

construction & aggregates

in Santa Clara County

**An Economic Analysis of the Construction
and Aggregate Industries in Santa Clara County**

June, 2006



Prepared for the Construction Materials Association of California,
Santa Clara County Chapter

*By Sharon Prager, e concepts and
Peter Cheng, Applied Development Economics*

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NOTE

An Economic Analysis of the Construction and Aggregate Industries in Santa Clara County is the seventh 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 state study was performed in 2001, and an updated edition was published in December, 2004. Research on the economic impacts of the construction and aggregate industries in individual counties has been ongoing since 2002. Counties studied include Tulare, Merced, Fresno, and Shasta.

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“This area has the greatest concentration of brain power of any place in the world and contains those people who will ultimately drive the future of this country and the world.”

Tony Ridder
Former CEO, Knight Ridder Corp.

FOREWARD

Highway 280, the Peninsula's panoramic freeway, often winds through places parallel to the San Andreas Fault. The 800 mile fault system is perpetually responsible for being the frequent epicenter of California's turbulent and tumultuous geological history.

Highway 280 and Highway 101, a few miles to the east, are also the freeways that travel through the epicenter of the future – Silicon Valley. During this drive, awe-struck first-time visitors reverently point out famous Valley companies. It is here – in the 40 cities in 4 counties that these arteries traverse – that the world's future is invented.

These freeways, along with local expressways, truly are arteries. They are the lifeblood that carry the people and products, and by extension, ideas and innovations, to office complexes, research labs, and universities. This cauldron of creativity is supported by an infrastructure of homes, hospitals, houses of worship, streets, sewer systems, schools, shopping centers, and cultural, civic, and recreational facilities.

Silicon Valley forges the foundations for the future, but depends itself upon a well built and maintained infrastructure to enable its economic, social, and environmental achievements. Insufficient investment in infrastructure is increasing the competitiveness of other high tech centers in the US and abroad, and could cause the Valley to cede its leadership role over the coming decades. Fortunately, there are positive signs – from business groups, to the voters of San Jose, to the Governor's office – recognizing that infrastructure is of critical importance.

Infrastructure, the Valley's physical and literal foundation, is built from local aggregates – sand, gravel, and crushed stone. These natural resources are the building materials needed for all construction. Aggregates are necessary for making concrete, asphalt, and other construction components for which there are no substitutes. Building and maintaining infrastructure requires the availability of hundreds of millions of tons of high quality aggregates.

Santa Clara County is in the heart of Silicon Valley, and this study focuses on the substantial economic impacts of its aggregates and construction industries. Equally important, if not more so, is their role in providing public and private infrastructure that is the bedrock for economic prosperity and preserving the area's superb quality of life. Santa Clara County's local aggregate producers are integral and important community partners helping ensure the Valley's foundations for the future.

EXECUTIVE SUMMARY

This report examines and identifies the economic contributions of the aggregate and construction industries to Santa Clara County measured by direct output and multiplier analysis, including direct, indirect, and induced impacts. Together, these economic activities represent a significant benefit to the regional economy. This study also investigates the intrinsic importance of construction and aggregates for infrastructure, thereby enabling the economic outputs of other major industries, and providing the fundamental foundations for the County's economic success and community livability.

SIGNIFICANT FINDINGS:

- The total economic impact from the aggregate and construction industries in Santa Clara County is **\$12.5 billion annually – 7% of Santa Clara County's economy**.
 - Generating nearly **95,000 jobs** and **\$5.4 billion of labor income**.
- Nearly **\$5.7 billion in direct output** is contributed to the Santa Clara economy by the aggregate and construction industries. Combined, aggregates and construction ranks as the County's 10th largest industry.
 - Generating nearly **41,000 full-time jobs** and **\$2.5 billion of labor income**.
- Almost **\$6.8 billion is contributed through indirect and induced impacts** by the aggregate and construction industries to the Santa Clara County economy.
 - Generating over **53,000 jobs** and nearly **\$3 billion** in labor income.
- Aggregates and construction has a **2.2 multiplier effect**, one of the highest of any industry. For every \$1.00 of direct output, these industries generate an additional \$1.20 in the economy.
- **The aggregate industry's average wage is \$71,200**, compared to an average income of \$66,000 for all industries in Santa Clara County.
- Local aggregate supplies are a valuable community resource. All construction requires aggregates to build, maintain, and repair infrastructure that is crucial for a robust economy, outstanding quality of life, and preserving Silicon Valley's leadership as the pre-eminent high tech region.
- Local aggregate supplies reduce costs to taxpayers, home buyers, consumers, and to the environment.

- Santa Clara County’s long-term sustainability and community livability depend upon land use and planning decisions that ensure the availability of local aggregates, and accessibility to permitted reserves.

In less than 25 years, Santa Clara County is projected to lead the entire nine-county Bay Area region in terms of both population and job growth. Two-thirds of the growth will occur in San Jose, and the next highest rates are projected for Milpitas, Gilroy, Santa Clara, unincorporated county areas, and Palo Alto.

Population growth and need for infrastructure are directly correlated. In addition to anticipated growth, the county’s economic vitality, quality of life, and competitiveness as the world’s premiere high-tech region are all dependent on investment in building and maintaining infrastructure. The critical importance of infrastructure has been recognized from Governor Schwarzenegger, the City of San Jose, and the Valley Transportation Authority (VTA), to such business organizations as the Silicon Valley Leadership Group.

Providing the necessary infrastructure requires access to millions of tons of aggregates – sand, gravel, and crushed stone. Aggregates are the basic raw materials required for building, and for making ready-mixed concrete, asphaltic concrete (often called “black top”), road base, subbase, and a wide variety of other products. For example, aggregates make up 94% of asphalt and 80% of concrete pavements. Without aggregates there would be no buildings, homes, highways, hospitals, shopping centers, sewer systems, trails or any other structure used by Californians. Between 60-75% of all aggregates are used in public works’ projects, including infrastructure for new housing developments, and nearly 90% of all materials required to build federal, state, and local roads consist of sand, gravel, and stone.

This report focuses on the substantial economic contribution of the aggregate and construction industries in Santa Clara County. However, the findings also have larger implications for the County’s successful sustainability, and its ability to provide infrastructure at a reasonable cost that favorably impacts its economy and environment. **Access to local aggregate supplies is a community asset that needs to be included in any short or long-term planning process.** All demographic and economic indicators point toward continued growth. That information, combined with this study’s economic results, indicates that planning for Santa Clara County’s future livability also means planning for the continuous availability of aggregates.

OVERVIEW

CALIFORNIA'S INSUFFICIENT INFRASTRUCTURE

“A new California is coming whether we plan for it or not . . . we will need more roads, more hospitals, more schools, more nurses, more teachers, more police and fire, more water, more energy, more ports and the need is urgent.”

Governor Arnold Schwarzenegger
State of the State Address, 2006

California grows at a rate of 1 person per minute, or 60 people per hour. In 2004, California's population was nearly 37 million, and recent estimates indicate that the state will add another 5 million people in the next 10 years. By 2020, population projections forecast 50 million residents.¹

The greater the population, the greater the demands made for, and on, infrastructure. During the next 20 years the state faces more than \$500 billion in infrastructure needs.² California's investment in infrastructure declined precipitously from 20% of state spending in the 1960s to about 3% in recent years.³ 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%. California is now ranked 50th of 50 states in per-capita spending on highways.⁴ Decades of neglect have resulted in an outdated and crumbling public infrastructure in all major categories, e.g., transportation, educational facilities, and water and flood control.

In the 1960s California had 9 million registered vehicles that traveled 33.3 billion miles per year. Today the state has 30 million registered vehicles traveling 183.7 billion miles annually. As California continues to add 600,000 people and 500,000 vehicles every year, the Department of Transportation expects a 35% increase in congestion over the next 10 years. In 1999, the California Transportation Commission and Caltrans reported the state had unfunded infrastructure needs of \$100 billion. The state's transportation infrastructure backlog is now estimated at \$160 billion.⁵ In the Bay Area, traffic congestion costs each driver \$1,325 per year in excess fuel and lost time – second only to the Los Angeles metropolitan area. This figure doesn't include the cost of decreased productivity and increased health expense due to resultant air pollution. In 2003, during the height of the dot.com recession, Santa Clara County ranked as the 11th worst area in the US for traffic delay – 53 hours per year.⁶ Over the next 25 years traffic is projected to grow 37%, especially on I-580 and Highway 101, directly affecting Santa Clara County.⁷

For every \$1 billion invested in transportation, 18,000 jobs are created in California.⁸ This not only benefits the economy, but is important considering the increased traffic flows projected into and out of Santa Clara County over the next 25 years. For example, there will be a 116% increase in daily trips over the Sunol Grade between Alameda and Santa Clara counties, and a 120% increase in daily trips between Santa Clara County and San Benito and Monterey counties.⁹

Increased population also indicates that over the next 10 years, 250,000 more students will be attending schools, and over 500,000 are projected for the state's colleges and universities. More than 8,000 schools in the K-12 system require modernization, and increased college enrollments will require hundreds of new buildings and facilities.¹⁰ By 2013, community colleges in Silicon Valley will have an additional 52,000 students, and more classrooms, labs, and libraries will need to be available.¹¹

A 2005 report card issued by the San Francisco Section of the American Society of Civil Engineers graded Bay Area infrastructure a "C-" overall. The categories earning the worst grade of "D+" were roadways, goods movement, and urban stormwater and flood control. Except for wastewater, which earned an "A-", all other categories (bridges, transit, aviation, parks, and water) earned a "C" or "C-". According to the report, "Much of our infrastructure has now reached the end of its useful life and can no longer support a population that has more than tripled since its construction."¹²

While faster growth increases are expected in the inland areas of California as opposed to the coastal population centers, the San Francisco Bay Area will still experience sizable population gains. The Bay Area is currently home to 7 million and is projected to grow 29% to 8.8 million by 2030.¹³

Santa Clara, Alameda, and Contra Costa counties will be home to 62% of the population, or over 5 million residents. About 3.3 million jobs will be concentrated in Santa Clara, Alameda, and San Francisco counties.¹⁴ Silicon Valley's population is expected to exceed 3.15 million by 2016, a 13.5% increase from 2000.¹⁵

In 2004 Santa Clara County's population exceeded 1.7 million people, and is projected to grow to over 2 million in the next 14 years.¹⁶ The County's fastest growing cities are Gilroy and Morgan Hill, with growth rates of 3.4 and 2.2% respectively. San Jose, the largest city, grew 0.7% in 2004.¹⁷ More importantly, by 2030 Santa Clara County will lead the Bay Area in both population and employment. Of the top 10 growth cities in the region, San Jose is predicted to be first in both population and jobs.¹⁸

Recently, the Silicon Valley Leadership Group's study, "Daring to Compete: A Region-to-Region Reality Check", concluded that of the 8 high tech regions in the US, Silicon Valley ranked dead last on quality-of-life issues, including transportation gridlock, housing costs, and education. While the Valley leads in productivity, venture capital, patents, and R&D, the question is, "for how long?" In a highly competitive environment – including overseas as well as the US – the report opines that to remain the world's leading high-tech center, the "region must address its social woes and invest more in its infrastructure to maintain its advantage."¹⁹

Fortunately, there are a number of positive indicators that the critical need for building and maintaining infrastructure has been recognized by government, local and state agencies, and the public.

INFRASTRUCTURE INITIATIVES ON THE UPSWING

Governor Schwarzenegger's Proposals

“In the next 20 years, California could grow to nearly 50 million people, with a water and transportation infrastructure sufficient for half the population. This is clearly untenable, and this 10-year program is a major step in remedying the situation.”

U.S. Senator Dianne Feinstein

In his 2006 State of the State speech, Governor Schwarzenegger asked voters to support his far-reaching public works' plan to improve California's infrastructure. The proposal called for \$222 billion over the next 10 years, \$107 billion of which would be earmarked for transportation. Transportation investment will incorporate *GoCalifornia*, a mobility action plan designed to decrease congestion, improve travel times, and increase safety. The deadline to place an infrastructure bond package on the June, 2006 ballot was missed due to the inability of legislators to reach a consensus on what the bond should include. However, legislative discussions are continuing, and it is probable that a bipartisan agreement will be reached in time to qualify an infrastructure bond package for the November ballot.

It is likely that some of these funds will be directed towards long delayed road projects, including building new lanes on Highway 101 in Santa Clara County, and a four-lane expressway on Highway 156. In addition, the state may be able to deliver nearly \$650 million for the BART extension to San Jose. It is anticipated that \$253 million would also be sent to local cities to fill potholes and keep streets and expressways smooth. In addition, the Governor's desire to restore Proposition 42 – the initiative that sets aside the sales tax on gasoline for traffic relief – will provide \$1.3 billion for road and rail projects.²⁰

Locally, San Jose voters have shown foresight by supporting measures for capital improvements and transportation projects, resulting in the “Decade of Investment” that began in 2000. During the period of 2000-2005, the City completed over 900 projects, and billions of dollars were infused into the economy during the worst of the downturn. For the remainder of the decade, the Capital Improvement Program (CIP) will provide \$2.1 billion towards transforming the City's infrastructure. Some of the projects include the new City Hall, branch libraries and community centers, park upgrades and amenities, traffic signals and streetlights, fire stations, crosswalks, airport projects, sewer rehabilitation, street widening, traffic calming, the water pollution control plant, and improvement of housing conditions.²¹

Santa Clara County's hospitals are also undergoing a construction boom. Under a state requirement, hospitals must meet new seismic safety standards by 2008, and many hospitals are updating both their physical and medical infrastructure. In Santa Clara County, eight major hospitals and medical centers are undergoing improvements valued at well over \$1.2 billion.²²

VTA's Valley Transportation Plan 2030 (VTP 2030) is the long-range countywide transportation plan for Santa Clara County. The Plan, adopted in February, 2005, is a

“planning framework for developing and delivering transportation projects and programs over the next 25 years (2005 to 2030).”²³ The Metropolitan Transportation Commission (MTC), the agency responsible for adopting the Bay Area’s regional transportation plan, has integrated VTP into their current plan, “Transportation 2030”. Under the categories of “Adequate Maintenance”, “System Efficiency”, and “Strategic Expansion”, transportation needs and improvements ranging from highways, streets, VTA, BART, Caltrain, bicycle lanes and pedestrian paths, to bridges, bus routes, safety, operational and intersection improvements, and trails are incorporated. The MTC document lists over 200 projects and programs valued at more than \$30 billion. (2004 dollars).

In the near term, Caltrans District 4 has identified \$68,770,000 in upcoming construction projects for 2006 in Santa Clara County.

Housing: High Demand vs. Low Affordability

By 2011 Silicon Valley’s population will need over 70,000 new homes. The types of housing will also depend on demographics. For example by 2040, 25% of the population in Santa Clara County will be seniors, and more condos and townhouses will be required.²⁴

In 2005, only 18% of households in Santa Clara County could afford a median-priced home, down from 23% a year ago.²⁵ At an average home price of \$700,000, providing housing for Santa Clara County workers continues to be challenging. This is a major concern, not the least since service providers such as teachers, nurses, and police officers cannot afford to live in local communities. Companies have voiced their dismay at the difficulty of attracting and retaining employees. Long, exhausting commutes, many from distant counties, affect productivity and family time. Sooner or later workers seek employment closer to home. This negatively affects Santa Clara County’s economic competitiveness as well as the overall quality of life.

There are a number of proposals being suggested by business groups, housing organizations, and legislators ranging from improved planning processes, creating an inventory of suitable land, and greater infill development, to streamlining approval processes, redevelopment, and housing bonds to help with home buying. It is mandatory that everyone works collaboratively to address this issue.

What all public and private infrastructure needs and plans share in common is dependence on millions of tons of aggregates for construction □ whether improving transportation, building affordable housing, schools or sewer systems, or maintaining parks and paths.

Santa Clara County’s Local Aggregate Resources – More Valuable than Ever

There is no construction – and hence no infrastructure – without aggregates. Always a valuable community commodity, these local natural resources have become even more important since the Governor’s proposed infrastructure improvements for rebuilding California.

The Importance of Aggregates

Sand, gravel, and crushed stone are referred to as “aggregates”. These natural resources are the first step in the construction process and used in a wide variety of products. Virtually every construction application needs and uses aggregates, whether residential, commercial, industrial, or for public works. Construction aggregates are used in portland cement concrete (PCC), asphaltic concrete (AC), plaster, stucco, road base, subbase, and generally provide from 80-100% of the material volume in those uses. For example, aggregates make up 94% of asphalt and 80% of concrete pavements. Without aggregates there would be no buildings, hospitals, roads, airports, shopping centers, homes, sewer systems, or any other structure used by Californians. Between 60-75% of all aggregates are used in public works’ projects, including infrastructure for new housing developments, and nearly 90% of all materials required to build federal, state, and local roads consists of sand, gravel, and stone. Aggregates are just as necessary for maintenance and repair as for new construction. As a South Bay engineer recently said, “whether maintaining or building infrastructure, we need aggregates. They are the building materials used to fix everything in the built environment. Without quarries we couldn’t even fix a broken water line.”²⁶ Aggregates build public and private infrastructure, and assure its maintenance and operation.

The chart below gives examples of infrastructure categories and related structures:

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; houses of worship, sports' complexes and stadiums
<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.²⁷

Aggregates are a Unique Community Resource

Aggregates are both commonplace and distinctive. Society depends on aggregates as much as on gasoline, electricity, and food products, yet unlike most other industries, there are no substitutes for aggregates. They can't be manufactured or duplicated, and their locations are geologically determined. Aggregate resources can't be "relocated".

Not only are deposits decided by nature and not people, aggregate resources must meet certain physical and chemical quality characteristics that are determined by their final use. Various government agencies such as the California Department of Transportation (Caltrans), Federal Highway Administration, the US Army Corps of Engineers, and the US Bureau of Reclamation have stipulations ensuring the suitability of aggregates for specific uses. Not all aggregates can be used for every construction application. For example, much of the aggregate required for making portland cement concrete (PCC) needs to be high-quality, or what is known as "concrete aggregate", to guarantee strength and durability. These aggregates are used for making PCC and asphaltic concrete (AC) because of rigorous and restrictive engineering specifications, and are the rarest and most valuable aggregate resources.

In addition, even though aggregates are essential raw materials, some are no longer available because another land use, e.g., housing or commercial developments, has precluded their use – what is termed "resource sterilization". Ironically, as the need and demand for aggregates increase, lack of planning, competing land uses, or societal issues attempt to preempt aggregate availability. This is not in accordance with the intent of California law.

In 1975 the State of California recognized the importance of land with mineral resources, and passed the California Surface Mining and Reclamation Act (SMARA).²⁸ SMARA requires the State Geologist to classify land into Mineral Resource Zones, "according to the known or inferred mineral potential of that land . . . *The primary goal of mineral land classification is to ensure that the mineral potential of land is recognized by local government decision-makers and considered before land-use decisions are made that could preclude mining.*" (Italics added).²⁹

Successfully sustaining Santa Clara County's economic vitality and high quality of life will require planning for the availability and accessibility of local aggregate supplies. These deposits play a major role in regional resource requirements, and should be respected and regarded highly enough to be protected for use both for current needs, and in planning for future sustainability.

In upscale, urban environments it is easy to take infrastructure for granted. Everyone expects to drive on good roads, have efficient waste and water treatment plants, and utilize attractive, well maintained bicycle paths and parks, but few think about the necessary aggregate products required to maintain the comfort, convenience, health, and safety fundamental for community livability. Unfortunately this lack of awareness of how our society functions on a daily "nuts-and-bolts" basis causes difficulties in land use planning and accessing the important natural resources that local communities require.

Inadequate planning for local aggregate supplies adds to spiraling housing costs and public works' budgets, and negatively affects the environment. The League of California Cities and the California Building Industry Association are working on a system whereby cities and counties designate sufficient land to ensure a 10 or 20-year supply of housing that includes a minimum review process. This will help reduce costs. However, such proactive planning needs to include access to local aggregate supplies as a basis for building these homes and their related infrastructure.³⁰

Economic and Environmental Advantages of Local Aggregate Resources

Aggregates are a low value, high weight commodity, and if supplies aren't obtained locally, transportation costs can rapidly exceed the value of the aggregates. Construction aggregate is usually mined near urban and construction sites because of greater transport costs over long distances. The farther aggregates are transported, the more expensive they become. Therefore, transportation costs are a principal factor in establishing the market area of an aggregates operation. For example, the established formula has been that 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."³¹ However, because of recent substantial fuel increases, particularly diesel, that mileage has likely decreased. The Department of Conservation is currently examining this equation.

All material costs are rising, many because of increased worldwide demand. According to Caltrans, the cost of concrete quadrupled from the 2004 average, and the cost of asphalt increased 44% during the same period. Results for bids opened in September and October, 2005 arrived at up to 54% over previously determined estimates.³² Certainly it benefits local communities to keep transportation costs as low as possible.

In Santa Clara County, where the median price of a home is over \$700,000, does it matter if aggregates are more expensive? Yes, because added costs continue pushing prices upward, and puts further strain on building more affordable housing. Interestingly, a California Building Industry report states that "studies show as little as \$1,000 added to the price of a home in California chases tens of thousands of families out of the home buying market."³³

Increased costs to businesses are passed along to consumers, contributing to a higher cost of living. Finally, since the majority of aggregates go into public works' projects, this directly impacts city and county budgets resulting in higher taxes and/or reduced services to the public. This is not a small consideration, as local budgets continue to face challenges.

Expensive environmental consequences should also be included. Longer transportation distances have much greater negative environmental impacts. The environmental and safety costs of additional air pollution, accidents, greater traffic and traffic congestion, more fuel consumption, increased road maintenance, and higher vehicle replacement rates are also the result of greater hauling distances. Local aggregate supplies benefit overall air quality, and improve county compliance with stated objectives that particulate matter from buses and other heavy-duty vehicles be reduced.³⁴

Restoring, Reclaiming, and Reusing Aggregate Land

Aggregate production is a necessary, but interim, land use. After providing the building materials for infrastructure, 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 the 1990s.³⁵

FOOTNOTES

1. Governor Arnold Schwarzenegger, Speech to the California State Association of Counties' 111th Annual Meeting, 30 November 2005.
2. Governor Arnold Schwarzenegger, "State of the State" address delivered in the chamber of the State Assembly, Sacramento, CA, 5 January 2006.
3. "Infrastructure in California: Overburdened, Outdated, and Overlooked," California Rebuild America Coalition fact sheet.
4. "Transportation 2030 Plan for the San Francisco Bay Area," Metropolitan Transportation Commission (MTC)
5. California Transportation Commission
6. "2005 Urban Mobility Report," Texas Transportation Institute (TTI) May, 2005.
7. Association of Bay Area Governments and Metropolitan Transportation Commission
8. Transportation California
9. MTC, 28.
10. Governor Schwarzenegger's "Strategic Growth Plan," as shown on <<http://www.governor.ca.gov>
11. Campaign for College Opportunity as cited by "2006 Silicon Valley Projections," Silicon Valley Leadership Group (SVLG).
12. "Bay Area Infrastructure Report Card," The San Francisco Section of the American Society of Civil Engineers (ASCE), October 2005.
13. MTC, 23.
14. Ibid.
15. SVLG
16. State of California Economic Development Department
17. Santa Clara County Economic Forecast, 2005, Office of Transportation Economics, California Department of Transportation.
18. MTC, 24.
19. "Silicon Valley's Reality Check," San Jose Mercury News, 16 September 2005.
20. "State Plan Targets Traffic," San Jose Mercury News, 7 January 2006.
21. "Quarterly Status Report, Citywide Capital Improvement Program and Strong Neighborhoods Initiative Projects," City of San Jose, 25 October 2005.
22. "Curing Hospitals," San Jose Mercury News, 8 January 2006.
23. "Valley Transportation Plan, 2030," Santa Clara Valley Transportation Authority (VTA), February 2005.

24. Counting California as cited in SVLG.
25. “Median Home Price Continues to Rise,” The Santa Clara County Real Estate Report, December 2005.
26. Interview with Steve Sherman, past President of the San Francisco ASCE as reported in Quarry Times, Winter 2005.
27. *50 Fascinating Facts about Stone, Sand and Gravel* (Arlington, VA: National Stone, Sand, and Gravel Association).
28. Article 1, §2711.(a) of the Surface Mining & Reclamation Act of 1975 states that “The Legislature hereby finds and declares that the extraction of minerals is essential to the continued economic well-being of the state and to the needs of the society, and that the reclamation of mined lands is necessary to prevent or minimize adverse effects on the environment and to protect the public health and safety.”
29. Department of Conservation letter dated Apr. 1, 1999 as included in DMG Open-File Report 99-02.
30. “Cost Matters,” The California Building Industry Association (CBIA)
31. 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.
32. CirclePoint, as cited in California Infrastructure Brief
33. CBIA
34. MTC, 19. The MTC 2030 Plan also states that “the projects included must help improve regional air quality.”
35. Sharon Prager, *Reclamation Survey* (Sacramento: Construction Materials Association of California, 2001), 6-7.

THE AGGREGATE AND CONSTRUCTION INDUSTRIES' CONTRIBUTION TO SANTA CLARA COUNTY'S ECONOMY

This portion of the report describes the contribution of aggregates and construction to the Santa Clara County economy. In addition to the direct contribution that these industries create through production and services, their purchases have significant economic impacts, and in turn, the purchases made by the employees whose companies supply the construction and aggregates' industries. These latter two impacts result in what is called the "multiplier effect".

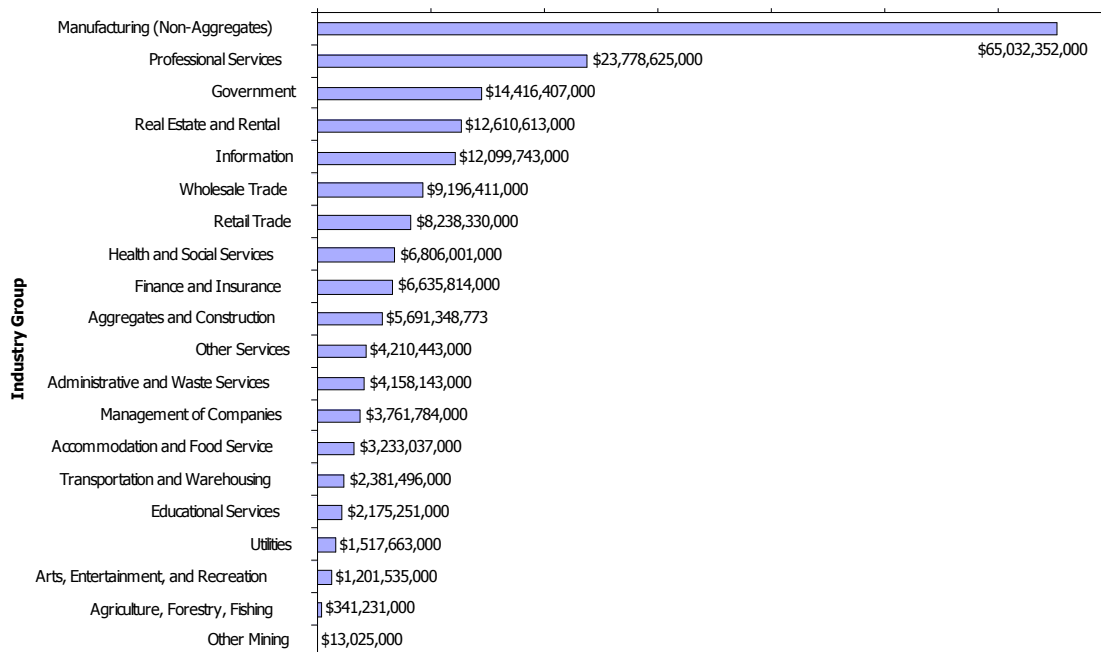
THE SANTA CLARA ECONOMY

With a total economic output of \$187 billion, Santa Clara County drives the Silicon Valley economy.¹ Manufacturing is the largest industry in terms of direct output (\$65 billion) followed by professional services (\$24 billion). Other industry groups accounting for more than \$10 billion of industry output include government, real estate, and information industry activities. The direct output for the aggregates and construction industries is \$5.7 billion, ranking it the 10th largest industry in Santa Clara County, or exactly mid-point for output compared to other county industries.

However, an exact economic ranking under represents the importance of the aggregates and construction industries, since their outputs build the critical fundamental foundations for society. Although their economic impacts are strong, it is the essential and determinative nature of what the aggregate and construction industries provide – vast varieties and quantities of necessary infrastructure – that enables the entire economy of the county and Valley to successfully function. Aggregates and construction are integral for providing the infrastructure required to maintain the county's economy, quality of life, and public works that protect our health, safety, and environment. More than ever, Santa Clara County continues to require a well built and maintained infrastructure for sustaining a growing population, community livability, and its competitiveness as the world's pre-eminent high tech region.

¹ Industry output represents the sum total of all economic activity for a geographic region or industry sector, and includes the value of all commodity inputs plus the value added components. The IMPLAN input-output model includes the following components in value added: proprietor income, employee compensation, other property income, and indirect business taxes.

FIGURE 1: Total Industry Output of Santa Clara County Industry Groups



Source: ADE, data from IMPLAN Impro input-output model

AGGREGATES AND CONSTRUCTION IN SANTA CLARA 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. Santa Clara County’s public and private infrastructure – its roads, highways, homes, schools, public works, 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.

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 Santa Clara County economy, therefore, is not possible without conferring equal weight to the aggregates industry.

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 industry 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

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 60-75% 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.

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

TOTAL ECONOMIC CONTRIBUTION OF THE AGGREGATES & CONSTRUCTION INDUSTRIES

The annual total direct and indirect contributions of the aggregate and construction industries to Santa Clara County is \$12.5 billion. This means that aggregates and construction has a multiplier of 2.2 – one of the highest of any industry. For every \$1.00 of construction and aggregates spending, an additional \$1.20 is created in the economy. This annual economic activity generated nearly 95,000 jobs and \$5.4 billion of labor income.

TABLE 1

Total Impact of the Aggregate and Construction Industries on the Santa Clara Economy

<i>Santa Clara County Aggregates & Construction Industries</i>	<i>Output</i>	<i>Employment</i>
Direct	\$5,691,349,000	40,991
Indirect	\$2,739,562,000	18,242
Induced	\$4,097,981,000	35,726
Total	\$12,528,892,000	94,959

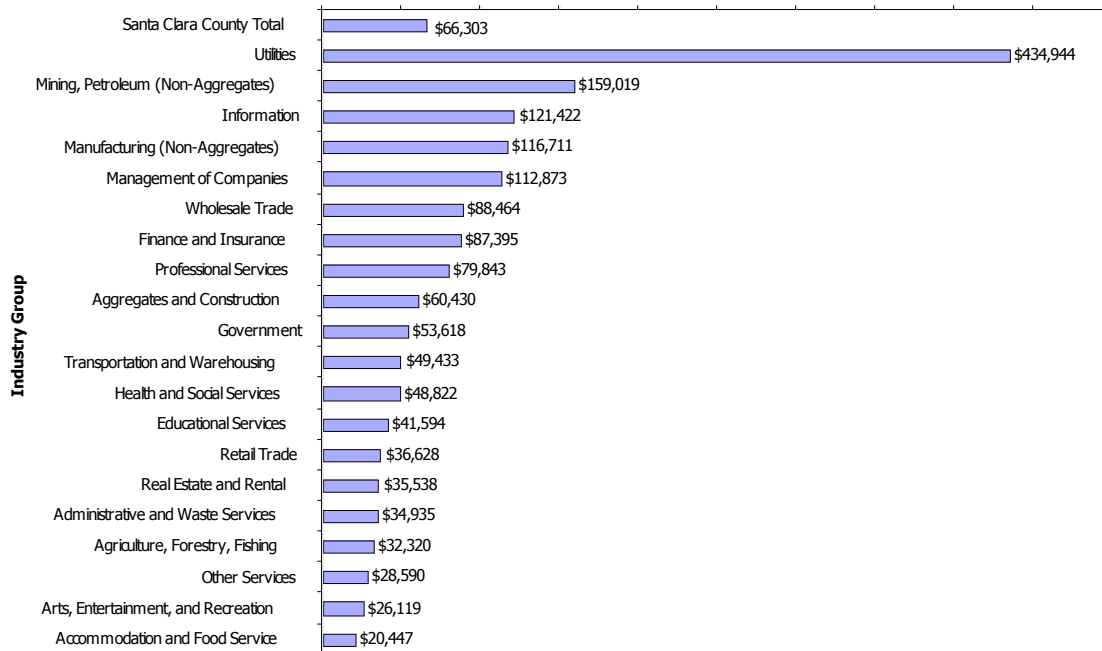
Source: Applied Development Economics, data from IMPLAN Impro Professional input-output model, and Dodge Analytics.

Overview of Average Wage Levels

Between 2000-2004, Silicon Valley had the largest percentage drop of jobs of any US metropolitan area since 1939. In 2004, while overall Silicon Valley industry clusters lost 3.2% of jobs, the building and construction cluster added jobs. In 2005, construction companies led the Bay Area in hiring new workers, following a statewide trend.

Labor income in Santa Clara County averages over \$66,000 per employee for all industries. Much of this is driven by information technology businesses, including professional services, manufacturing, and trade. Aggregate and construction’s combined average is over \$60,000 per employee. In the aggregates industry itself, the average wage per employee is \$71,185.

FIGURE 2: Average Income Per Worker In Santa Clara County



Source: ADE, data from IMPLAN Impro input-output model

TABLE 2

Labor Income Contributed by the Aggregates & Construction Industries in Santa Clara County

	Direct Impacts	Indirect Impacts	Induced Impacts	Total Impacts
Employment	40,991	18,242	35,726	94,959
Labor Income	\$2,489,060,000	\$1,190,055,000	\$1,793,425,000	\$5,472,540,000
Income Per Employee	\$60,722	\$65,237	\$50,200	\$57,631

Source: Applied Development Economics, data from IMPLAN Impro Professional input-output model, and Dodge Analytics.

SUMMARY OF OVERALL IMPACTS – MULTIPLIER ANALYSIS

Using an input-output model and other data sources, this section identifies the economic impact analysis that results from the activities of the aggregates and construction industries in Santa Clara County, and identifies not only the direct impacts from these activities, but the indirect and induced multiplier effects as well. These multipliers represent ancillary economic activity generated by the aggregates and construction activities, and result from supplier purchases made by these industries and local purchases made by employees. Altogether these activities represent a significant benefit to the regional economy.

Direct Impacts

On an annual basis, the aggregates and construction sectors in Santa Clara County directly generate \$5.7 billion of economic activity (industry output) for the county economy. This economic activity also directly generates the equivalent of nearly 41,000 full-time jobs, with about \$2.5 billion in labor income. Construction activity accounted for about \$5.2 billion in industry output, while aggregates generated about \$496 million of industry output.

While construction accounted for the bulk of the employment, aggregates generated a higher average wage per employee at nearly \$71,200, compared to about \$60,200 for construction.

Indirect Impacts

The indirect economic activity resulting from supplier purchases with various supplier businesses and service providers totals about \$2.7 billion. This indirect industry output represents the estimated indirect benefit for other businesses throughout Santa Clara County. The indirect economic impacts total about 18,242 jobs and nearly \$1.2 billion in labor income.

Induced Impacts

Employees working in these industries will also make purchases of household goods and services. These induced impacts represent an economic value of about \$4.1 billion to the Santa Clara County economy. They generate over 35,700 jobs and \$1.8 billion in labor income.

TABLE 3

Summary of Economic Impacts

<i>AGGREGATES</i>	<i>Direct Impacts</i>	<i>Indirect Impacts</i>	<i>Induced Impacts</i>	<i>Total Impacts</i>
<i>Industry Output</i>	\$495,993,126	\$191,800,093	\$238,290,183	\$926,083,402
<i>Employment</i>	1,875	1,184	2,077	5,137
<i>Labor Income</i>	133,472,537	80,461,389	104,284,409	318,218,331
<i>Income per Employee</i>	\$71,185	\$67,952	\$50,199	\$61,952

<i>CONSTRUCTION</i>	<i>Direct Impacts</i>	<i>Indirect Impacts</i>	<i>Induced Impacts</i>	<i>Total Impacts</i>
<i>Industry Output</i>	\$5,195,355,648	\$2,547,762,402	\$3,859,690,765	\$11,602,808,576
<i>Employment</i>	39,116	17,058	33,648	89,822
<i>Labor Income</i>	\$2,355,587,328	\$1,109,593,874	\$1,689,140,379	\$5,154,321,500
<i>Income per Employee</i>	\$60,221	\$65,049	\$50,200	\$57,384

Source: Applied Development Economics, data from IMPLAN Impro Professional input-output model, and Dodge Analytics.

TOTAL ECONOMIC IMPACT

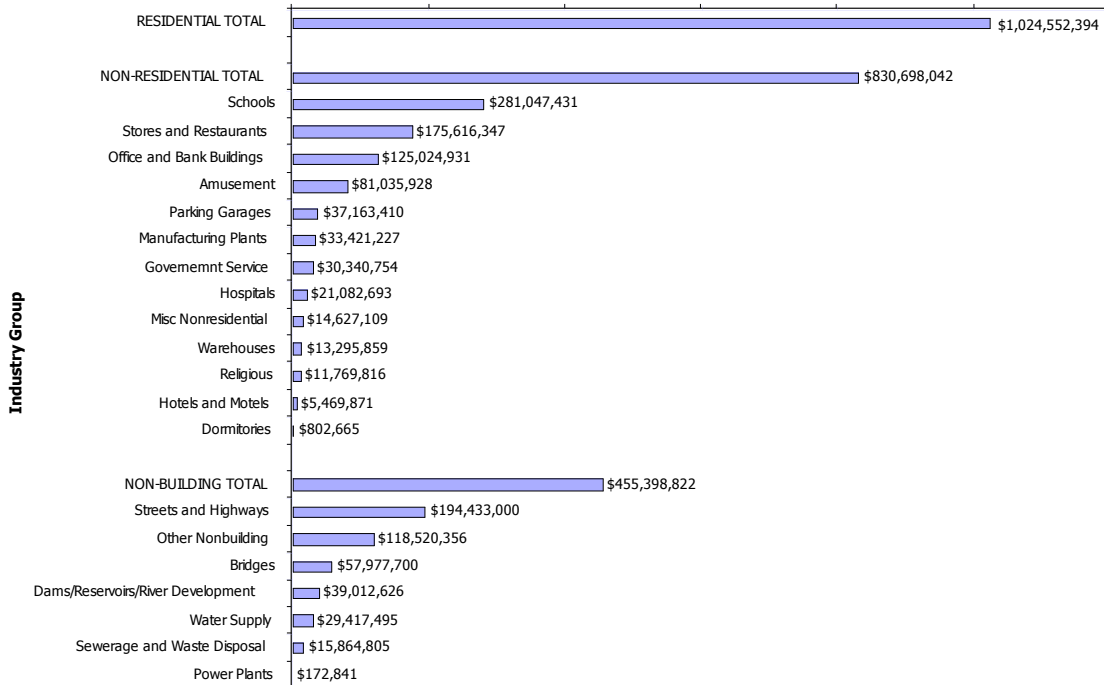
Calculating direct impacts (output), and the indirect and induced impacts (“multiplier effects”), the result is **\$12.5 billion in annual economic activity to Santa Clara County. This includes nearly 95,000 jobs and \$5.4 billion of labor income.**

This total economic impact indicates that aggregates and construction produces 7% of all Santa Clara County output. The combined industries rank 10th (midpoint) in economic output of the County’s top 20 industries.

ECONOMIC IMPACT OF CONSTRUCTION STARTS IN SANTA CLARA COUNTY

The following is an example of how the economy benefits. In 2004, the total construction starts in Santa Clara County had a value of approximately \$2.3 billion. Residential construction accounted for over \$1.0 billion, while non-residential buildings accounted for about \$831 million, with the remainder going to non-building activities such as road construction.

FIGURE 3: Estimated Construction Starts in Santa Clara County, 2004



Source: ADE, data estimated from Dodge Analytics

On an annual basis, these construction starts (including aggregate supplies) generate the equivalent of over 18,000 full-time jobs, with about \$1.1 billion of labor income. After accounting for the multiplier effects, the total impact on the local economy is about \$5.2 billion of annual economic activity. This includes over 40,600 jobs and \$2.3 billion of labor income.

This economic activity benefits local supplier businesses with a total indirect impact of \$1.1 billion. The indirect economic impacts also create about 7,400 jobs and nearly \$483 million in labor income.

The induced impacts represent an economic value of about \$1.7 billion to the Santa Clara County economy. They generate over 15,200 jobs and \$765 million in labor income.

CONCLUSION

This study finds that the economic contributions of the aggregates and construction industries are substantial, totaling \$12.5 billion annually, or 7% of Santa Clara County's economy.

Aggregate and construction's direct output contributes nearly \$5.7 billion, generating 41,000 full-time jobs and \$2.5 billion of labor income. An additional \$6.8 billion is contributed through indirect and induced impacts generating over 53,000 jobs and nearly \$3 billion in labor income.

Average wages for the aggregates industry alone is \$71,200 compared to an average income of \$66,000 for all industries in Santa Clara County.

Combined, aggregates and construction ranks as the County's 10th largest industry. These results also indicate that aggregates and construction has a 2.2 multiplier effect, one of the highest of any industry. For every \$1.00 of direct output, these industries generate an additional \$1.20 in the economy.

Equally important to these economic impacts is the intrinsic value of these industries. Accessing local aggregates is integral to building and maintaining Santa Clara County's infrastructure. Aggregates are required for all the "essential foundations" of a successful community: economic opportunity, transportation, affordable housing, water management, quality growth, preserving and protecting nature and open space, efficient land reuse, and educational facilities. Without aggregates to build its foundations, Santa Clara County suffers a loss of competitiveness and community livability. As such, aggregate and construction activities are a critical county indicator. These are important bellwether industries that reflect the fundamental health of Santa Clara County's economy and quality of life.

Urban aggregate producers in Santa Clara County are increasingly an "endangered species". Yet it is their proximity to construction, road maintenance, and public works' projects that saves taxpayers money, reduces environmental impacts, and seamlessly serves the public to produce and maintain convenience, comfort, health, and safety.

Forty years ago Ronald Reagan asked Californians to join him in building a "creative society". Doing so is difficult because it often requires collaboration. Collaboration is not an "either-or" process – it is inclusive and means "working together". This is an important concept to remember when planning and permitting local aggregate supplies, because there isn't anyone in Santa Clara County who doesn't depend on aggregates daily.

Including valuable aggregate resources and their producing sites into the County's long-term planning, and expediting the permitting process, benefits both Santa Clara County and Silicon Valley overall. As communities and counties wrestle with policy formulation, capacity-building for sustainable urbanization, and maintaining world-class competitiveness,

the tenet of sustainable aggregates management is increasingly important for ensuring low cost, high quality aggregates for all of the important infrastructure projects depended on by the public. Whether road improvements or school facilities, more affordable housing or new park amenities, expanding water systems or VTA light-rail, nothing gets built without aggregates.

A combination of continued population growth, urbanization, and competing land uses gives new urgency to ensuring that Santa Clara County's local aggregate resources 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.

APPENDIX

Impact Definitions

The analysis calculated the multiplier impacts based on three economic measures: employment, industry output, and labor income. These measures are defined as follows:

- Employment indicates the number of jobs that the aggregates and construction industries generate on an annual basis.
- Industry output represents the sum of all economic activity generated by these businesses. This activity includes all commodity inputs, labor income, property income, and other value added components.
- Labor income represents the income generated through both self-employment, and wage-and-salary employee compensation.

The multiplier impacts for these measures come from the Type II multipliers. These multipliers include the direct, indirect, and induced impacts. These multiplier descriptions are as summarized below:

- Direct impacts represent the jobs and other economic impacts that are directly generated by the aggregates and construction sectors on an annual basis.
- Indirect impacts represent the jobs and other economic effects that will potentially be generated elsewhere in Santa Clara County as a result of the aggregates and construction activity. These indirect impacts result from supplier purchases.
- Induced impacts represent the economic effects that will be generated through household purchases made in Santa Clara County as a result of employee spending. These induced impacts most typically occur in retail and other local-serving industry categories such as personal services, education, and health care.

THE IMPLAN ECONOMIC MODEL

The IMPLAN economic impact 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 Santa Clara County. No adjustments were made to the model for specific industries or special conditions in Santa Clara County.

About the Authors

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Peter Cheng is an economist with Applied Development Economics, Inc. (ADE), a consulting firm specializing in economic planning and development services. ADE has completed local and regional projects throughout the Western US, and has received many national and regional awards.

Peter Cheng specializes in economic base analysis, downtown revitalization, tourism analysis, and industrial development studies. Mr. Cheng has conducted extensive analyses of employment and occupational trends for a variety of industries, and has completed numerous input-output analyses for industrial market and regional economic base studies. He has successfully managed a number of ADE's retail and tourism studies, and is the primary developer of the firm's retail analytical models.

Mr. Cheng has a background in land use and physical planning, and additional experience in transportation and housing. He has conducted demographic, transportation, and land use

studies, as well as legislation and policy analyses for local governments. He has also worked on environmental and public works' projects in the private sector.

Mr. Cheng holds a Bachelor's degree in Sociology from the University of California, Los Angeles, and a Master's degree in City Planning from the University of California at Berkeley.

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Ms. Prager's career has focused on the transportation and mining industries, including over a decade with BHP Billiton, the world's largest diversified resources company. Her experience includes co-authoring, with Applied Development Economics, a series of state and county economic impact studies of the construction and aggregate industries in California, as well as co-authorship of an investment study with The Fraser Institute in Vancouver, Canada. Ms. Prager's articles have appeared in trade magazines and environmental proceedings, and she is recognized as an industry expert by research organizations.

Ms. Prager holds a Masters degree from Stanford University, completing her thesis on the sociocultural and public policy issues of the Island Copper Mine in Canada.

