Planning for the Future in Silicon Valley

Ed Blackmond
424 North Third Street
San Jose, CA 95112
408-279-0780
Ed@Blackmond.com

Executive Summary

Silicon Valley is the world's leading center of innovation in business and technology, but it is becoming an increasingly more difficult place to live. Restoring our quality of life is essential to maintaining our economic and technological leadership.

Our diminishing quality of life is a direct result of public policy decisions made during the last 50 years that simply do not scale to the size of our community today. By compartmentalizing our public policy processes we have inhibited the evolution of an institution with the responsibility, authority, and incentive to pursue goals of Silicon Valley as a region rather than goals of individual localities within the region. Our localized approach to issues of regional impact has led us into the situation we are in today. It will not lead us back out. We need to apply the same methods that have made us the world leaders in business and technology innovation towards creating a new public policy paradigm to maintain our leadership position.

This paper presents a plan to pursue regional public policy within the established localized framework. Key to this plan is redevelopment of our existing industrial land more efficiently to provide for economic growth while supporting the housing and transportation requirements of the entire region. The result will be higher density industrial campuses that are as easily accessible by rail transit commuters as they are by automobile commuters and will provide much needed housing nearby.

The heart of the plan is a financial model to fund these efforts without the need for a public investment in the form of a tax. Rather than siphoning resources from local and county governments, additional revenue will be generated as the economy grows.

Introduction

Traffic congestion and the housing crisis have replaced sunshine and innovation as the defining characteristics of Silicon Valley. Everyone who lives or works here has a horror story to tell. While we all like to tell stories, we will not be able to continue as a vibrant community (both social and economic) for very much longer if we don't take steps to eliminate these problems.

These issues are related. In fact, they are both symptoms of the same problem. We have a limited amount of land in the Valley, and we don't use it very efficiently. Our land use

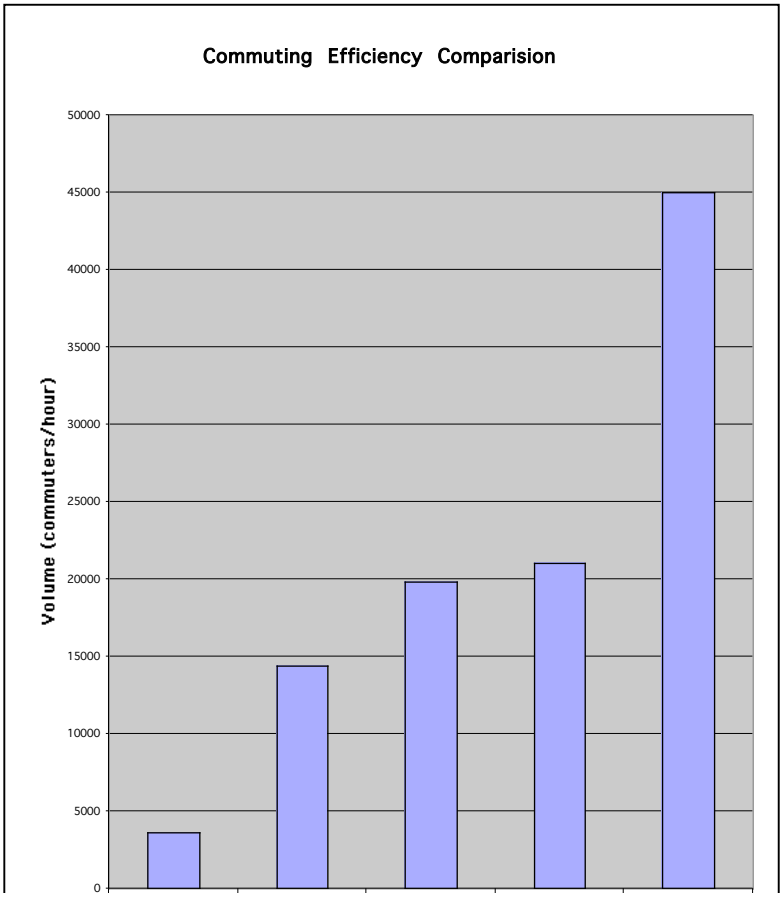
patterns date back to 50 years ago when the population of the Valley was significantly smaller and the amount of land seemed infinite. At the time, the beautiful campus like settings of our industrial parks was a sensible way to use the land. People could live in their comfortable suburban homes and drive along freeways to work in a park-like atmosphere surrounded by fields and trees. Unfortunately, nobody foresaw the tremendous growth that occurred over the last 50 years and the explosive growth during the decade of the 1990's was certainly beyond anybody's wildest dreams. Now we have grown to the point where the old style of land use can no longer effectively support our community.

How will it be possible to continue our economic growth (i.e. job growth) under these conditions? Where will the people filling the jobs live? Where will the jobs be located? Even if we find a place for the offices and the houses, how will people commute from those houses to the offices? Understanding how inefficiently we use our land at job sites and for transportation corridors is the key to creating plans for future development and for fueling continued economic growth.

Land Use Efficiency

A single freeway lane can support a volume of about 3600 cars per hour. This means a four-lane highway such as US101 through Silicon Valley, with three regular lanes and one carpool lane, can carry a maximum of about 20,000 commuters each hour in one direction.

One BART train can seat 700 passengers. If it is packed completely full, it will hold about 1500 passengers. The maximum possible frequency of a BART train is on the order of one every two minutes. It must stop for roughly a minute at each station, and it takes about a minute for one train to close its doors and leave a station and another one to arrive and open its doors. Operating at this maximum frequency, a single BART track can carry 21,000 commuters per hour in one direction with everyone sitting and a maximum of 45,000 commuters per hour if the cars are completely packed.



This is a very important concept to grasp. A single BART line with everyone

sitting comfortably can move more people than four lanes of freeway traffic flowing at its maximum capacity. If the trains are packed completely full it can move more than twice as many people. In addition, traffic on the freeway slows down as the saturation point is reached. BART trains run at the same speed regardless of the number of passengers. A similar analysis shows how other rail systems such as CalTrain offer similar efficiencies over cars on freeways. Clearly, to continue our economic growth, rail transit must be a significant component of our transportation system.

The people who now commute to work in their cars all drive to the parking lot outside the building where they work, park their cars and walk inside. Where will the all the rail transit commuters go when they get off the train? Today there are so few jobs within walking distance of CalTrain, ACE, and Light Rail stations that rail commuters must take shuttle buses, which slowly weave their way along streets and through parking lots dropping people off at their workplaces. This is where the efficiency of rail transit breaks down in Silicon Valley and why so few people actually use it.

It should be obvious that rail transit, as it currently exists, simply does not work in Silicon Valley today. Because our freeways are operating at their maximum capacity, we won't be able to continue our growth without taking advantage of rail as a commuting option. Therefore we must find a way to efficiently integrate rail systems into our development plans. We can't simply lay down some railroad tracks, call it a transportation system, and expect our traffic congestion to disappear.

Development Guidelines

As we plan for the integration of rail commuting into our community there are some things we need to consider. First, this is going to require higher density development, but we do not want to create New York City. Buildings over eight stories tall not only create urban canyons with dark shadows and uncomfortable wind gusts, but also seem menacing and intimidating. We also do not want to make automobile commuting any less convenient than it is now and hopefully it can get better as some commuters switch to rail transit. Finally, we must not destroy the park-like atmosphere of our office campuses with their green landscaping, majestic trees, quiet ponds, and unique character of the innovative companies occupying them. This atmosphere is an important reason why we are able to remain so productive in spite of issues like our housing crisis and traffic congestion.

With these constraints in mind, here are some guidelines for future development. The industrial campuses of the future will have to be oriented towards transit stations

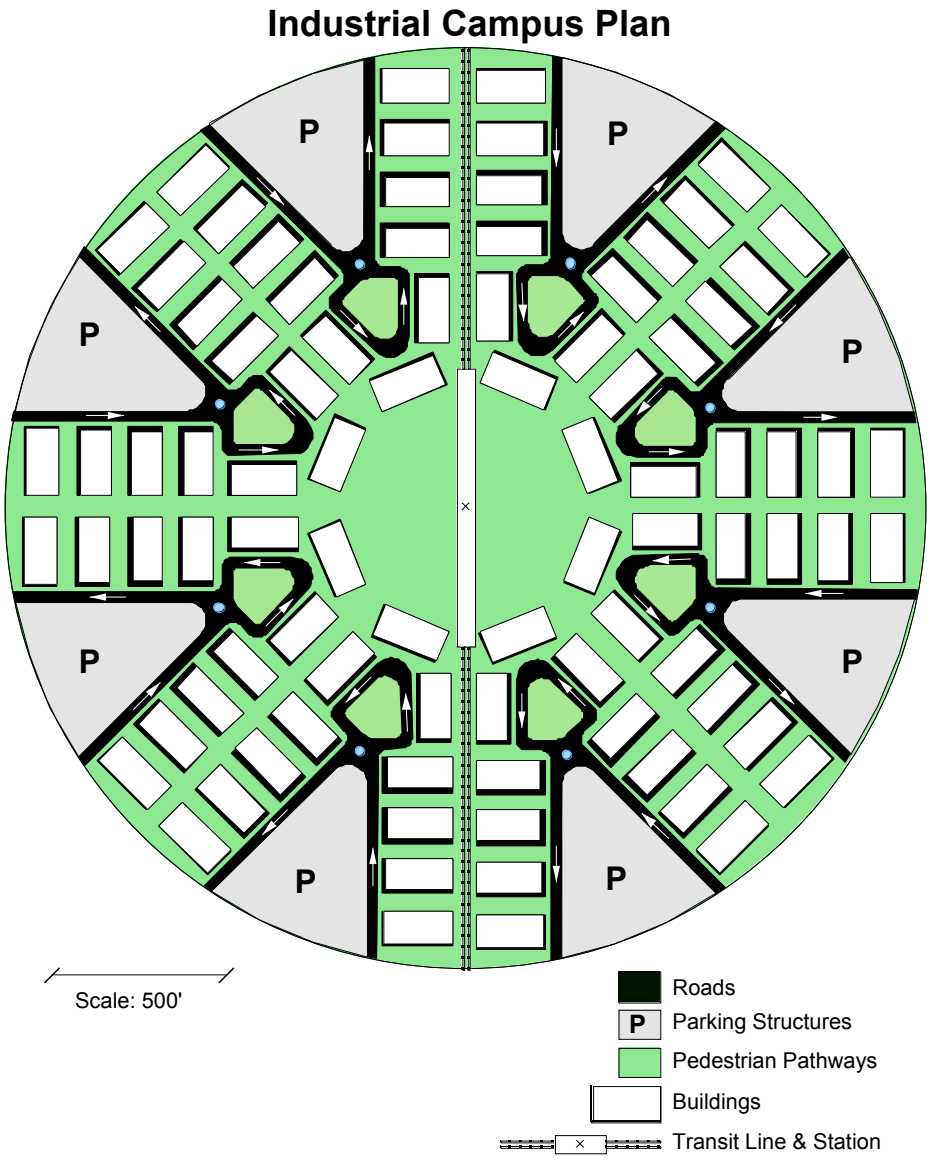
Guidelines for Future Land Use Planning

- Campus-like industrial park
- Convenient for both automobile and rail transit commuters
  - Max of 5 minute walk (1300 feet) to the office for either alternative
  - Pedestrian corridors separate from roads
- Human scale for buildings (a mix of 4, 6, and 8 stories)

making it possible for people to walk from the train to their office in five minutes or less. Not everyone will be able or want to take the train to work, so there must also be convenient parking available. Because pedestrian and automobile traffic don't mix very well, the industrial campuses of the future must provide separate corridors so pedestrians don't have to cross streets and automobiles aren't held up waiting for pedestrians.

The Industrial Campus

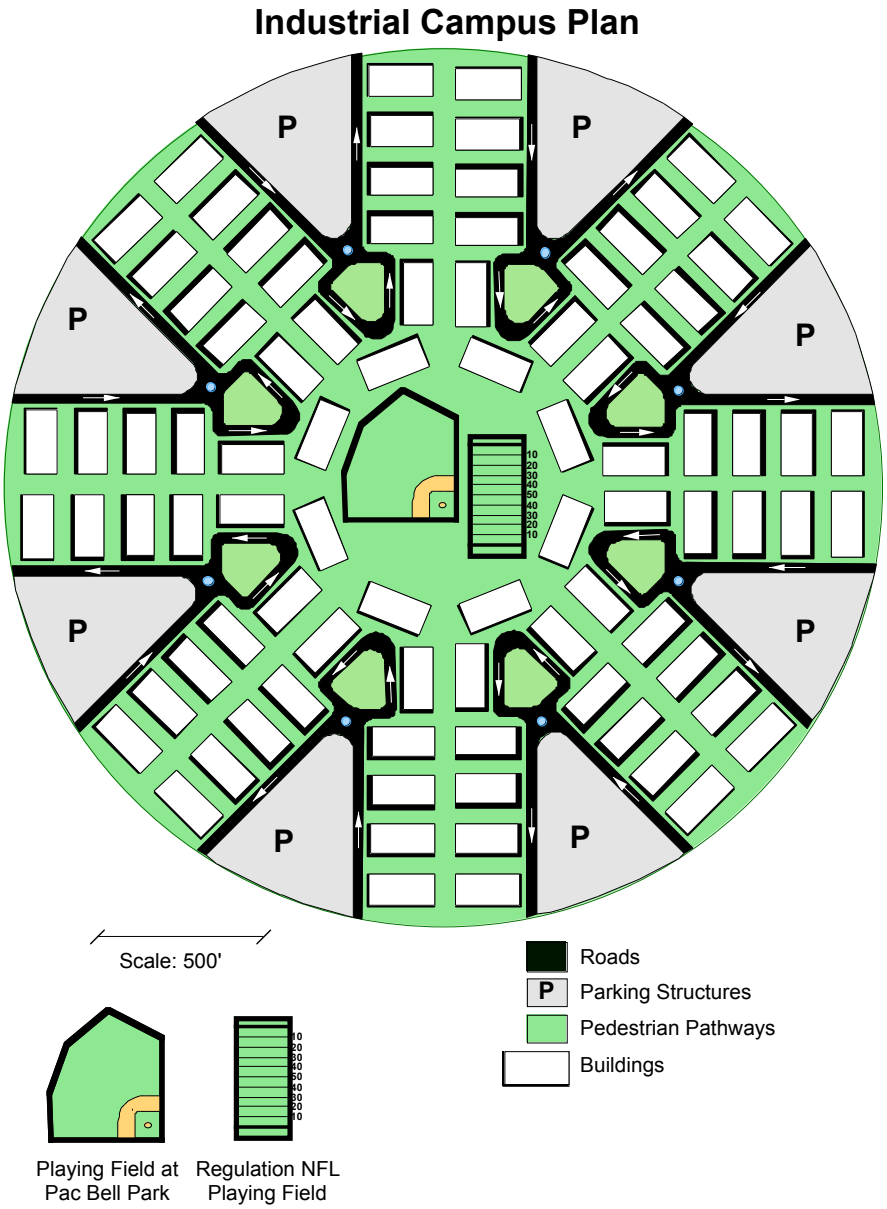
How realistic are these guidelines? The plan below presents the layout of an industrial campus consistent with these guidelines. To clearly demonstrate characteristics that may be obscured in a more aesthetically pleasing layout, it is drawn here in a symmetric circular plan. In this plan a mix of office buildings, with an average height of six stories, and 8 parking structures surround a transit station at the center of the campus. The office space totals 10.8 million square feet, enough for 33,000 jobs, each of which is within a 5-



minute walk of the transit station and a parking space. This business center could even be used as a park-&-ride lot for those who live near the campus and work elsewhere.

The 8-acre park immediately surrounding the transit station will be a place where employees can stroll during their lunch breaks. There will be benches and tables where people can eat or play cards. People will be able to play volleyball, ultimate Frisbee, or even baseball or football in this park. The pedestrian corridors leading into the building clusters will be lined with trees with a look and feel similar to the San Carlos St. pedestrian walkway through San Jose State's campus. These are as wide as typical streets making the scale of the four, six, and eight story buildings lining the pathways quite reasonable. This is a peaceful place where employees will like to work whether they drive their car or ride the train.

The Industrial Campus diagram is redrawn below superimposed with two familiar objects: the playing field from Pacific Bell Park, and an NFL regulation football field. This demonstrates the size of the park area and provides a reference to imagine the spacious open feeling that will be felt walking through the park and along the pedestrian malls.



Comparison with Cisco Campus

This discussion began by arguing that we are not using land very efficiently in Silicon Valley. To determine how this plan compares with other developments, consider the plan Cisco is proposing for Coyote Valley. The Cisco plan is considered by many to be an efficient state of the art facility, far superior to most other Silicon Valley campuses.

Cisco plans to develop a 365-acre campus with 6.6 million square feet of office space for up to 20,000 employees. The Industrial Campus plan presented above creates a 125-acre

campus for 33,000 workers. There is also an 8-acre park where employees can relax and unwind from the stress we all feel in our highly productive workplace.

The Cisco plan calls for building a CalTrain station right next to the development. Eventually, there may be a light rail station on the other side of the development. With this orientation of the CalTrain station, only about 1,000 of the 20,000 jobs will be within a 5-minute walk of the station. Instead of being able to walk, shuttle busses will be used to transport employees from the station to the buildings where they work. For the buildings farthest away from the station, this ride could take longer than ten minutes as employees in closer buildings are dropped off first. For employees who choose to walk from the train station, they will first have to cross a parking lot at the CalTrain station and then a 4-lane street with cars moving faster than 50 miles per hour to get to the Cisco campus. Once they are on the Cisco campus, they will have to navigate their way through more than 200 acres of parking lots before arriving at their building.

The Industrial Campus plan presented here provides 33,000 jobs all within a five minute walk of the transit station. There will be no need for shuttle busses. Unlike walking across streets and through parking lots, the walk from the transit station to the office will be free from the annoying smell of automobile exhaust and the irritating noise. It will be a pleasant relaxing stroll through an 8-acre park down a tree-lined corridor.

Comparison of Cisco and Industrial Campus Plans

	Cisco	IC
Land for office buildings (acres)	365	125
Office space (sq.ft.)	6.6M	10.8M
# employees	20,000	33,000
Park area included (acres)	0	8
Land for housing (acres)	0	240
# housing units	0	2400
Overall cost* ($ billion)	1.6	**0**

*after sale of housing and surplus office space

Unfortunately, real estate development doesn't take place in a financial vacuum. The two plans must also be compared from a fiscal perspective. Cisco plans to spend $1.6 billion developing their 365-acre campus. The Industrial Campus plan presented here requires only 125 acres. The remaining 240 acres could be developed with housing. At a density of 10 units per acre (i.e. mostly single family homes), 2400 housing units could be built and when sold at market rates would yield a profit of $800 million after subtracting building costs. In addition, the Industrial Campus plan includes 4.2 million square feet of additional office space. Using the $1.6 billion Cisco is budgeting for 6.6 million square feet of office space as a guideline, the additional 4.2 million square feet of space could be sold for about $1 billion. Taking into account the profits from selling the housing and surplus office space, and the additional cost of building parking structures rather than surface lots, Cisco could develop their Coyote Valley campus for essentially no cost.

Housing

The Industrial Campus plan shows how we can create places for all the new workers as our economy grows in the future. It also shows how rail transit can effectively be used as a commuting alternative to deal with the traffic congestion problem. But where will all these new employees live?

Look back at the financial analysis comparing the Cisco plan with the Industrial Campus plan. Not only does the Industrial Campus plan create space for 65% more employees, it does this while converting 65% of the land area for housing. Cisco plans to develop open land in Coyote Valley. What would happen if developed land in the Golden Triangle area (bounded by US101, CA237, and I880) was redeveloped according to the new guidelines? As our economy grows, we will have to do this or something like it because we will need more office space for people to work.

As another example of the efficiency of this design, imagine that the plan to bring BART to Silicon Valley ran the tracks directly through the heart of the Golden Triangle area. Six Industrial Campus developments centered on BART stations would provide more office space than is currently in the entire Golden Triangle area. Now imagine that all the businesses currently in the Golden Triangle area moved their operations to the new Industrial Campuses. This would free up land that could be purchased and redeveloped into 28,000 new housing units (assuming 10 housing units per acre).

Financial Analysis of the Industrial Campus

In February of 2001, BEA Systems purchased 40 acres of land in the Golden Triangle area for $250 million. At roughly $145/sqft this may be the most expensive land deal in Silicon Valley history. With this new record for land prices, the efficiency of the Industrial Campus becomes even more apparent.

The 40-acre parcel of land purchased by BEA is part of a much larger vacant lot and next to a few newly developed buildings. All combined there is enough land in this area to build an Industrial Campus. Tearing down brand new buildings may seem ridiculous, but consider the value of an Industrial Campus at this location.

The Industrial Campus plan requires a rail transit line passing through the center of campus. Because a line doesn't exist here one will have to be constructed. The most effective system for this would be a rail line connecting the Peninsula Caltrain commuter line with the Guadalupe corridor light rail line with a stop within the new Industrial Campus. This new system would run directly through the San Jose Airport with a stop at the terminal. It could also hook up with the proposed BART line passed by Silicon Valley voters in November of 2000.

This Industrial Campus combined with the transit line through the airport would not only provide a realistic alternative for Silicon Valley commuters it would also provide much needed congestion relief at the San Jose Airport. It will make it possible for anyone living on the Peninsula from San Francisco to Gilroy to commute to the new Industrial Campus or the San Jose Airport in a fraction of the time it now takes to drive. In addition, the new transit line would connect with the ACE line providing easy access to commuters from the East Bay as well.

Can this be financially feasible? Appendix A shows a financial analysis of this project. At roughly $6 million per acre, acquiring the land for the Industrial Campus would cost

about $790 million. Developing the 10.8 million square feet of office space and the 9.2 million square feet of parking structures would cost another $1.35 billion. Building a rail line compatible with the future BART system would cost about $500 million. All told the project would cost just over $2.6 billion.

Suppose 30-year bonds were issued to fund this entire cost with an interest rate of 6%. At this rate, $790 million in interest would accrue during a 5-year construction period. The expense of paying this off over the remaining 25 years of the loan would cost about $2.6 million per month. The interest on the bonds would be $13.2 million per month and paying back the principle would cost $7 million per month. All told, the cost of financing the development would amount to $23 million per month during the 25 years after construction is completed.

Now suppose the office space were leased at a rate of $3 per square foot per month (a reasonable rate for this class of space). Assuming a 5% vacancy rate, monthly revenue from leasing the property would be $30 million. Property taxes, insurance, and maintenance of both the rail line and the campus facilities would add an additional expense of about $7 million each month. Subtracting the bond costs and expenses from the revenue shows the project would operate with a positive cash flow of about $500,000 per month.

Funding Infrastructure Development

This analysis suggests an alternative mechanism for funding rail transportation infrastructure for Silicon Valley. The Industrial Campus design makes it possible to build and operate significant transportation infrastructure without a public investment. The analysis presented in Appendix A demonstrates that a project of this magnitude can be funded entirely without raising taxes of any kind. Because of this, the project can be completed using the approval processes already in place.

One way to implement this strategy would be to create regional agencies for improving livability (RAIL). Each RAIL would be organized as real estate investment trust (REIT). This allows them operate as businesses free from the burdens of political influence and bureaucracies found in government agencies.

Silicon Valley Regional Agency for Improving Livability

Real Estate Investment Trust (REIT)
Expand rail transit in Silicon Valley
Develop Industrial Campuses
Purchase vacated offices and redevelop into housing
Lease office space and sell housing to pay off bonds

Rather than receiving grants from federal and state transportation and housing agencies, RAILs would sell shares and bonds to investors. As government budgets get stretched thinner and thinner, this structure makes it possible to accomplish more with less. The funds raised would be used to fund infrastructure development within the RAIL region.

In Silicon Valley, we could create the Silicon Valley Regional Agency for Improving Livability (SVRAIL). SVRAIL will issue bonds raising funds to expand rail transit infrastructure in Silicon Valley and redevelop the areas around transit stations with Industrial Campuses. Once offices are built, SVRAIL will lease the space and use the income to pay off the bonds. The office buildings vacated when businesses move into offices in the Industrial Campuses will be purchased, redeveloped into housing, and sold generating additional income to pay off the bonds.

Leasing the office space creates a very interesting opportunity. These recurring payments will continue even after the bonds issued for the initial development are paid off. The funds could be used for continued operation, maintenance, and expansion of the transportation infrastructure eliminating the need to collect fares from riders. A commuter could get on a train and ride all the way through Silicon Valley free of charge.

Environment

As required by the California Environmental Quality Act, development of the scale proposed here can't be considered without taking into account the affects on the environment. Full analysis is beyond the scope of this document, but a few simple observations will show real environmental benefits.

First and foremost the redevelopment efforts proposed here puts a complete stop to urban sprawl. In addition, by bringing balance back to jobs and housing in the region and making all those jobs accessible to rail and auto commuters alike, the effects of the last 50 years of sprawl will begin to be reversed.

There are only a few more areas of open land left for development in Silicon Valley. The proposal presented here allows us to continue our economic growth far into the future without the need to expand into and pave over these open spaces. The amount of space that will paved over for use as parking lots in the Cisco development planned for Coyote Valley is enough to build two Industrial Campuses. By redeveloping land we are already using we can save this open land for the benefit of our entire community for many generations.

Another environmental benefit of the redevelopment plans proposed here is related to the reduction in traffic congestion. Because fewer cars will be driven fewer miles, there will be fewer emissions from automobile exhaust. This will make the air we breathe much cleaner. A hidden side effect is that we will need less gasoline reducing the amount of oil pumped out of the ground and transported it to the Bay Area. This will reduce the potential for environmental hazards such as spills from large oil tankers. From an economic perspective it will also reduce our dependence on foreign sources of oil.

Affordable Housing

The redevelopment proposals presented here simply produce more housing units. This will go a long way towards leveling off the meteoric rise in housing prices. However, this by itself won't deal with the issue that housing is still far too expensive for people at or below the medium income level.

Fortunately, this too can be addressed as part of the proposal. In the analysis above, it was shown that the revenue generated by leasing the office space over a 30-year period would far exceed the costs for maintaining the buildings and the rail lines. Some of this revenue can be used in an innovative way to sponsor affordable housing.

The RAIL organization could make housing available for a fraction of the market rate in return for a corresponding share of the equity. For example, consider a $400,000 house. The RAIL organization could sell this house for $100,000 under a contract that provided RAIL with 75% of the equity gain when the house was sold.

The principle plus interest payment for this $100,000 mortgage would be about $600/month. The average apartment in Silicon Valley now rents for about $1,500/month. Certainly many of the people paying $1,500/month for rent would not object to sharing 75% of the equity in their property with RAIL if it meant that their monthly payment would by almost two thirds. A side effect of this is that all rents in Silicon Valley would be reduced as enough housing became available for all the people who want to live here.

Conclusions

Realizing we can't go through the 21st century with 20th century land use patterns provides the opportunity to create an entirely new and vibrant community in Silicon Valley. We will create higher density developments for work places, but they will be much more user friendly than the sprawling office complexes we have today. This higher density will not only allow our economy to continue to grow, but will make it possible to provide housing at a faster rate than our job growth. This will eventually bring better balance among housing and jobs to Silicon Valley. Integrating work places with rail transportation systems makes all this possible. With the creation of the Silicon Valley Regional Agency for Improving Livability we will have the mechanism to fund this development and restore our quality of life.

About the Author: Ed Blackmond is a computer engineer with a BSEE from the University of Pittsburgh and an MSEE from Purdue University. He moved to Silicon Valley in 1985 to work in the computer industry. In 1988 he joined a custom software development business and has been president of the company, now called Eureka! Computing Solutions, since the end of 1989. Ed lives in San Jose where he is undertaking a life-long project to revive a 100-year-old Queen Anne style Victorian home. He is owner of the French restaurant, Theo's, in Soquel, CA.

When he moved here in 1985, Ed discovered he would have to pay $700/month to rent a two-bedroom apartment and constantly felt trapped because he couldn't get anywhere without sitting in horrendous traffic jams. Housing prices and traffic congestion have only gotten worse since. This paper is the culmination of more than 15 years of thinking about the inefficiencies of our land use patterns. The Industrial Campus design took its shape sometime in 1992. The RAIL framework, as a funding mechanism, evolved as housing prices and commercial lease rates rose high enough to make it economically feasible today.

Appendix A

Industrial Campus Financial Analysis

Real estate development does not happen in a financial vacuum. The statement below presents a financial model for building an Industrial Campus in Silicon Valley. The project includes building a rail line that will be compatible with the BART system proposed for Silicon Valley. This line would run from Caltrain to the Guadalupe corridor light rail line on North First Street with stops at the San Jose Airport terminals, long term parking, and rental car facility.

The Industrial Campus and the rail line will not only provide a realistic alternative for Silicon Valley commuters it will also provide much needed congestion relief at the San Jose Airport. It will make it possible for anyone living on the Peninsula from San Francisco to Gilroy to commute to the new Industrial Campus or the San Jose Airport in a fraction of the time it now takes to drive. Because the new transit line will also connect with the ACE line, commuters from the East Bay will see similar savings in time.

An important aspect of this plan is that it requires **no public investment**. By using the land so much more efficiently, the revenue derived from this asset in the form of lease payments produces the funds necessary to finance the plan.

This will lead to a new paradigm for funding transportation infrastructure. Instead of raising tax revenue, we can borrow money to redevelop the land more efficiently and repay the loans with the additional revenue this redevelopment generates.

Assumptions			
	land purchase price ($/sqft)	$145	
	office building cost ($/sqft)	$95	
	garage building cost ($/sqft)	$35	
	lease rate ($/sqft/month)	$3.00	
	vacancy rate	5.00%	
	bond rate	6.00%	
	bond term (years)	30	
	construction period (years)	5	
Development Costs			
	land purchased (acres)	125	$789,525,000
	office space (sq ft)	10,800,000	$1,026,000,000
	garage space (sq ft)	9,186,560	$321,529,600
	Transit Line		$500,000,000
	Total		$2,637,054,600
Construction Expense			
	Bond interest accumulated during construction period		$791,116,380
Monthly Revenue			
	Rent ($/month)		$30,780,000
Monthly Expenses			
	Bond Interest		$13,185,273
	Bond Principle		$7,325,152
	Construction expense		$2,637,055
	Operation and Maintenance factor for office buildings, parking structures, park, pedestrian malls, and rail line (% cost/year)	1.50%	
	Operation and maintenance: ($/month)		$3,296,318
	Management factor for property management, taxes, insurance etc. (% cost/year)	1.75%	
	Property management ($/month)		$3,845,705
	Total		$30,289,502
Monthly Cash Flow			$490,498
Annual Income			$5,885,974