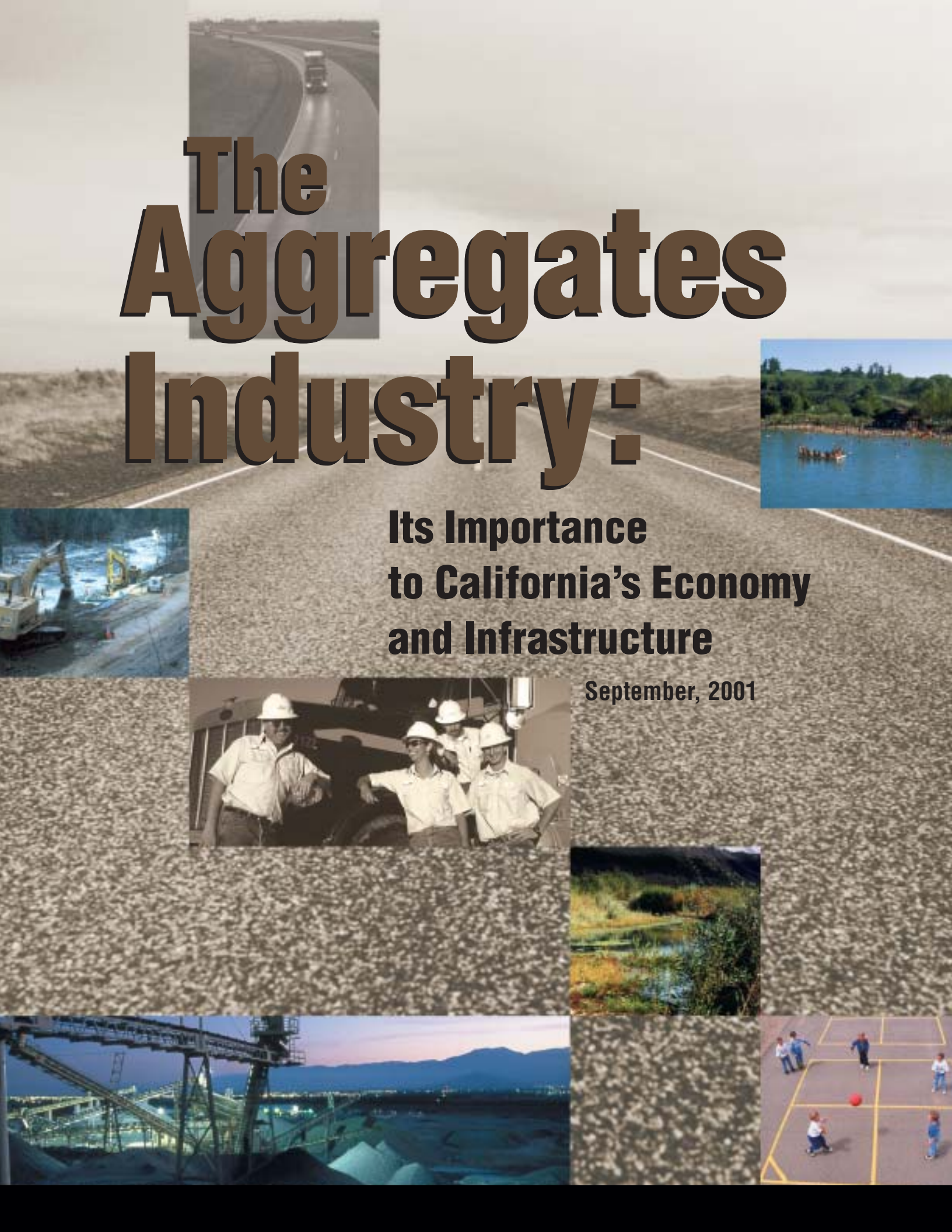


# The Aggregates Industry:

**Its Importance  
to California's Economy  
and Infrastructure**

September, 2001



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Prepared for the  
Construction Materials Association of California

September, 2001



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Left Photo: Rock crushing and processing operations at RMC Pacific Materials' - Friant Plant near Fresno

Center: Granite Regional Park (Reclaimed quarry site) - Sacramento  
Granite Construction, Inc.

Right: Central Valley Concrete pours concrete at a shopping center in Turlock  
Santa Fe Aggregates, Inc.

# Preface

California is at a crossroads – a crossroads counting on sand and gravel, concrete, and crushed stone for construction.

The Golden State’s gloss is being chipped away by a cracked and crumbling infrastructure. Roads, streets, highways, bridges, schools, buildings, and power plants are in desperate need of rehabilitation or replacement. The deterioration of California’s infrastructure is costlier than any financial figure: it is threatening our quality of life, public safety, competitiveness, and economic future.

Californians don’t shy away from reality. They know that growth projections have conservatively estimated a population of 50 million by 2025. Affordable housing, schools, recreational facilities, and efficient transportation systems will be needed. The “Capital Outlay and Infrastructure Report, 1999,” published by the California Department of Finance, notes that California’s estimated population increases are an important factor influencing infrastructure investment. For example, school facilities will be needed for a projected enrollment growth of 50,000 students per year.

Recently, residents received a tiny taste of what it might be like to live with an inconsistent, undependable, and expensive electricity supply. The power crisis may be solved relatively quickly and seamlessly compared to the infrastructure challenges ahead.

While California’s infrastructure needs are newsworthy, the availability of aggregates – sand and gravel and crushed stone – has been overlooked. Without these natural materials, building cannot begin. There is no construction without aggregates.

Depending on the locale, the California Division of Mines and Geology estimates a range of 0-50 years for depletion of permitted supplies of aggregates. Examples include the San Fernando Valley’s 1-year supply, Eastern Merced County’s 4-year supply, and Western Ventura County’s 0-year supply. Unless new supplies of aggregates are permitted expeditiously, California will quickly run out of the materials that maintain, repair, or build virtually every structure in the state.

This study examines the substantial, but generally unknown, economic impact of the aggregates industry in California, and more urgently, its importance to the state’s infrastructure. Without a strong infrastructure the state’s foundation for the future falls flat.

Sharon Prager

*e concepts*



# Introduction

The purpose of this report is to provide statistical data on the importance of the aggregates industry in the California economy. Chapter 1 defines the construction and aggregates industries and discusses their relationship. Chapter 2 provides the most recent impact data available for the construction and aggregates industries in California. Chapter 3 provides information on construction trends in California between 1995 and 1999. Chapter 4 looks at the potential impact of the aggregates industry on the California economy if investment levels in transportation and school construction are increased to meet recognized needs. Chapter 5 presents the conclusions of the authors.

This report was funded by the Construction Materials Association of California (CMAC) and prepared by Applied Development Economics (ADE), a research and consulting firm specializing in the analysis of industrial sectors for California and other states. James R. King, President, and Randy Evans, Associate, prepared the report in association with Sharon Prager of *e concepts*. The views presented in the report are those of the authors and do not necessarily reflect the opinion of CMAC or its members.

Special thanks are given to the F. W. Dodge Corporation for providing the data used in Chapter 3.

*e concepts* is a public relations and public affairs consultancy dedicated to the needs of the natural resource industries. Principal Consultant Sharon Prager has an extensive background in mining, co-authored a mining investment study with Canada's renowned *Fraser Institute*, and her articles have appeared in industry publications. Ms. Prager has a graduate degree from Stanford University.

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Field Trip to Cache Creek Conservancy (Reclaimed aggregate sites)

Teichert Materials, Inc.  
Solano Concrete Company, Inc.  
Syar Industries, Inc.

# Executive Summary

The aggregates industry is the major supplier of raw materials to the construction industry, producing the sand and gravel, crushed stone, asphaltic concrete, and ready-mix concrete required for building California's infrastructure, including its housing, schools, transportation systems, industrial and commercial facilities, and power plants. Accessing abundant aggregates is the first step in the construction process.

This report assesses the impact of the construction and aggregates industries on California's economy measured by gross product, wages, value added, employment, and taxes. The study finds that the construction industry provides over \$108 billion to the state's \$1.2 trillion gross product. The aggregates industry, in its critical role as the supplier of raw materials to the construction industry, contributes \$5.1 billion to the state's gross product.

Of the industry's \$5.1 billion contribution, over \$1.5 billion in wages, and a total value added of \$2.4 billion, is provided to the state's economy. In addition, the aggregates industry employs almost 35,000 California workers, and contributes nearly \$1 billion in federal and state tax revenues.

Between 1995 and 1999, California construction put in place increased over \$9.4 billion. While the momentum continued in 2000, signs of a slow down surfaced. Increases in construction put in place have resulted in labor shortages in all segments of the industry, and there are growing concerns about shortfalls in raw materials, particularly since supplies of permitted aggregates are running out.

Nationally, California's spending for essential infrastructure ranks near the bottom. A lack of investment over the past three decades is causing serious and growing deficiencies in housing, transportation networks, schools, water and sewer systems, and power plants. If California is to maintain its quality of life, prepare for population increases, and sustain the economic growth enjoyed over the past five years, the state will need to substantially increase its infrastructure construction and maintenance. Moreover, a crumbling infrastructure affects California businesses' ability to remain competitive in the global economy.

Building and maintaining the state's crucial infrastructure depends on access to local, low-cost, and plentiful aggregates. Data on the aggregate industry's contribution to the state's economic growth indicate that public policy support for the industry is essential for meeting critical state infrastructure needs.



Top Left: Employees monitoring air quality  
Hanson Aggregates Mid-Pacific, Inc.

Bottom Left: Graniterock people at AR Wilson quarry

Right: Paving Job - Palm Springs  
Granite Construction, Inc.



# 1. The Construction and Aggregate Industries: Counterparts in Constructing California

## 1.1 Definitions and Descriptions

### Background

California, by itself, is the world's sixth largest economy. Producing aggregates is the first step in the process of providing the infrastructure that California requires for global economic competitiveness. If the aggregates industry is unable to supply the materials required for the construction of public and private infrastructure at a competitive price, the state's businesses will be unable to sustain the high performance workplaces required for competitive advantage against other states and nations.

For example, California businesses are finding it increasingly difficult to recruit the talent required for business innovation and productivity. Housing prices range from expensive to stratospheric in all but the most isolated regions of the state, and continue to rise. Traffic congestion affects quality of life, and concerned parents worry how the lack of school facilities may hurt their children's education.

Additionally, school construction is failing to keep pace with the need for educating and training students for the 21st century. This deficiency prevents California businesses from sustaining the productivity gains made since 1995. Smaller classrooms in well-constructed and maintained facilities are not only conducive to efficient learning, but also assist school participation in class size reduction programs.

Of particular significance is the current power crisis that is already causing some major California businesses to contemplate expansion or relocation elsewhere. Clearly, the lack of supply exacerbated by California's failure to build additional power generation facilities, is a conspicuous component.

Concurrently, traffic congestion is increasing in all of the state's metropolitan employment centers. Inadequate intra-urban transportation systems and corridors connecting urban and suburban population centers are causing unreasonably long commutes.

All of these problems – traffic congestion, unaffordable housing, power shortages, and lack of school facilities – affect quality of life, the education of our future citizens, and a strong economy. Increasing the supply of power, housing, school facilities, and transportation networks depends upon the availability of products from California's aggregate industry. Without these materials the construction industry cannot provide the infrastructure that is the foundation for the state's economic progress since 1995.

## 1.2 The Construction Industry

The construction industry builds structures for both the public and private sectors, including roads, highways, bridges, dams, commercial buildings, hospitals, power plants, pipelines, sewage treatment facilities, homes, apartments, railroads, and airports. The term "construction" includes new work, additions, alterations, reconstruction, installations, and repairs. In other words, virtually every project that needs building, remodeling, or repairing involves some sector of the construction industry. The industry employs a wide range of trades and craftspeople, as well as architects, engineers, contractors, supervisors, truck drivers, equipment operators, and skilled and unskilled labor.

Generally, the construction industry is classified into four broad categories based on the kinds of work performed by contractors: a) highway, b) heavy construction, c) general building (including home building), and d) special trade contractors.



Bottom Right: Tallest concrete frame building west of the Mississippi, Pankow Builders - San Francisco  
Calaveras Materials Inc.  
South Valley Materials, Inc.

Highway contractors usually work under a federal, state, county, or city contract, and build roads, highways, bridges and airports. All of these activities require large amounts of aggregates. For example, road and highway pavement is generally either asphaltic concrete or portland cement concrete. Asphaltic concrete pavement consists of a mixture of fine and coarse aggregates and asphalt binders. In the case of portland cement concrete pavement, cement is mixed with fine and coarse aggregates, sand, and water which produce a rigid high-strength concrete.

Along with highway contractors, heavy construction contractors are big earthmovers. This sector of the industry builds foundations, bridges, dams, and tunnels. Huge quantities of concrete are used in these projects, and aggregates make up between 70-80% of the volume of concrete.

General building contractors erect commercial and industrial buildings, as well as homes and apartments. All of these structures use significant aggregates in the building process.

The special trade contractors are the skilled craftspeople who work in sequence after the foundation is completed; e.g., iron workers, form builders, electricians, plumbers, steam fitters, glaziers, plasterers, tile setters, painters, and woodworkers are some of the specialties often required.



The construction industry is the largest single industry in the U.S. accounting for 15% of the gross national product.<sup>1</sup> While California often describes itself as a “knowledge-based service economy,” emphasizing its strengths in high-tech, biotech, and professional services, in 1999 the state’s fastest growing industry was construction.<sup>2</sup>

A variety of final products for both public and private sectors are produced by California’s construction industry (*see Exhibit 1*).

Above: Trucks weighing in at AR Wilson Quarry - Aromas Graniterock  
Photo Credit: Charley Rea

## Exhibit 1

### Construction Industry Products

- Residential Structures
- Utility Structures
- Farm Structures
- Government Facilities
- Industrial and Commercial Buildings
- Highways and Streets
- Mineral Extraction Facilities
- Maintenance and Repair, all Facilities

Source: Implan Pro

<sup>1</sup> Encyclopedia Americana, 1998 ed., s.v. “Construction Industry,” by William H. Quirk, “Engineering and Construction World.”

<sup>2</sup> As measured by employment increases. See “Economic Report of the Governor 2000,” California Department of Finance.

## 1.3 The Aggregates Industry

### Aggregates and its Uses

Sand, gravel, and crushed stone are referred to as “aggregates”. These basic raw materials are the first step in the construction process and used in a huge variety of products. Aggregates are required for making portland cement concrete and asphaltic concrete – essential substances for building and maintaining our public and private infrastructure. Without aggregates there would be no buildings, hospitals, roads, airports, shopping centers, homes, sewer systems, or any other structure used by Californians. Approximately 60% of all aggregates are used in public works projects, and nearly 90% of all materials required to build federal, state, and local roads consists of sand, gravel, and stone.

California leads the nation in aggregates production, totaling nearly 223 million tons in 1998<sup>3</sup>. Construction and road building are the most familiar uses of aggregates, but California’s approximately 618 operations statewide also provide the opportunity to make paint, glass, plastics, medicine, household products, and crucial components for agriculture, water treatment, and protecting the environment.

The construction of an average home uses nearly 100 tons of aggregates. After adding the necessary neighborhood infrastructure, a 1500 sq. ft. home requires 328 tons of sand and gravel and 202 cubic yards of concrete. Statistics from the United States Geological Survey indicate that the State of California consumes about 210 million tons of aggregates annually. Accordingly, at 1998 rates, every California resident needs about 6.2 tons per year of new aggregates for buildings, streets, and homes. As population increases, so too will demand for aggregates.



Left: State-of-the art Asphalt Plant - Fresno  
Calaveras Materials Inc.  
Right: Reclaimed land at aggregates site  
Stevens Creek Quarry

Geological conditions determine where deposits of aggregates are located. Not only are the deposits decided by nature and not people, certain physical property characteristics and qualities must be present depending on the ultimate application. For example, there are strict specifications for aggregates used in portland cement concrete to ensure strength and durability. As the California Division of Mines and Geology has noted, “aggregates used in portland cement concrete should not contain gypsum, pyrite, zeolite, opal, chalcedony, chert, siliceous shale, volcanic glass, or high-silica volcanic rocks.” Specifications also require certain particle-size distributions, and customers such as CalTrans have their own specifications.

### Regulations and Reclamation

California aggregate companies are heavily regulated and must meet the requirements of up to 80 agencies overseeing federal, state, county, and local laws. Regulations cover environmental, technical, health and safety, aesthetic, cultural, land use, and reclamation standards. Obtaining a permit to operate is both intensive and extensive, involving in-depth studies and thorough data compilation. Consulting with communities, regulatory agencies, government officials, and all other interested or affected stakeholders is an equally important procedure. The permitting process often takes from 2-10 years to complete, involves substantial up-front investment by the company, and offers no guarantee of project approval. Once the permit is granted, the regulatory process continues throughout the life of the operation with continued submission of data, renewal determinations, and inspections.

<sup>3</sup> Figure includes 11 million tons of portland cement





Yet as the uses of aggregates indicate, it is critical that local and uninterrupted sources of supply be available to maintain a strong, cost-effective infrastructure and an energetic economy. Acquiring aggregates is a necessary land use.

Nevertheless, what most people do not know is that aggregates production is an interim land use. California law requires that each site has a reclamation plan, but in reality two resources are created: first, the production of aggregates and derivative materials critical to communities, and second, reclaimed land that is designed and developed for diverse uses. California aggregate operators have reclaimed land to wildlife habitat, wetlands, open space, agricultural crops, fruit and nut trees, vineyards, commercial and residential development, recreation, lakes, hiking and biking trails, water slides, Christmas tree farms, parks, sports fields, and many other valuable public uses.

It would be difficult to find any other for-profit industry in California that actually *creates* thousands of acres of wetlands, wildlife habitat, open space, and agricultural land.



## Summary

- California producers of aggregates provide basic raw materials that are the first step in the construction process.
- Without aggregates, no public or private infrastructure would exist.
- Deposits of aggregates and their locations are determined by geological conditions.
- The aggregates industry is heavily regulated and must meet stringent conditions to obtain and retain permission to operate.
- Aggregates production is an interim land use. After aggregates are removed, land is reclaimed to uses favored by the public.
- Thousands of acres of new California wetlands and wildlife habitat are created or restored. Historically California has lost 90% of its wetlands, and restoration by the aggregates industry is resulting in a resurgence of wetlands often seen for the first time in decades or centuries.
- Components of the aggregates industry include the industries listed in *Exhibit 2*.

Bottom Left: Enjoying lunch - School field trip at Hallwood Habitat (Reclaimed aggregates site) Baldwin Contracting Company, Inc.

Top Right: Manteca Water-slides - Oakwood Lake Resort (Reclaimed aggregates site) Brown Sand, Inc.

## Exhibit 2

### Components of the Aggregates Industry

Sic Codes	Product
1410, 1420	Dimension Stone
1480	Nonmetallic Minerals (except fuels)
2951	Paving Mixtures and Blocks
3240	Cement, Hydraulic
3275	Gypsum Products
1440	Sand and Gravel
1490	Misc. Nonmetallic Minerals, N.E.C.
2952	Asphalt Felts and Coatings
3274	Ready-mixed Concrete Lime
3271	Concrete Block and Brick
3272	Concrete Products, N.E.C.

# 2. The Aggregate Industry's Impact on California's Economy

## 2.1 Impact Analysis

Because the aggregates industry is an integral supplier to the construction industry, it is useful to include an impact analysis of the construction industry and its suppliers (including the aggregates industry), on the California economy. The following sections cover gross product, wages, employment, value added, and tax payments.

### 2.1.1 Definitions

For purposes of this report, definitions of the terms "Direct", "Indirect", and "Induced" follow. These impacts are examined separately for the construction and aggregates industries, as noted in brackets.

**Direct:** "Direct" means the impact of gross product, wages, employment, value added, and taxes attributable to those businesses that are solely involved in the [construction industry] [aggregates industry].

**Indirect:** "Indirect" refers to the impact of those businesses that are suppliers to the [construction industry] [aggregates industry].

**Induced:** "Induced" impacts are those by consumer businesses that serve the needs of employees of the core businesses and/or the supplier businesses in the [construction industry] [aggregates industry].

## 2.2 Gross Product - California

Note: all dollar amounts in this Chapter are based on 1998 statistics.



Right: Ready-Mix Concrete Truck - Redwood City Plant Graniterock

### 2.2.1 Construction Industry

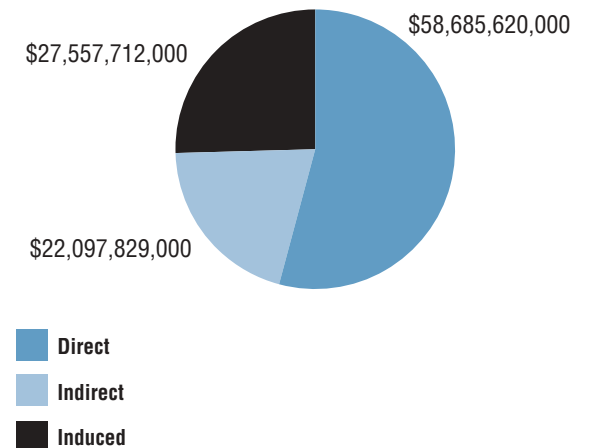
The total gross product of the 1998 California economy was \$1,118.9 trillion. This represents the total value of the goods and services produced by all California businesses during the year. The construction industry's impact on the state's economy was over \$108.3 billion. This includes the value of all goods and services provided by the construction industry and its suppliers used to produce the final products listed in *Exhibit 1*.

Core industries are exclusively engaged in providing goods and services. Goods and services directly supplied by core industries in the construction industry were over \$58.6 billion. In addition, suppliers to these core industries, including the aggregates industry, provided \$22 billion. Employee wage expenditures on consumer goods and services contributed another \$27.5 billion.

Therefore, the construction industry's impact, including its suppliers, and wages paid by both core industries and suppliers, results in a total gross product of \$108.3 billion (*see Figure 1*).

Figure 1

Total Gross Product of Construction Industry 1998 (Total \$108 billion)



Source: Implan Pro

## 2.2.2 Aggregates Industry

In 1998 the total impact of the goods and services on the California economy by the aggregates industry (see Exhibit 2) exceeded \$5.17 billion. Core businesses contributed over \$3 billion to the \$5.17 billion, or 60% of the aggregate industry's total impact on the California economy. In addition, over \$1.3 billion in gross product was attributable to suppliers of aggregates industry firms. Consumer expenditures by employees of the aggregates industry and their suppliers accounted for an additional \$751.9 million. Hence, the total 1998 gross product of the aggregates industry was \$5.17 billion, or 4.6% of the total impact of the construction industry (\$108.3 billion), see Figure 2.

## 2.3 Wages - California

### 2.3.1 Construction Industry

Wages include the total compensation paid to workers and managers of firms in the construction industry and its suppliers, as well as the wages of those employed in the consumer goods and services firms that serve workers in the core and supplier industries.

Figure 3 shows the total wages for the construction industry at over \$43.4 billion. The wages of the core industries in the construction industry amounted to \$24.1 billion, or 55.5% of the total. Wages paid to suppliers were \$8.95 billion, or 20.5% of the total. Wages paid to workers supplying goods and services to employees in the core and supplier industries added another \$10.2 billion, or 23.5% of the total.

An early steam shovel from the Logan (now AR Wilson) Quarry Graniterock

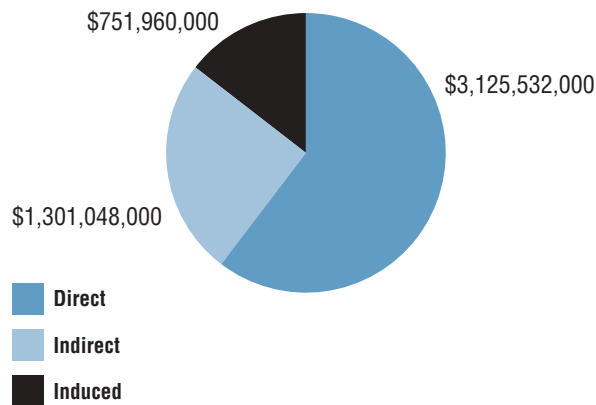


## 2.3.2 Aggregates Industry

Wages paid by firms in the aggregates industry, their suppliers, and the wages of workers supplying consumer goods and services to the employees of these businesses, were over \$1.5 billion in 1998 (see Figure 4). Wages paid by the core industries were over \$803 million, or 53.5% of the total. Suppliers to the aggregates industry added over \$353 million, or 23.5% of the total, and consumer goods suppliers contributed \$356 million, or 23.5% of the total.

Figure 2

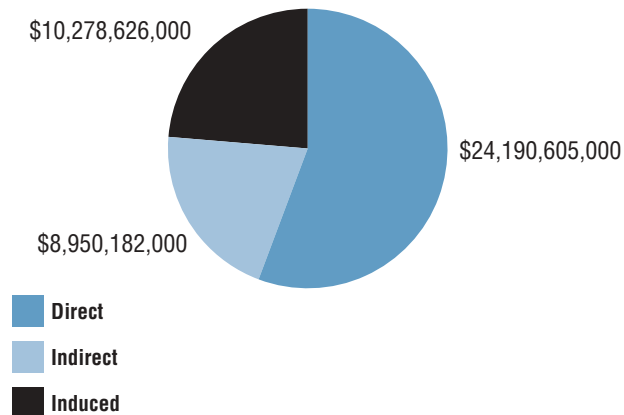
Total Gross Product of Aggregates Industry 1998 (Total \$5.17 billion)



Source: Implan Pro

Figure 3

Total Wages of Construction Industry 1998 (Total \$43.4 billion)



Source: Implan Pro

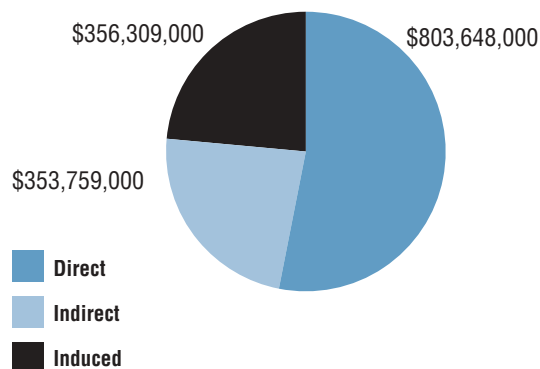
## 2.4 Value Added - California

### 2.4.1 Construction Industry

Value added is the value of goods and services less the cost of materials purchased from suppliers. The term is frequently used as a criterion for measuring productivity; i.e., the higher the value added, the higher the productivity. Higher value added businesses tend to generate higher wages.

**Figure 4**

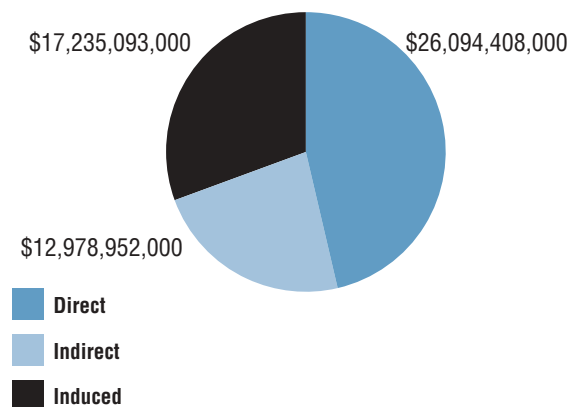
**Total Wages of Aggregates Industry 1998  
(Total \$1.5 billion)**



Source: Implan Pro

**Figure 5**

**Total Value Added of Construction Industry  
1998 (Total \$56 billion)**



Source: Implan Pro

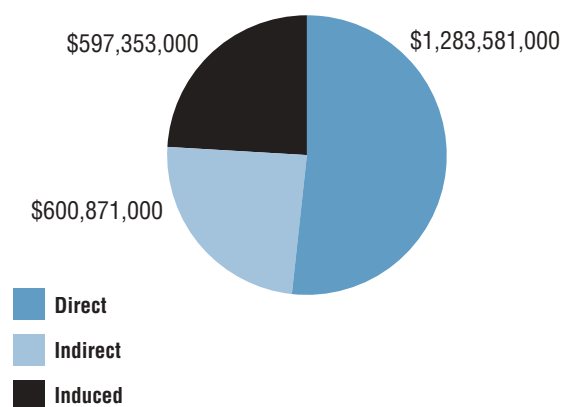
Figure 5 provides the value-added data for the construction industry. Total value added by the construction industry in 1998 was over \$56 billion. The core businesses in the construction industry were responsible for over \$26 billion, or 46% of the total. Suppliers to the core businesses added over \$12.9 billion, or 23% of the total. The value added by local consumer goods and services suppliers was over \$17 billion, or 30% of the total value added by the construction industry.

### 2.4.2 Aggregates Industry

The total value added for the aggregates industry was over \$2.4 billion in 1998. This total was comprised of over \$1.2 billion (48%) from aggregates industry core businesses; over \$600 million from suppliers (25%), and over \$597 million (25%) from firms providing consumer goods and services to the employees of these businesses (see Figure 6).

**Figure 6**

**Total Value Added of Aggregates Industry  
1998 (Total \$2.4 billion)**



Source: Implan Pro



Asphalt paving at Stanford University  
PAVEX Division  
Graniterock

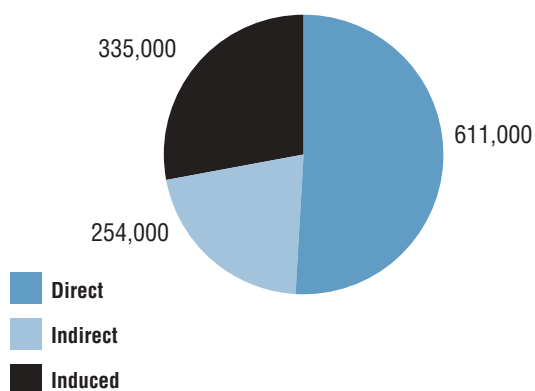
## 2.5 Employment - California

### 2.5.1 Construction Industry

The total employment impact of the construction industry in 1998 was over 1.2 million. Of this total over 611,000, or 52%, were employed by core businesses in the construction industry. The suppliers to the core businesses employed over 253,000, or 21%, and over 335,000 were employed by businesses providing goods and services to the employees of the core and supplier businesses in the construction industry (see Figure 7).

Figure 7

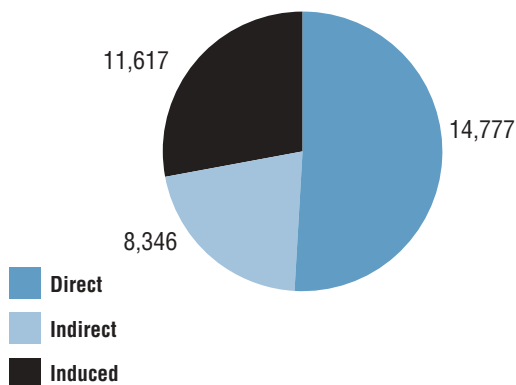
Total Employment of Construction Industry 1998 (Total 1.2 million)



Source: Implan Pro

Figure 8

Total Employment of Aggregates Industry 1998 (Total 34,740)



Source: Implan Pro

### Aggregates Industry

Over 34,700 workers were reported by the aggregates industry in 1998. Of this total, over 14,700 (42.5%) were employed by core businesses, over 8,300 (24%) by supplier businesses and over 11,600 (33.5%) by consumer businesses (see figure 8).

### Taxes

The aggregates industry contributed \$972,488,000 in 1998 federal and state tax revenues.

### 2.6 Suppliers to the Aggregates Industry

Table 1 lists the top suppliers to the aggregates industry in California. These are the industries that make up the indirect contribution to gross product, earnings, employment and taxes.

Table 1

#### Top Aggregate Supplier Industries in California

Industry	Regional Inputs*
Petroleum Refining	335.32
Wholesale Trade	230.91
Motor Fright	198.89
Railroads	45.48
Cyclic Crudes	32.27
Surface Active Agents	26.01
Glass Products	15.58
Engineering, Architectural Services	11.28
Management and Consulting Services	9.84

Source: Implan Pro

# 3. Recent Trends

The California economy has experienced significant growth since 1995. The construction and aggregates industries have been important contributors to the economy through a variety of infrastructure projects vital to continuing prosperity.

However, signs of a looming economic downturn during the first quarter of 2001 indicate that the necessity of maintaining and improving California's infrastructure is becoming increasingly pivotal to sustaining a strong economy.

The following tables present data compiled by the Dodge Corporation on the growth in construction "put in place" between 1995 and 1999. *Figure 9's* trend line indicates a \$9.4 billion increase of construction put in place in California during this period.

*Table 2* shows the increase in construction put in place for **each of the top ten counties** over the five-year period. Each county showed a relatively stable annual increase, and an increase in construction put in place in 1999 over 1995. The exception was Contra Costa County, which decreased from over \$1 billion to \$889 million over the five-year period.



San Jose Hills  
Granite Construction, Inc.

**Figure 9**

**Increase in Construction put-in-place for California from 1995 - 1999 (in billions)**

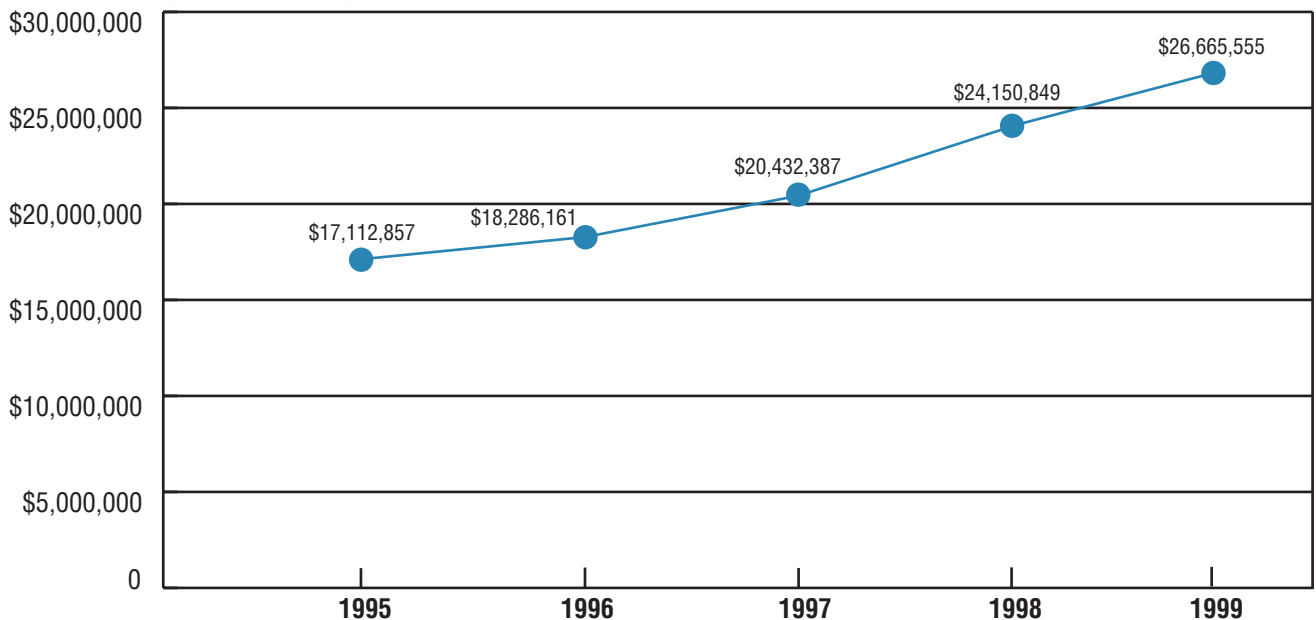


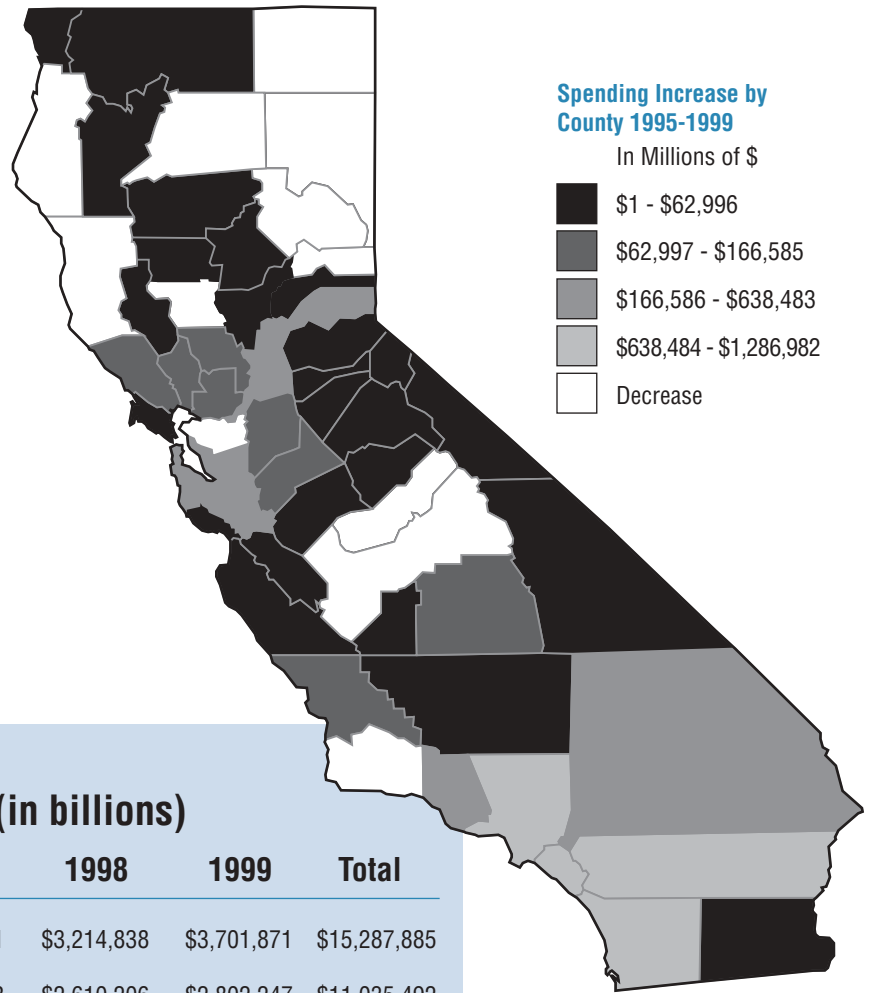


Table 3 shows the increases in construction by project type. Single-family homes accounted for 37.6% Of the construction put in place in 1995, and 43.6% in 1999. This project category showed the largest absolute increase, over \$5 billion, during the five year period - an increase of over 80%. The absolute increase in construction put in place for office buildings was \$1.2 billion, or an increase of over 260%. It is also worth noting that spending increases for some important infrastructure projects were modest or declined, including education, streets, runways, bridges, health, sewer, water and utilities.

Figure 10 displays geographically the construction put in place by the **size of increase or decrease** during the 1995-1999 period. Of 58 counties, only 12 showed a decrease; 10 showed increases of between \$638.4 million and \$1.268 billion, and 7 counties showed increases between \$168.5 million and \$683.4 million.

Top Photo: Reclaimed Wetlands & Waterfowl Habitat - San Joaquin River, Fresno  
 Vulcan Western Division  
 Photo Credit: John Buada©

**Figure 10**  
**Increase (or Decrease) by County**  
**1995 - 1999**



Source: ADE, F.W. Dodge

**Table 2**  
**Top 10 Counties for 5-year Period (in billions)**

County	1995	1996	1997	1998	1999	Total
Los Angeles, Ca	\$2,815,045	\$2,661,880	\$2,894,251	\$3,214,838	\$3,701,871	\$15,287,885
San Diego, Ca	\$1,515,265	\$1,830,765	\$2,277,008	\$2,610,206	\$2,802,247	\$11,035,492
Orange, Ca	\$1,434,603	\$1,606,759	\$1,976,541	\$2,288,279	\$2,591,471	\$9,897,653
Riverside, Ca	\$1,042,190	\$1,135,284	\$1,451,289	\$1,929,322	\$2,268,778	\$7,826,863
Santa Clara, Ca	\$735,070	\$1,053,973	\$1,403,329	\$1,710,965	\$1,373,553	\$6,276,890
Alameda, Ca	\$843,175	\$1,053,159	\$1,256,691	\$1,464,424	\$1,379,297	\$5,996,747
San Bernardino, Ca	\$880,850	\$957,983	\$953,955	\$1,118,721	\$1,353,294	\$5,264,804
Sacramento, Ca	\$722,342	\$938,884	\$1,020,685	\$1,062,934	\$1,118,991	\$4,863,837
Contra Costa, Ca	\$1,061,043	\$855,220	\$646,741	\$740,185	\$889,384	\$4,192,572
Ventura, Ca	\$475,198	\$486,774	\$543,960	\$674,944	\$844,335	\$3,025,210



Canadian geese enjoy habitat at Winton Plant  
Santa Fe Aggregates, Inc.

**Table 3**

**Increases in Construction put in place by Project Type for California 1995 - 1999 (in billions)**

<b>Project Type</b>	<b>1995</b>	<b>1999</b>	<b>1995 - 1999 Difference</b>
Single Family	\$6,439,377	\$11,639,423	\$5,200,046
Offices	\$475,311	\$1,719,512	\$1,244,201
Multi-Family	\$623,158	\$1,571,829	\$948,672
Warehouses	\$399,084	\$1,060,158	\$661,074
Miscellaneous Non-Res	\$445,788	\$986,542	\$540,754
Hotel/Dormitories	\$103,204	\$572,365	\$469,161
Manufacturing	\$355,423	\$633,415	\$277,992
Stores	\$737,704	\$998,789	\$261,084
Auto Service	\$327,576	\$588,139	\$260,563
Education	\$766,719	\$997,752	\$231,032
Religious	\$103,816	\$157,371	\$53,555
Other Non-Building	\$1,462,052	\$1,494,711	\$32,658
Dams/Reservoirs	\$234,876	\$257,758	\$22,882
Street/Runways	\$1,420,694	\$1,426,701	\$6,007
Bridges	\$527,968	\$472,335	-\$55,632
Public Bldgs.	\$337,388	\$268,934	-\$68,453
Health	\$449,382	\$323,509	-\$125,873
Sewer/Water	\$1,559,087	\$1,367,328	-\$191,758
Utilities	\$344,250	\$128,983	-\$215,267
<b>Total</b>	<b>\$17,112,857</b>	<b>\$26,665,555</b>	<b>\$9,552,698</b>

Source: F.W. Dodge

# 4. Potential Impacts

This section discusses the potential impact of aggregates businesses on the gross product, wages, employment, and taxes paid in the state if transportation and school construction were increased.

Transportation: each \$10 billion increase in spending on transportation generates an additional:

- \$1 billion in gross product
- \$29 million in wages
- 5,398 employees

School construction: an additional \$2.8 billion in spending generates:

- \$174 million in gross product
- \$46 million in wages
- 852 employees

## 4.1 Economic Impact of Increased Transportation Spending

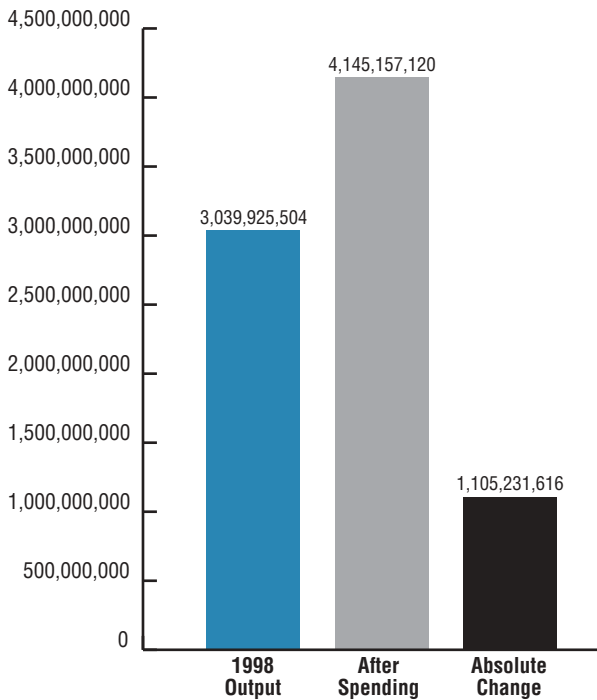
The California Transportation Commission estimates that \$100 billion in transportation spending is required to meet the state's needs. *Figures 11-12* illustrate the potential impact on aggregates businesses of spending an additional \$10 billion annually on transportation construction in California.

*Figure 11* estimates total gross product by the aggregates industry to be \$3 billion in 1998. \$10 billion in transportation spending will increase total gross product to \$4.1 billion, an increase of \$1.1 billion.

*Figure 12* estimates total wages for the aggregates industry in 1999 to be \$807.4 million. A \$10 billion increase in transportation spending raises this figure to \$1.1 billion, an increase of \$293 million.

**Figure 11**

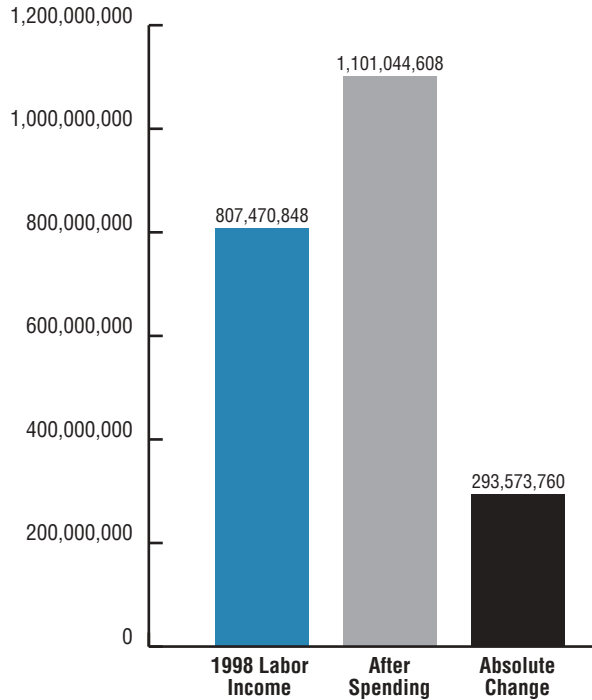
### Transportation Spending Impact on Aggregates Industries Gross Product



Source: Implan Pro, ADE

**Figure 12**

### Transportation Spending Impact on Employee Wages



Source: Implan Pro, ADE



Above: School Field Trip - Hallwood Habitat Educational Program  
Baldwin Contracting Company, Inc.

## 4.2 Increased Spending for School Construction

An estimated increase in school construction of \$2.8 billion yearly over the next decade increases aggregates industry annual gross product to over \$174 million (see figure 13).

Based on the same level of increase, wages paid to aggregates industry employees would increase by over \$46 million (see figure 14).

## 4.3 The Need for Aggregates

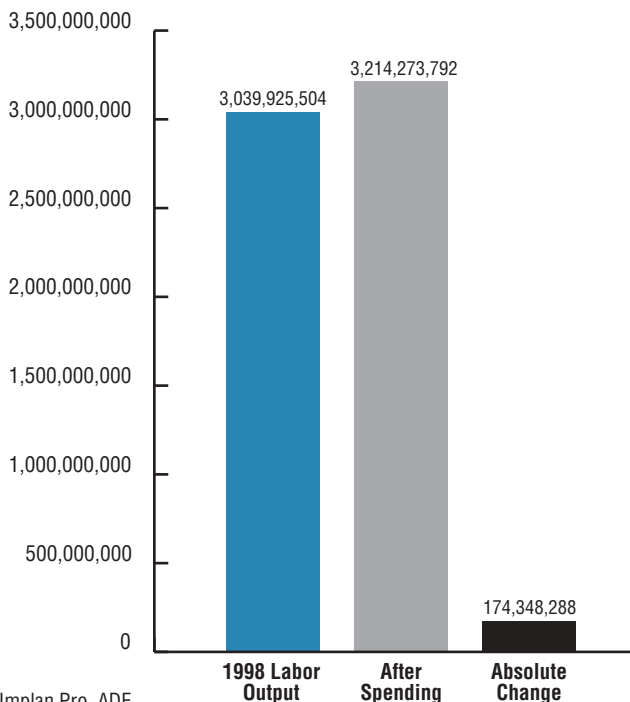
Despite the strength of the construction industry over the past 6 years, California's infrastructure needs are substantial. In addition to failing to provide transportation and educational facilities to match the growing population, California is falling far short in supplying affordable housing. More recently, the power crisis has revealed that investment in new generation has been insufficient for meeting the growing energy

demands of California consumers and industries.

If California businesses are to remain competitive in the global economy, the state will need to make major investments in infrastructure. Failure to do so may cause some of our most important industries to seek alternative locations where they are not plagued by such problems. However, infrastructure requires aggregates, and local and county jurisdictions will need to give greater consideration to aggregates in their land use planning and decision making processes. Without local, low-cost, and accessible aggregates, California communities will be unable to provide an attractive quality of life, nor maintain, improve, or build appropriate infrastructure. It is critical to California's future that resource assessment of aggregates be an integral part of land use planning. Current permitted supplies are rapidly running out and expedited government actions are required if the aggregates industry is to continue supplying the raw materials essential for construction.

Figure 13

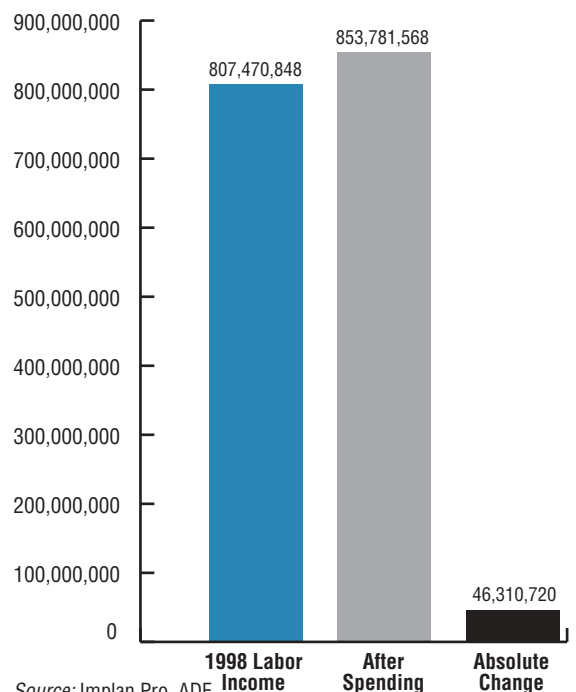
### School Construction Spending Impact on Aggregates Industries Gross Product



Source: Implan Pro, ADE

Figure 14

### School Construction Spending Impact on Employee Wages



Source: Implan Pro, ADE

# 5. Conclusion

This study has found that the aggregates industry, as the major supplier of raw materials for all construction in California, plays a pivotal role in the state's economy and its infrastructure.

Over \$100 billion, or 10% of the state's total gross product, is contributed by the construction industry. Yet construction isn't possible without the resources supplied by the aggregates industry: sand and gravel, crushed stone, asphaltic concrete, and ready-mix concrete. Without aggregates construction can't commence.

Other key findings:

- The aggregates industry contributes \$5.1 billion to the state's gross product, including nearly \$1 billion in federal and state taxes.
- Aggregate companies employ nearly 35,000 workers and provide over \$1.5 billion in wages.
- Aggregate companies boost the economies of all 58 California counties.
- While construction increased by over \$9.5 billion between 1995-99, California's failure to invest in essential infrastructure is causing critical deficiencies in roads, schools, bridges, power plants, airports, and water and sewage systems.

- A deteriorating infrastructure threatens California's quality of life, public safety, and competitiveness in the global economy.
- Between needed investments in infrastructure and a strong construction climate, access to local, low-cost, and large supplies of aggregates are critically important to California's future.

The findings herein also indicate that policies and programs statewide must begin to consider the importance of the aggregates industry in providing the essential infrastructure that sustains California's economic growth, quality of life, and continued prosperity.

Current permitted supplies of aggregates are rapidly running out, and it is critical to California's future that resource assessments of aggregates be an integral part of land use planning. If California is to meet the tough infrastructure challenges ahead, and the aggregates industry is to continue supplying the raw materials essential for construction, policymakers will need to ensure that land use policies conserve aggregate resources for future availability and use at the local level.



Bottom: Reclaimed Aggregates Site - Windsor  
Hanson Aggregates Mid-Pacific, Inc.

Top: Employee bands a baby barn owl - Winton Plant  
Santa Fe Aggregates, Inc.

# Methodology

The Aggregates Industry is made up of those industries supplying raw materials in support of final demand for a variety of physical infrastructure projects including, but not limited to, residential and commercial buildings, highways and roadways, and public buildings. Included in the Aggregates Industry are industries supplying sand, gravel and crushed stone to the construction industry for meeting this final demand.

Using this definition, ADE used an Input/Output methodology to identify those industries that are suppliers to the Aggregates Industry, and calculated the direct and indirect impact of those industries and suppliers on gross product, wages, value added and employment in California. A statistical multiplier was used by ADE to determine the induced impact of the Aggregates Industry and its suppliers on those same factors.

Data supplied by the FW Dodge Company on “construction put in place” from 1995 to 1999 were used to determine the growth of the Construction Industry and the Aggregates Industry over this period for the State of California and selected California locations. Estimates of potential growth in the Aggregates Industry over the next ten years was calculated by ADE based on published estimates in the growth in demand for transportation and school construction.



Above: PAVEX on the job - Highway 101, San Benito County Graniterock



Right: Vineyards near Russian River - Reclaimed aggregates site Syar Industries, Inc.

# Selected References

## Industrial Cluster Analysis

ADE was involved in a series of projects commissioned by the California Trade and Commerce Agency to formulate a state economic development strategy. Throughout 1995, a number of regional forums throughout the state identified the assets and potential obstacles for each region. For example, the forum held in the San Francisco Bay Area focused on multimedia and the environmental technology industries, while the focus in San Diego County was on the biomedical and telecommunications industries. ADE conducted the economic base analyses for each of these regions; and in conjunction with the state Labor Market Information Division, ADE identified industrial growth trends and analyzed industry clusters that are of particular importance to an individual region.

## Economic Base Analysis

The San Gabriel Valley COG asked ADE to develop an analysis of the valley's economic base showing the location and type of businesses found in each of its cities. ADE used the ES 202 files maintained by the Labor Market Information Department of EDD to analyze the mix and growth in employment in the valley and each city between 1991 and 1996 for seven industrial clusters. The findings were presented to the COG and steps were taken to mobilize business participation in continued analysis and actions.

## Regional Employment Growth Analysis

ADE has just completed a statistical analysis of the economic base of California and each of its nine regions for the California Community Colleges. This analysis uses the ES 202 files maintained by the Labor Market Information Department of EDD. This data which provides information on the number of employees, average wages and location for all firms in the State was used to provide data on employment growth and concentration between 1991 and 1997. This data will be used by community colleges, workforce investment boards and economic development organizations to develop workforce initiatives meet the requirements of growing firms in each of the State's regions.

## County Economic Growth Analysis

In a significant departure from traditional practice, ADE is working with a consultant team headed by Lawrence Mintier & Associates to develop an economic strategy to guide the general planning process. ADE conducted an analysis of the County's economic base, identified industries showing strong employment and income growth, and organized these industries into Industrial Clusters. This analysis was used to develop five scenarios that are likely to drive the Fresno County economy during the coming two decades. After public input was completed, the Planning Commission and the County Board of Supervisors directed the Consultant Team to prepare an economic strategy reflecting increased emphasis of the expansion of value added industries to complement the strong farming and ranching sectors in the Fresno economic base. The team was also directed to include non-agricultural industry growth as a long-term goal. The economic strategy has been approved by the County Board of Supervisors and is being implemented.

# Acknowledgements and Credits

Baldwin Contracting Company, Inc.  
 Brown Sand, Inc.  
 Buada Associates - John Buada  
 Calaveras Materials Inc.  
 California Department of Finance  
 California Department of Conservation,  
 Division of Mines and Geology  
 Central Valley Concrete  
 F.W. Dodge Corporation  
 Granite Construction, Inc.  
 Granite Rock Company  
 Hanson Aggregates Mid-Pacific, Inc.  
 Pankow Builders  
 RMC Pacific Materials  
 Santa Fe Aggregates, Inc.  
 Solano Concrete Company, Inc.  
 South Valley Materials, Inc.  
 Stevens Creek Quarry  
 Syar Industries, Inc.  
 Teichert Materials, Inc.  
 Union Asphalt, Inc.  
 Vulcan Western Division  
 Whole Access - Phyllis Cangemi, Executive Director

High quality rip-rap boulders -  
 AR Wilson Quarry  
 Graniterock



## COVER PHOTOS

Bottom Left: Materials Plant - Indio  
 Granite Construction, Inc.

Center: Graniterock Concrete Drivers - Watsonville

Far Left: Highway 50 Repair  
 Granite Construction, Inc.

Top Right: Shadow Cliffs Regional Recreational Area - East  
 Bay Regional Park District, Pleasanton (Reclaimed  
 Aggregates Site)  
 Hanson Aggregates Mid-Pacific, Inc.  
 RMC Pacific Materials  
 Vulcan Western Division

Lower Right: Instream Habitat (Reclaimed Wildlife Habitat)  
 Union Asphalt, Inc.

## BACK COVER

Lower Left: Reclaimed land at aggregates site in Pinedale  
 (N. Fresno)  
 Calaveras Materials Inc.

Center Left: Reclaimed land, Diener Site  
 Calaveras Materials Inc.  
 Photo Credit: John Buada©

Top Left: Borba Farms' Rancho Vista del Rio - Madera  
 Calaveras Materials Inc.  
 Photo Credit: John Buada©

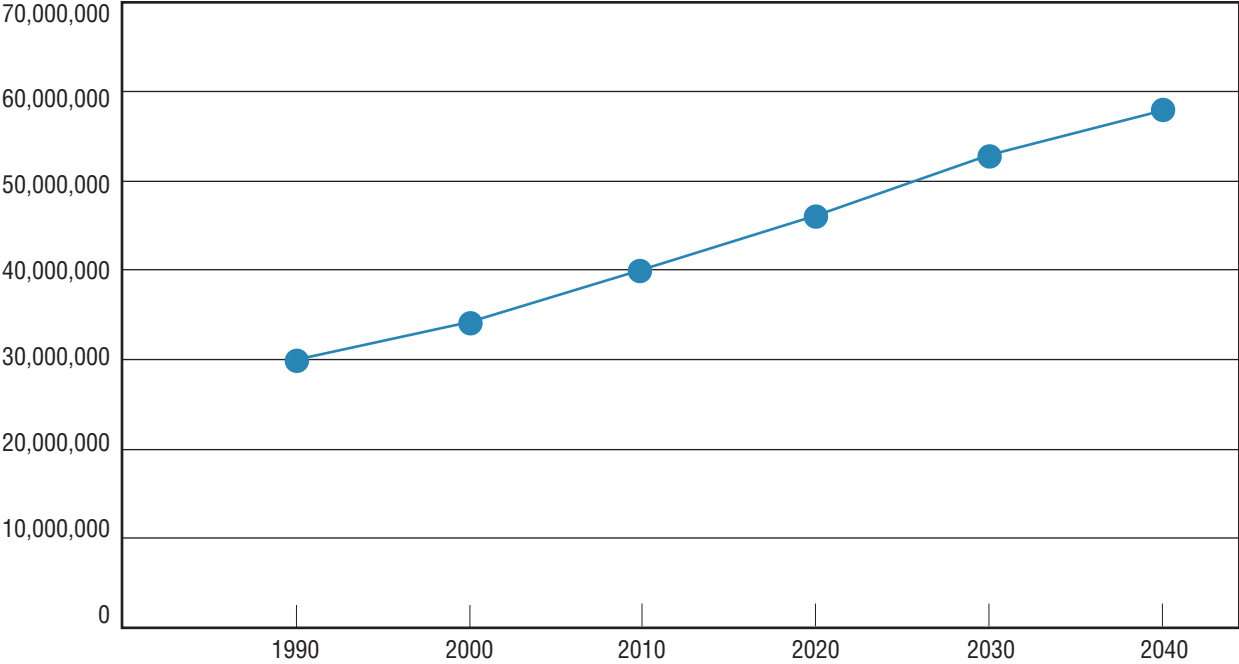
Top: State-of-the art Asphalt Plant - Fresno  
 Calaveras Materials Inc.

Bottom Right: Helping Provide Access to the Disabled: Phyllis  
 Cangemi, Executive Director of Whole Access &  
 RMC Pacific Ready-Mix Concrete Truck  
 RMC Pacific Materials  
 Whole Access

Bottom Center: Waterfowl Habitat & Fishing Lake: Diener Lake, San  
 Joaquin River, Madera Co.  
 Calaveras Materials Inc.  
 Photo Credit: John Buada©

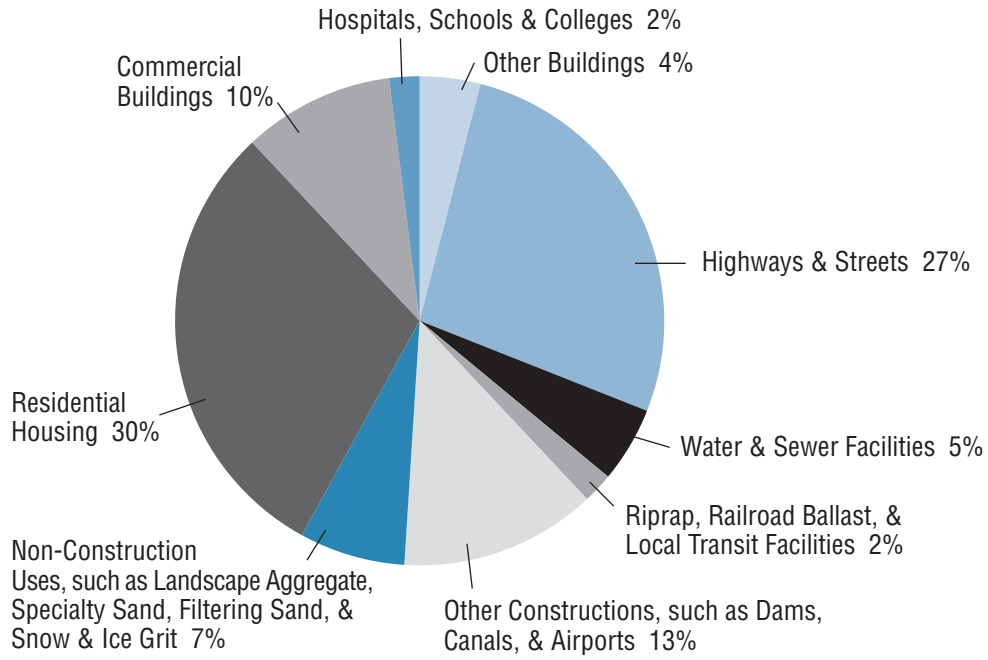
# Appendix

## California Projected Population Growth: 1990-2040



Source: California Department of Finance

## End Uses of Aggregates



Source: California Department of Conservation, Division of Mines and Geology





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