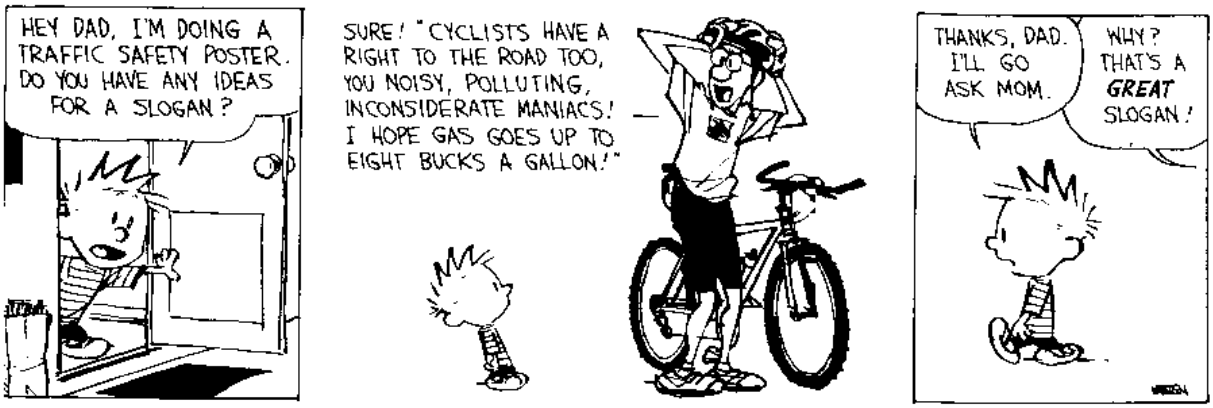

Car-free Housing: If You Build It, Will They Come?

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The Big Picture

This paper is about latent political and economic issues and how they can become more manifest through research and advocacy—or not. The issue in this case is the unsustainability of the car-sprawl system and the potential market for car-free housing.

Culture and vested interests have the power to frame markets in ways that exclude external costs, systematically imposing these costs on weaker interests. Markets also have indirect costs, where actors usually have no way to buy a solution to the problem they themselves are creating, such as congestion or a lack of enough "free" parking. For both external and indirect costs, there is no price incentive to reduce the cost; there is no reason to economize or become more efficient.

The power of culture means that those who are disadvantaged do not understand the costs they are absorbing, because they share the cultural assumptions of the dominant forces. These dominant forces are the attentive middle class and vested interests. A related problem is that the conflict between business and environmentalists often lacks insight by both sides into the views of the other; culture and knowledge limit the grounds for finding solutions that meet the needs of

both sides. Moving creative new policies from the fringe to the main stream is a major challenge for academics concerned about the sustainability and creativity of the larger human experiment.

Historically, political science has been concerned with democracy, rights, race, class, leadership, regulation, taxation, efficiency, violence, war, and so on, and, since the 1970s, with the environment. Only recently have concerns about sustainability come into focus, and then usually one issue at a time: overpopulation, species extinctions, food production, water depletion, stratospheric ozone depletion, global warming, peak oil, etc. The sustainability movement seeks to use the best science to change the economy so that future generations will have the same natural wealth as this generation, or even more. Sustainability and its sidekick, indicator reform, bring a refurbished yardstick to society based on a trilogy of major goals, known as "the three e's": equity, economy, and environment. This paper is, then, part of the challenge sustainability poses to political science, to ask new empirical questions based on new normative perspectives.

Traditional paradigms of urban systems are being challenged by Smart Growth paradigms, and Smart Growth paradigms are being challenged by the emerging sustainability paradigms. I use the plural, paradigms, because the challenges take place across a number of issues areas often treated separately from each other, such as land use, transportation, economic development, indicators, global warming, transportation pricing, and religion.

This paper fits into the larger framework of ideas summarized above and discussed in my essay, "From Smart Growth to Sustainability: The Challenge of Multiple Paradigm Change."[1] I have defined **ten topics**, listed below, with citations for a few related papers, relating to urban sustainability.

1. **Smart Growth; land use; greenbelt.** "The ABAG Regional Numbers Game: How We Plan for Growth in the Bay Area" discusses how a large, public, regional planning process for the nine county Bay Area produced a "network of neighborhoods" vision for the region, how that vision was subverted by demographic projections that were supposed to follow the vision, and why elected officials supported the projections. "Toronto's Neighborhoods; Quantifying Walkable Densities" develops a new methodology at the micro-scale for measuring geographic area of neighborhoods and establishes a density range conducive to

[1]Also at http://isis.csuhayward.edu/DBSW/politicalscience/slewis/FromSmart/index.htm. An application to the San Francisco Bay Area is proposed at http://isis.csuhayward.edu/ALSS/POLSCI/slewis/sps/sps.htm.

high levels of walking and transit use accomplished largely without high rise buildings.

2. **Transportation: highways vs. transit.** "Land Use and Transportation: Envisioning Regional Sustainability" discusses an alternative tested in the computer model of the San Francisco Bay Area transportation planning agency, how that model produced better performance than the Regional Transportation Plan, and the claims made by the agency in order to reject the plan. "MTC Sees Bullet, Does Not Bite" is a short op ed piece discussing an alternative tested by the same agency several years later, which also produced better performance and yet was rejected by the agency.
3. **Aggregate vs. per capita growth and human capital.** "Growth Without Growth" abstracts a paper by Paul Gottlieb and adds my observations. "Comments by Sherman Lewis on Economic and Business Caucus... Working Principles" discusses from a sustainability perspective, a pro-growth policy piece by representatives of large business in the Bay Area.
4. **Social equity and jobs.**
5. **Status of women.**
6. **Job location externalities and housing responsibility.** "Economic Questions from *From Smart Growth to Sustainability*" discusses a number of economic issues for this topic and 3, 4, and 8 of this list that economists have not studied.
7. **Fiscal reform and affordable housing.**
8. **Global warming.** "Global Warming Outline" covers the issues succinctly.
9. **Carism, auto dependency, externalities, pricing reform.** "Paying Directly for Driving" reviews pricing issues under 12 topics. "Elasticity Illustration: Pollution Tax, Elasticity, Tax Swap, Aggregate Demand, Benefit" shows a step-by-step quantitative analysis of how a swapped carbon tax would work.
10. **Indicators.** While largely conventional, "Pathways to Results; Measuring Progress Toward Sustainability" uses a number of important indicators, some taking a new and innovative approach. See http://www.bayareaalliance.org/indicators.html

The Smaller Picture

The topics of major relevance from the above for this paper on car-free neighborhoods are Smart Growth, transportation, and carism.

Car-free, the Old

The "car-free neighborhood," one of the more important topics in the new sustainability

paradigm, comes in two forms, historical and modern. Historically, some neighborhoods in larger, older American cities were built to high densities, with quality for the middle to affluent classes, and lacked parking. They were three to seven stories high. By the mid-1920s this housing was holding its own, but suburbs were getting started because of the streetcar and the automobile. Streetcars exploded across the urban landscape from the 1890s to the 1920s. They supported more urbanization than earlier transportation developments, ferries and suburban rail. Streetcar suburbs sprang up along the tracks at a compact density. In the biggest older cities like New York, Boston, and Chicago, streetcars went underground as subways and overhead as elevateds.

As the auto became very inexpensive in the 1910s, it found space in the streetcar suburbs, but initially people continued to take the trolley to jobs and shopping, as well as walk to local stores. Women tended not to drive, to stay home, and to shop without a car. By the mid-1920s, car-accessed downtowns were growing, lots for housing were getting bigger, and subdivisions were filling in areas between trolleys and going further out. Streetcars lost ground, slowed down by cars in their right-of-way, by fare controls cutting off recapitalization, by cheap car travel, and by dispersed land development. Suburbanization was coming on strong in the late 1920s, then was dampened by depression and World War II, then burst forth anew as the American monoculture dream after the War. As we enter the 21st century, urbanization has become even more dispersed and car-dependent.

Somehow, the historical, dense, car-free neighborhood survived to this day. The best of the classic car-free neighborhoods built before the streetcar suburb is Back Bay-Beacon Hill in Boston, but they also include the upper Tenderloin (Noberloin) and North Beach - Telegraph Hill in San Francisco, Adams Morgan and even Pleasant Hill and Capitol Hill in Washington DC, West Greenwich Village, Brooklyn Heights, Park Slope and other neighborhoods in New York City, neighborhoods close to the Lake on the north and south side of downtown Chicago, Liberty in Philadelphia—and very few others.

High-rise neighborhoods for various reasons don’t make the cut because they are rare, mostly very small or in New York City, have sustainability issues of their own, including cars, and are unlikely to be a model in response to auto pricing reform.

These classic neighborhoods survived the onslaught of the car monoculture by the design, quality, and spaciousness of their construction, by their pedestrian and transit access to shopping

streets and downtowns, and by yielding to as much carification as their streetscape allowed. Parking is often the major management and quality-of-life issue in these neighborhoods.

Europe has more of these old car-free neighborhoods and similar parking problems. In summer 1985 I visited several of them: New Town in Edinburgh; Quartier Archives in Paris; Zermatt in Switzerland; Caraveggio in Venice; Osterbro in Kobenhaven, Ostermalm and Vasastaden in Stockholm, Pimlico in London, Oude Westen in Rotterdam; Jordaan in Amsterdam; Uhlen Horst in Hamburg; Ruttenscheid in Essen; Agnes Viertel in Koln, Innere Nordstadt in Bonn; Sachsenhausen and Ostend in Frankfurt, and Josephplatz in Munich.

Whether in Europe or here in America, these old neighborhoods do not look very car-free; but the statistics show low levels of car ownership and use relative to income, and a high quality of life without car dependency.

Car-free, the New

The modern car-free neighborhoods have been a special interest of Jan Scheurer, an Australian researcher. His *Car-Free Housing in European Cities* is the best academic introduction to a movement that began in 1992, though unsuccessfully, in Bremen, Germany.[2] Among the larger projects are:

- **GWL-terrein** in Amsterdam (600 units, 14.8 acres, 41 units per acre,110 parking spaces all on one side of the area; 4 bicycles owned per 3 residents, 5 to 10 story buildings, 62 percent car-free households),
- **Slateford Green** in Edinburgh (120 units, 3.4 acres, 35 units per acre, 2 to 4 story buildings, 74 percent car-free households)
- **Floridsdorf** in Vienna (250 units, 4.5 acres, 56 units per acre, 6 story buildings, 92 percent car-free households)
- **Vauban** in Freiburg, Germany (94 acres, 2,000 units, 21 units per acre, 5,000 residents, 600 jobs planned, 2 to 4 story buildings, 46 percent car-free households),
- **Saarlandstrasse** in Hamburg (220 units, 5 acres, 44 per acre, 3 to 5 story buildings).

The projects have many sustainability features, such as redevelopment of old sites, low-energy-use buildings, solar heating, photovoltaics (limited), rainwater collection, greywater systems, recycling of waste, composting, community center, exercise room, resident

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[2]wwwistp.murdoch.edu.au/publications/projets/carfree.html. See also “Residential Areas for Households without Cars, August 27-28, 2001, http://www.trg.dk/td/papers/papers01/Traf-bypl/Scheurer1405.pdf

participation in planning and operation, transit, bicycle workshops, pedestrian and bicycle ways, traffic exclusion, severely reduced and inconvenient parking, car sharing, local retail, community gardens, and work spaces. “Every carfree housing development introduced in this chapter is a haven for kids and attracts households with kids....”[3]

While these five European projects are small in the total scheme of things, they are part of a larger debate about urban sustainability that bubbles with plans and schemes for many other places. The movement does not try to eliminate cars, but struggles with how to manage them and reduce their role. In addition, a much larger middle class population in both America and Europe lives without a car or uses a car relatively little. The Quarry Project, which I am proposing, is one more idea in the discussion.

The following down to the top of p. 12 is a summary of the Quarry Project I have been using to promote the Project, and part of it summarizes the market research issues which are the focus of this paper.

The Quarry Project in Hayward, California, Research Summary

The Quarry Project is a proposed dense, relatively car-free development. It would be an alternative to sprawl and dependency on automobiles, which themselves resulted from large distortions in market prices due to a failure to have auto users pay directly for the costs of driving. The American housing market is now so dominated by car-dependent demand that it cannot respond to the latent demand for a less car-dependent life style.

The Quarry Project is proposed for a location near California State University Hayward (CSU Hayward) in the City of Hayward, and would be served by a Rapid Bus connecting the campus to the BART Station in downtown Hayward. **The Rapid Bus and the Quarry Project work together** to support a “car-free” life style. A car-free lifestyle allows ample mobility without car ownership or, for car owners, greatly reduced trips. The Quarry Project and Rapid Bus are described in more detail at http://hapa-ca.org/. The Hayward Area Planning Association is researching and advocating these two proposals.

A “car-free” lifestyle can provide a better quality of life at less cost than sprawl, but is difficult to provide because of **problems of scale**. Cheap autos give sprawl the advantage of functionality at a very small scale, even a single house. Transit-Oriented Development (TOD),

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[3]Scheurer, p. 26

by contrast, requires enough people close enough to each other to justify frequent, reliable transit and walking distances to basic local business. A large project is required, not only for economies of scale in construction and management, but also for transportation functionality. Along with density and size, the more car-free a project is, the more it supports transit, walk trips, and local business.

The Quarry Project is part of a larger **Smart Growth Corridor** from the Hayward BART station to the CSU Hayward campus based on three- to five-story apartments and condominiums with reduced parking, paid parking, and frequent transit.

The Quarry Project is possible because of **an unusual opportunity**, a combination of a large vacant site of 30.7 acres coming onto the market in a few years, and funds available for investment in Rapid Bus. The land, a long-closed rock quarry north of Carlos Bee Blvd., is now owned by Caltrans but is no longer needed for a now defunct freeway and will be sold, probably in two or three years.

Benefits. The Quarry Project provides a **comprehensive, holistic alternative** to the dominant urban system of sprawl and auto dependency with **many benefits**:

- **Fossil fuels**: The Project reduces fossil fuel use for space heating and transportation, global warming gases, and air pollution from ozone and particulates. The LEED (Leadership in Energy and Environmental Design) Green Building Rating System is the most advanced standard for energy conservation and use of non-fossil energy in buildings. The Quarry Project would meet the LEED gold or platinum standard. Combined with less car use compared to alternative development, the Project would use dramatically less fossil energy, on the order of 70 percent less compared to a comparable subdivision, for both housing and transportation.
- **Water use and pollution**. With less water used for landscaping and washing cars and sidewalks, water consumption would be dramatically lower than suburbia.
- **Solid Waste.** The Project would make segregation and recycling of waste materials easy.
- **Noise.** Buildings would have special sound-proofing between units.
- **Quality of life.** The Project would have visually appealing neo-urban building facades and landscaping using native California drought-resistant plants and natural rainfall, supporting much bird life.

- **Resources:** The Project would use significantly less building material, fewer resources for transportation, and far less land than suburbia, saving agricultural land and wildlife habitat.
- **Economy:** The Project would demonstrate marketability of a more cost-effective urban system and would support an increase in local business. It would demonstrate how the US can reduce its economic dependency on fossil fuels.
- **Health:** The Project provides an environment that dramatically reduces health risks for its residents from auto accidents and increases walking, reducing over-weight and poor physical conditioning that result from a sedentary life style.
- **Accidents:** With less auto use, the Project would reduce vehicle accidents.
- **Housing:** The Project reduces building costs by about 25 percent, supporting more affordable housing for CSU Hayward students, workers, families, moderate income households, and all physical abilities, ages, races, ethnicities, and household types.
- **Education:** The Project helps CSU Hayward enrollments through improved access and affordable housing very close to the campus.
- **Transportation:** The Project supports a dramatic reduction in drive-alone vehicle trips, auto vehicle miles traveled, vehicle hours of travel, and congestion, compared to the suburban alternative, with access comparable to or better than suburbia.
- **National Security:** The Project demonstrates how the US can, by reducing its economic dependency on fossil fuels, avoid the military costs of dependency on foreign oil, loss of life and wealth, and moral turpitude from supporting authoritarian oil regimes. If two wars in Iraq have something to do with oil, this goal is relevant.

Transportation. The Quarry Project has many ways to meet the **transportation needs** of its residents. The **Rapid Bus** would initially run every ten minutes from 7am to midnight, and reach the CSU Hayward campus in two minutes and downtown Hayward BART in six minutes. With expected increases in ridership, service would be every five minutes. The bus would provide easy access to stores, restaurants, and other businesses along Mission Blvd. and in downtown Hayward. Every month, Quarry Project residents would get a free transit pass, called an Ecopass. Operating funds would come from rents, a “class pass” to be approved by CSU Hayward students, and from CSU Hayward parking fines. Capital funds, about six million dollars, would come from amending the expenditure plan of Measure B of 1986 to use money

left over from the Foothill - Mission project.

The Rapid Bus would stop at the Project using Overlook Ave. and a new bus-only lane on an extension of Palisade St. to a new junction with Carlos Bee Blvd. The busway would go between **the store and the office.** The store building on the south side would have a grocery store at busway level and a restaurant above with a beautiful view of the Bay Area. Below the store would be a café with low prices and fast food, and with a patio opening onto a little park. Having the most commonly used local businesses in easy walking distance is an important transportation feature. The office on the north side would have mailboxes, rental office, a meeting and exercise room, a freight electrocart, and a minibus. A small park would be just north.

Walkways would extend north from Overlook and the office to **1,000 units of three story apartments and condominiums.** The Project would use New Urbanism features: walking-oriented design, walking streets, variegated facades, porches, fencing, awnings, and ample landscaping. The density of 1,000 units on 28 acres would be about 36 units per acre and 82 people per acre. Building coverage would be 34.1 percent of the 28 acres, with a Floor Area Ratio of 1.02.

Besides walking, bus, and local commerce, the Quarry Project would have several additional transportation features. Residents would get a number of **taxi vouchers** for rides home when the Rapid Bus is not running and for certain places not reached conveniently by transit, such as a local hospital or clinic. **Car share and car rental** for special longer trips and vacation trips would be integrated into the Project. (Enterprise Rent-a-Car is already located nearby on Mission Blvd.)

The Quarry Project residents association would own and operate a **minibus** for getting kids to local schools and for special trips decided by the association. A flatbed **freight electrocart** kept at the office would be available for special household needs like moving luggage and furniture. Overlook Ave. would have **curb space** for drop-off, pick-up, temporary parking of rental cars, and some paid parking spaces near the store. The Project would fund **neighborhood parking management** to mitigate “poaching” by Quarry residents on parking spaces on Palisade Ave., which are needed by houses along the street.

The Quarry Project would have 100 **parking spaces** on an extension north of Overlook Ave, allowing some residents to have routine use of a car, but not as conveniently as usual

because the parking is separated from the buildings. These parking spaces would be rented at a market price to residents separately from the cost of apartments and condos.

While most access would be by walking, the main **walkways allow access** by police, fire, ambulance, garbage trucks, recycling trucks, moving vans, and the freight electrocart. Trucks delivering mail and smaller packages would use a pull-out at the office.

The Market. The Quarry Project, intended for a **mix of incomes and lengths of residency**, needs to have units larger than usually found in apartment complexes. The Quarry Project should as much, as possible, provide a market choice that can meet national norms for floor space. The national average houses size is 1,707 square feet, and the Quarry Project would average 1,250 square feet. While the Quarry Project cannot economically provide really large houses, it could provide six bedroom units. The current plan calls for 48 studios, 108 one bedrooms, 198 two bedrooms, 294 three bedrooms, 204 four bedrooms, and 148 six bedrooms.

The primary building type would be **three-story, wood frame walk ups**. The Project accommodates wheelchair access for ground floor units and, for all units, shopping carts, bicycles, package deliveries, and modern telecommunications. The Project would have special measures for personal security, especially for women, who generally feel more vulnerable to crime and are more sensitive to street safety issues than men. Security measures would include defensible space design (fencing, good sight lines, no hiding places) along the walkways. A site manager, available by cell phone, would be on duty at all times and would patrol the site on an unpredictable schedule.

Demonstrating market feasibility, the most difficult aspect of the Quarry Project, requires four steps. First, a civil engineer experienced in site development needs to estimate the cost of grading and utilities. Second, a pro forma would be prepared. A pro forma is a financial analysis of cost and income discounted by year to estimate profitability, which also includes a realistic estimate of possible rents for different sizes of units. Reducing pavement and parking and using more land for housing save an estimated at 25 percent of usual construction costs. Rent levels would therefore be reduced about 20 percent from local comparables, and about 5 percent would be used for Ecopass and more intensive management.

Third, a comprehensive **Mobility Analysis** would show how typical Quarry Project residents would travel without routine use of an automobile to make trips for all purposes: work,

BART, CSU Hayward, groceries, meals out, banking, health, movies, video rentals, cleaners, car rental/car share, airports, recreation, and open space.

Fourth, the car-free element requires **special market survey research.** Prospective tenants would get a promotional brochure with a sketch site plan, a perspective drawing, floor plans, rent levels and sales prices based on the pro forma, the transportation features (limited parking separately paid for on a market basis, Rapid Bus, Ecopass, taxi vouchers, minibus), and the Mobility Analysis covering how residents would live mostly without a car. .

Interviews with likely prospects need extra time to explain and discuss the difference in mobility. If a prospective renter has a travel pattern that the Quarry Project can support, can save money, has attitudes supporting the Quarry life style, and expresses a desire to live there, all these elements would be evidence of demand. Identifying enough prospects would then show enough demand.

The **more market segments** served, the bigger the market, and the more feasible the Project. There is no good reason car-free living would not appeal to everyone including families. The **primary market** would be renters: students or workers able to reach work by Rapid Bus or BART, people needing to save money on housing and transportation, people committed to walking for health reasons, and people wanting a car-free lifestyle for the benefits outlined above. The Quarry Project could also appeal to people wanting to own their own home. The Project could include townhouses or condominiums to the extent the market research shows a demand, and could anticipate conversion to ownership condos based on future demand.

Two market **surveys of CSU Hayward students** have been completed. The first survey had 81 respondents and found about 22 percent of students would probably move to The Quarry Project. Probable movers had positive attitudes, wanted to save on rent, and could get where they needed to go without routine use of a car. The student market alone showed enough demand to fill the Project. The students require, and would have, the ability to reach the campus, do daily shopping, and get to work in an acceptable travel time. The most important reason was saving on rent, then improving personal health and benefitting the environment and national security.

Implementation. Assuming demand can be demonstrated, serious steps can be taken toward implementation. A for-profit or non-profit housing developer would need to get involved. The City of Hayward would get funding from MTC to do a **Specific Plan** and Environmental

Impact Report for the corridor and its projects, integrating land use and transportation planning. During this process, support from the Palisade and Highland **neighborhoods** would be sought based on the improved visual appearance of the site over the current eyesore, and on having less traffic than would occur under the current land use designation. Car-oriented development now planned would generate about 3,300 trips, over 5 times more traffic than the Quarry Project.

The developer would then get **permits with minimal risk and delay**, and can, if needed, put together a partnership of investors as needed for the commercial building, market housing, and subsidized housing using a variety of **funding sources** from the state and from banks. The major funding sources are Proposition 46 of 2002, the California Housing Finance Agency, 4 percent and 9 percent tax credits, Community Reinvestment Act, Community Capital Investment Initiative, and private activity lending. The developer, or the City of Hayward using its redevelopment powers, would **buy the land** form Caltrans for its market value, as required by a special law (SB509, 2004), based on current plan designation.

The topography lends itself to **stages for construction** purposes, building from south to north using an extension of Overlook. As people move in, the rules need to anticipate needs and provide for them in a way consistent with pedestrianization. There must be convenient ways to do everything people usually use cars to do, indicating that intensive management would be needed in the initial year to deal with the unexpected.

No car and low mileage in the US

The rest of this paper enlarges on the issue outlined above, market feasibility. First, how big is the existing market? Households with no car available and with a low number of vehicle miles traveled are already living a car-free lifestyle. People living in high density areas are also likely to be living far-free. However, some of these households may do so because of poverty rather than choice. We will look at car availability, car use, density, and income.

The National Household Transportation Survey (NHTS) for 2001 is the best source of national data; it is compressive, accessible, and allows users to create their own tables, including two-way and three-way tables. Starting with the simplest data, **8.1 percent of US households were auto-free**, or at least have no vehicle in the household. Closely related to zero vehicles in household is households where there are fewer cars than there are adults, indicating some grown-up doesn't have a car. An **additional 15.1 percent** of the adult population turns up one car or

more short.

How many of them live in areas with a transit density? In the US population of 277,203,000 in 2001, **4.1 percent lived at densities above 25,000 persons** per square mile, which is 39 persons per gross acre. A gross acre in this case includes all land in census block groups, not just land for housing, but also streets, businesses, and anything else that happens to be there, sometimes seriously diluting the reported density. Net densities, which include only land residentially used, are much higher. Transit density starts at about 30 persons per gross acre. Compact densities of 10 to 25 thousand persons per square mile can support transit, but to a lesser extent (10 thousand per acre is 16 persons per gross acre). 8.5 percent of the population lived at a compact density.

Households without a car do not completely overlap with those living in dense or compact areas. A two-way table shows the relationship between auto availability and density. **Within the category of zero auto households, 24 percent live in transit density** and 18 percent live at a compact density. Zero auto households are a small percent of the national total, only 8 percent, so households with both zero autos and in dense neighborhoods are only 2.0 percent of total US households, a small percent, but still totaling 2.1 million households. Households with both zero auto and in compact neighborhoods total an additional 1.5 percent of the national households.

How many of them may be living there from choice, not from necessity of low income? The NHTS “create a table” feature in this case allows looking at persons, not households, which is a little more accurate. The table coming from the website is huge and requires considerable manipulation to find meaningful data. At a far corner of the matrix we find persons in high income households, which is over $100,000 per year, with zero vehicles, living at densities over 39 persons per acre. There are 335,000 persons in this rarified category, fully 0.121 percent of the national population. **If we pull in all those with household incomes above $30,000 per year, the percent goes up to 0.53 percent.** (See bolded numbers in table below.) At the compact density of 16 to 39 persons per acre, again for zero auto households with incomes above $30,000, we find an additional 0.20 percent of the national population.

Not surprisingly, few people seem to have a car-free lifestyle, but it is interesting that there are any at all. The middle to affluent income, car-free, high density population numbers about one and half million people. The methodology leaves out many car-free, well-off persons living at lower densities where their specific circumstances support mobility comparable to car-driving

suburbanites. Depending on their needs, people living close to campuses, grocery stores, restaurants, and/or multiplex theaters could have access comparable to suburbia.

Car-free Persons by income level and higher population densities

Number of Persons (Thousands)	Population per sq mile - Block group			Percent	
	10 to 25k	over 25,000	All	10 to 25k	over 25,000
0 vehicles; HH income $0 - $9,999	899	945		0.32%	0.341%
0 vehicles; HH income $10,000 - $19,999	693	888		0.25%	0.320%
0 vehicles; HH income $20,000 - $29,999	496	514		0.18%	0.185%
0 vehicles; HH income $30,000 - $39,999	287	391		0.10%	0.141%
0 vehicles; HH income $40,000 - $49,999	178	304		0.06%	0.110%
0 vehicles; HH income $50,000 - $59,999	25	111		0.01%	0.040%
0 vehicles; HH income $60,000 - $69,999	13	110		0.00%	0.040%
0 vehicles; HH income $70,000 - $79,999	21	91		0.01%	0.033%
0 vehicles; HH income $80,000 - $99,999	1	123		0.00%	0.044%
0 vehicles; HH income > = $100,000	16	**335**		0.01%	**0.121%**
ST: 0 vehicles; HH income > = $30,000	*541*	*1,465*		*0.195%*	***0.528%***
Total	2,629	3,812	277,203	0.95%	1.375%
2001 NHTS	*NHTS Data Version 1/04*				

We need to focus now on driving, especially on the 27 percent of drivers who drive less than 5,000 miles per year, and to relate them to density and income. (At the high end of the spectrum we find the 5 percent of drivers who drive more than 40,000 miles per year. They look pretty car-dependent.) As density goes up, vehicle miles traveled goes down. At the most rural density of fewer than 100 persons per square mile, drivers average about 17,000 miles per year. Driving drops steadily with density. At the transit densities above 39 persons per square mile, drivers are averaging about 7,000 miles per year.

As we move from a little driving to a lot of driving, the statistics show an odd bump along the way. Starting from the 27 percent who drive less than 5,000 miles a year, the next category is those who drive 5,000 to 10,000 miles per year, which drops down to 13 percent. The next category, 10,000 to 15,000 miles per year, jumps up to 24 percent, and the next higher category drips back down, to 14 percent. It is one of these statistical nightmares where the mode is very different from the median, which is different again from the mean.

This bump at 10 to 15 thousand would only be a curiosity were it not for how it relates to density. An NHTS two-way table shows vehicle miles traveled (vmt) by density categories. There are eight density levels, each with its own line on the chart. Each line shows the percent of

drivers at various levels of vmt. Seven of the density levels are very close to the national pattern: a high percent below 5,000 vmt, a drop down to percent of drivers at 5 to 10,000 vmt, a jump back up to the high point at 10 to 15,000 vmt, and a steady decline at higher vmts. The eighth density level, the transit density, is the one we are interested in,. Drivers living in this density have a much, much higher percent of driving less than 5,000 miles per year: 57 percent are in this low mileage category as compared to the others, which cluster around 25 percent. The next very unusual thing is that the dense category does not have the bump the other seven, higher density categories have. High density is clearly related to less driving.

The next question is, how many drivers may be driving less by choice, not from necessity of low income? The NHTS table is again huge and requires considerable manipulation. At a far corner of this matrix we find persons in high income households, driving less than 5,000 miles per year, living at densities over 39 persons per acre. There are 449,000 persons in this still rarified category, with 0.313 percent of the national population. **If we pull in all those with household incomes above $30,000 per year, the percent goes up to 1.04 percent.** At the compact density of 16 to 39 persons per acre, again for low mileage households with incomes above $30,000, we find an additional 1.32 percent of the national population.

Low mileage drivers by income level and higher population densities

Number of Drivers (Thousands)	Population per sq mile - Block group			Percent	
Miles respondent drove last 12 months less than 5,000 miles	10 to 25k	over 25,000	All		
HH income $0 - $9,999	296	213		0.207%	0.149%
HH income $10,000 - $19,999	548	267		0.382%	0.186%
HH income $20,000 - $29,999	598	267		0.417%	0.186%
HH income $30,000 - $39,999	482	321		0.336%	0.224%
HH income $40,000 - $49,999	229	219		0.160%	0.153%
HH income $50,000 - $59,999	257	126		0.179%	0.088%
HH income $60,000 - $69,999	188	101		0.131%	0.070%
HH income $70,000 - $79,999	109	125		0.076%	0.087%
HH income $80,000 - $99,999	250	150		0.174%	0.105%
HH income > = $100,000	379	**449**		0.264%	**0.313%**
ST: HH income >= $30,000	*1,894*	*1,491*		*1.321%*	*1.040%*
Total	3,336	2,238	143,329 *	2.328%	1.561%

*Based on a two way table for persons by vmt and density, without unascertained values.

2001 NHTS *NHTS Data Version 1/04*

We can now combine persons in zero vehicle households with persons in the low mileage households to estimate the car-free population in the US. There is a caveat first, which is that some persons with no vehicles nevertheless report driving vehicles, and I have not adjusted for possible double counting of persons with no vehicles driving less than 5,000 miles per year. That said, the 0.53 percent of the no vehicle group combined with the 1.04 percent of the low mileage group totals 1.57 percent car-free. In population terms, the total is just shy of three million people. With more time, the differences between the vehicle data set and the vmt data set could be reconciled and a more accurate analysis could be made, but the adjustment is unlikely to change the above in any major way.

The San Francisco Bay Area

We will look at the part of the Bay Area which is the least car-dependent, using 2000 census data from the MTC website. I did not have the same data as in the NHTS, so we will look at vehicles available, commute mode, and travel analysis zone density.

The nine counties of the Bay Area have 160 cities and other Census Defined Places (CDPs). I ranked all of them for percent of households with zero vehicles and for percent drive alone commute. I selected all those with 10 percent or more zero vehicle or 58 percent or less drive alone commute. Thirteen places survived, 8 of which met both criteria, 2 of which had drive alone commutes below 58 percent but zero auto below 10 percent, and 3 of which had the reverse, that is, higher zero auto household but high drive alone commutes. These last three were lower income, single family neighborhoods with poor transit, so their large number of zero vehicle households was due to poverty, and their high drive alone to work was due to lack of density and of transit. The 13 areas had a household population of 643,000, of which 22 percent had no vehicle and 52.7 percent commuted without driving alone.

San Francisco, not surprisingly, was top performer for car-free households, and the Stanford CDP was tops for commuting, with75 percent using modes other than driving alone. Stanford's success is not accidental; it is a result of economic analysis of parking, its role in generating traffic, restrictions on the amount of parking, high costs for parking, high densities supporting short walking distances and transit, support for bicycling, and frequent transit.

The Hayward market area ranks well below the top 13 places, but is not at the car-dependent end of the spectrum either. The Quarry Project will have to attract people from the Hayward area and possibly the larger market, mostly in San Francisco, Oakland and Berkeley.

Commute Mode and Zero Household Vehicles, Selected Bay Area Cities

County	Place	Zero vehicle households	Total House-holds	% zero house-holds	Drive alone commuters	Commuters	% drive alone commuters	Average commute minutes
SC	Stanford CDP	335	3,148	10.6%	1,438	5,711	25.2%	12.7
SF	San Francisco	94,178	329,700	28.6%	169,508	418,553	40.5%	30.7
ALA	Berkeley	7,649	44,955	17.0%	23,626	54,674	43.2%	27.8
ALA	Albany	529	7,011	7.5%	4,613	8,568	53.8%	29.2
ALA	Oakland	29,584	150,787	19.6%	94,333	170,503	55.3%	31.1
ALA	Emeryville	454	3,975	11.4%	2,359	4,155	56.8%	26.4
SM	Daly City	2,486	30,727	8.1%	28,654	49,640	57.7%	29.9
CC	El Cerrito	740	10,243	7.2%	6,884	11,867	58.0%	32.2
CC	San Pablo	1,571	9,057	17.3%	6,165	10,405	59.3%	33.4
CC	Richmond	4,476	34,705	12.9%	24,738	41,745	59.3%	34.3
SM	East Palo Alto	721	6,938	10.4%	7,053	11,014	64.0%	25.9
ALA	Ashland CDP	730	7,216	10.1%	5,906	8,874	66.6%	29.6
ALA	Cherryland CDP	473	4,608	10.3%	3,789	5,577	67.9%	31
	total	143,926	643,070	22.4%	379,066	801,286	47.3%	30.54

2000 Census, Bay Area places with 10 percent or more zero vehicle households or 58 percent or less Drive Alone Commute.

Hayward Market Area

ALA	Hayward	3,555	44,902	7.9%	42,622	61,696	69.1%	31.3
ALA	San Leandro	2,850	30,616	9.3%	25,973	36,928	70.3%	30.5
ALA	Union City	947	18,628	5.1%	22,243	30,457	73.0%	32.1
ALA	San Lorenzo CDP	482	7,532	6.4%	7,334	9,663	75.9%	29.1
ALA	Castro Valley CDP	1,071	21,653	4.9%	21,819	28,564	76.4%	30.4
Hayward market area		8,905	123,331	7.2%	119,991	167,308	71.7%	30.99

Source, March 31, 2005: ftp://198.31.87.7/pub/mtc/census2000/DP2-4/, Compare1-BayPlace-19902000.xls

Three Less Car-Dependent Bay Area Cities

	San Francisco	Oakland	Berkeley	Total
Households	329,700	150,787	44,955	525,442
HH with zero vehicles available	94,178	29,584	7,649	131,411
Percent with zero vehicles	28.6%	19.6%	17.0%	25.0%
total commuters	418,553	170,503	54,674	643,730
transit commuters	130,311	29,728	10,156	170,195
Percent by transit	31.1%	17.4%	18.6%	26.4%

source, March 31, 2005: 2000 census
http://www.mtc.ca.gov/maps_and_data/datamart/census/dp234/Census-Transportation-Related.htm

San Francisco, Oakland, and Berkeley are the heart of the car-free area in the Bay Area or, more accurately, they have more car-free households and high density neighborhoods than the rest of the region. They have 25 percent of households with zero vehicle, and 26 percent of workers using transit to get to work.

MTC has data for travel analysis zones, of which there are 1,454 in the 9 counties. These zones are similar to census tracts and larger than the block groups that were used to look at density in the national statistics. I calculated the 1454 zone population densities and ranked them with a cut off line at 39 per acre, same as the NHTS break point. The Bay Area had 328 high density zones with 1,443,000 population and an average density of 69.2 persons per acre. Of the 328 zone total, most were in the inner bay counties of San Francisco (179) and Alameda (64). There were 37 in San Mateo, 26 in Santa Clara, 18 in Contra Costa, 2 in Solano, and 2 in Marin. The census has data on vehicle availability but not for the same zone system, and regional mileage data does not exist for households.

Without a consistent data set, it is hard to estimate a car-free population—no vehicle available or low mileage, high density, middle to affluent income—for the Bay Area. The national data indicate that 57.3 percent of those living at high density drive less than 5,000 miles a year. If applied to the Bay Area, the high density, low mileage population would be about 827,000. The NHTS data also show that two-thirds of low mileage persons at high density have household incomes above $30,000 per year, which is the cut off line at the bottom of the middle class. If applied to the Bay Area, the low mileage, middle to affluent income population in dense neighborhoods would be about 551,000 people.

Why is this important? There is a tendency to think everyone has a car, drives a lot, and lives in suburbia, except for Manhattan and a few other smaller downtowns. The idea that there is not only a car-free population, but also that this population is big enough to create a market for car-free housing, needs more emphasis. It is also important that the kinds of statistics we need are not readily available, let alone discussed as to how good they are. These people in these areas need more recognition for achieving the benefits described above for the Quarry Project. We need to figure out how to make the system work better, and attract more people to it.

Selling Car-Free: Trip Duration Budgets

To distinguish between time length and distance length, the term “duration” is used for time length. People need their cars to get around, and are unlikely to move into car-free housing

if their travel takes more time. How much time are we talking about? The average person 15 years old or older spends, if employed, spends 65.1 minutes per day driving a car. If not employed, the average person spends 34.5 minutes driving.[4] These averages included non-drivers and drivers who do not drive on the census day. If car-free housing can get people where they need to go in a similar amount of time using other modes, it could work.

Can the Quarry Project can support mobility that meets regional and national norms in terms of duration appropriate for the purpose of travel? We will look at long lists of purposes of travel and the average duration travel takes for each purpose, regardless of mode. This exercise will tell us if the Quarry Project is, hypothetically at least, reasonable.

There are three statistical lists of travel purposes. The newest but least useful is the American Time Use Survey (ATUS) of the Bureau of Labor Statistics, which came out September 2004.[5] The problem is that travel time, except for child care, is included with the related activity, and some activities require a lot of travel time and others, none. Nevertheless, ATUS Table 1 below is a good place to start for understanding the activities of a 24 hour day within which travel must fit. I've bolded the categories that seem likely to require travel after waking up. The average hours per day can be confusing, as it combines for work hours those who do work and those who don't, to get an average of 3.69 hours. It is more helpful to know that 46 percent worked and spent 8 hours at it, including their travel time. The bolded items most likely to require travel time add up to 6.67 hours, which includes the travel time.

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[4]Table A-16 Minutes Spent Driving Daily by Persons 15 and Older by Sex, Age and Worker Status, US Bureau of Transportation Statistics, Highlights of the 2001 NHTS, Daily Passenger Travel.

[5]US Dept. of Labor News, Sept. 14, 2004, http://www.bls.gov/news.release/pdf/atus.pdf

Table 1. Average hours per day spent in primary activities (1) for the total population and for persons reporting the activity on the diary day by activity category, 2003 annual averages

Activity, age 15 years and over	Average hours per day	Percent reporting the activity	Hours per day of those reporting
Total all actvities (2)	24.00	-	-
Personal care activities	9.34	99.90	9.34
Sleeping	8.57	99.90	8.58
Eating and drinking	1.21	91.50	1.32
Household activities	1.83	73.50	2.50
Housework	0.62	37.70	1.64
Food preparation and cleanup	0.53	50.70	1.05
Lawn and garden care	0.20	10.20	1.95
Household management	0.13	15.60	0.85
Purchasing goods and services	0.81	46.10	1.77
Consumer goods purchases	0.40	41.40	0.97
Professional and personal care services	0.09	9.50	0.99
Caring for and helping household members	0.55	26.60	2.07
Caring for and helping household children	0.42	21.60	1.93
Caring for and helping non-household members	0.29	15.70	1.82
Caring for and helping non-household adults	0.11	10.50	1.02
Working and work-related activities	3.69	46.00	8.02
Working	3.32	43.90	7.57
Educational activities	0.47	8.30	5.68
Attending class	0.29	5.60	5.11
Homework and research	0.14	5.40	2.50
Organizational civic and religious activities	0.32	13.20	2.43
Religious and spiritual activities	0.14	8.10	1.75
Volunteering (organizational and civic activities)	0.14	6.40	2.17
Leisure and sports	5.11	95.90	5.33
Socializing and communicating	0.78	40.10	1.94
Watching television	2.57	78.70	3.27
Participating in sports exercise and recreation	0.30	17.40	1.69
Telephone calls mail and e-mail	0.19	25.70	0.74
Other activities not elsewhere classified	0.19	12.80	1.47
Usually or often requiring travel	6.66		

1. Primary activities are those respondents identify as their main activity. Other activities done simultaneously are not included.
2 All major activity categories include related travel time. See Technical Note for activity category definitions.
Source: BLS, ATUS, 2004, http://www.bls.gov/news.release/pdf/atus.pdf.

In the next table, the NHTS comes to the rescue with a lengthy list of purposes and how much time people on average spend getting to them. Other tables, which we will ignore, tell us about mode and average trip time using that mode. One such table, for example, has person trips by mode showing length of trip by seven categories for duration and duration by mode, where we learn that walk trips in the 40 to 49 minute time category go 1.89 miles.

Persons, Trip Purposes and Duration

2001 NHTS, Data Version 1/04

Average Person Trip Duration , Travel Day

Travel day trip purpose	**Sample Size**	Mean Minutes
Appropriate Skip	241	30.82
Refused	59	13.93
Don't Know	199	30.25
Not Ascertained	106	21.22
Home	216,195	19.65
Go to work	47,493	24.56
Return to work	10,934	14.46
Attend business meeting/trip	1,336	42.21
Other work related	11,473	33.32
School/religious activity	3,973	18.16
Go to school as student	18,225	18.03
Go to religious activity	9,845	14.85
Go to library: school related	845	16.56
OS - Day care	2,421	14.79
Medical/dental services	9,132	22.80
Shopping/errands	18,198	17.77
Buy goods: groceries/clothing/hardware store	72,040	14.85
Buy services: video rentals/dry cleaner/post office/car service/bank	20,971	11.87
Buy gas	9,439	15.86
Social/recreational	6,939	29.71
Go to gym/exercise/play sports	19,577	24.16
Rest or relaxation/vacation	2,792	67.62
Visit friends/relatives	29,712	26.52
Go out/hang out: entertainment/theater/sports event/go to bar	10,754	25.11
Visit public place: historical site/museum/park/library	2,719	26.35
Family personal business/obligations	9,873	23.28
Use professional services: attorney/accountant	1,345	19.62
Attend funeral/wedding	1,109	29.95
Use personal services: grooming/haircut/nails	2,362	15.84
Pet care: walk the dog/vet visits	2,614	19.76
Attend meeting: PTA/home owners association/local government	3,104	19.82
Transport someone	791	21.81
Pick up someone	17,285	15.84
Take and wait	3,872	18.58
Drop someone off	18,933	16.30
Meals	3,983	15.07
Social event	3,129	23.39
Get/eat meal	29,883	15.67
Coffee/ice cream/snacks	3,776	10.85
Other reason	4,785	33.72
All	632,462	19.78

March 31, 2005, from http://nhts.ornl.gov/2001/

Finally, the following table from MTC has another long list of trip purposes for the Bay Area:

Table A-11: Primary Activities and Average Duration

Activity	Frequency	Percent	Avg. Length (hours)
Trip	61,784	28.8%	0.47
Meals / meal-prep	29,300	13.6%	1.25
Sleep	25,366	11.8%	5.68
Amusements at home	15,241	7.1%	2.00
Work / work-related	14,155	6.6%	4.25
Hygiene	8,705	4.1%	1.28
HH chores	7,532	3.5%	2.53
School / school-related	6,036	2.8%	3.25
Morning routine	5,727	2.7%	1.20
Shopping	5,360	2.5%	1.05
Multiple activities	5,152	2.4%	2.61
Rest and Relaxation	4,467	2.1%	2.26
Recreation / play	3,585	1.7%	2.01
HH / Personal business	3,717	1.7%	1.11
Visiting	3,251	1.5%	1.90
Exercise / athletics	3,087	1.4%	1.56
HH Obligations (family care)	2,764	1.3%	1.26
Evening routine	1,184	0.6%	0.98
Hobbies	900	0.4%	2.45
Getting ready (not am or p.m.)	866	0.4%	1.09
Waiting	793	0.4%	0.61
Out of area	626	0.3%	17.52
Entertainment	724	0.3%	2.32
Amusements out-of-home	615	0.3%	2.16
Religion / civil services	690	0.3%	2.13
Medical services	673	0.3%	1.38
Computer work	485	0.2%	2.60
Civic / volunteer services	396	0.2%	2.14
Sick / ill	152	0.1%	7.07
Day care / after school care	174	0.1%	4.65
Other (not categorized below)	162	0.1%`	1.50
Waiting for transportation	169	0.1%	0.88
Personal services	12	0.0%	1.92
Professional services	32	0.0%	1.50
Doing diary	76	0.0%	1.02
Refused	841	0.4%	22.74
Total	214,819	100.0%	2.44

Base: All reported activities.

Source: MTC Transportation Survey of 3,678 households, 2001

These tables are grist for the mill of interviewing prospective residents. They will be used to compile a list of trip purposes to be used for the interview. One more kind of information is needed, the existing destinations and travel times to them from the Quarry Project, which can then be related to the trip purpose lists and durations. The Project itself will have a grocery store, restaurant, cafe (with coffee, ice cream and snacks), all within a few minutes walking distance. There are, however, many additional businesses within a short walk and Rapid Bus ride. The CSU Hayward campus has a bookstore, academic library, two food kiosks, and two ATMs, a copy service, and four food vendors in the University Union with quite a variety of affordable food. Next to the campus is a small neighborhood shopping center with a grocery store, pizza place, Chinese restaurant, video rentals, cafe, women's workout gym, and dry cleaner. Along the route from the Quarry Project to Hayward BART are many more businesses: 44 restaurants and cafes, 15 personal care salons, 7 bars, 5 grocery stores, 5 antique shops, 5 banks, 5 book stores, 4 motels, 4 furniture stores, 4 clothing stores, 4 art galleries, 3 cleaners, 3 dance studios, and 52 other business types in ones and twos. If you, for example, like to play billiards and have your palm read, the Quarry Project could be for you.

The next step, having shown hypothetical feasibility in some detail, is to screen and to interview prospective residents. We can easily screen out most people because their travel pattern won't work at the Quarry. We then still have a large number that need further research to see if their travel pattern can be met at the Quarry. We need to have an interactive, educational interview with them to go over their travel pattern and see how it would be met and the travel durations at the Quarry. Prospective residents would usually be used to driving for most needs and have to think through how travel would work in a car-free setting. The mobility analysis will have the travel durations for various purposes. The durations will include start walk time, wait time, transit time, and destination walk time, and so on, so the respondent will understand how to travel without a car.

The Student Survey. As mentioned in the summary on p. 11 above, in January 2004 I did a survey of 81 CSU Hayward students.[6] The 32 item questionnaire assumed that rents would be

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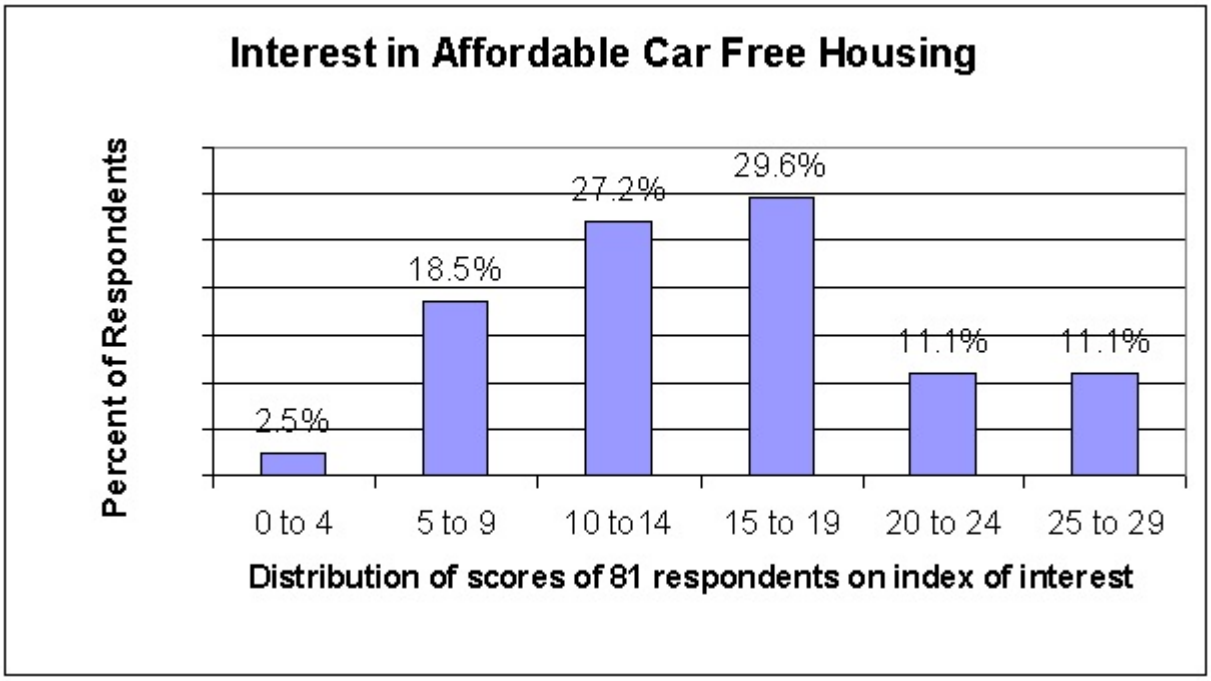
[6]"Report on survey on access and housing for CSUH Enrollment," Sherman Lewis, April 21, 2004. All percents refer to the base of 81 useful responses. The material here is taken from the Executive Summary. Most access issues are omitted.



20 percent below the existing market, which rents parking spaces bundled with living quarters.

The major purpose of the questionnaire was to estimate what proportion of CSU Hayward students would be interested and able to live in **affordable, car-free housing close to campus served by frequent Rapid Bus**. 18 of the questions lent themselves to constructing an index of interest in affordable car-free housing from 2 points to 29 points. About 11 percent of CSU Hayward students would have a very high probability of wanting to live in the car-free setting, another 11 percent would have a high probability, and about 30 percent would have some probability. Even discounting some of this interest, a conservative estimate would be that **about 20 percent of CSU Hayward students would want to live in such housing.** These students have the attitudes and circumstances supporting such a housing choice. Their circumstances include their income, housing situation, work situation, travel characteristics, and enrollment characteristics.Given enrollment of about 14,000 students at CSU Hayward, twenty percent would yield 2,800 students, which can be compared to the capacity of the proposed Quarry Project of 2,000.

Attitudes on three basic issues. Three questions covered student attitudes about affordable housing near campus vs. speed of access to campus, the value of parking lots vs. transit, and the practicality of car-free housing. Students favored affordable apartments (69 percent) over increasing the speed of a major access road, Foothill/Mission Boulevard (22

percent), by a significant margin. Relatively few respondents actually used Foothill/Mission, but also a majority did not need affordable apartments close to campus. Students favored better transit (57 percent) over more parking lots (38 percent). Relatively few actually used transit, but also a majority did not have serious parking problems. 42 percent of students thought car-free housing would "work for some," and 19 percent thought it would work for "many" or "most."

Access time to campus. Drive-alone dominated mode of access to campus: 78 percent drove to campus, 9 percent took AC Transit or the Hillhopper, 7 percent walked, and 5 percent carpooled. Students lived in many areas, the biggest being the Hayward - Castro Valley area with 25 percent, Union City/Newark/Fremont with 20 percent, and the Oakland/Berkeley area with 15 percent. For all students, the average travel time to the entry to the campus clustered between 10 and 45 minutes. Travel time from campus entry to destination building was mostly 0 to 15 minutes, concentrated in the 5 to 10 minute range. 28 percent had occasional or no problems finding parking spaces, 41 percent sometimes had problems, and 28 percent often had problems. Late-arriving students probably had the most trouble. 61 percent came to campus four or more days per week, 26 percent came three days a week, and 13 percent came two or fewer. These details are important in judging the appeal of the Quarry Project, which would be about 8 minutes to the campus (walk, wait, bus to center), and avoids on-campus congestion, hunt for space, and walk-in time of the car mode.

Housing. Of those in the survey 62 percent lived in single family, 7 percent in townhouses or condominiums, 21 percent in two story multiples, 9 percent in 3 to seven story multiples, and none in apartments over 7 stories. 19 percent owned their own home, 51 percent lived rent free or with below market rent, and 30 percent paid market rents. This last group is most likely to be interested in the Quarry Project. 54 percent paid less than $500 a month, 28 percent paid $500 to $1000, and 11 percent paid over $1000. Affordable housing was a big problem for 25 percent and an important budget factor for 19 percent more. Closely related to this, affordable housing was definitely a factor for 16 percent in deciding to attend CSU Hayward, and one of a number of factors for 20 percent more. 37 percent definitely, and 24 percent probably, would consider housing close to campus renting at a below market rate. Among these students, the leading reason was money, followed by shorter distance/saving time. Students for whom a break on rent would not appeal already had inexpensive and/or close housing or had diverse other reasons not related to money and distance.

Trips. 36 percent do not work, 4 percent work under 12 hours per week, 17 percent work 12 to 20 hours, 26 percent work 20 to 35 hours, and 12 percent work 35 to 50 hours. 40 percent work two or fewer days per week, 11 percent work 3 days, and 49 percent work four or more days. Work sites are so scattered that the biggest number was the 36 percent who do not work; the various work places each had 11 percent or the total or less. 10 percent worked on campus or in Hayward. 14 percent of students had career jobs, with 4 percent being able to reach work from Hayward BART. 44 percent had non-career jobs, with 16 percent reachable from Hayward BART. Non-workers, local workers, and BART-related workers add up to 66 percent, so despite the scatter, the Quarry Project would be practical for over half the students. In addition to the trip to work, other typical trips included child care/school, grocery shopping, eating out/take out, bank/ATM, video rental, movies/events, visit family/friends, and health related. Most of these could be accommodated in car-free housing. Family/friends seemed to have the most variation for car-free purposes.

Age and sex of respondents. 57 percent of the students were aged 17 to 22, 30 percent 23 to 29, and 9 percent 30 to 39. 60 percent were women and 36 percent men (and 4 percent no answer), reasonably close to CSU Hayward averages.

Selling car-free housing. Students thought that less rent and good access to campus and downtown Hayward were the chief selling points for car-free housing, followed by being able to get to work and to do personal business. Walking for health had some appeal, but several environmental advantages in the public interest rated lower. The answers show a great variety of student attitudes and situations, and more pragmatism than idealism, and a real market for car-free housing based on lower rents. Students are quite diverse in age and living situations. Some live at home; others have families and are homeowners. They live in many different places with wildly different schedules that overlap only at class time. Many don’t work, others have temporary part time jobs, others have well-paid career jobs. While many clearly would not want the Quarry Project, many others could go either way, and about 20 percent, mostly those paying high rents and living locally, would definitely be interested.

Big budget market research. Besides the diverse student market, many people renting and taking BART to work in the corridor south of Oakland could be interested. An excellent way to reach them is with advertising on BART using posters in stations and cards in the trains.

Unfortunately, the way BART advertising is set up now makes it too expensive and the turnover of signs is too slow for what I would like to do. I envision a series of about a dozen advertisements, one per week. Each would have the same content at top and bottom, with a middle block of text changing. The first few would present the benefits of car-free housing as summarized above (pp. 7-8) in an entertaining way. One or two ads would reveal the rent-savings and details of the site plan and floor plans; one or two would give examples of how people would get around. For example, ad #1 could be:

1 The Quarry Project

Get Global Warming?

- heat-absorbing gases are increasing
- temperatures are rising
- ice caps are melting
- glaciers are melting
- ocean levels are rising
- spring is earlier, fall later, winter shorter
- plants and animals are moving poleward and to higher elevations
- disease vectors are moving poleward
- precipitation is increasing
- forest fires are increasing
- extreme weather is increasing

You've got global warming, but do you get it? Some people are ready to make a life style choice — even live without a car in Hayward.

BUILDING FACADE LOGO HERE

A project of the Hayward Area Planning Association www,ca-hapa.org **Visit us for more details.**

The concluding ad would tell people how to show an interest in the Project. In the concluding week or two, representatives of the Project could pass out business reply post cards that interested people could fill out. All of this (and advertising on the campus) would be coordinated with a web site where people could look at the ad series, at longer write-ups, take a questionnaire similar to the student survey that would check for attitudes, living situations, travel needs, and economic factors supportive of living in the Quarry Project, register on a list of interested parties, and allow their name and current city of residence to be used on a long list that would be public. Some respondents could be requested to help with their example in an ad headed "It would work for me/us" featuring four different examples.

Why fantasize about all of this? Given the lack of "comparables," there is no established way of showing a market. If a few hundred, or thousand, "real" people showed clear reasons why they would want to live in the Quarry Project, it might persuade developers, the city, lenders, and state funding agencies to take it seriously. Their interest in turn depends on a comprehensive factual analysis and visualization of what we are trying sell.

We need a good estimate of rents and sale prices for Quarry Project units, requiring a pro forma that looks at outgo and income by year, discounts to present value, and estimates profitability. A pro forma would indicate how much is saved by car-free design, which in turn supports lower rent and ecopass. I have assumed a 25 percent savings from lower construction costs and more units; but as density and land value go down, the cost of parking also goes down. A two-bedroom unit with parking underneath would have 25 percent of costs in serving cars, while a similar unit with surface parking and low land values could have 5 percent of costs in serving cars. I have a very incomplete draft pro forma which at least makes a start conceptually. It will probably cost a few thousand dollars to get good data.

The Quarry Project, in fact, needs expensive expertise—architects, engineers, investment analysts, market researchers—to demonstrate market feasability. While small in the total cash flow of the Project, information still costs a lot of money, tens of thousands to get started, and hundreds of thousands to prepare plans and process approvals, plus whatever millions the land might cost. These up-front, high risk costs, are a major reason developers look to "comparables"—similar housing already on the market—as a major basis for investing, which makes major innovation difficult.

While a pro forma has much hard data, it ultimately depends on a judgment that balances pricing and absorption simultaneously. At a low price, the Project would sell out fast but lose money. It is not a good idea to sell units at a loss and try to make it up on volume. At a high price, the units don't sell at all, and at a price someplace in between, units sell at some frequency, which is the absorption rate at that price. The Project has to be based on an initial pricing point that sells units fast enough and high enough in price to generate enough income to pay off the real estate loans. If demand is high enough, prices can go up and increase the profitability of the Project. The more profitable the Project, the more similar projects will be attempted elsewhere, to the point where demand is met. Product differentiation can start, giving buyers choice as to degree of car-free, and kind of car-free. With transportation pricing reform, the market would develop automatically, so the problem is whether enough people would buy at the right price for other reasons.

Conclusions

There are many paths by which new policy can become reality. It is difficult to separate a chain of events leading to innovation from the larger context in which it occurs. The context has to be there for the action to be feasible, yet it is hard to study where context leaves off and a policy process begins. Growth management and now Smart Growth emerged nationally from many debates creating a new context and policy developments reinforcing the context over two decades. Yet Smart Growth reigns in only the land use side of the equation, sprawl. Smarter Smart Growth would in addition reign in the impact of the car, but there is little context for policy innovation, let alone new policy.

The Quarry Project poses as a policy innovation but may mainly serve as part of an effort to change the context. By specific elaboration of many details, the Quarry Project helps people envision what a car-free development would be like and its advantages. With enough imagination, Quarry Project life seems normal and our car - suburb system seems rather strange. But advocacy bumps up against the conservatism of the development community; a car-free project big enough to work requires a scale that makes it very expensive.

An alternative route is to improve the functioning of dense areas to the point where they have some consciousness of a lack of cars and a high quality of life. The underpricing of street parking and lack of adequate regulation of traffic usually lower the quality of street life in

existing dense neighborhoods. Residents see many cars and have no way of knowing that most people do not own a car or drive them infrequently. There is no consciousness of a special system, and no good research comparing a car-free neighborhood with a typical low-density suburban neighborhood across a diverse spectrum of performance measures.

The Quarry Project research will get more expensive as it goes along because it must get more similar to other development proposals to be taken seriously. The market research is the most challenging because there is no way to do it that is recognized by developers and banks. Patrick Kennedy's Gaia Building in Berkeley has limited parking, rented separately from its apartments. The apartments are fully rented and the parking is two-thirds vacant. Another project in Fruitvale in Oakland which rented its parking separately from the apartments also has vacancies—parking vacancies. Both cases illustrate investor error: building more parking than the market wants. These mistakes are the consequence of a lack of comparables—very few projects charge separate for parking.

A frequent reaction I get is that the Quarry Project can't work in Hayward; maybe in San Francisco or Oakland-Berkeley, but not in Hayward. It will be interesting to see what progress nevertheless can be made, especially to create evidence of demand for a latent market requiring consumer education to create the demand itself. This kind of work should not be carried out by political scientists; it requires entrepreneurship, salesmanship, and money.

Still, I think, if we build it, they will come.