

construction & aggregates

in Shasta County

An Economic Analysis of the Construction and Aggregate Industries in Shasta County

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Prepared for Construction Materials Association of California,
Shasta County Chapter

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AN ECONOMIC ANALYSIS OF THE CONSTRUCTION AND AGGREGATE INDUSTRIES IN SHASTA COUNTY

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Prepared for The Construction Materials Association of California
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NOTE

An Economic Analysis of the Construction and Aggregate Industries in Shasta County is the fifth in a series of economic studies that analyze the economic impacts of the construction and aggregate industries in the state and selected counties. The first study in 2001 provided statistical data on the importance of the construction and aggregate industries statewide. Research on the economic impacts of the construction and aggregate industries in individual counties was launched in 2002 with the release of the second study examining Tulare County. The third and fourth studies, covering Merced and Fresno counties, were published in August and October, 2003, respectively.

The Shasta County study has been developed in cooperation with the Shasta Builders' Exchange and the Association of General Contractors.

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1. EXECUTIVE SUMMARY

This report examines and assesses the contributions of the aggregate and construction industries on the Shasta County economy measured by total output, including revenues, employment, wages, value added impacts, and taxes. The report also briefly examines the economic and social effects of potential aggregate shortages on the County's future.

SIGNIFICANT FINDINGS

Based on 2000 data, without factoring in any projected growth, this study finds that:

- The total economic impact from the aggregate and construction industries in Shasta County is **\$1.4 billion annually**.
- **Nearly \$1 billion** (\$980 million) in direct output was contributed to the Shasta County economy by the aggregate and construction industries, or **14% of all Shasta County output**. Combined, aggregates and construction rank as the third largest industry in Shasta County. Only Services, and Finance, Insurance, and Real Estate are larger.
- **Almost \$100 million** (\$91 million) of aggregate and construction's direct output was used by the county's major industries. The Finance, Insurance, and Real Estate sector, and the Transportation, Communications, and Public Utilities sector, each used \$21 million of aggregate and construction products. Services followed at \$13 million and Manufacturing at \$6.9 million.
- **Nearly \$400 million** (\$393 million) was contributed indirectly by the aggregate and construction industries to the Shasta County economy.
- The aggregate and construction industries employed **over 7400 people, 9% of all county employment**.
- The aggregate industry's **average total employee compensation was \$59,687**, over 3 times the county's per capita income.
- Aggregate accessibility and availability **are crucial for building the infrastructure** required for Shasta County's economic vitality, and for sustaining its outstanding quality of life.
- Shasta County's future depends upon land use decisions that **ensure the availability of aggregates**, and accessibility to permitted reserves.

Between 1990-2000, Shasta County grew by 11%, and population projections estimate that by 2020, Shasta County's population will increase by more than 40% over current figures. As a result, Shasta County is planning and building for growth, particularly the City of Redding which is in the midst of a \$350 million capital projects boom.

In 2000, Shasta County's per capita income was \$17,738, and its median household income \$34,335 (compared to \$22,711 and \$47,493 for California overall). Between 1997-2001, Shasta County experienced a cumulative job growth rate of 11%. However, over the past decade the County lost nearly 600 manufacturing jobs, and most of the current job growth is occurring in the low paying services sector.

The ability of Shasta County to grow successfully, retain current businesses, develop a diversified economy that attracts industries with high wages, and sustain a superb quality of life, will largely be determined by its investment in infrastructure.

Providing the necessary infrastructure requires access to local, large, and low-cost supplies of high quality sand and gravel and crushed stone – called “construction aggregates”. Aggregates are the basic raw materials required for building, and for making ready-mix concrete, asphaltic concrete (often called “black top”), road base, sub base, and a wide variety of other products. 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 consist of sand, gravel, and stone.

However, as discussed in a 1997 California Department of Conservation Mineral Classification Study, access to large quantities of aggregates is dependent upon land-use decisions that are fully informed of the area's valuable aggregate resources. As the report states, “The economic well-being of urban areas throughout California is directly linked to the availability of basic construction materials . . .”¹

This report focuses on the substantial economic contribution of the aggregate and construction industries in Shasta County. However, the findings also have implications for the County's progress, its ability to have the infrastructure that favorably impacts its economic, social, and environmental future, and the inclusion of aggregate resources in its long range land use planning. All demographic and economic indicators point toward continued growth. That information, combined with the economic data herein, indicates that planning for Shasta County's future livability also means planning for the continuous availability of aggregates.

1. Don Dupras, Mineral Land Classification of Alluvial Sand and Gravel, Crushed Stone, Volcanic Cinders, Limestone, and Diatomite Within Shasta County, California (Sacramento: California Department of Conservation, Division of Mines and Geology, 1997), 25.

2. OVERVIEW

On July 8, 1940, the first bucket of concrete was placed at Shasta Dam. Building the Shasta Dam required 12,200,000 tons of aggregates,¹ mostly for the 6,535,000 cubic yards of concrete contained in the structure.² The aggregates were transported by a 10 mile conveyor belt from what is now Turtle Bay in Redding. Had the US government and construction companies lacked access to large, local supplies of high-quality concrete-grade aggregates, Shasta County could not have been selected for the first phase of the Central Valley Project. Since 1945, Shasta Dam has provided flood control, irrigation, drinking water, and power production for much of Northern California. America's second largest dam has made an almost immeasurable contribution to California's history and economy.

Today, access to local high quality concrete grade aggregates is no less critical to the success of Shasta County communities. Aggregates are fundamental and essential resources for building the infrastructure necessary for economic prosperity, and preserving the area's superb quality of life.

2.1 CALIFORNIA'S INSUFFICIENT INFRASTRUCTURE

Since 1990, California has gained over 4 million new residents – the largest population increase of all 50 states. The California Department of Finance estimates a population of 45 million in 2020, and 50 million in the 2030s. Although growth continues unabated throughout California, it is occurring most rapidly beyond the San Francisco and Los Angeles regions. Over half of the state's population now lives outside the state's coastal megalopolises.³

At the same time, California has failed at planning for growth and the concomitant infrastructure required. It has been well publicized that California's expenditures for infrastructure rank near the bottom nationally, and that the state needs to spend over \$90 billion to meet its infrastructure needs.⁴ Additionally, over \$1 billion of state transportation projects await completion.⁵

There is a direct correlation between increased population and infrastructure requirements. Infrastructure comprises public works such as roads, highways, bridges, water and sewer systems, airports, dams, and power plants, as well as schools, libraries, and other public buildings. Residential and commercial construction is also included as infrastructure in this report. A dynamic economy, sustainable environment, quality school system, and a healthy quality of life all depend upon the construction and maintenance of infrastructure.

Currently, California is only producing one-half its housing needs, and although the state's population has grown by 50% during the past 20 years, road capacity has barely increased 7%. In the 1960s approximately 20% of state spending was directed towards

infrastructure. Today that figure is close to 3% despite tremendous growth, and outdated and crumbling infrastructure.⁶

2.2 SHASTA COUNTY'S GROWTH TRAJECTORY

Shasta County is sharing in the overall population growth of the Central Valley, which is growing at a faster rate than the state. Between 1990-2000, Shasta County grew by 11%, and Redding, the county seat and largest city, grew 21.7% to 80,865. Population projections estimate that by 2020, Shasta County will reach 231,000, an increase of more than 40% over current figures.⁷ By 2046, the county's population is estimated at 358,500, or a total population increase of 104% in less than 50 years.

The county continues to build its future. Redding is in the midst of a \$350 million capital projects boom including major downtown renovations, new parks, restored neighborhoods, and improved streets. The city has built a \$12 million sports park; a \$5 million Aquatic Center, the 16-mile Sacramento River Trail System; restored Tiger Field for professional baseball, and will complete the Turtle Bay Exploration Park, including the \$23 million "Sundial" Bridge, in 2004. The city is also restoring the historic Cascade Theatre and is planning to build a 60,000 sq. ft., \$20 million library. Shasta College's expansion includes building a new Health Sciences Center in downtown Redding, and Simpson College is constructing a new student services center.⁸

Redding has well thought-out plans for providing the public infrastructure necessary to support its growth, including improvements for water and wastewater systems; streets, traffic, and the airport. For example, Redding has completed a \$46 million, 43-megawatt gas-fired generator, resurfaced Redding airport's runway, and dug trenches on both sides of town for new sewer and water lines. In addition to the new General Plan adopted in 2000, the city is also developing plans for its water, wastewater, fire protection, streets, parks, trails, and open space. The importance of infrastructure is acknowledged in Redding's 2003 Annual Report: "Ranging from streets to waterlines to airports, providing for future success means putting an appropriate emphasis on providing a foundation on which to build our city."⁹

Redding's development permit activity has increased more than 40% between 1999-2001. During 2001-2002, building permits were issued for more than \$151 million in new construction, a 13.3% increase over 2000-01, and the current year indicates a similar increase.¹⁰

Compared to other California locations, such as the Bay Area, housing prices in Shasta County are still reasonable. However, countywide, real estate prices have increased 15% during the past year, in addition to a similar percentage the previous year.¹¹ At the same time, while home listings have decreased, and construction has leveled off, more expensive homes are being built. Consequently, homes are becoming increasingly unaffordable and there is growing apprehension that many working and middle class families will be priced out of the market.

According to the Office of Federal Housing Enterprise Oversight, the greater Redding area's home appreciation rate of 16.3% during the first quarter of 2003 was the fastest in the nation. From 4th quarter 2000 to 4th quarter 2001, the National Association of Home Builders' Housing Opportunity Index shows that Redding dropped from the 11th to the 28th most affordable place to live in the Western US.¹²

Shasta County's two smaller incorporated cities are also planning for growth. The City of Shasta Lake has been making downtown and surrounding area improvements; marketing the Shasta Gateway Industrial Park, and developing a commercial center near Shasta Dam and Cascade Boulevards. Anderson, 10 miles south of Redding, is planning to build the Anderson Marketplace, a proposed 205,117 sq. ft. retail center.

Economic Backdrop

According to Census 2000, Shasta County's per capita income was \$17,738, and its median household income \$34,335 (compared to \$22,711 and \$47,493 for California overall).¹³ In 2000, Shasta County's unemployment rate was 6.9%, although that dropped from a high of 9.1% in 1997. Shasta County exceeds California's unemployment rate, partly due to the seasonal nature of the tourism industry.¹⁴

Services, retail trade, and government account for 73.4% of employment in Shasta County. Between 1997-2001, Shasta County added 6200 jobs, for a cumulative growth rate of 11%. Although construction and mining, and finance, insurance, and real estate gained jobs, projections for 1999-2006 forecast that 77.5% of the nonfarm job growth will be in services, retail trade, and government.¹⁵

Based on US Dept. of Labor statistics, from 2000-2003, the National Association of Manufacturers reported that California lost 167,000 manufacturing jobs. During the past decade, Shasta County lost 580 jobs due to the closure of two forest product companies and a pool-cleaning products builder.¹⁶ While the county's employment rate has increased, many are in the low paying services sector.

According to the Redding Chamber of Commerce, overall job growth in the past 5 years was more than double the national average (19.9% vs. 8.7%).¹⁷ Retail trade is 22% of Redding's economy, making it the city's second largest industry. As the northern state's regional center, Redding attracts 180,000-200,000 people from 4 counties to 12 major shopping destinations.¹⁸ In addition to new shopping centers, others have expanded and/or renovated, and major retailers continue to locate to the area. Wal-Mart is expanding to a Supercenter in Redding, and will also build a 184,000 sq. ft. store in Anderson in the planned Anderson Marketplace shopping center.

Much of the growth in services is due to the "urban refugee" phenomenon that affects many communities in the western US. New residents, usually from high priced California urban areas, move to smaller, lower cost-of-living communities throughout California and other desirable western locales. Their influx drives up home prices, resulting in economic distortions. Since local residents generally earn the wage scale of

the community, housing becomes less affordable, and the employment created by the demands of the recent arrivals tends to be dominated by relatively low-paying service jobs. At the same time, new residents often tend to oppose traditional industries that pay higher wages, based on perceptions of personally-held aesthetic or “lifestyle” expectations. Shasta County is also attractive to a large and growing retiree demographic, increasing the demand for services, primarily in health care and related sectors.

Given the continued population growth and increasingly unaffordable housing, it is important for the County to attract industries offering middle-class wages. According to Jim Zauher, President of the Economic Development Corporation of Shasta County (EDC), light industry, basic manufacturing, and distribution are key to replacing the higher-paying lost jobs. The EDC is promoting local expansion and new business by targeting growth industries that help diversify the economy, and that match up favorably with the county’s labor force and amenities. As part of this initiative, the Economic Development Corporation and the City of Redding are continuing to work on developing the 700-acre Stillwater Industrial Park east of the Redding Municipal Airport. At full capacity, Stillwater will have 4.4 million sq. ft. of building space housing 9500 employees. This large industrial park with full city infrastructure will be one of only a few industrial parks owned by a city. Building the Stillwater Industrial Park is a critical step for attracting and supporting new industrial development that helps increase the County’s per capita income.¹⁹

If Shasta County is to continue developing a diverse economy, and attract industries that offer higher salaries, it will need to link economic development with infrastructure investment. In a highly competitive global economy, first class infrastructure and an excellent quality of life are primary considerations of businesses when deciding location. Infrastructure is strategic to the County’s competitiveness.

Shasta County’s projected population and economic growth, city and county plans, and quality of life, all share one common denominator necessary for success: the need for local and large supplies of high quality construction aggregates.

2.3 NO INFRASTRUCTURE IS BUILT WITHOUT AGGREGATES

Building and maintaining the infrastructure necessary for Shasta County’s economic vitality and superb quality of life requires a continuous supply of locally available sand and gravel and crushed stone, called “construction aggregates”. These natural resources are the first step in the construction process and used in a wide variety of products. Much of the aggregate required needs to be high-quality, or what is known as “concrete aggregate”. These aggregates are necessary for making portland cement concrete (PCC) and asphaltic concrete (AC).

Virtually every construction application needs and uses aggregates. Construction aggregates are used in PCC, AC, plaster, stucco, road base, subbase, and fill, and generally provide from 80-100% of the material volume in those uses.²⁰ 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 for building federal, state, and local roads consist of sand, gravel, and stone.

Physical infrastructure, or the “built environment”, comprises public works projects and residential, commercial, and industrial buildings:

INFRASTRUCTURE CATEGORIES	EXAMPLES
<ul style="list-style-type: none"> • TRANSPORTATION 	Roads, highways, bridges, ports, airports, railroad beds, and public transit
<ul style="list-style-type: none"> • WATER RESOURCES 	Water and sewer systems, pumping and power plants, canals, pipelines, reservoirs, and flood control structures
<ul style="list-style-type: none"> • PUBLIC BUILDINGS 	Schools, libraries, hospitals, laboratories, correctional facilities, and government offices
<ul style="list-style-type: none"> • OUTDOOR AND RECREATIONAL 	Parks, trails, fire stations, forest and agricultural stations
<ul style="list-style-type: none"> • RESIDENTIAL, COMMERCIAL, AND INDUSTRIAL BUILDINGS 	Homes, shopping centers, manufacturing plants, office complexes, agricultural structures

- Aggregates make up more than 94% of asphalt and 80% of concrete pavements.
- Construction of an average home requires 400 tons of aggregates, or 16 truck trailer loads.
- 38,000 tons of aggregates are required for one lane-mile of a four-lane highway, or 1,520 truck trailer loads.
- Water and sewer facilities use aggregates for filtration in water purification and sewage treatment.
- Thousands of tons of aggregates are required for water and sewage treatment plants, water storage, power plants, prisons, dams, tunnels, and erosion control.
- A school or hospital requires at least 15,000 tons of aggregates, or 600 truck trailer loads.

- Aggregates are also used in agriculture and forestry, environmental protection, and in the manufacturing of glass, paint, cosmetics, pharmaceuticals, and many other consumer products.²¹

Aggregates' indispensability to infrastructure demonstrates that aggregates are essential to the economic well being of cities and counties, and their availability directly affects a community's livability. Therefore, when determining what data to include and exclude in long-range planning, it is important to include local aggregate resources into the planning process.

All Aggregates Are Not Alike

Sand and gravel and crushed stone are rarely noticed by the public, although the prevailing assumption is that aggregates are "everywhere", and can be found "anywhere".

In reality, not every aggregate deposit is physically or chemically suited for every use. For example, only high-quality concrete aggregates can be used for PCC and AC because of rigorous and restrictive engineering specifications. These are the rarest and most valuable aggregate resources. Certain physical and chemical property characteristics and qualities must be present depending on the ultimate application, and various government agencies such as the California Department of Transportation (Caltrans), the US Army Corps of Engineers, and the US Bureau of Reclamation have set specifications to ensure the suitability of aggregates for specific uses. The California Geological Survey (formerly the California Division of Mines and Geology) states that "Most aggregate specifications have been established to ensure the manufacture of strong, durable structures, capable of withstanding the physical and chemical effects of weathering and use."²²

High-tech industries receive the attention, but society depends on aggregates as much as on gasoline, electricity, and food products. For most uses, there are no substitutes for aggregates – they can't be manufactured or duplicated, and their locations are determined by geological conditions. There are few other industries that can't be moved or grown elsewhere, or that are so critical and unique to their applications. What is often assumed to be a common commodity, accessible everywhere, and taken for granted, is actually quite the opposite.

2.4 ON BORROWED TIME: SHORT SUPPLIES SHORT-CIRCUIT SHASTA COUNTY'S FUTURE

Juxtaposed against Shasta County communities' well-laid out plans for growth, economic vitality, and a sustainable quality of life, is the need for large quantities of locally produced, high-quality construction aggregates. The county's success depends upon the availability and accessibility of local aggregate supplies.

If the county is to build, maintain, and replace current and future infrastructure, it will require hundreds of millions of tons of construction aggregates. Due to growth, the

average per capita consumption of aggregates in Shasta County is 8.0 tons per person.²³ This is higher than the state's average of 7 tons per person per year,²⁴ and is unlikely to decrease in the near future.

According to a 1997 California Department of Conservation Mineral Land Classification Report, projected demand for construction aggregates in Shasta County to the year 2046 will be approximately 110.3 million tons. Of this total, approximately 67%, or 74 million tons, will need to be concrete grade, and 33%, or 36 million tons, for other construction and aggregate uses.²⁵

Based on the county's per capita consumption rate, and the then-permitted concrete-grade aggregate reserves used in the 1997 study, depletion of supplies was estimated to occur in 2014.²⁶ This estimate is based on alluvial aggregates, and does not include the county's massive tonnages of developed and undeveloped limestone resources. However, the report also notes that depletion estimates are dependent upon the availability and accessibility of aggregates. If construction materials are unavailable due to urbanization or land use decisions that have resulted in the inability to access the land for aggregates, such depletion dates are moot.

Aggregates are a low value, high weight commodity, and supplies must be obtained locally or transportation costs can rapidly exceed the value of the aggregates. The farther aggregates are transported, the more expensive they become. Hence, transportation costs are a principal factor in establishing the market area of an aggregates operation. For example, a one-way haulage distance of 20-25 miles, or a one-hour round trip of about 40-50 miles, "approximately doubles the final delivered price of aggregate to the consumer."²⁷

There are also additional environmental and safety impacts associated with longer-distance transport. Increased fuel consumption, air pollution, traffic congestion, and road maintenance all affect the environment, and longer transportation distances also raise safety concerns.

2.5 AGGREGATES BENEFIT COMMUNITIES

Population forecasts, community plans, infrastructure needs, and economic development projects all indicate that demand for aggregates in Shasta County will remain strong over the next 50 years. The state study also reports that "nearly 90% to 95% of the production within the study region has been consumed within Shasta County."²⁸

Aggregate supplies must be locally available and accessible if they are to benefit their communities. As described earlier in this section, an important criterion is whether the aggregates are physically and/or chemically suitable for the ultimate application.

However, the land hosting the aggregate deposit must first be available and accessible. To ensure that is possible, earlier land-use planning had to have recognized the area's natural resources, and their importance to the entire community and/or county.

Ironically, decisions favoring other land uses often preclude aggregate accessibility even though projections from the state government have warned of the upcoming depletion of those very aggregates depended upon by residents for economic growth, public infrastructure, and community livability.

Other criteria that determine the actual availability of aggregates are whether production is economically feasible; the potential for obtaining all necessary government permits, and public input during the permitting process. Such factors, especially the latter, often tend to increase the scarcity of these invaluable materials as much, or more, as the physical and chemical requirements. According to the state's Mineral Classification Report, developing aggregates is "controlled by geology . . . physical site conditions . . . and societal values."²⁹

Given Shasta County's geological abundance and the market demand for aggregates, resource availability and/or depletion may not be challenged as much by geological, economic, or technological factors as by social issues. If the resultant outcome is the withholding or unavailability of aggregate supplies, the entire community pays a high social price in terms of overall quality of life, environmental protection, and economic well-being. The resultant artificial shortages drive up overall prices, further decreasing affordable housing and the ability to attract new businesses to Shasta County. Since the County is competing for jobs not only with other California communities, but globally, the stakes are even greater, threatening future community sustainability and livability. If aggregate supplies go below levels of market efficiency, the county pays a price in less output and slower growth. Slow growth/no growth policies may be favored by some citizens, but that is a separate public policy issue, and aggregate availability should not be substituted as a de facto symbol for an entirely different objective.

2.6 PRESERVING THE SOCIAL GOOD

As discussed throughout this report, aggregates promote the welfare of the community through their substantial economic contribution as an industry, their necessity to other businesses and for successful economic development, public infrastructure, and sustaining community livability.

Aggregates are also used for a myriad of other uses, including a large number that protect or assist the environment. For example, Shasta County contains Iron Mountain, described by the EPA as "one of the country's most toxic Superfund sites."³⁰ Yet it is a nearby aggregates operation that supplies high grade chemically correct sand and rock used for drainage and as filter media.

Another important local environmental usage of aggregates is for fish spawning. Shasta County's lakes, rivers, and streams are popular with recreational enthusiasts, particularly anglers. However, since the construction of the area's various dams, there has been a large decrease in the natural replenishment of sand and gravel that is necessary to maintain fish spawning habitats. The California Department of Fish and Game (CDFG) began a program to actively restore fish spawning habitats within the active streams and

rivers of Shasta County. Since mid-1996, the CDFG has placed nearly 75,000 tons of spawning gravel at Lower Clear Creek sites, including Saeltzer Dam, downstream of Saeltzer Dam, Whiskeytown Dam, Placer Bridge, Reading Bar, Clear Creek Bridge, and the City of Redding.³¹

Restoring, Reclaiming, and Reusing Aggregate Land

Aggregate companies are heavily regulated and must meet the requirements of nearly 80 agencies overseeing federal, state, county, and local laws. Once permitted, the regulatory process continues throughout the life of the operation.

Nevertheless, aggregate production is an interim land use. After providing the building materials necessary for infrastructure, the land is reclaimed and restored. In California, aggregate producers reclaim land to nearly 50 diverse and desirable uses, including open space, agriculture, and recreation. While over 90% of California's wetlands have been lost over the past 100 years due to statewide settlement, California's sand and gravel producers are a major resource for creating and restoring thousands of acres of wetlands and wildlife habitat. The California Office of Mine Reclamation reports that statewide, aggregate producers have reclaimed over 50 square miles of land during the decade of 1990-2000, a size comparable to the City and County of San Francisco.³²

Many land use projects are the result of successful partnerships between aggregate producers, communities, and local and county governments. Whether reclaimed to residential or commercial developments that generate additional economic value, or to recreational uses for the public's enjoyment, reclaimed aggregate land is a community asset.

1. Redding Record Searchlight, "Welcome 2003," (Annual publication), 69.

According to the California Department of Conservation's Mineral Land Classification Report for Shasta County, demand for all aggregate in Shasta County to the year 2046 will be approximately 110.3 million tons. This is nearly *ten times* the amount of aggregates used for building Shasta Dam.

2. Al Rocca, Shasta Lake Boomtowns and the Building of Shasta Dam (Chicago: Arcadia Publishing, 2002), 108.

3. Mark Baldassare, A California State of Mind (Berkeley: University of California Press, 2002), 35.

4. *Ibid.*, 38.

5. Michael Kolber, "State Road Work Stalled," Sacramento Bee, 14 October 2003.

6. "Infrastructure in California: Overburdened, Outdated, and Overlooked," California Rebuild America Coalition fact sheet.

7. State of California Employment Development Department, County Snapshots, <<http://www.calmis.ca.gov/file/cosnaps/shastsnap.pdf>.

8. "Welcome 2003," 10.

The Sundial Bridge at Turtle Bay Exploration Park is designed by world renowned architect Santiago Calatrava. Mr. Calatrava was recently selected to design the new transit hub at the World Trade Center in New York.

9. City of Redding 2003 Annual Report, 16.

10. *Ibid.*, 4.

11. "Welcome 2003," 19.

12. *Ibid.*

13. U.S. Census Bureau Quick Facts
14. Employment Development Department
15. Ibid.
16. "Welcome 2003," 23.
17. "About Redding," Greater Redding Chamber of Commerce, <<http://www.reddingchamber.com/aboutred.shtml>.
18. "Welcome 2003," 21.
19. Jim Zauher, Executive Director, EDC of Shasta County, on-site interview by Sharon Prager, Redding, CA, 6 October 2003.
20. Don Dupras, Mineral Land Classification of Alluvial Sand and Gravel, Crushed Stone, Volcanic Cinders, Limestone, and Diatomite within Shasta County, California (Sacramento: California Department of Conservation, Division of Mines and Geology, 1997), 25.
21. 50 Fascinating Facts about Stone, Sand and Gravel (Arlington, VA: National Stone, Sand and Gravel Association).
22. Dupras, 26.
23. Ibid., 65.
24. Kohler, Susan L., Aggregate Availability in California (Sacramento: California Department of Conservation, California Geological Survey, 2002), 16.
25. Dupras, xi.
26. Ibid., 73-74.
27. Ibid., 33.
28. Ibid., 59.
29. Ibid., 31.
30. "U.S. and State of California Announce Long-Term Settlement for Iron Mountain Mine," US Environmental Protection Agency, as shown on <<http://www.epa.gov/region09/features/ironmountain.html>.
31. Mike Berry, Senior Fishery Biologist, California Department of Fish and Game, e-mail communications and phone interview by Sharon Prager during October, 2003.
32. Sharon Prager, Reclamation Survey (Sacramento: Construction Materials Association of California, 2001), 6-7.

3. THE AGGREGATE AND CONSTRUCTION INDUSTRIES' CONTRIBUTION TO SHASTA COUNTY'S ECONOMY

This portion of the report describes the contribution of aggregates and construction to the Shasta County economy in 2000. In addition to the direct contribution that these industries create through production and services, their purchases have significant economic impacts. The economic contributions of other selected industries are also shown for context and comparison purposes.

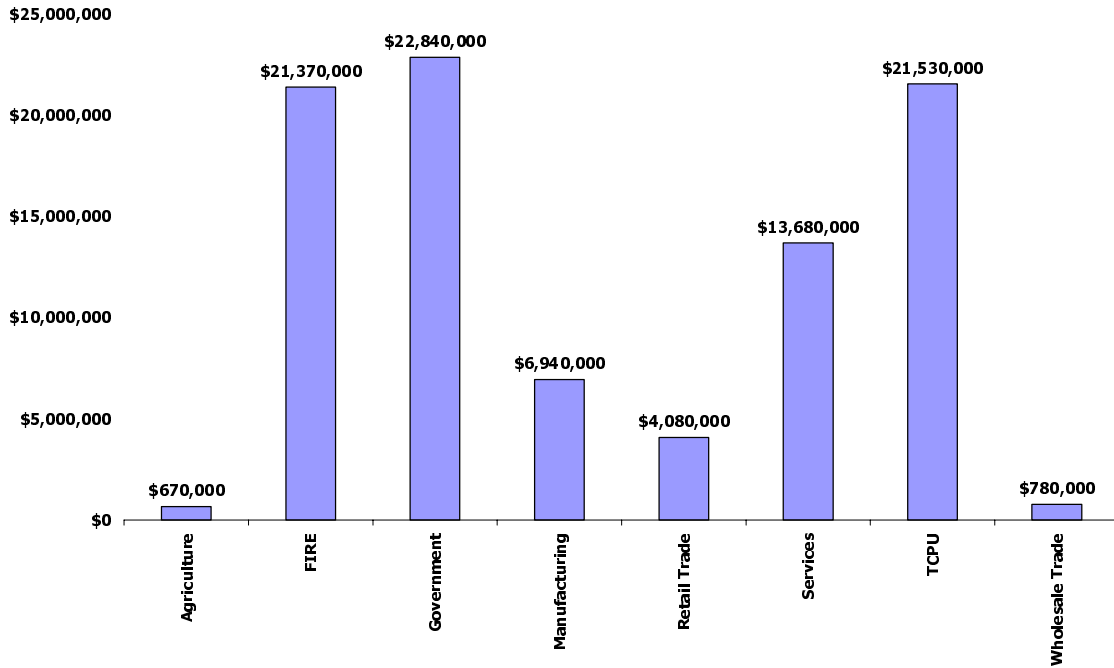
3.1 THE SHASTA COUNTY ECONOMY – 2000

Shasta County drives the Northern Sacramento Valley economy. The total economic output of all Shasta County industries in 2000 was \$7 billion. Services was the largest industry in terms of direct output (\$1.6 billion), followed by finance, insurance & real estate (\$1 billion), and retail trade (\$922 million). The direct output for the aggregate and construction industries was \$980 million, ranking it the third largest industry in Shasta County.

Not only are the aggregate and construction industries important economic contributors, they are integral for providing the infrastructure required to maintain the county's economy and quality of life, as well as public facilities needed for future generations. Shasta County continues to require expanded infrastructure to sustain a growing economy, population and services.

In addition, aggregates and construction play a vital role in supporting and maintaining all other Shasta County industries. In 2000 aggregates and construction had a total input of \$91 million into other industries. In other words, \$91 million of aggregate and construction products and services were used to produce goods and services in other industries. Over \$21 million of aggregate and construction products were required by the finance, insurance, and real estate sector, in addition to another \$21 million of products used by transportation, communications, and public utilities. Services and manufacturing relied on over \$13 million and \$6.9 million, respectively, of aggregate and construction production. Figure 1 is the amount that the aggregate and construction industries contribute to the output of the major industries in Shasta County.

**FIGURE 1
AGGREGATE AND CONSTRUCTION INPUTS INTO MAJOR SHASTA COUNTY
INDUSTRIES, 2000**



Source: IMPLAN Professional 2.0; 2000 Shasta County Implan Data.

Note: Agriculture includes agricultural crops, agricultural services, forestry, and fishing; TCPU- Transportation, communications, and public utilities; FIRE-Finance, insurance, and real estate.

3.2 AGGREGATES AND CONSTRUCTION IN SHASTA COUNTY

Since sand, gravel and crushed stone are the basic raw materials used in construction, road building, and asphaltic and ready-mix concrete, the aggregates industry is an indispensable component of the construction industry. Shasta County’s public and private infrastructure – its roads, highways, homes, schools, and buildings depend upon aggregates for construction. Having access to local, large, and high-quality supplies of aggregates is a prerequisite for efficient, cost-effective building.

In 2000, the total direct and indirect contributions of the aggregate and construction industries to Shasta County was \$1.4 billion. This total is larger than the well known Shasta County industries of Health Services and Tourism.

The aggregate and construction industries employed over 7,000 people in Shasta County in 2000 – 9 percent of all county employment. Purchases by the aggregate and construction industries employed over 3,800 additional personnel.

**TABLE 1
TOTAL IMPACT OF THE AGGREGATE AND CONSTRUCTION INDUSTRY ON THE SHASTA
COUNTY ECONOMY**

2000 Shasta County Aggregates & Construction Industry	Output	Employment
Direct	\$980,801,000	7,418
Indirect	\$393,987,000	3,849
Total	\$1,374,788,000	11,267

Source: IMPLAN Professional 2.0; 2000 Shasta County Implan Data.

3.3 INDUSTRY COMPARISONS – WHERE DO AGGREGATES AND CONSTRUCTION FIT IN THE SHASTA ECONOMY?

The construction industry depends upon the aggregates industry. Without readily available aggregates, construction costs skyrocket and work is delayed or postponed. In this sense, the construction industry can be seen as a value-added component of the aggregates industry. The connection between aggregates and construction is similar to the soil needed for crop production, or to silicon for semiconductors. Recognizing the importance of the construction industry to the Shasta County economy, therefore, is not possible without conferring equal weight to the aggregates industry.

Aggregates are essential to the services, manufacturing, and transportation industries. Services, including tourism, need the transportation systems and infrastructure that are provided by aggregates and construction. Infrastructure is no less important to the distribution systems required for the expanding retail and financial services sectors. Demand for these services is continuing to increase, in part because of Shasta County's growing population of older adults.

While all industries are interdependent, it is useful to examine individual industries to gauge their performance and impacts. Since this study focuses on the aggregate and construction industries, other prominent Shasta County industries have been selected for comparison. This is not meant to imply that any industry is less important than another. Instead, it is simply a measure of the contribution of each. For instance, while direct output (dollars contributed to the total Shasta County economy through production) may be higher in one industry, wages or employment may be higher in another. The industries used herein for comparison purposes were simply chosen because of their acknowledged importance to Shasta County and make for easy comparisons to aggregates and construction.

Construction

The construction industry builds structures for both the public and private sector, 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.

For this report, the construction industry¹ includes:

- **New Residential Structures**
- **New Industrial And Commercial**
- **New Utility Structures**
- **New Highways And Streets**
- **New Farm Structures**
- **New Mineral Extraction Facilities**
- **New Government Facilities**
- **Maintenance And Repair, Residential**
- **Maintenance And Repair Other Facilities**

In Shasta County, there are 889 businesses engaged in the construction industry.²

Aggregates

Sand, gravel, and crushed stone are collectively 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 in constructing federal, state, and local roads consist of sand, gravel, and stone.

¹ All Industry definitions constructed from IMPLAN Professional 2.0

² D&B Sales & Marketing Solutions, October – December 2003.

The aggregates industry includes the following:

- **Dimension Stone**
- **Sand And Gravel**
- **Nonmetallic Minerals**
- **Misc. Nonmetallic Minerals**
- **Paving Mixtures And Blocks**
- **Asphalt Felts And Coatings**
- **Cement, Hydraulic**
- **Concrete Block And Brick**
- **Concrete Products**
- **Ready-Mixed Concrete**
- **Gypsum Products**

In Shasta County, there are 21 businesses engaged in the aggregates industry.³

Health Services

Services is the largest industry in Shasta County and health services is one of the largest subcategories. Health services are becoming increasingly important in the County due to a growing aging population. In the northern part of the state, Redding is the center for medical care, and by serving a wide geographical area, the impact of health services reaches far beyond Shasta County's borders. In addition to health services per se, the health services category below includes the manufacturing component present in Shasta County.

Health services is made up of the following industries:

- **Surgical and Medical Instruments**
- **Surgical Appliances and Supplies**
- **Dental Equipment and Supplies**
- **Doctors and Dentists**
- **Nursing and Protective Care**
- **Hospitals**

In Shasta County, there are 570 businesses engaged in the health services industry.⁴

Tourism

As the gateway to Shasta Lake, the Trinity Mountains and the Cascades, Shasta County generates much of its output from tourism. Tourist spending is concentrated in the

³ Ibid

⁴ Ibid

industry categories of eating & drinking establishments; hotels and lodging; and amusement and recreation. The State of California estimates that tourists spent \$286 million in 2000 in Shasta County. While the components listed here also serve local residents, we allocated a certain percentage for each based on state estimates for tourist capture.

Tourism is made up of the following industries:

- **Eating & Drinking**
- **Hotels and Lodging Places**
- **Amusement and Recreation Services**
- **Food Stores**
- **Retail**
- **Air Travel**
- **Local Travel**

In Shasta County, there are 1,390 businesses engaged in the tourism industry.⁵

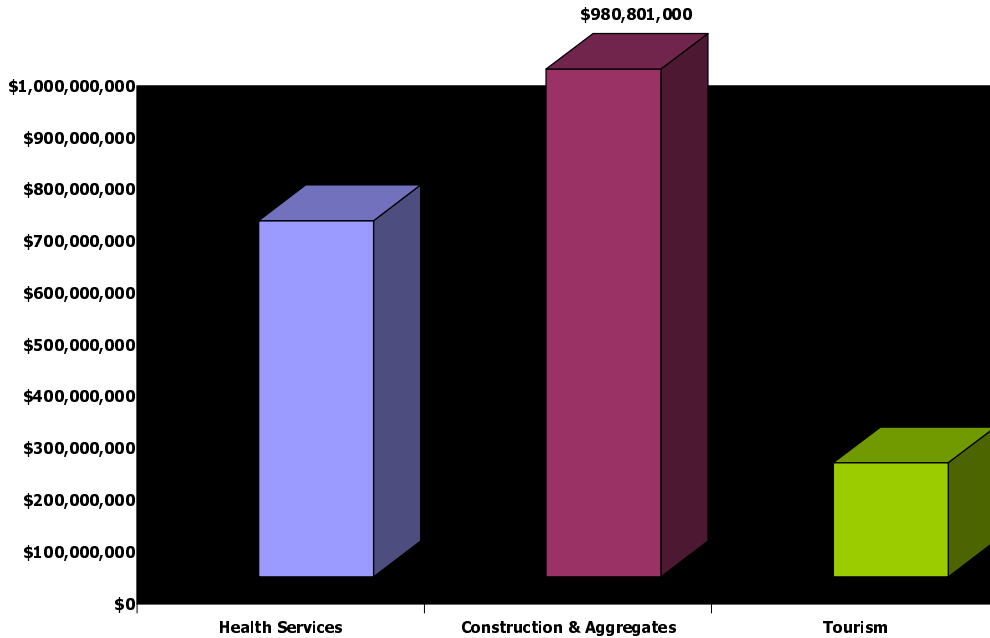
⁵ Ibid

Direct Output

The total output of all Shasta County industries in 2000 was just over \$7 billion. Together, the direct output of the aggregate and construction industries was \$980 million, or 14% of all Shasta County output.

The direct output of aggregates and construction is larger than the other industries used for comparison. The direct output for health services in 2000 was \$687 million, while tourism was \$220 million.

**FIGURE 2
SHASTA COUNTY SELECTED INDUSTRY OUTPUT, 2000**

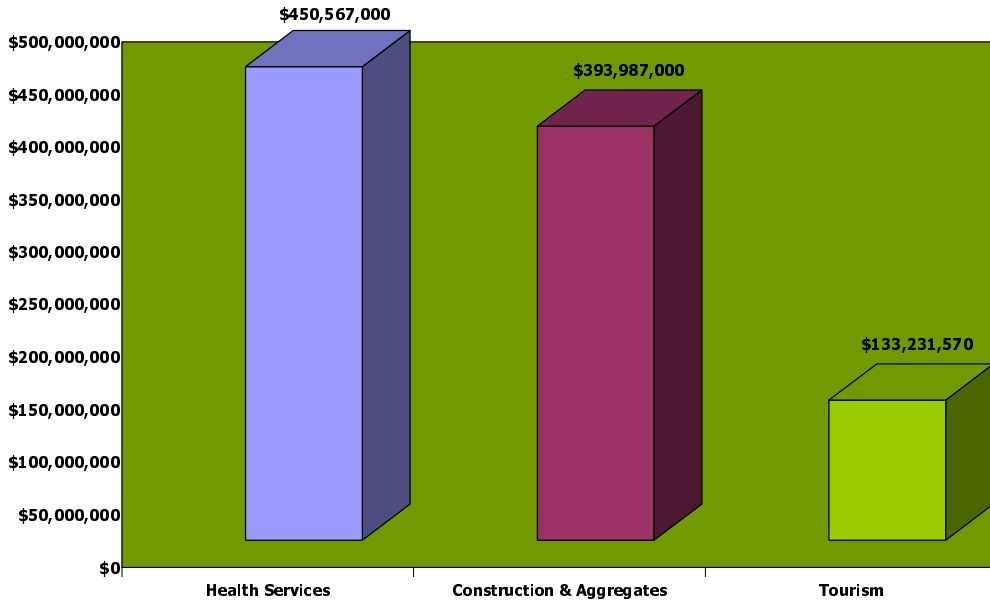


Source: Applied Development Economics; IMPLAN Professional 2.0, Shasta County 2000

Indirect Output

In addition to the direct output of industries, their indirect contribution is an important component of the impacts on an economy. The indirect contributions of an industry are the revenues, salaries, and taxes generated by an industry's purchases. The aggregate and construction's indirect contribution to Shasta County in 2000 was over \$393 million. This compares favorably with health services which had indirect output of \$450 million. Figure 3 compares the indirect contributions of the industries in Shasta County in 2000.

**FIGURE 3
2000 INDIRECT OUTPUT OF SELECTED SHASTA COUNTY INDUSTRIES**



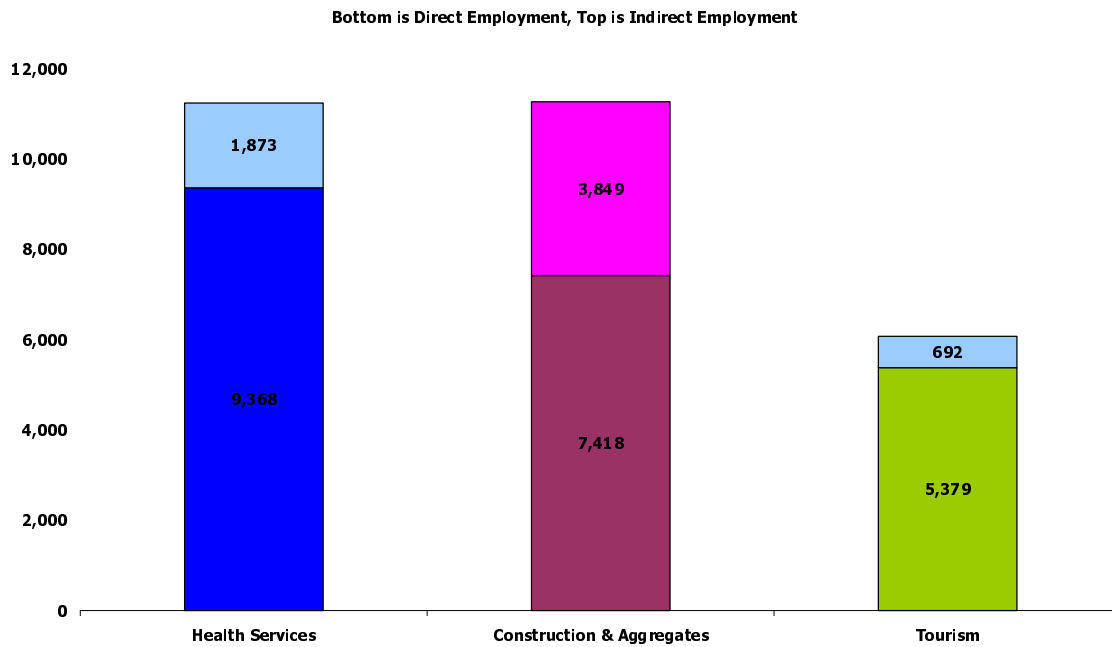
Source: Applied Development Economics; IMPLAN Professional 2.0, Shasta County 2000

Employment

Direct employment of the aggregate and construction industries in 2000 was over 7,400. At the same time, health services employed just over 9,300. Tourism employed an estimated 5,300.

In addition to those employed directly by the aggregate and construction industries, the purchases made by aggregate and construction created employment in other industries. The indirect employment of the aggregate and construction industries in 2000 was over 3,800. This figure is greater than the indirect employment generated by either of the other industries.

FIGURE 4
2000 EMPLOYMENT (DIRECT & INDIRECT) FOR SELECT SHASTA COUNTY INDUSTRIES



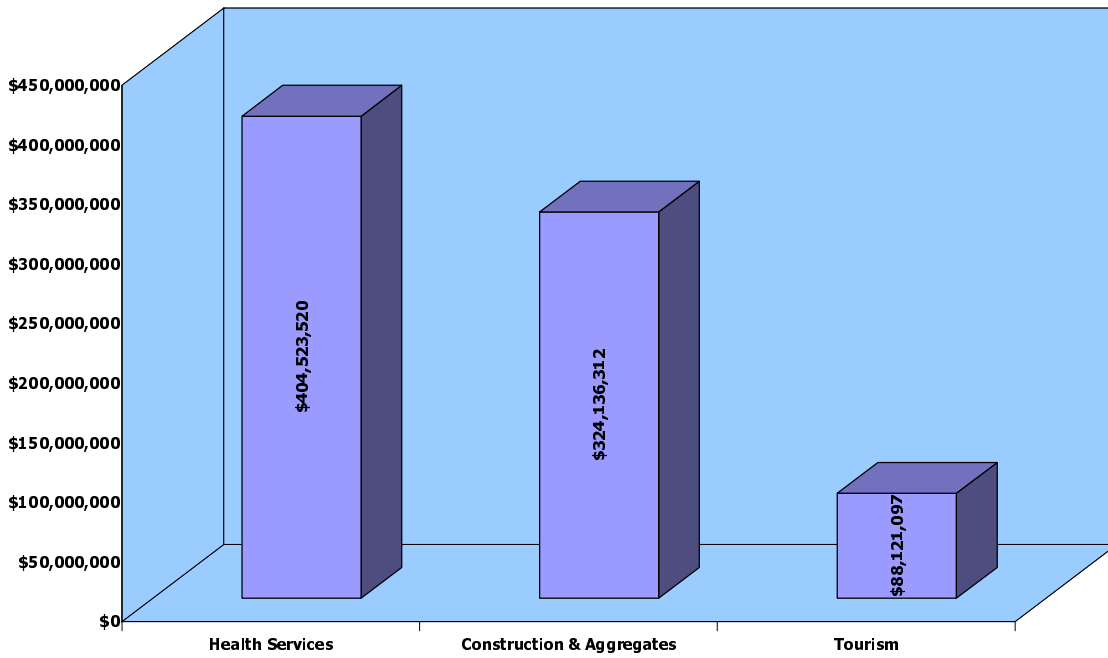
Source: Applied Development Economics; IMPLAN Professional 2.0, Shasta County 2000

Dividing the number of employees by the direct output, an aggregate and construction employee contributed \$132,219 to industry output. This compares to \$73,435 per employee for health services, and \$40,960 per employee for tourism.

Labor Income

Labor income represents all forms of employment income. This includes both proprietor and employee income. Direct labor income by the aggregate and construction industries in Shasta County in 2000 was \$324 million. This compares favorably to health services with direct labor income of \$404 million. Labor income for tourism was \$107 million.

**FIGURE 5
LABOR INCOME IN 2000 FOR SELECT SHASTA COUNTY INDUSTRIES**

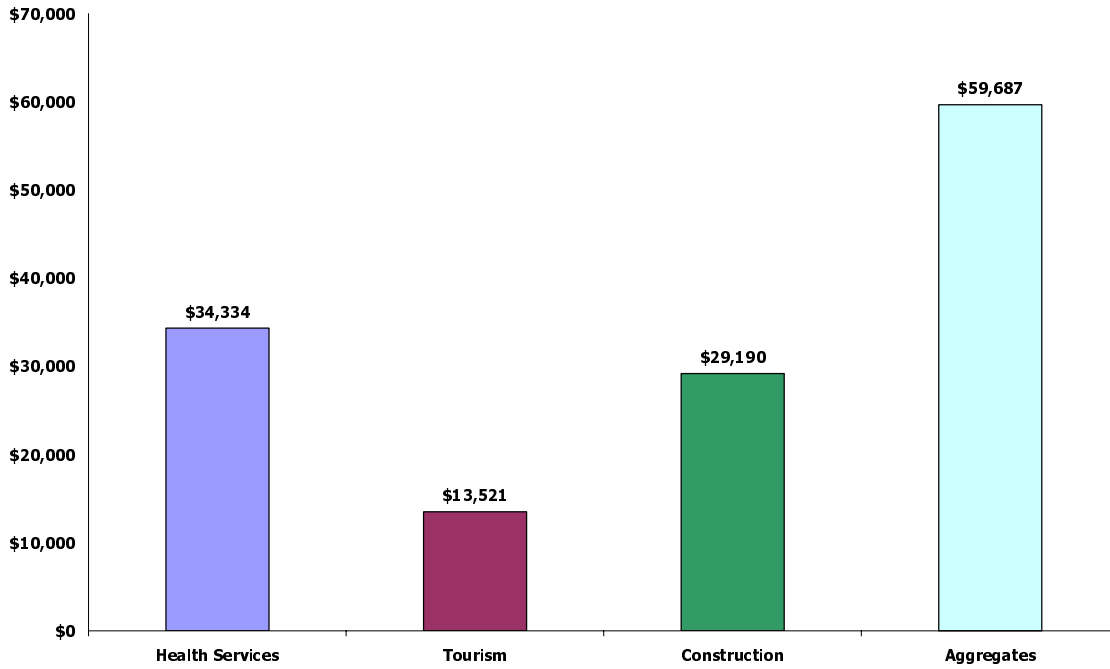


Source: Applied Development Economics; IMPLAN Professional 2.0, Shasta County 2000

Employee Compensation

Unlike labor income, employee compensation are wages paid to employees in the form of pay and benefits. While aggregates and construction had an average wage of \$31,842, aggregates alone had the highest wage of the selected industries at \$59,687. Figure 6 is the average wage paid to an employee in the selected industries in Shasta County in 2000.

**FIGURE 6
AVERAGE WAGES IN 2000 FOR SELECT SHASTA COUNTY INDUSTRIES**

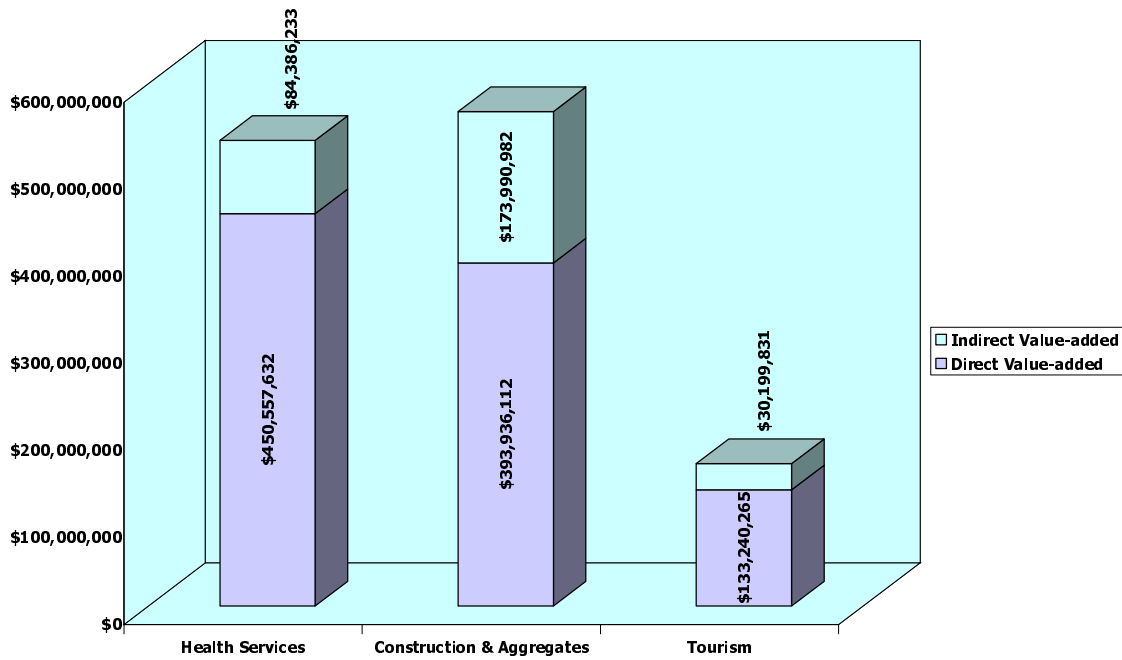


Source: Applied Development Economics; IMPLAN Professional 2.0, Shasta County 2000

Value-added Contributions

Value-added contributions represent employee compensation⁶, proprietor income⁷, other property income⁸ and indirect business taxes⁹. The direct value-added contribution of the aggregate and construction industries to the Shasta County economy in 2000 was \$393 million. Figure 7 is the direct and indirect value-added contributions of the select industries in 2000.

FIGURE 7
2000 VALUE-ADDED CONTRIBUTIONS OF SELECT SHASTA COUNTY INDUSTRIES



Source: Applied Development Economics; IMPLAN Professional 2.0, Shasta County 2000

⁶ Includes wages, salary payments and non-cash compensation sources such as benefits.

⁷ Includes income derived from self-employment.

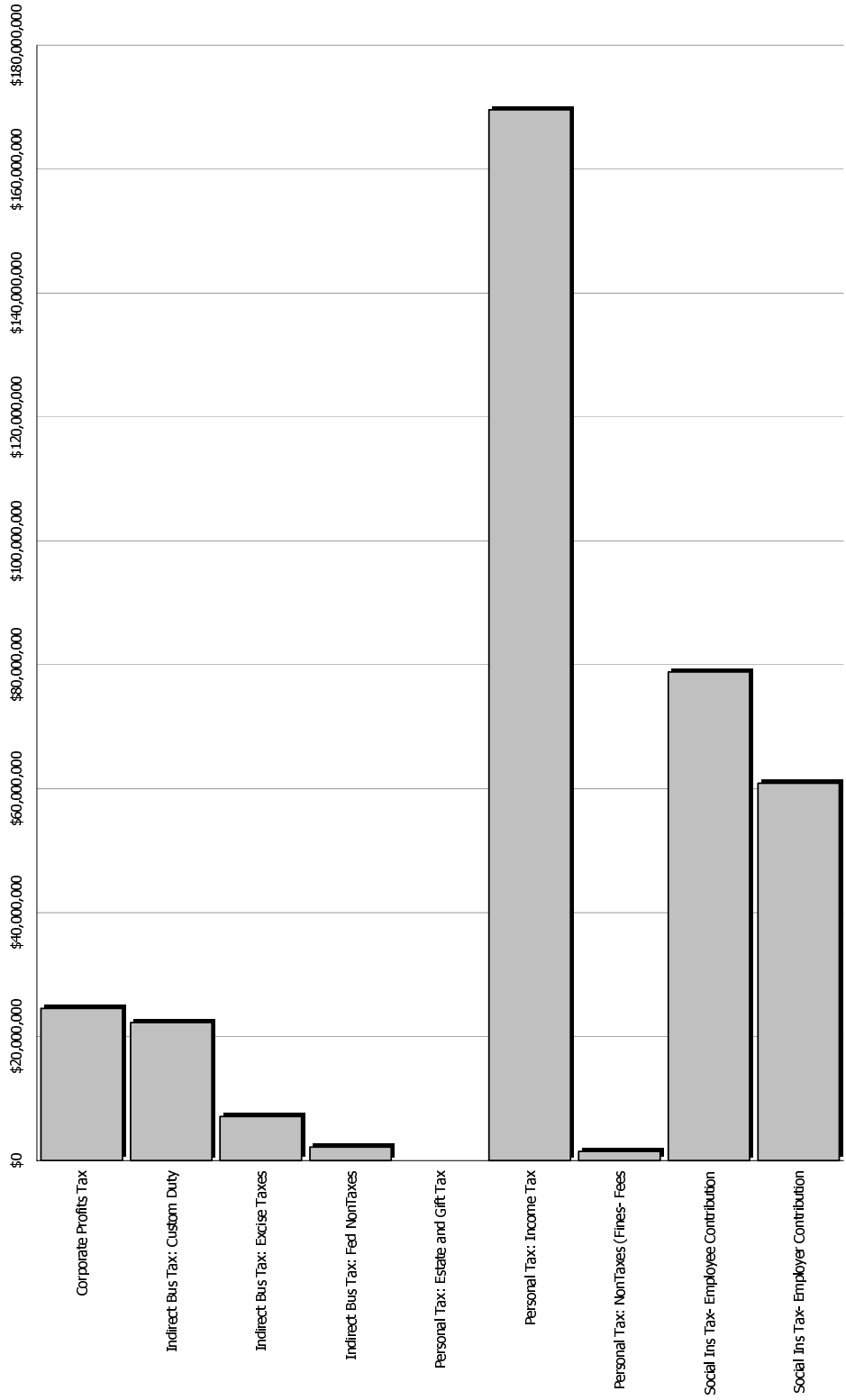
⁸ Includes payments from interest, rents, royalties, dividends and profits.

⁹ Includes household excise and sales taxes paid to business by households, excluding taxes on profit and income.

Taxes

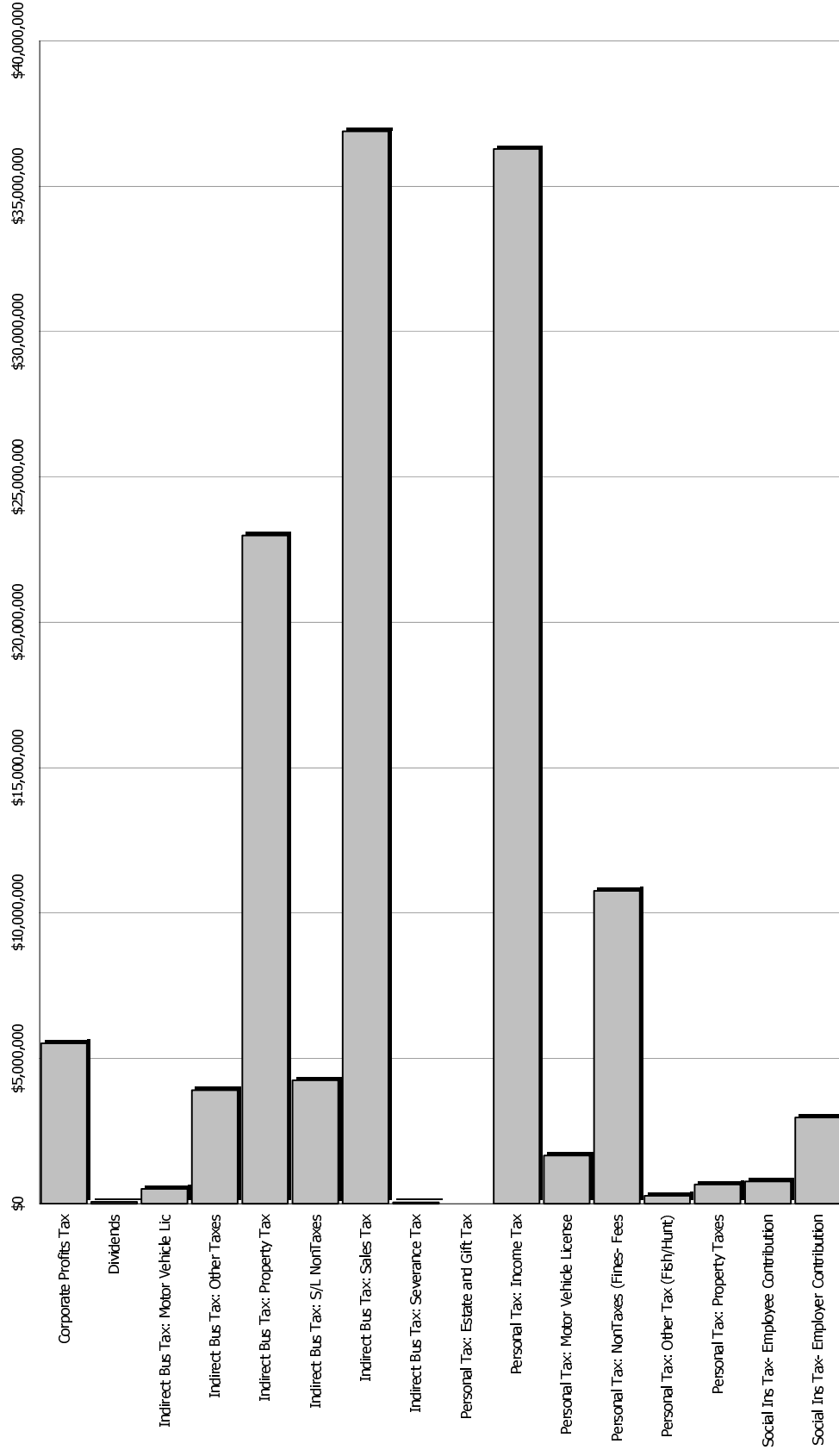
Federal, state and local governments receive significant additional tax revenues from the economic activity generated by the aggregate and construction industries. In Shasta County, aggregates and construction contributed over \$113 million in federal taxes, and \$36 million in state and local taxes. This compares to \$138 million in both federal and state taxes paid by health services. The following charts illustrate the estimated tax impact of the aggregate and construction industries in Shasta County in 2000.

FIGURE 8
2000 FEDERAL TAX CONTRIBUTIONS OF THE SHASTA COUNTY AGGREGATE AND CONSTRUCTION INDUSTRIES



Source: Applied Development Economics; IMPLAN Professional 2.0, Shasta County 2000

**FIGURE 9
2000 STATE/LOCAL TAX CONTRIBUTIONS OF THE SHASTA COUNTY AGGREGATE AND CONSTRUCTION INDUSTRIES**



4. CONCLUSION

This study finds that the aggregate and construction industries contribute \$1.4 billion annually to Shasta County's economy, ranking it as the third largest industry in Shasta County following Services, and the Finance, Insurance, and Real Estate sector.

The aggregate and construction industries' \$980 million direct output contributes over 14% of the county's total output, employs 9% of the county's workforce, and pays \$149 million in federal, state, and local taxes. In a county where the per capita personal income is about \$17,738, the aggregates industry paid an average total employee compensation of \$59,687.

In addition, almost \$100 million of aggregate and construction products and services are used by other industries. Finance, Insurance, and Real Estate (FIRE), followed by Transportation, Communications, and Public Utilities (TCPU), are the two industry division classifications in Shasta County that have the greatest need for aggregate and construction products. Services and Manufacturing are also substantial users of aggregate and construction goods and services. This underscores the linkage and essentiality of aggregates and construction to other important county industries, and in turn, to Shasta County's total industry output.

This study also notes that all construction depends upon having sufficient long-term quantities of locally available supplies of aggregates. Aggregates are the basic raw materials necessary for making ready mix concrete, asphaltic concrete, and a variety of other products required for building infrastructure.

Population forecasts, community plans, infrastructure needs, and economic development projects all indicate that demand for aggregates in Shasta County will remain strong over the next 50 years. A state Minerals Classification Study also reported that nearly 90% to 95% of production is consumed within Shasta County.

Although Shasta County's population and employment both continue to grow, most of the recently created jobs are in the low paying services sector. The County, much like the rest of California, has lost hundreds of manufacturing jobs that paid middle class wages. If Shasta County is to continue efforts at developing a diversified economy, and attract industries that offer higher salaries, it will need to link economic development with infrastructure investment. In a highly competitive global economy, innovative companies choose communities with excellent infrastructure and cultural and recreational opportunities.

If the county is to build, maintain, and replace current and future infrastructure, it will require hundreds of millions of tons of construction aggregates. As documented in the California Department of Conservation's Mineral Land Classification study, the average

per capita consumption of aggregates in Shasta County is 8.0 tons per person. This is higher than the state's average of 7 tons per person per year, and due to growth is unlikely to decrease in the near future. Without local, large quantities of high-grade concrete aggregates, Shasta County will risk its economic growth, quality of life, and community livability.

The accessibility and availability of construction aggregates are critical for building strategic infrastructure such as affordable housing, efficient transportation systems, schools, improved water storage capacity, and all other public and private structures that protects a community's livability and economy vitality.

Aggregate availability and accessibility depend upon land use planning that recognizes and values this natural resource, and its importance to realizing county goals. All citizens use aggregates and without local supplies of these resources, the common good is compromised. While demand for consumer goods ebbs and flows, and is often based on trends and technologies, the need for maintenance and/or construction of affordable housing, roads, schools, hospitals, and public infrastructure is permanent.

Residing in Redding's Turtle Bay, the City's natural history complex, is the foundation of an aggregates plant built in 1939 for the construction of Shasta Dam. Known as the "Monolith", its history is being restored and interpreted as public art by Seattle environmental artist Buster Simpson. The concrete structure will contain visual and auditory effects reminiscent of an aggregates crushing plant, as well as historic photos. The Monolith will also serve as a background for outdoor music and theatre; a training ground for rock climbers and emergency personnel; used as a haunted house, and continue as residence to local plant and animal life.¹ Redding has chosen to not only honor the structure's historical significance, but through artistic vision and the public input process, acknowledge its multi-use and multidimensional role in the life of the community.

The meaning of aggregates is not unlike the transformation of the Monolith. They too have a multi-use and multidimensional role in everyone's daily life. Sand and gravel and crushed stone transcend into materials and monuments that become part of the fabric and foundation of a community.

A combination of continued population growth, urbanization, and competing land uses gives new urgency to ensuring that concrete-grade sand and gravel and crushed stone resources within Shasta County be available for use. Local supplies of aggregates, or lack thereof, will impact the range of choices available to decision-makers, clearly shaping long range planning and the resultant outcomes. Aggregates are a community asset directly linking the interrelated spheres of economy, environment, and society. Protecting these resources is a form of insurance for the community's health, growth, economy, and future. Ultimately, the citizens of Shasta County will determine whether to chart their destiny or endanger their dreams.

1. Scott Mobley, "Monolith Work Could Resume," [Redding Record Searchlight](#), 26 August 2003.

Glossary

Direct output: This is the contribution directly attributed to an industry – their employees, revenues and wages.

Employee compensation: wage and salary payments as well as benefits, including health and life insurance, retirement payments and other non-cash compensation.

Indirect effect: the secondary impact caused by changing input needs of directly affected industries (e.g., additional input purchases to produce additional output).

Indirect business taxes: consist primarily of excise and sales taxes paid by individuals to businesses; these taxes occur during the normal operation of the businesses but do not include taxes on profit and income.

Indirect output: the revenues, salaries and taxes generated by the purchases made by an industry.

Industries: the collection of businesses in an economy within a given region; purchasing goods and services and paying workers.

Labor income: represents all forms of employment income as the sum of employee compensation and proprietor income.

Output: industry output is a measure of the value of goods and services produced in a given area.

Proprietary income: consists of payments received by self-employed individuals as income. This includes income received by private business owners, doctors, lawyers and so forth.

Value-added: employee compensation, proprietary income, other property type income, and indirect business taxes. Generally, the value of goods and services less the cost of materials.

Appendix A

THE IMPLAN ECONOMIC MODEL

The IMPLAN United States Economic Model

The IMPLAN economic impact model was used to estimate the economic and tax contributions of the aggregate & construction, health services, transportation and tourism industries to the Shasta County economy in 2000. The model, which is licensed by the Minnesota IMPLAN Group, Inc., was developed over a period of eight years at the University of Minnesota. IMPLAN is used by more than 500 universities and government agencies to estimate the economic and fiscal impacts of investments and/or changes in industry employment. IMPLAN is an economic impact assessment modeling system that estimates the national and local, private- sector impacts of economic changes.

IMPLAN Economic Impact Analysis

IMPLAN is an input-output model. Input-output accounting describes commodity flows from producers to intermediate and final consumers. The total industry purchases of commodities, services, employment compensation, value added, and imports is equal to the value of the commodities produced. Purchases for final use (final demand) drive the model. Industries producing goods and services for final demand purchase goods and services from other producers. These other producers, in turn, purchase goods and services. This buying of goods and services (indirect purchases) continues until leakages from the jurisdiction (imports and taxes) stop the cycle.

The model summarizes these complex interactions as economic multipliers, which can be used to estimate the total economic impact of the employment, sales and taxes generated by the industries in Shasta County. No adjustments were made to the model for specific industries or special conditions in Shasta County.

Industry Definition

IMPLAN industrial sectors are made up of BEA (Bureau of Economic Analysis) Commodity and Standard Industry Classifications (SIC). The industries defined for the model constructed for Shasta County contain aggregated and partial industry sectors as defined by Standard Industry Classifications. Below is a crosswalk for the industries from the IMPLAN model to the Standard Industry Classifications.

IMPLAN Sector to SIC Crosswalk

IMPLAN Sector	SIC
Construction	
New Residential Structures	1500, 1600, 1700
New Industrial And Commercial	1500, 1600, 1700
New Utility Structures	1500, 1600, 1700
New Highways And Streets	1500, 1600, 1700
New Farm Structures	1500, 1600, 1700
New Mineral Extraction Facilities	1500, 1600, 1700
New Government Facilities	1500, 1600, 1700
Maintenance And Repair, Residential	1500, 1600, 1700
Maintenance And Repair Other Facilities	1500, 1600, 1700
Aggregates	
Dimension Stone	1410, 1420
Sand And Gravel	1440
Nonmetallic Minerals	1480
Misc. Nonmetallic Minerals, N.E.C.	1490
Paving Mixtures And Blocks	2951
Asphalt Felts And Coatings	2992
Cement, Hydraulic	3251
Concrete Block And Brick	3271
Concrete Products, N.E.C	3272
Ready-Mixed Concrete	3273
Gypsum Products	3275
Health Services	
Surgical And Medical Instruments	3841
Surgical Appliances And Supplies	3842
Dental Equipment And Supplies	3843
Doctors and Dentists	8010, 8020
Nursing and Protective Care	8050
Hospitals	8060
Tourism	
General Merchandise Stores	5300
Apparel Stores	5600
Food Stores	5400
Misc. Retail	5900
Air Travel	4500
Local Travel	4100
Eating & Drinking	5800
Hotels & Lodging Places	7000
Amusement and Recreation Services	7910, 7991, 7992, 7993, 7996, 7999

Source: IMPLAN Pro

