Fascinating Facts about Stone, Sand & Gravel*, National Stone, Sand & Gravel Association (Undated) (available at: http://msgravel.com/assets/1312/50facts.pdf); *Natural Aggregate: Building America's Future*, U.S. Geological Survey Circular 110 (1993) (available at: https://pubs.usgs.gov/circ/1993/1110/report.pdf).

A. *Components of the Aggregates Industry*

Table 2 decomposes the broader industry into its two primary components. The value of the crushed stone component in 2023 ($23.4 billion) is twice that of crushed sand and gravel ($11.2 billion), in part due to greater production (1,500 to 920 million metric tons) and in part to a higher price per ton ($15.60 to $12.20 per ton). Employment is nearly twice as large in the crushed stone component, which is proportionate to the differences in production. The two industry components have nearly identical labor intensities per unit of output.

Table 2. Components of the Aggregates Industry

Construction Sand and Gravel	**2018**	**2019**	**2020**	**2021**	**2022**	**2023[e]**
Production (million metric tons)	917	922	921	939	953	920
Price (Avg/Ton)	$9.17	$9.63	$9.96	$10.35	$11.25	$12.20
Value (millions)	$8,410	$8,880	$9,160	$9,830	$10,700	$11,224
Employment	38,600	39,600	37,900	37,800	39,100	37,000
Production / Employment	0.024	0.023	0.024	0.025	0.024	0.025
Crushed Stone						
Production (million metric tons)	1,400	1,470	1,460	1,510	1,550	1,500
Price (Avg/ Ton)	$11.61	$12.36	$12.69	$13.19	$14.23	$15.60
Value (millions)	$16,300	$18,200	$18,600	$19,900	$22,000	$23,400
Employment	68,500	69,000	68,000	68,900	70,400	70,000
Production / Employment	0.020	0.021	0.021	0.022	0.022	0.021

(e) Estimated.

According to the USGS, there are an estimated 3,400 companies and government agencies supplying construction sand and gravel, with about 6,500 operations and 200 sales-distribution yards across the fifty states.[13] The largest producing states, accounting for just over half of all production, including Texas, California, Minnesota, Michigan, Arizona, Colorado, Ohio, Utah, Washington, and Nevada. These ten states account for about 53% of total production. Natural aggregates are largely used as inputs to other products, and the USGS estimates that about 43% of construction sand and gravel was used as concrete aggregates, 25% for road base and coverings and road stabilization, 12% as construction fill, 12% as asphaltic concrete aggregates among other bituminous mixtures, among other products such as other concrete products, filtration, golf course maintenance, plaster and gunite sands, railroad ballast, road stabilization, roofing granules, and snow and ice control.

The 1.5 billion metric tons of crushed stone produced in 2022 by 1,400 companies operating 3,500 quarries and 180 sales-distribution yards across the country.[14] The largest ten producing states are (in order): Texas, Florida, Missouri, Pennsylvania, Ohio, Georgia, North Carolina, Kentucky, Illinois, and Tennessee. These states accounted for 54% of the total production. Most of the domestic crushed stone is limestone (69%) and granite (15%). The bulk of the crushed rock is used as construction material (70%), and largely for road construction and maintenance. Other types of use include cement manufacturing (20%), lime manufacturing (7%), among other

[13] U.S. Geological Survey, Mineral Commodity Summaries, Sand and Gravel (Construction) (January 2022) (available at: h https://pubs.usgs.gov/periodicals/mcs2024/mcs2024-sand-gravel.pdf).

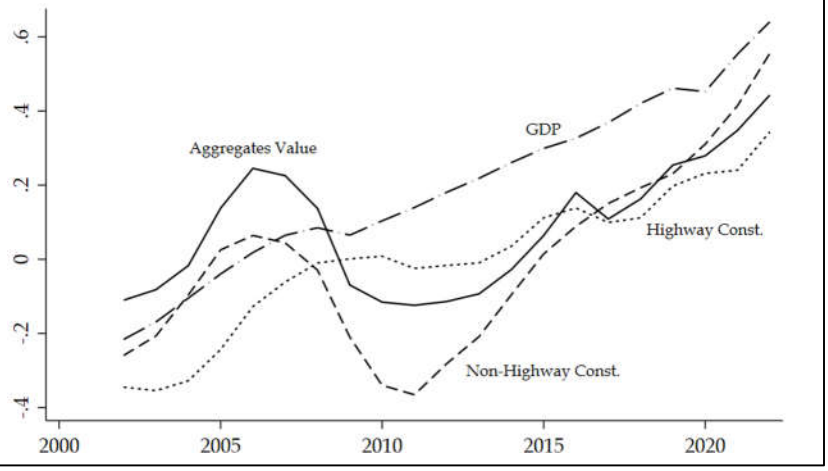
[14] U.S. Geological Survey, Mineral Commodity Summaries, Stone (Crushed) (January 2022) (available at: https://pubs.usgs.gov/periodicals/mcs2024/mcs2024-stone-crushed.pdf).

assorted uses including chemicals, agricultural uses, and miscellaneous other applications and products.

B. *Aggregates Production Over Time*

Figure 1 illustrates a time series of aggregates production over the period 2002 through 2022 along with national construction expenditures, total highway and street construction, and Gross Domestic Product ("GDP").[15] The USGS notes that the industry closely parallels the health of the construction industry, as much of the industry's output is consumed by the industry. As expected, the trend in aggregate sales follows closely that of construction expenditures (as part of such expenditures). A 10% increase in construction expenditures is associated with an 6.7% increase in aggregate sales, while a 10% increase in highway and street construction is associated with a 5.6% increase in aggregate sales.[16] The output of the aggregates industry is largely unrelated to changes in GDP. The value of aggregates production grew substantially during the housing bubble of the mid-2000s and was largely unaffected by the Covid pandemic of 2020-2021, as construction expenditures remained stable.

Figure 1. Time Series of the Aggregates Industry



A strong U.S. construction market is the key determinant for economic activity in the aggregates industry. Analysis of the consumption of aggregates shows that the primary economic sectors in which aggregates are consumed include: residential buildings (33%); highways and streets (31%); commercial buildings (19%); government buildings (5%); other public works (8%); railroads (3%); and private non-construction (1%).[17] The bipartisan Infrastructure Investment and Jobs Act of 2021, which aims to repair one-in-five miles of the nation's roads and bridges and 45,000 bridges

[15] The series are measured in current dollars and scaled for purposes of the illustration.

[16] Growth rates based on a regression model of log first-differences with aggregates total value as the dependent variable. Both types of construction are statistically significant at the 5% level or better. The two growth rates are not statistically different from one another.

[17] J.J. Wilson, *The Aggregates Business in the U.S.A.*, Presentation by the President of the National Stone, Sand & Gravel Association (Undated) (available at: https://ioqnz.co.nz/uploads/JoyWilson-NZ.pdf).

with approximately $350 billion of federal funds, has and will going forward have a sizable effect on the aggregates industry.[18]

III. Economic Impacts

We now turn to the quantification of the economic contributions of the aggregates industry. To do so, we employ Lightcast's proprietary multiregional social accounting matrix ("MR-SAM"). This model estimates the employment and monetary contributions of one sector to the broader economy. Lightcast's MR-SAM characterizes over 1,100 industries, 16 demographic cohorts, and 750 occupations to represent the flow of all economic transactions in an economic area, which may be defined at the county, state, or national levels. The effects vary considerably across the geographic level, so we offer evidence at all three levels of aggregation.

Lightcast's proprietary data and analysis system—called "Analyst"—employs a similar statistical approach as that found in the widely-used input-output models IMPLAN and RIMS II. One distinguishing difference is that Lightcast uses a higher number of available industries, thereby allowing the Lightcast multipliers to better reflect local, sub-regional, and regional economic changes. Lightcast gathers comprehensive economic, labor market, demographic, education, profile, and job posting data from dozens of government and private-sector sources, including data at the national, state, metropolitan area, and county levels.

A. *What are Impact Multipliers?*

Using a rich dataset on industry relationships, the Lightcast Input-Output model can calculate how changes in one industry—say a change in jobs or sales—will then propagate to other industries in a regional economy.[19] The relationship between the two industries is measured by a *multiplier*, which is, in effect, the quantification of a "ripple effect." Interpretation of a multiplier is rather straightforward. For example, a jobs multiplier of 3.0 means that an increase of 100 jobs in the industry of interest would lead to a total increase of 300 jobs (3.0x100 = 300) in the economy more broadly (within the region of interest). Likewise, reductions in jobs will reduce employment in the broader regional economy. As defined in this SCORECARD, this change of 300 includes the original 100 jobs, meaning the additional change in jobs from the activity is the remainder of 200 jobs. Of course, industries with strong ties to other industries (*i.e.*, a strong *supply chain*) generally have higher multipliers than industries with weaker supply chains. Unlike some types of economic activity, quarries and mines operate over many decades, so the industry's multiplier effects are recurring and not short-lived (*e.g.*, construction projects). The economic effects reported here are sustained and not a short-term response to investment projects.

Multipliers quantify four types of effects: (1) initial; (2) direct; (3) indirect; and (4) induced. The initial and direct multipliers are linked to the industry in which the primary change is occurring.

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[18] *A Guidebook to the Bipartisan Infrastructure Law*, The White House (January 2024) (available at: https://www.whitehouse.gov/build/guidebook/#:~:text=The%20Bipartisan%20Infrastructure%20Law%20makes,%2C%20energy%2C%20and%20the%20environment).

[19] *What is a Multiplier?* Lightcast Data FAQ (available at: https://kb.lightcast.io/en/articles/6957478-what-is-a-multiplier). For technical details, see, *e.g.*, R.W. Jackson, *Input-Output Analysis: A Primer (2nd Edition)*, WVI Research Repository (2020) (available at: https://its.uci.edu/~mmcnally/books/Input-OutputAnalysis-APrimer%282ndEd%29.pdf).

The *initial* multiplier is always 1.00. The *direct* multiplier represents the most immediate "ripple effect" resulting from the initial change. Like the initial multiplier, these changes are linked to the industry in which the primary change is occurring. For instance, adding five salespeople to Industry A should result in more jobs being added to that industry such as managerial, support, or production personnel. The *indirect* multiplier represents the change that will occur in the industries that supply the industry in which the primary change is occurring. Finally, the *induced* multiplier is the result of initial, direct, and indirect activity. That is, the new workers from these direct and indirect effects spend their incomes in the region of interest to buy groceries, healthcare, and so forth, and this increase in expenditures affects the sales, employment, and earnings of these industries. The *indirect* and *induced* effects are hypothetical in nature based on the generally accepted supply chain and increased spending effects. (Table 9 below illustrates how these multiplier effects are distributed across industries.)

There are many types of multipliers, but here we will focus on multipliers for jobs, earnings, and sales. Jobs multipliers indicate how important an industry is in regional job creation. Often, the types of jobs created outside the industry of interest are spread over many industries, especially those resulting from the induced effects. An earnings multiplier is based on the total amount of employee compensation paid by employers in the industry. If the earnings multiplier is 1.5, then for every $1 of compensation in the industry there is $1.50 of compensation throughout the economy. A large jobs multiplier and a small earnings multiplier implies that many low-wage jobs are created (and vice versa). Thus, the relative sizes of the two multipliers say something about the quality of the jobs created. Sales multipliers quantify how total sales in one industry relate to total sales in other industries.

Economic impacts may be quantified at the national, state, and county levels, and in some cases, city and zip-code levels. The size of the multipliers will vary by the level of geographic aggregation. Multipliers are larger the broader is the geography of interest. Multipliers calculated at the county level are the smallest because the direct, indirect, and induced effects may be realized outside the narrow geographic boundaries of the county; these outside-the-area impacts are known as "leakage." Induced effects are consumption-based, and consumption—say a vacation—may occur nearly anywhere. Importantly, the smaller relative sizes of the county multipliers do not imply the effects of the industry are small, only that the economic impacts may be felt in other counties, states, or even nations. We provide evidence on the multipliers at all three levels of aggregation. At the county level, we compute the economic impacts of the aggregates industry (or parts thereof) for Monroe County, Michigan; Cook County, Illinois; Windsor County, Vermont; and Talbot County, Georgia.

B. *Details of the Aggregates Industry*

Given the nature of the data, our analysis is limited to an analysis of the quarry operations of the aggregates industry. Specifically, the component sectors included in the analysis are listed in Table 3.

Table 3. Industry Sectors Included in the Analysis

Industry Sector Description	NAICS Code
Crushed and Broken Limestone Mining and Quarrying	212312
Crushed and Broken Granite Mining and Quarrying	212313
Other Crushed and Broken Stone Mining and Quarrying	212319
Construction Sand and Gravel Mining	212321
Industrial Sand Mining	212322

As shown in Table 1, total employment in aggregates industry has been stable as industry production has grown about 1.4% annually. Average earnings per job in the aggregates industry were $87,416 in 2023, nearly 20% above the national average earnings of $73,700, reflecting in part the high-skilled nature of the jobs. Table 4 lists the top ten occupations (by Standard Occupational Classification, "SOC") in terms of employment for the quarry industry.[20]

Table 4. Top Ten Occupations in Industry Group

SOC	Description	Employment (2016)	% of Jobs	Median Hourly Earnings	Entry Education Level*
47-5022	Excavating and Loading Machine and Dragline Operators, Surface Mining	12,339	11.8%	$24.24	HS/GED
53-3032	Heavy and Tractor-Trailer Truck Drivers	11,191	10.7%	$25.55	PS
47-2073	Operating Engineers and Other Construction Equipment Operators	9,192	8.8%	$26.76	HS/GED
11-9199	Managers, All Other	8,594	8.2%	$29.24	BD
47-1011	First-Line Supervisors of Construction Trades and Extraction Workers	5,924	5.7%	$34.87	HS/GED
47-5041	Continuous Mining Machine Operators	3,662	3.5%	$29.17	None
47-5051	Rock Splitters, Quarry	3,262	3.1%	$21.92	None
49-3042	Mobile Heavy Equipment Mechanics, Except Engines	2,829	2.7%	$28.96	HS/GED
11-1021	General and Operations Managers	2,681	2.6%	$47.57	BD
51-9021	Crushing, Grinding, and Polishing Machine Setters, Operators, and Tenders	2,354	2.2%	$21.36	HS/GED

* HS/GED (High School or Equivalent); PS: Post-secondary education; BD: Bachelor's Degree.

The overall size of the aggregates industry for the purposes of the Input-Output analysis is summarized in Table 5 (based on Lightcast's data). Total annual sales (gross receipts) include sales to both consumers and other industries of production was $39.8 billion in 2023. Of gross sales, earnings—including wages, salaries, supplements (additional employee benefits), and proprietor income—was $9.6 billion. About $2.1 billion in taxes was paid by the aggregates

[20] https://www.bls.gov/soc.

industry in 20223. Gross Regional Product ("GRP")—a type of "value added"—measures the final market value of all goods and services produced in a region. This figure is the sum of earnings, property income, and taxes on production. Total GRP from the quarry industry in 2023 was $23.9 billion.

Table 5. The Aggregates Industry

Gross Sales (Total)	$39.8 billion
Gross Sales (In-region)	$37.9 billion
Earnings (wages, salaries, proprietor income)	$9.6 billion
Taxes	$2.1 billion
Gross Regional Product (value added)	$23.9 billion
Employees	104,841

C. *National Impact of the Aggregates Industry*

We now turn to estimates of how the aggregates industry contributes to the economy more broadly. In Table 6, the jobs, earnings, and sales multipliers are provided, and each is broken into its component parts. These multipliers capture the broadest economic impacts by including government impacts (the Lightcast multipliers). As shown in the table, the quarry industry does not have high direct and indirect multipliers. Due in part to the higher-than-average earnings per worker (and thus more disposable income), the induced multipliers are large.

Table 6. National Multipliers for the Aggregates Industry

Type	Jobs	Earnings	Sales
Total	**6.95**	**5.98**	**4.29**
Initial	1.00	1.00	1.00
Direct	0.44	0.52	0.37
Indirect	0.42	0.38	0.27
Induced	5.09	4.08	2.65

Using the multipliers from Table 6, we can extrapolate the effect of the aggregates industry on the national economy. Table 7 summarizes the aggregates industry's impact on the national economy, which minimizes the effect of leakages. We apply the multiplier to the employment base of the aggregates industry estimated by Lightcast to be 104,841.

Table 7. National Impact of the Aggregates Industry

	Aggregate Industry	Lightcast Multiplier	Impact on Other Industries	Total Impact
Jobs	104,841	6.95	623,933	728,774
Earnings	$9.2 billion	5.98	$45.6 billion	$54.8 billion
Sales	$39.8 billion	4.29	$130.9 billion	$170.7 billion

The aggregates industry exerts a sizable influence on the U.S. economy. In addition to the direct employment in the quarry industry, the economic activity of the industry is associated with an additional 623,933 jobs for a total employment effect of 728,774 jobs. The industry's $9.2 billion

in earnings (payments to labor and proprietors) ripples through the economy to create an additional $45.6 billion in earnings, for a total of $45.6 billion in earnings. Including multiplier effects, the aggregate industry's $39.8 billion in sales drives an additional $130.9 billion in sales for a total of $170.7 billion in sales.

Table 8. National Impact of the Aggregates Industry (Conservative)

	Aggregate Industry	Type II Multipliers	Impact on Other Industries	Total Impact
Jobs	104,841	4.35	351,640	456,481
Earnings	$9.2 billion	3.74	$25.2 billion	$34.4 billion
Sales	$27.2 billion	2.86	$50.6 billion	$77.8 billion

We present in Table 8 more conservative estimates of the multipliers (the Type II multipliers). In constructing these estimates, both indirect and induced effects are retained, but government impacts are excluded, recognizing that such effects may be policy based rather than economically driven. The differences in the multipliers are limited to the *induced* component of the multiplier. The multipliers remain large. The aggregates industry supports 456,481 jobs, $34.4 billion in earnings, and $77.8 billion in sales for the American economy. Even these conservative estimates are quite large.

Table 9. Distribution of Jobs by Standard Occupation Classification ("SOC")

SOC	Description	Jobs
41-0000	Sales and Related Occupations	80,185
43-0000	Office and Administrative Support Occupations	76,755
47-0000	Construction and Extraction Occupations	71,456
53-0000	Transportation and Material Moving Occupations	71,266
11-0000	Management Occupations	69,903
13-0000	Business and Financial Operations Occupations	52,733
35-0000	Food Preparation and Serving Related Occupations	41,350
51-0000	Production Occupations	39,233
49-0000	Installation, Maintenance, and Repair Occupations	31,151
29-0000	Healthcare Practitioners and Technical Occupations	28,363
31-0000	Healthcare Support Occupations	25,031
37-0000	Building and Grounds Cleaning and Maintenance Occupations	22,711
39-0000	Personal Care and Service Occupations	21,253
25-0000	Educational Instruction and Library Occupations	20,435
27-0000	Arts, Design, Entertainment, Sports, and Media Occupations	19,697
15-0000	Computer and Mathematical Occupations	16,510
33-0000	Protective Service Occupations	8,394
21-0000	Community and Social Service Occupations	8,270
17-0000	Architecture and Engineering Occupations	8,048
19-0000	Life, Physical, and Social Science Occupations	4,844
23-0000	Legal Occupations	4,711
45-0000	Farming, Fishing, and Forestry Occupations	3,559
99-0000	Unclassified Occupation	2,914
	Total Jobs	728,772

Table 9 shows how the jobs created by the aggregates industry are distributed across job classifications. As expected, many of the jobs are in "Construction and Extraction" and "Transportation and Material Moving" occupations, but the impacted occupations are numerous and diverse. This diversity is, in part, driven by the indirect and induced components of the multiplier.

D. *State-Level Impact of the Aggregates Industry*

We now turn to the state-level economic impacts. State multipliers will vary across states and generally be smaller than those calculated at the national level. We also use the more conservative estimates of the Type II multiplier in addressing state-level effects, excluding government effects and thereby reducing the induced multiplier.[21]

[21] *What are the Different Types of Input-Output Multipliers?* Lightcast (available at: https://kb.lightcast.io/en/articles/6957519-what-are-the-different-types-of-input-output-multipliers).

Table 10. State-Level Economic Impacts – Sales ($ millions)

State	Multiplier	Industry Sales	Total Impact	State	Multiplier	Industry Sales	Total Impact
Alabama	1.42	788	1,117	Montana	1.42	355	503
Alaska	1.40	97	136	Nebraska	1.40	458	641
Arizona	1.66	353	584	Nevada	1.53	387	590
Arkansas	1.40	581	814	New Hampshire	1.47	242	355
California	1.82	1,930	3,509	New Jersey	1.51	570	860
Colorado	1.71	688	1,174	New Mexico	1.34	174	234
Connecticut	1.49	293	436	New York	1.54	1,947	3,003
D.C.	1.21	9	11	North Carolina	1.54	1,025	1,577
Delaware	1.36	50	68	North Dakota	1.38	349	484
Florida	1.78	1,009	1,800	Ohio	1.57	1,622	2,539
Georgia	1.61	1,548	2,485	Oklahoma	1.46	925	1,349
Hawaii	1.55	172	268	Oregon	1.55	819	1,268
Idaho	1.45	336	485	Pennsylvania	1.54	2,106	3,242
Illinois	1.63	1,548	2,522	Rhode Island	1.47	73	107
Indiana	1.42	1,012	1,436	South Carolina	1.42	598	847
Iowa	1.36	1,051	1,429	South Dakota	1.38	244	337
Kansas	1.45	430	622	Tennessee	1.48	1,223	1,807
Kentucky	1.34	943	1,264	Texas	1.87	4,356	8,141
Louisiana	1.50	329	492	Utah	1.66	689	1,141
Maine	1.47	112	165	Vermont	1.35	147	199
Maryland	1.42	493	699	Virginia	1.42	998	1,422
Massachusetts	1.60	468	751	Washington	1.60	1,002	1,604
Michigan	1.57	1,128	1,767	West Virginia	1.24	262	324
Minnesota	1.69	695	1,175	Wisconsin	1.50	1,275	1,918
Mississippi	1.37	146	200	Wyoming	1.33	204	270
Missouri	1.48	1,504	2,233				

Table 10 summarizes the state-level impacts on sales.[22] Across all states, the average sales multiplier is 1.58 (weighted by sales), which is, as expected, smaller than the national sales multiplier is 2.86 (from Table 8 for the Type II multiplier). There are sizeable ripple effects. In California, for instance, the $1.93 billion in aggregates sales has a $3.51 billion effect on the state's economy. Texas' $4.36 billion in sales ripples through the state's economy to produce a $8.14 billion total economic effect.

[22] The multipliers reported are a weighted average of crushed stone and sand-gravel components based on the relative sales.

Table 11. State-Level Economic Impacts – Jobs

State	Multiplier	Industry Jobs	Total Impact	State	Multiplier	Industry Jobs	Total Impact
Alabama	1.90	2,362	4,494	Montana	1.80	1,259	2,265
Alaska	1.37	561	768	Nebraska	1.96	1,115	2,190
Arizona	1.89	1,500	2,838	Nevada	2.03	1,100	2,233
Arkansas	1.89	1,767	3,336	New Hampshire	1.76	778	1,372
California	2.65	4,220	11,178	New Jersey	2.30	1,049	2,417
Colorado	2.08	2,345	4,876	New Mexico	1.52	715	1,089
Connecticut	1.92	711	1,368	New York	1.88	4,836	9,079
D.C.	1.15	52	59	North Carolina	2.19	2,731	5,990
Delaware	1.85	109	201	North Dakota	1.67	1,146	1,915
Florida	2.52	3,021	7,625	Ohio	2.41	3,598	8,655
Georgia	2.78	2,983	8,307	Oklahoma	2.08	2,651	5,522
Hawaii	2.61	327	852	Oregon	2.00	2,440	4,885
Idaho	1.85	1,164	2,160	Pennsylvania	2.08	5,514	11,445
Illinois	2.47	3,246	8,012	Rhode Island	1.83	228	416
Indiana	1.97	2,601	5,114	South Carolina	2.10	1,461	3,068
Iowa	2.02	2,131	4,312	South Dakota	1.74	747	1,302
Kansas	1.80	1,445	2,600	Tennessee	2.22	2,694	5,980
Kentucky	1.88	2,352	4,427	Texas	2.64	12,358	32,681
Louisiana	1.83	1,313	2,406	Utah	2.35	1,927	4,533
Maine	1.72	446	768	Vermont	1.71	451	773
Maryland	2.01	1,060	2,136	Virginia	2.01	2,312	4,644
Massachusetts	2.21	1,065	2,351	Washington	2.07	2,505	5,189
Michigan	2.16	3,172	6,867	West Virginia	1.60	716	1,143
Minnesota	2.15	2,165	4,646	Wisconsin	2.11	3,428	7,247
Mississippi	1.60	678	1,083	Wyoming	1.58	710	1,123
Missouri	2.22	3,578	7,957				

Table 11 summarizes the state-level impacts on jobs. Again, the multipliers reported are a weighted average of crushed stone and sand-gravel components based on the relative sales. Across all states, the average jobs multiplier is 2.00 (2.21 weighted by jobs), which is lower than the national jobs multiplier (Type II) is 4.35. There is much variation in the levels of the jobs multipliers. The jobs multiplier is 2.78 in Georgia (the largest) but only 1.15 in the District of Columbia (the smallest). In Connecticut, the state's 711 quarry jobs translate into 1,8687 statewide jobs. Texas, the state with the largest quarry work force, has 32,681 statewide jobs resulting from its 12,358 quarry jobs.

Table 12. State-Level Economic Impacts – Earnings ($ millions)

State	Multiplier	Industry Earnings	Total Impact	State	Multiplier	Industry Earnings	Total Impact
Alabama	1.67	182	303	Montana	1.56	101	158
Alaska	1.53	25	39	Nebraska	1.74	89	156
Arizona	2.06	83	170	Nevada	1.84	92	170
Arkansas	1.65	137	226	New Hampshire	1.74	62	108
California	2.26	435	984	New Jersey	1.88	129	242
Colorado	2.04	176	360	New Mexico	1.50	41	61
Connecticut	1.81	67	122	New York	1.99	379	754
D.C.	1.35	2.3	3.1	North Carolina	1.94	226	439
Delaware	1.60	10	16	North Dakota	1.51	93	141
Florida	2.32	228	531	Ohio	1.96	344	674
Georgia	2.10	315	663	Oklahoma	1.65	243	402
Hawaii	1.87	42	79	Oregon	1.90	192	365
Idaho	1.70	82	140	Pennsylvania	1.97	448	883
Illinois	2.02	343	694	Rhode Island	1.80	17	31
Indiana	1.68	226	379	South Carolina	1.69	135	228
Iowa	1.65	204	337	South Dakota	1.58	55	87
Kansas	1.70	102	173	Tennessee	1.84	257	472
Kentucky	1.56	222	345	Texas	2.19	1154	2524
Louisiana	1.68	89	149	Utah	1.98	166	328
Maine	1.80	26	47	Vermont	1.58	35	55
Maryland	1.73	105	182	Virginia	1.79	210	377
Massachusetts	2.02	108	219	Washington	1.94	231	449
Michigan	1.87	275	513	West Virginia	1.39	62	86
Minnesota	2.02	179	362	Wisconsin	1.81	308	558
Mississippi	1.51	39	59	Wyoming	1.44	55	78
Missouri	1.84	341	627				

Table 12 summarizes the state-level impacts on labor earnings. Across all states, the average earnings multiplier is 1.78 (1.94 weighted by earnings); each dollar earned by employees in the aggregates industry adds $0.78 in earnings for jobs in other sectors. With an average jobs multiplier of 2.00, the average earnings of the total jobs supported by the industry are about 90% of earnings in the aggregate industry, a difference largely attributable to the high induced share of supported jobs (which typically have lower earnings). On average, earnings account for about 23% of total sales.

E. *County-Level Effects of the Aggregates Industry*

The aggregates industry operates in every state. Given the high cost of transportation, quarries must be geographically disperse, and thus operate in many of the nation's counties near the location of use. In fact, 90% of aggregates are consumed within 50 miles of the place of extraction.[23] Since much of the economic impact is based on induced effects, the economic impact at the county level will be much smaller than either the state or national multipliers. While other areas are certain to benefit from the economic activity of the aggregates industry in any one county, the county level economic impacts do not include these extra-regional effects.

[23] *50 Fascinating Facts, supra* n. 12; *see also Natural Aggregate: Building America's Future*, U.S. Geological Survey Circular 110 (1993) (available at: https://pubs.usgs.gov/circ/1993/1110/report.pdf).

To determine the county level economic impacts, and to see how they may vary across counties, we estimated the multipliers for four counties: (1) Monroe County, Michigan; (2) Cook County, Illinois; (3) Windsor County, Vermont; and (4) Talbot County, Georgia. To quantify the economic effects of a quarry operation, we compare two states of the county economy: one with active quarry operations to a hypothetical alternative of one without active operations. Table 13 summarizes the key results.

Table 13. County-Level Economic Impacts

	Monroe County, Michigan	Cook County, Illinois	Windsor County, Vermont	Talbot County, Georgia
Aggregates Total Sales	**$77,594,702**	**$245,110,778**	**$17,338,768**	**$66,749,469**
Changes in Earnings	**21,631,703**	**102,679,823**	**5,540,464**	**17,373,042**
Initial	16,640,428	51,528,055	4,130,049	15,495,551
Direct	3,511,267	18,572,666	696,119	1,426,225
Indirect	533,042	7,678,980	159,692	141,681
Induced	946,996	24,900,127	554,604	309,585
Changes in Jobs	**152**	**1,063**	**72**	**186**
Initial	79	455	49	133
Direct	41	161	10	35
Indirect	10	88	3	5
Induced	22	358	11	13
Total Taxes	**5,097,975**	**25,463,585**	**1,770,198**	**4,289,613**
Local Taxes	2,170,155	10,771,823	777,850	1,851,148
State Taxes	2,017,178	10,040,675	712,917	1,710,220
Federal Taxes	910,642	4,651,087	279,431	728,245

In Monroe County, Michigan, the aggregates industry produces $77.6 million in products supporting $21.6 million in total earnings. About $16.6 million of these earnings come directly from the aggregates industry, so the earnings multiplier is 1.3. The aggregates industry supports 152 jobs, with 79 being aggregate industry jobs, for a jobs multiplier of 1.93. Local, state, and federal governments *each* benefit from approximately $5.1 million in tax revenue, with $2.2 million in local taxes. The aggregates sector in Cook County, Illinois, is much larger, with $245 million in sales, supporting $102.7 million in earnings, 1,063 total jobs, and $25.5 million in total taxes. The earnings multiplier is 1.99 and the jobs multiplier is 2.34. Aggregates production in Windsor County, Vermont, is the smallest of the group, with $17.3 million in annual sales. These sales support 72 total jobs, of which 49 are in aggregates production, for a jobs multiplier of 1.47, and $5.5 million in earnings, with an earnings multiplier of 1.34. Finally, about $66.7 million of aggregates are produced annually in the county, support 186 total jobs (jobs multiplier 1.40), $17.4 million in earnings (earnings multiplier 1.12), and $4.3 million in total taxes.

These county examples illustrate that the economic impacts (*i.e.*, multipliers) vary by location. The variation in impacts and multipliers depend on several factors, including the purchase of inputs and labor income expenditure outside the target county. An accurate assessment of local economic impacts requires a quantification for the specific economic area of interest.

IV. Downstream Effects on the Transportation Industry

Input-Output models are supply-side models. That is, the relationships between an industry's activity and its supply chain are quantified, and these average relationships are then used to estimate the effect on the supply-chain industries when the target industry changes in some way (*e.g.*, an increase in sales). For example, quarries consume electricity, so an increase in a quarry's activity increases the output and employment of the electricity industry. If a quarry spends one-million dollars on electricity, and the electricity industry employs six people per million in output, then the quarry supports six jobs in the electricity industry, which the Input-Output model includes in employment effects.

Downstream effects are largely ignored in these models, and for good reasons. Such effects are often speculative and risk over-stating economic impacts. In some cases, however, downstream effects are apparent. In the aggregates industry, for example, the extracted materials must be transported (usually by trucks) to the location of use, so quarry production and transportation are near perfect complements. On average, the cost of truck transportation of quarried stone amounts to nearly half (45%) of the price of the product.[24]

Say, for example, that a stone quarry in Texas increases its output by $1 million dollars, which in turn increases local truck transportation output by $0.82 million. Increased output by the stone quarry supports 7 total jobs and $0.53 million in earnings. The corresponding increase in sales for truck transportation sales supports an additional 10 jobs and $0.63 million in earnings. Ignoring the necessary transportation of materials, therefore, substantially understates the economic impacts of the aggregates industry, understating economic impacts by more than half.

Estimating the economic impacts of a single quarry, or even of all quarries at the state level, might include the impacts from the transportation industry. Doing so requires location-specific estimates of the share of transportation costs and transportation modalities (*e.g.*, truck or rail) for delivered products, which may vary depending on the location. As transportation of materials is a requirement, it seems reasonable to include such economic impacts. Absent detailed local estimates, however, these effects are excluded from the analysis above.

V. Other Economic Impacts of the Aggregates Industry

As demonstrated above, the aggregates industry provides significant benefits—*e.g.*, sales, earnings, and jobs—to local and state economies and the nation. However, even after all the usable material has been extracted, the economic benefits from quarries can continue for years to come via innovative reclamation plans. While many fear that an abandoned quarry will be an eyesore, this fear is misplaced. Quarry operators are often required by law to reclaim quarries for the protection of the environment and for subsequent beneficial use of the quarry and reclaimed land.[25] Among other requirements, these protections often include the mandatory

[24] An interview with a stone quarry operator indicated that transportation costs average 45% of a delivered truck load of stone. Thus, a $1 increase in quarry sales increases truck transportation revenue by $0.82, for a total delivered cost of $1.82. This estimate is confirmed by econometric analysis using state-level data for years 2001 through 2022 obtained from IMPLAN. A first difference regression of trucking sales on aggregates sales, with fixed effects for state and year, provides a coefficient of 0.84 on the regressor.

[25] *See, e.g.,* West Virginia Quarry Reclamation Act, 22 West Virginia Code Chapter 4, § 22-4-17 *et seq.*

requirement that quarry operators both file a reclamation plan and post a performance bond as a prerequisite condition for obtaining a quarry permit in the first instance.[26]

The techniques used to maximize reclamation have evolved and innovated over time. These modern techniques include, but are certainly not limited to: (1) rollover slopes; (2) backfilling; (3) bench planting restoration; (4) blasting; and (5) natural recovery.[27] As highlighted below, the reclamation results are often stunning.[28]

A. *Brownstone Park (Connecticut)*

Starting in the early 1990s, this quarry was converted into an adventure park featuring a variety of outdoor activities, including cliff-jumping, rock climbing, swimming, kayaking, scuba diving, climbing and rappelling, wake boarding, rope-swings, 750-foot zip-lining, a 100-foot water slide and inflatable water toys. Brownstone Park has successfully yielded high revenue for the city due to the increasing number of visitors that attend the park every year as well as a large number of employment opportunities. Monitoring of the area by park lifeguards and police officers has eliminated safety hazards posed by the quarry lake prior to redevelopment. Not only does the adventure park re-use the land, but it stimulates outdoor activities that bring people out of their homes and into nature.[29]

B. *Citiva (California)*

Located in the center of San Diego, California, this quarry had served as the major stone and concrete source for construction projects in the region for the last 70 years, including the downtown baseball stadium of the San Diego Padres and airport runways. After nine years of planning, a plan to develop the old quarry was approved by the San Diego City Council by a vote of 7-1. In 2010, the developers broke ground on Civita and the first homes were occupied in 2011. In 2013, following hundreds of public meetings and 10 years of planning, the San Diego Parks and Recreation Board approved the design of Civita's central park, Civita Park. The 230-acre Civita project is one of the largest examples of "urban infill," which is the development of vacant or under-used city sites, in the U.S. In all, the Civita development plans call for 60 to 70 acres of parks and open space, 4,780 residences (including approximately 478 affordable units), an approximately 480,000-square-foot retail center, and 420,000 square feet for an office/business campus. The $2 billion Civita project will ultimately create a high-density urban village

[26] *See, e.g., id.*, § 22-4-17; § 22-4-20.

[27] *See, e.g.*, I.A. Legwalla, E. Lange and J. Cripps, *Quarry Reclamation in England: A Review of Techniques,* 4 JOURNAL AMERICAN SOCIETY OF MINING AND RECLAMATION 55 (2015).

[28] *See, e.g.*, B. Pack, *Old Quarries Turned into Gold Mines,* SAN ANTONIO EXPRESS NEWS (August 11, 2015) (available at: http://www.expressnews.com/150years/economy-business/article/Old-S-A-quarries-are-successfully-redeveloped-as-6438913.php).

[29] C. McCandless, *No Longer Just a Hole in the Ground: The Adaptive Re-Use of Resource Depleted Quarries*, MIT (2013) (available at: http://www.mit.edu/people/spirn/Public/Ulises-11-308/Quarrying.pdf).

organized around a network of parks and open space, with housing, retail, office, and civic components linked by pedestrian trails, walkable streets, and bike paths.[30]

C. *Fantasy Lake Scuba Park (Wake Forest, NC)*

About thirty years ago, reclamation efforts began at Fantasy Lake to convert a 100-year-old quarry into a unique scuba diving recreational and training park. Recently referred to by the Raleigh NEWS & OBSERVER as "a scuba diving mecca," the lake is ideal for building scuba diving experience and advancing certification. The lake is recognized by dive groups, rescue groups, law enforcement and the military as an excellent facility for advanced training. The great expanse, visibility, and depths of the lake set it apart from smaller facilities.[31]

D. *The Quarry Golf Course (Giants Ridge Resort, Minnesota)*

Sculpted out of a former sand quarry, the Quarry at Giants Ridge is an excellent example of a re-purposed industrial site and it is a fitting tribute to northeastern Minnesota's rich mining history. Today, the Quarry is the number one public golf course in Minnesota, according to GOLF DIGEST. Since its opening, it has also been ranked in the top 20 public courses in the United States every year it has been eligible.[32]

E. *Six Flags (San Antonio, Texas)*

This amusement park occupies ground that once provided material to build the surrounding community. The former limestone quarry first produced aggregates in 1934 in a much less developed location compared to the San Antonio of the 21st century.[33] According to THEME PARK REVIEW, Six Flags Fiesta Texas is the most picturesque park in the Six Flags chain because the former rock quarry "creates a backdrop for the park and allows for some unique interaction between rides."[34]

F. *Chambers Bay Golf Course (Puget Sound, Washington)*

Chambers Bay is a public golf course in the northwest United States, located in University Place, Washington on Puget Sound southwest of Tacoma.[35] Formerly a sand-and-gravel quarry, within

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[30] R. Showley, *Construction Starts on Mission Valley's Largest Development*, SAN DIEGO UNION-TRIBUNE (December 1, 2013) (available at: http://www.sandiegouniontribune.com/business/growth-development/sdut-civita-begins-mission-valley-2010dec01-story.html).

[31] Fantasy Lake Scuba Park webpage (available at: http://www.fantasyscubapark.com/about_us.htm).

[32] Wild North Golf (available at: http://www.wildnorthgolf.com/northern-minnesota-golf-courses/the-quarry-at-giants-ridge).

[33] Sunrock Group (http://www.thesunrockgroup.com/sustainable-development/environmental-stewardship).

[34] THEME PARK REVIEW (available at: http://www.themeparkreview.com/parks/park.php?pageid=47).

[35] http://www.chambersbaygolf.com.

ten years of starting reclamation the site went from an abandoned quarry to a world-class golf course which hosted 2015 U.S. Open Golf Championship in 2015.[36]

G. *The Henry C. Palmisano Nature Park (Chicago, Illinois)*

The Henry C. Palmisano Nature Park is located on the former site of the shuttered Stearns Quarry. Once used as a landfill, this 27-acre park is a vibrant public space. Opened in 2009, the park showcases innovative landscape design that honors the site's industrial past while creating a diverse natural habitat. Visitors can explore a variety of ecosystems, including wetlands, prairies, and a fishing pond, all of which support local wildlife and plant species. The park's most striking feature is its stepped stone terrace, which offers panoramic views of the Chicago skyline and pays homage to the quarry's history. Walking paths wind through the park, providing opportunities for exercise and nature observation. Educational signage throughout the park informs visitors about the area's geological and cultural history, as well as its current ecological significance.

H. *Centennial Beach (Naperville, Illinois)*

Centennial Beach, located in downtown Naperville, Illinois, is a beloved community attraction that blends the concept of a swimming pool with a natural beach setting. Originally a quarry, this man-made swimming area was transformed into a public beach in 1931 to commemorate Naperville's 100th anniversary, hence its name. The beach spans 6 acres and features a large, sandy area for sunbathing and play, surrounded by grassy spaces perfect for picnicking. What makes Centennial Beach truly special is its gradual depth change, ranging from zero-depth entry to 15 feet deep, accommodating swimmers of all ages and skill levels. The facility includes diving boards, water slides, and designated lap swimming areas. Beyond swimming, visitors can enjoy amenities such as a splash pad for younger children, concession stands, and beach volleyball courts. With its crystal-clear water, lifeguard supervision, and family-friendly atmosphere, Centennial Beach has become a cherished summer destination for Naperville residents and visitors alike, offering a unique alternative to traditional public pools or natural lakes.

I. *Independence Grove (Libertyville, Illinois)*

Independence Grove is a stunning 1,151-acre forest preserve located in Libertyville, Illinois, just north of Chicago. This expansive park is centered around a 115-acre man-made lake, which was created from a former gravel quarry. The preserve offers a wide array of recreational opportunities for visitors of all ages and interests. Visitors can enjoy swimming at the sand beach, fishing in the well-stocked lake, or renting kayaks, canoes, and paddleboards to explore the water. The park features over seven miles of trails for hiking, biking, and cross-country skiing in winter, winding through diverse habitats including prairies, woodlands, and wetlands. A unique feature is the Native Plant Garden, showcasing local flora and providing educational opportunities. The preserve also includes a visitors' center with exhibits on local ecology, a café, and a 19,000-square-foot plaza that hosts summer concerts and events. With its blend of natural beauty and modern

[36] D. Sheinin, *In 10 Years, Chambers Bay Went from Abandoned Quarry to U.S. Open Host,* WASHINGTON POST (June 17, 2015) (available at: https://www.washingtonpost.com/sports/golf/in-10-years-chambers-bay-went-from-abandoned-quarry-to-us-open-host/2015/06/17/d9d16106-14f6-11e5-9518-f9e0a8959f32_story.html?utm_term=.d0df062b3473).

amenities, Independence Grove is a popular destination for both active recreation and peaceful nature appreciation, attracting visitors from throughout the Chicago metropolitan area.

VI. Conclusion

In this SCORECARD, we update our 2017 estimates of the economic impacts of the aggregates industry with current data. The aggregates industry continues to be a significant contributor to the economic wellbeing of the United States. The industry's near $40 billion in sales and 105,000 mostly skilled workers with $9.2 billion in earnings supports in total $171 billion in national sales, $55 billion in national earnings (*i.e.*, labor compensation), and 729,000 jobs across a wide range of occupations and industries. Sizable impacts on employment, earnings, and sales are found also at the state and county levels. While substantial, these estimated impacts are likely understated, perhaps by as much as a factor of two, as Input-Output models ignore the necessary transportation of the materials to the use site. Quarries affect economic wellbeing in other ways, including the recreational services offered by shuttered quarries. In all, the aggregates industry supports substantial economic activity, and, as a primary input to the construction industry, is a necessary component for economic growth.

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