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California Construction And
Industrial Materials Association

AGGREGATE & CONSTRUCTION INDUSTRY ESSENTIAL TO CALIFORNIA ECONOMY 2018

AGGREGATE AND CONSTRUCTION INDUSTRY BENEFITS TO CALIFORNIA ECONOMY

Executive Summary

A vital California economy depends on the accessibility and availability of large local supplies of high quality construction materials.

Rock, sand and gravel (aggregate), Ready Mix concrete and industrial minerals are essential local materials that build roads, bridges, homes, hospitals, parks and public infrastructure. These materials also provide ingredients for beer, wine, vitamins, nutrients, and soil enhancements, as well as for paint, roofing shingles, glass, pipes, brick, plastic and solar panels.

The aggregate and construction industry is a major economic engine for the state and local communities. This analysis performed by Applied Development Economics (ADE) examines the industry output, and employment impact as well as its impact and importance to other industries.

The analysis includes:

- Industry Output
- Employment Impact
- Labor Income
- Value Added Impacts
- Multiplier Effect

Some of the most impactful, shareable facts from the study are summarized here:

- California's 5th largest industry – larger than hospitality, agriculture, utilities and even retail.
- $210 billion industry output ($483 billion total economic impact on the California economy).
- $26.6 billion contributed to other California industries annually. Of this, the largest beneficiary is financial services, including real estate development, at $18 billion, followed by manufacturing at $3 billion.
- 1.16 million California jobs (2.8 million total jobs supported).
- $75.4 billion labor income ($178 billion total labor income).
- Every $10 in labor income generated by the industry spins off an additional $13 income in other sectors.
- At $76,500, the aggregate industry pays some of the highest wages and compensation in the state - higher than construction, financial, transportation, and education and health sectors.
- Compared to other California industries, aggregate worker income ranks 6th overall.
- $111 billion in value-added benefit.

This report summarizes findings from analysis of the impact of aggregate and construction industry on the California economy performed by Applied Development Economics, a Walnut Creek, California based firm that studies economic conditions and market trends in California.

OUTPUT OF CALIFORNIA INDUSTRIES

In 2016, California's industry output totaled $4.2 trillion (Table 1). This represents the value of all economic activity within the state, including inputs, labor income, property income, and all other components of value added. Professional and financial services comprised the two largest industry groups in California, followed by manufacturing (non-aggregates), and education and health care services.

Aggregates and construction together accounted for $209.8 billion in total industry output, which made it the 5th largest industry group in the state. Aggregates and construction exceeded the output for wholesale and retail trade, hospitality, and transportation services.

TABLE 1: OUTPUT OF CALIFORNIA INDUSTRIES, 2016

Industry Group	Industry Output
Total	**$4,200,658,000,000**
Professional and Business Services	$895,676,000,000
Financial Services (including Real Estate)	$763,397,000,000
Manufacturing (Remainder)	$718,402,000,000
Education and Health Services	$290,323,000,000
Aggregates and Construction	**$209,809,000,000**
Aggregates	**$9,479,000,000**
Construction	**$200,330,000,000**
Wholesale Trade	$209,588,000,000
Retail Trade	$194,560,000,000
Leisure and Hospitality	$190,598,000,000
Transportation and Warehousing	$126,194,000,000
Other Services	$98,684,000,000
Utilities	$67,669,000,000
Agriculture	$58,177,000,000
Non-Aggregates Mining	$12,456,000,000

Source: ADE, Inc.; data from IMPLAN Pro input-output model
Notes: Manufacturing and mining industries exclude aggregates-related categories. Aggregates-related mining industries includes stone, gravel, and nonmetallic mineral mining, as well as nonmetallic minerals services. Aggregates-related manufacturing include asphalt, cement, concrete products, and gypsum products.

AGGREGATES AND CONSTRUCTION CONTRIBUTION TO OTHER INDUSTRIES

The aggregates and construction sector represents a significant source of economic activity, and it also serves as an important supplier input into other industries. These forward input linkages are essential to the production of goods and services by these other industries.

In 2016, the aggregates and construction industry contributed over $26 billion in inputs to other industries in California (Table 2). The largest consumer of these goods and services was financial services. This sector includes real estate, to which aggregates and construction make building and other development possible. Manufacturing industries consumed $3.0 billion in goods and services from the aggregates and construction sector. Professional and business services benefited from

$1.9 billion in aggregates and construction inputs to support their economic activities. Other industries with over $500 million in supplier contribution from aggregates and construction sectors include hospitality, transportation, retail trade, and other services.

TABLE 2: CONTRIBUTION OF AGGREGATES AND CONSTRUCTION INPUTS TO CALIFORNIA INDUSTRIES, 2016

Industry Group	Industry Output
Total – All Industries	**$26,562,977,000**
Financial Services (including Real Estate)	$16,847,702,000
Manufacturing (Remainder)	$3,048,912,000
Professional and Business Services	$1,892,887,000
Leisure and Hospitality	$977,926,000
Transportation and Warehousing	$728,668,000
Retail Trade	$638,343,000
Other Services	$520,722,000
Education and Health Services	$464,840,000
Wholesale Trade	$408,277,000
Utilities	$401,111,000
Agriculture	$387,373,000
Non-Aggregates Mining	$246,215,000

Source: ADE, Inc.; data from IMPLAN Pro input-output model
Notes: To prevent double-counting, the table does not include aggregate and construction supplier trade with other aggregate and construction businesses. Aggregates-related mining industries includes stone, gravel, and nonmetallic mineral mining, as well as nonmetallic minerals services. Aggregates-related manufacturing include asphalt, cement, concrete products, and gypsum products.

OUTPUT MULTIPLIER IMPACT ON CALIFORNIA ECONOMY

The aggregates and construction industry generate a direct impact on the California economy of over $209.8 billion in industry output (Table 3). This output creates ancillary benefits to the economy by engaging with other industry sectors that supply inputs to the aggregates and construction industry. Using an input-output model, the analysis can estimate the economic impacts that the aggregates and construction industry create on the overall economy and other specific industries. These linkages are known as indirect effects, and they create an additional $88.1 billion in industry output across multiple sectors. In addition, induced effects are created through household spending generated through increased labor income. The induced effects from the aggregates and construction industry total $184.8 billion in industry output.

This creates a total economic impact on industry output of $482.7 billion. With a direct output of $209.9 billion, this means that every $1.00 of output generated by the aggregates and construction industry results in another $1.30 of economic impact for other industries.

TABLE 3: MULTIPLIER IMPACT OF AGGREGATES AND CONSTRUCTION INDUSTRY OUTPUT ON CALIFORNIA ECONOMY, 2016

Multiplier Effect	Industry Output
Total Effect	**$482,705,682,000**
Direct Effect	$209,808,802,000
Indirect Effect	$88,067,056,000
Induced Effect	$184,829,824,000

Source: ADE, Inc.; data from IMPLAN Pro input-output model
Notes: To prevent double-counting, the table does not include aggregate and construction supplier trade with other aggregate and construction businesses.

EMPLOYMENT IMPACT ON CALIFORNIA ECONOMY

Aggregates and construction industry contributions on the employment base in California total nearly 2.8 million jobs (Table 4). The industry direct creates nearly 1.2 million jobs (including wage-and-salary jobs, and self-employment). Purchases made by the aggregates and construction industry create an additional 432,000 indirect jobs, while employee spending supports another 1.2 million jobs. With a total employment effect of 2.8 million jobs, every job created in the aggregates and construction industries results in another 1.40 jobs in other industries.

TABLE 4: MULTIPLIER IMPACT OF AGGREGATES AND CONSTRUCTION JOBS ON CALIFORNIA ECONOMY, 2016

Multiplier Effect	Jobs
Total Effect	**2,776,000**
Direct Effect	1,159,000
Indirect Effect	432,000
Induced Effect	1,185,000

Source: ADE, Inc.; data from IMPLAN Pro input-output model
Notes: Jobs include both wage-and-salary employment and self-employment. To prevent double-counting, the table does not include aggregate and construction supplier trade with other aggregate and construction businesses.

LABOR INCOME FROM AGGREGATES AND CONSTRUCTION INDUSTRY

In 2016, the direct labor income paid by the aggregates and construction industry totaled $75.4 billion (Table 5). This includes both employee compensation and proprietor income. The indirect labor income resulting from supplier purchases totaled $28.7 billion. Household spending by employees resulted in a $73.8 billion economic impact in labor income.

With a total labor income effect of $177.9 billion, the multiplier effect generates an additional $1.36 in other industries for every $1.00 in labor income generated by the aggregates and construction industries.

TABLE 5: MULTIPLIER IMPACT OF AGGREGATES AND CONSTRUCTION LABOR INCOME ON CALIFORNIA ECONOMY, 2016

Multiplier Effect	Labor Income
Total Effect	**$177,859,038,000**
Direct Effect	$75,391,828,000
Indirect Effect	$28,682,361,000
Induced Effect	$73,784,850,000

Source: ADE, Inc.; data from IMPLAN Pro input-output model
Notes: Labor income includes both wage-and-salary employment and self-employment. To prevent double-counting, the table does not include aggregate and construction supplier trade with other aggregate and construction businesses.

AVERAGE LABOR INCOME BY AGGREGATES AND CONSTRUCTION INDUSTRY

In 2016, the average labor income for workers in aggregates and construction was over $65,000 annually, which includes wage-and-salary workers and self-employed proprietors. The average indirect labor income from supplier purchases by the aggregates and construction industry was $66,400. In

the average induced labor income from household spending was $62,300 per worker. When looking only at aggregates industries, the average labor income is notably higher at just over $76,500 (see table 7).

TABLE 6: AVERAGE LABOR INCOME PAID BY AGGREGATES AND CONSTRUCTION AND LINKED INDUSTRIES, 2016

Multiplier Effect	Average Labor Income
Direct Effect	$65,049
Indirect Effect	$66,394
Induced Effect	$62,266

Source: ADE, Inc.; data from IMPLAN Pro input-output model
Notes: Labor income includes both wage-and-salary employment and self-employment. To prevent double-counting, the table does not include aggregate and construction supplier trade with other aggregate and construction businesses.

COMPARISON OF AVERAGE LABOR INCOME BY INDUSTRY IN CALIFORNIA

With an average labor income of nearly $65,100, the aggregates and construction industry ranks higher than most other industry groups in California, and slightly below the statewide average for all industries. Specific industries with higher average labor income include utilities, manufacturing, professional services, mining, and wholesale trade. The aggregates and construction industry has a higher labor income than other large industries, such as financial services, transportation, and education/health services.

When considering the aggregates and construction industries separately, aggregates sectors have a notably higher average labor income of just over $76,500. Construction industries are slightly lower with an average labor income of around $64,800.

TABLE 7: COMPARISON OF AVERAGE LABOR INCOME BY INDUSTRY IN CALIFORNIA, 2016

Industry Sector	Average Labor Income
Total – All Industries	$67,994
Utilities	$127,836
Manufacturing (Remainder)	$101,549
Professional and Business Services	$90,836
Non-Aggregates Mining	$87,311
Wholesale Trade	$82,279
Aggregates and Construction	**$65,063**
Aggregates Only	**$76,507**
Construction Only	**$64,816**
Financial Services (including Real Estate)	$61,894
Transportation and Warehousing	$58,679
Education and Health Services	$55,171
Agriculture	$51,338
Other Services	$42,662
Retail Trade	$40,337
Leisure and Hospitality	$33,038

Source: ADE, Inc.; data from IMPLAN Pro input-output model
Notes: Labor income includes both wage-and-salary employment and self-employment. To prevent double-counting, the table does not include aggregate and construction supplier trade with other aggregate and construction businesses. Aggregates-related mining industries includes stone, gravel, and nonmetallic mineral mining, as well as nonmetallic minerals services. Aggregates-related manufacturing include asphalt, cement, concrete products, and gypsum products.

VALUE ADDED IMPACTS OF AGGREGATE AND CONSTRUCTION INDUSTRY IN CALIFORNIA

The value-added impacts are analogous to the gross domestic product (GDP) measure. Among other measures, value-added includes the value of payments to workers, earned profits, taxes paid, and interest paid. For value-added, aggregates and construction industries in California directly contribute $111.0 billion. Supplier purchases made by the industry support another $51.2 billion in value-added. Induced effects resulting from household spending by workers contribute another $122.7 billion in value-added.

TABLE 8: MULTIPLIER IMPACT OF AGGREGATES AND CONSTRUCTION VALUE-ADDED ON CALIFORNIA ECONOMY, 2016

Multiplier Effect	Value-Added
Total Effect	**$284,870,926,000**
Direct Effect	$110,953,153,000
Indirect Effect	$51,183,916,000
Induced Effect	$122,733,857,000

Source: ADE, Inc.; data from IMPLAN Pro input-output model
Notes: Value-added includes both wage-and-salary employment and self-employment. To prevent double-counting, the table does not include aggregate and construction supplier trade with other aggregate and construction businesses.

SUMMARY OF MULTIPLIERS

When looking at the multiplier values aggregates and construction individually, the aggregates multipliers are generally higher. For example, the employment multiplier for aggregates shows that each job supports nearly 2.7 additional jobs, while the employment multiplier for construction indicates each job supporting approximately 1.4 additional jobs. However, because the size of the construction industry is larger, the multiplier values tend to follow construction more closely than aggregates when combining the two industry groups.

TABLE 9: SUMMARY OF MULTIPLIER VALUES FOR AGGREGATES, CONSTRUCTION, AND COMBINED INDUSTRY GROUPS, 2016

Multiplier Effect	Aggregates and Construction	Aggregates Only	Construction Only
Output	2.30	2.25	2.31
Employment	2.40	3.69	2.35
Employee Compensation	2.65	3.06	2.62
Value Added	2.57	3.17	2.54
Labor Income	2.36	3.35	2.32

Source: ADE, Inc.; data from IMPLAN Pro input-output model
Notes: Jobs include both wage-and-salary employment and self-employment. Labor income includes both wage-and-salary employment and self-employment. To prevent double-counting, the table does not include aggregate and construction supplier trade with other aggregate and construction businesses.

OTHER INDUSTRY INDICATORS

According to the California Geological Survey, aggregates production in California totaled 148.9 million tons in 2016, which represents an increase of 11.5 percent from 2009.[1] This tonnage of aggregate production generates about 6.0 million truckloads.

The largest consumer of aggregates in California is public infrastructure, with 43 percent of the total demand. Residential construction accounts for 34 percent of aggregates demand, while commercial construction makes up 17 percent of aggregates demand.

Long-term employment projections from CalTrans indicate that construction employment will increase at a compounded average growth rate (CAGR) of 0.6 percent, while manufacturing will grow at a slower CAGR of 0.3 percent between 2017 and 2050.[2] By comparison, the overall job base in California is projected to grow at a CAGR of 0.8 percent. The construction job growth rate matches up with the expected growth rate in population of 0.6 percent.

According to the University of Pacific (UOP) Center for Business and Policy Research, the short-term projections for California indicate that the growth rate for construction employment will significantly outpace the rest of the state economy.[3] From 2018 through 2021, the UOP forecast shows construction employment growing at an annual rate of 4.0 to 7.0 percent, while the overall statewide employment grows at a rate of between 0.7 and 2.1 percent. It should be noted that the manufacturing employment is forecast to grow at a slower rate than the overall employment (-0.6 to 1.3 percent).

[1] California Department of Transportation; "2018 Aggregate Resource Policy Statement and Tools"; March 1, 2018.
[2] California Department of Transportation; "California County-Level Economic Forecast: 2017-2050"; September 2017.
[3] Center for Business and Policy Research, University of Pacific Eberhardt School of Business; "California & Metro Forecast"; June 2018.

ABOUT ADE

Applied Development Economics, Inc. (ADE) is a consulting firm specializing in economic planning and development services. Since its founding in 1985, the firm has established a distinguished body of work resulting in tangible benefits for our clients. Based out of Walnut Creek, California, our base of private- and public-sector clients includes government agencies, economic development organizations, foundations, universities, research institutes, businesses, and private investors, including developers. Our body of work includes numerous economic impact studies covering a broad range of development projects, programs, and industries. These studies have included aggregates and construction projects, including three statewide studies of the industry in California. Over the years, the firm has received numerous critical accolades, including 16 state and national awards since 1995 from the California Association for Local Economic Development, the American Planning Association, and the International Economic Development Council.

ABOUT IMPLAN

The application used to estimate the economic contributions of the aggregates and construction industries to the California is the IMPLAN Pro input-output model. The model, which is currently developed by IMPLAN, LLC, was originally written at the University of Minnesota as a US Forestry Service project. IMPLAN is used by hundreds of universities, government agencies, and private organizations to estimate the economic and fiscal impacts of investments and other changes in industry activity. IMPLAN is an economic impact assessment modeling system that estimates the national and local, private-sector impacts of economic changes.

The IMPLAN input-output model describes commodity flows from producers to intermediate and final consumers. The model summarizes these complex interactions as economic multipliers, which can be used to estimate the total economic impact of the employment, economic activity, and labor income generated by the industries in California.