LOCATION MATTERS:

Affordable Housing and VMT Reduction in San Diego County

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The San Diego Foundation
Growing a Vibrant Region

SAN DIEGO HOUSING FEDERATION

CNT

California Housing Partnership Corporation

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This report was prepared for the San Diego Housing Federation (SDHF) by the Center for Neighborhood Technology (CNT) and co-authored with the California Housing Partnership Corporation (CHPC).

In 2015, CNT, with support of CHPC, completed a statistical analysis of household travel in California to estimate the relationship between income, location-efficiency, and vehicle miles traveled (VMT) throughout the state. Location efficient places have access to jobs and services and allow residents and visitors to get around by walking, biking, or on transit, reducing car travel. This report applies the findings from the statewide study (available here) to households in San Diego County. This report is meant to inform local planning and development efforts aimed at reducing VMT and resulting greenhouse gas (GHG) emissions. The report also provides guidance on use of the state's Affordable Housing and Sustainable Communities (AHSC) program to support development of location-efficient affordable homes and GHG-reducing transportation investments in San Diego County.

Summary of Key Findings

- Lower-income households drive significantly less than median income households in San Diego County. The lowest income households (those earning 50% of median income or less) drive ***10-12.9 fewer*** miles per day. Meanwhile, high-income households drive nearly ***6 miles more*** than median income households.
- Lower income and higher income households show the same potential reduction in VMT when living in more location efficient places compared to areas with less location efficiency. However, because lower income households have much lower VMT to start, they experience greater percentage reductions in VMT than higher income households.
- Living in the County's most location efficient areas results in significantly lower VMT. These areas include the region's urban core (City of San Diego), trolley-served East County communities (La Mesa, El Cajon, Lemon Grove), San Diego's South Bay (National City), and cities on the Sprinter light rail line (Escondido, San Marcos, Vista and Oceanside).
- Lower-income households are more likely to live in transit-rich areas than higher-income households. This tendency is shared by diverse household types with lower-income families and seniors far more likely to live near transit than higher income households of similar demographics.
- Lower-income households living near transit own fewer cars, live in smaller units, and are likely to live in larger buildings, all factors that contribute to lower-income households' propensity to live at greater densities near high quality transit, making affordable housing near transit a more efficient use of space with lower per-unit costs than market rate housing.
- The AHSC program could fund an estimated **1,100 affordable homes** near transit in San Diego County that will eliminate an estimated **65.6 million miles of driving** from San Diego County roads and provide **17.9 thousand metric tons** of GHG reductions over the lifetime of the developments.

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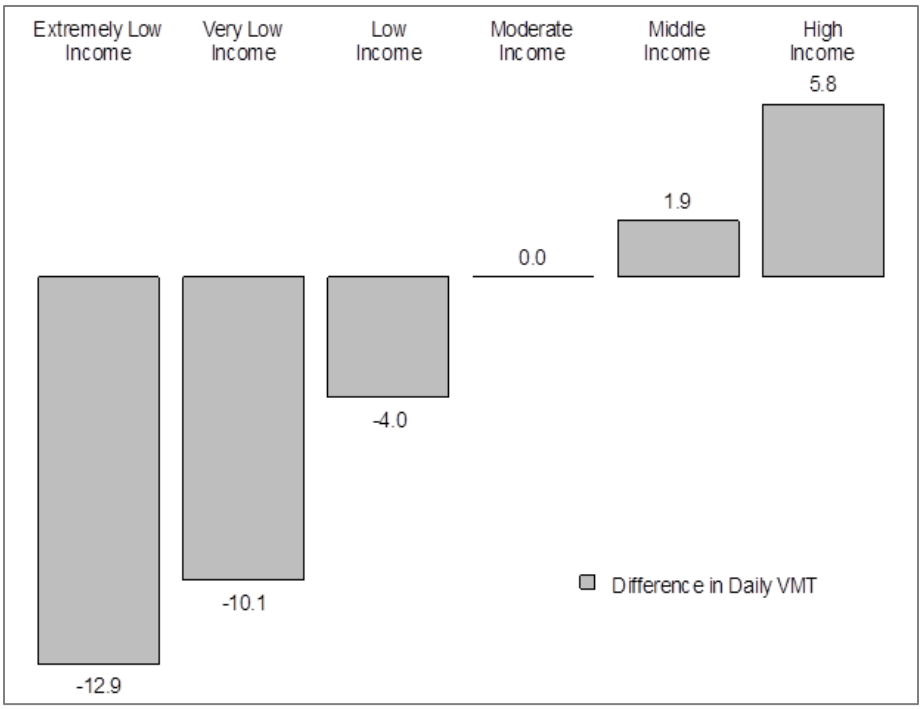
For more information on this report, please visit the San Diego Housing Federation's website at housingsandiego.org/advocacy/climateaction.

Impact of Household Income on VMT in San Diego

CNT calculated the impact of income on VMT in San Diego for a household with average demographics for the county and the average level of location efficiency (as defined in the next section) for the county's neighborhoods. This analysis revealed that Extremely Low Income (ELI) households earning up to 30% of the area median income (AMI) drive 12.9 miles less than a median income household. Very Low Income (VLI) households, earning between 30% and 50% of AMI, drive 10 miles less than median. Meanwhile, high-income households earning over 150% of AMI drive nearly 6 miles more than median. These differences add up: a high-income household would drive 6,800 more miles per year than an otherwise similar ELI household.



Location Efficiency Impacts on VMT

Excluding household income and demographics to focus only on the VMT impact of location efficiency shows that VMT drops with increased location efficiency. CNT used three variables to measure location efficiency in the half mile around each household: 1) **employment density** measured as jobs per square mile, serves as a proxy for access to neighborhood services and amenities as well as local job opportunities, 2) **transit availability**, measured by the number of transit vehicles (e.g., bus, light rail, heavy rail) making stops in the neighborhood around the household on a weekly basis, indicates the level of transit service a household enjoys, and 3) **neighborhood commute distance** for workers living around the household showing proximity of the neighborhood to regional job opportunities.

Increasing location efficiency reduces VMT for all households by the same amount. Because lower income households start from a lower level of VMT, however, they experience greater percentage reductions in VMT with increased location efficiency. The elasticities[i] in the table on the following page show the percentage change in household VMT in response to percentage change in each of the three

[i]An elasticity measures one variable's responsiveness to change in another variable, in this case the elasticities show each income group's percentage reduction in VMT divided by the percentage increase in location efficiency.

location efficiency factors. In all cases, lower income households show greater percentage change in VMT in response to increased location efficiency.

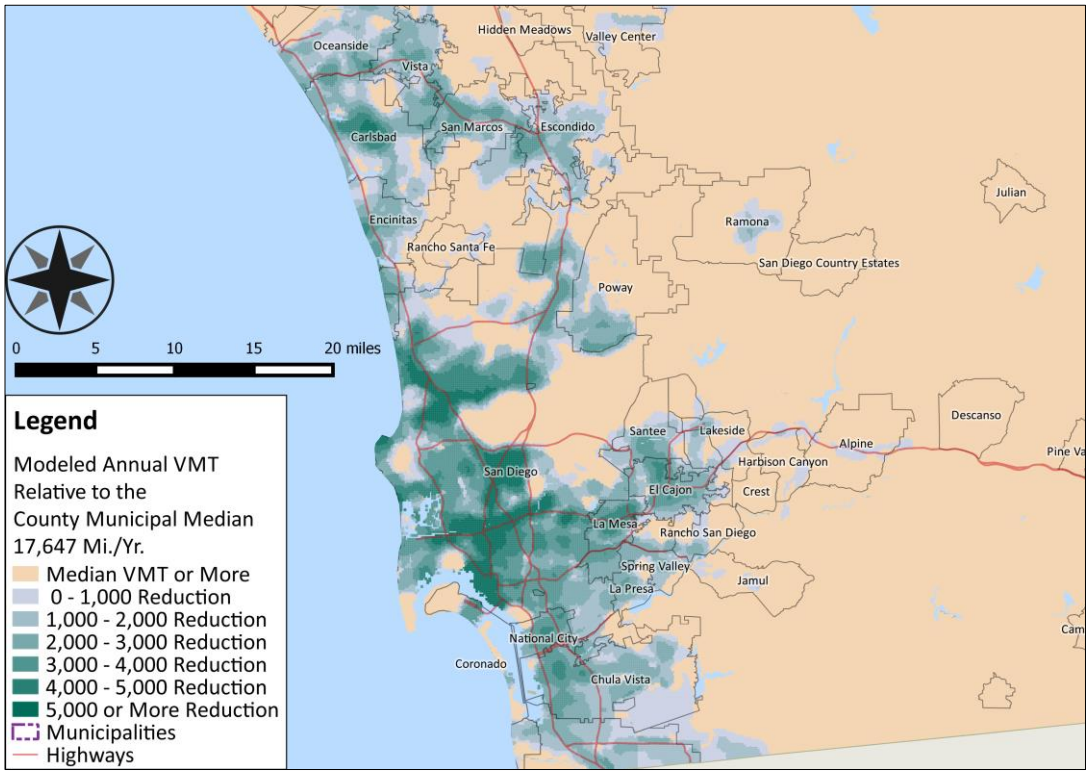
Elasticity of VMT in Response to Changes in Location Efficiency

Income Group	Employment Density	Transit Availability	Neighborhood Commute Distance
Extremely Low (ELI)	-0.097	-0.034	0.246
Very Low (VLI)	-0.089	-0.031	0.227
Low (LI)	-0.072	-0.025	0.183
Moderate (MI)	-0.066	-0.023	0.169
Middle (MdI)	-0.061	-0.021	0.155
High (HI)	-0.056	-0.02	0.143

Mapping The Impact of Location Efficiency on Annual Household VMT

The map below shows annual household VMT in San Diego County for a median household. Areas with darker shading have lower estimated VMT and, therefore, are the most likely sites for location efficient development. San Diego's planning agencies should be investing most heavily in building affordable communities in the region's urban core (City of San Diego), along trolley service to East County communities (La Mesa, El Cajon, Lemon Grove), in San Diego's South Bay (National City), and cities along the Sprinter light rail line (Escondido, San Marcos, Vista and Oceanside). The map also highlights the need for greater transit investment to connect to jobs rich areas such as the University of California San Diego and nearby neighborhoods and commercial areas.

Estimated Annual VMT Reduction by Location in San Diego County



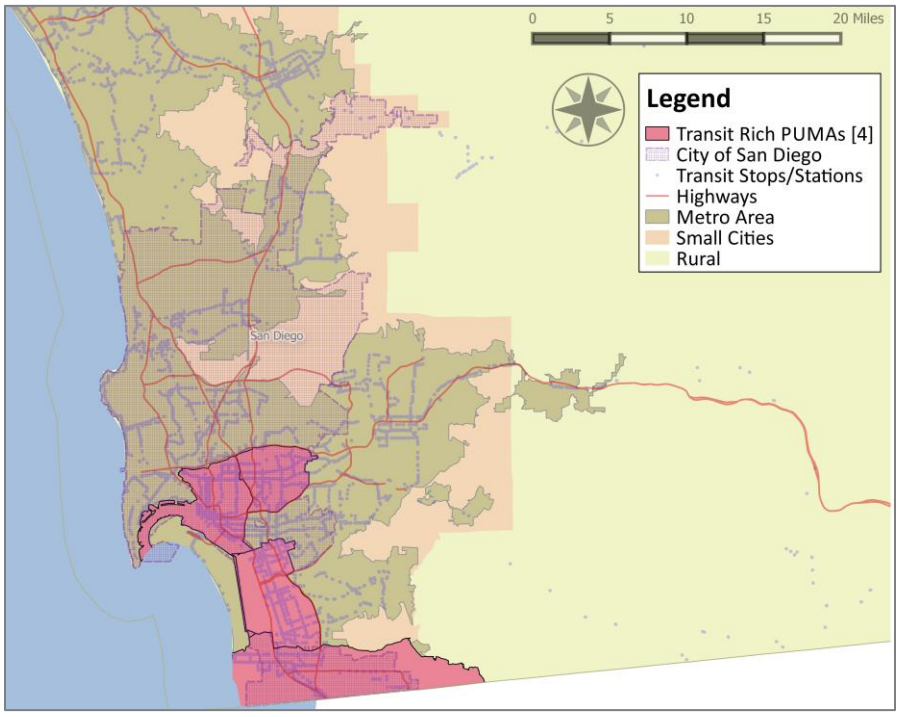
Applying the Model: San Diego County Households Living in Transit-Rich Areas

While households of different incomes experience the same amount of VMT reduction with increased location efficiency, different income groups have different housing characteristics, different rates of living near transit, different patterns of car ownership, and different demographics, each of which can affect VMT reduction in location efficient developments.

To investigate these effects, the model was applied to actual households living in the most transit-rich areas of San Diego County using data from the US Census Public Use Microdata Area (PUMA) level. PUMAs are districts of roughly 100,000 residents each that the Census uses to release highly detailed household data. CNT identified transit-rich areas in San Diego by selecting those PUMAs where 70% of households have at least 1,000 transit vehicles per week (buses, rail) making stops within a half mile. The four transit-rich PUMAs, shown in red on the map on the below, account for 20% of San Diego County households and constitute a location-efficient geography with full data on the inhabitants.

Households were assigned to income groups based on household size and income and further grouped into clusters by household type. Households with children were clustered as Families. Households with a ratio greater than one of senior citizens to non-senior adults were clustered as Seniors. Households with a low ratio of seniors and no children were clustered as Adults.

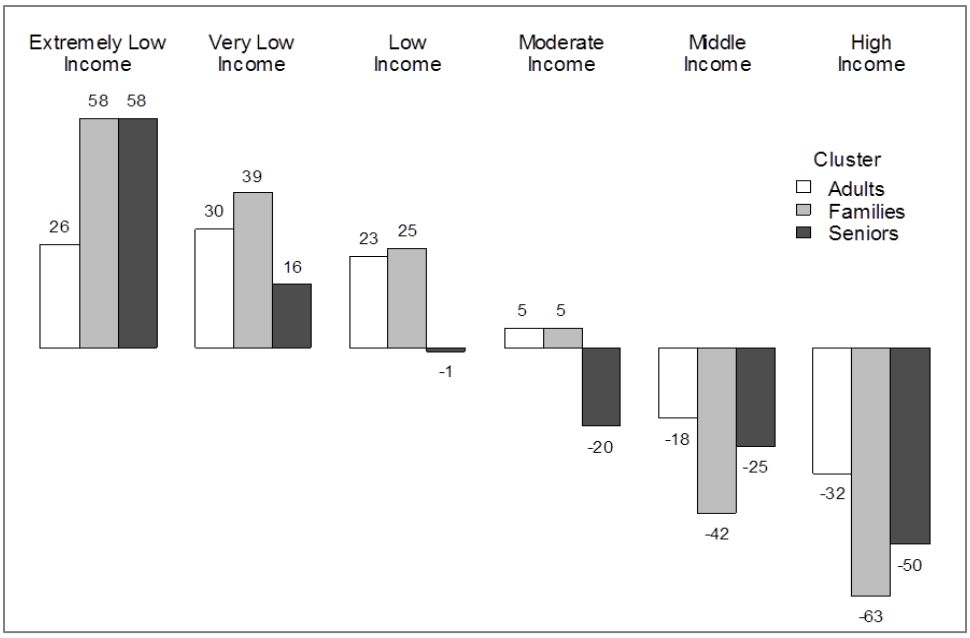
Transit-Rich PUMAs in San Diego County



Lower Income Households Are More Likely to Live in Transit Accessible Areas

As the figure on the following page makes clear, lower-income households of all household types are much more likely to live in transit-rich areas. In contrast, middle and high-income households are less likely to live near transit. Lower income families with children and senior households have an even higher likelihood of living in transit-rich areas while higher income households of these types are markedly less likely to live near transit.

Likelihood of Living in Transit-Rich PUMAs by Household Income and Type (in Percentages)



Lower Income Households Use Space More Efficiently in Transit-Rich Areas

Lower income households own fewer cars, live in smaller units, and tend to live in larger multifamily buildings than higher-income families. As a result, lower-income households use less space for parking cars and tend to live at higher densities. For higher income households, it is just the opposite, demonstrating that lower-income households use space in location-efficient areas more efficiently.

For example:

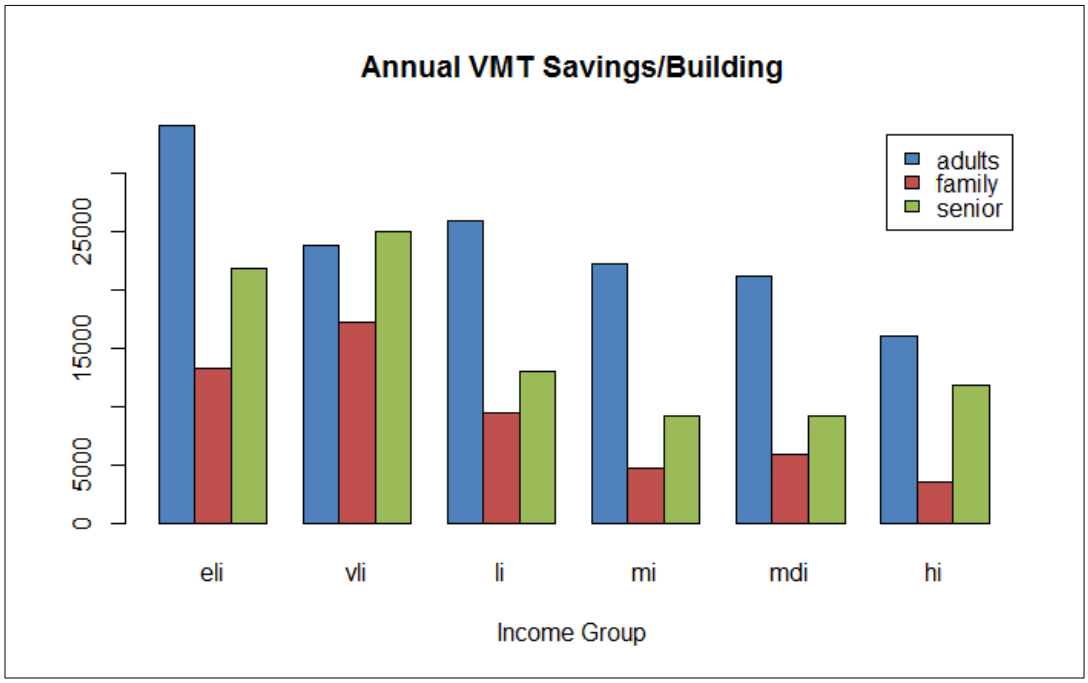
- A Very Low Income Family takes up ***32% less*** space in their building than the Median Family while a High Income Family takes up ***12% more*** space than the median – even though both families have roughly the same number of inhabitants (4.3 vs. 4.2, respectively).

- This pattern also extends to parking, which absorbs valuable buildable land and can cost tens of thousands of dollars to build. ELI and VLI households own fewer cars and consequently need ***52% and 33% less*** parking respectively.

As a result of lower income households' greater residential density and reduced parking need, the benefits of location-efficient living can be more widely shared at a lower cost per unit in affordable developments.

The following graph illustrates this point using the predicted annual VMT reduction associated with developing a parcel within a transit-rich area for the average households, by income and household cluster, currently living outside the transit-rich area (but within the San Diego Metro Region). The household characteristics are based on a weighted average, by income and household cluster, of the PUMS data from the non-transit-rich PUMAs. The initial location-efficiency characteristics are based on PUMA averages weighted by the number of households, by income and cluster. The final location-efficiency characteristics are based on PUMA averages weighted by all households (i.e. to provide the same values). The VMT model is used to calculate the annual VMT for a single household in both locations. Those benefits are then aggregated by the number of households, by income and household type that live in a typical building in transit-rich areas. The graph shows that in all cases, a parcel aimed

at lower-income household results in greater VMT reductions than developing the same parcel for higher-income households.



Estimating the future GHG reduction benefits of building affordable transit-oriented development

For this analysis, we assume that a new affordable unit will be occupied by a household moving from a location less accessible by transit to a development built in an area with good transit (using the four transit-rich PUMAs). While it cannot be guaranteed that new TOD units will be occupied by a mover from a less transit-accessible area, each new TOD unit represents an addition to the total supply of housing near transit and an additional household living near transit that otherwise could not afford to do so.

- We focus our calculations on Extremely Low-Income, Very Low-Income, and Low Income households because public investment is most essential to building and preserving homes for these income groups, and we also assume these units will be occupied by families (rather than seniors or adults only). We assume that homes in affordable TOD would serve 26% ELI households, 51% VLI households and 23% LI households based on the income mix of the 2015-2016 AHSC funded projects.

- The average difference in annual VMT for this mix of ELI, VLI and LI family households living in four transit-rich PUMAs areas vs. non-transit-rich areas is – 53,798 VMT per year per building with an average of 50 units per building.

- We assume an average of $300 million per year will be invested in affordable housing through the AHSC program in each of the three fiscal years running from 2016/2017 through 2018/2019 based on estimates that cap-and-trade funds will be $2 billion in 2015, rising by $500 million per year as well as the precedent from the 2015-2016 funding round that affordable housing receives more than the statutorily guaranteed 50% of AHSC funds. We also assume that San

Diego County will receive 8% of these funds (assuming allocation will roughly correspond to population by county and following San Diego's results from the 2015-2016 funding round).

- In light of the most recent AHSC program guidelines, we assume that each housing development will receive an estimated average award of $65,000 per unit from these cap-and-trade funds. In the past, each affordable unit receiving funding has been required to remain affordable for 55 years, so we keep that timeframe for funded developments.

Based on these assumptions, we estimate that over **1,100 transit-connected homes** can be built in San Diego, or a little more than 22 buildings of 50 units each. Together, these affordable homes would remove **1,191,842 miles** of vehicle travel **per year** from our roads. Over the 55-year estimated life of these buildings, this equates to eliminating **65.6 million miles of driving** from San Diego County roads and **17.9 thousand metric tons** of GHG reductions, even with cleaner cars and fuels anticipated in the future[ii].

Conclusion

The research presented in this report finds that investment in location efficient housing for lower income households is a very reasonable component to a climate change program aimed at reducing VMT. Developing parcels for lower-income households is likely to lead to higher reductions in VMT than developing those parcels for higher income populations. Low income households live at higher densities in location-efficient areas, in part due to lower car ownership, allowing the benefits of location efficiency to be more widely realized and thus leading to additional VMT reductions.

Not only will investing in location efficient homes affordable to lower income households help the County meet its GHG and congestion management goals, it will also improve access and opportunity for vulnerable working families and seniors. In addition, the maps of San Diego's potential for VMT reduction highlight the need for increased transit investment to better connect residents to concentrations of jobs and services as well as the need to plan for and invest in housing for households of all incomes along the County's expanding transit infrastructure and near its jobs-rich areas.

[ii] Estimates used conversion factor of 273.15 CO2 grams per mile based on ARB's EMFAC 2011 CO2 emission rates. These include Low Carbon Fuel Standards and "Pavley" efficiency standards. 2035 rates were used as the average for all years.

Policy Recommendations from the San Diego Housing Federation

The San Diego Housing Federation has developed the following recommendations to build on the findings of this report with concrete local actions that can support GHG reduction and equitable growth through policies that fund and encourage affordable housing development in location efficient parts of the county:

1. Ensure a significant percentage of housing built near transit is affordable to lower income households through a combination of land-use policies:
    - Require inclusion of a percentage of affordable homes in all transit-oriented development.
    - Implement land value capture near transit that requires a percentage of affordable housing when height and density are increased.
    - Encourage public agencies to dedicate land near transit for affordable housing and set aside funds for site acquisition.

2. Require a dedicated set-aside of funding for transit-oriented affordable homes and related infrastructure as a component of any new funding streams.

3. Use the Smart Growth Incentive Program and other regional and local funding programs to reward jurisdictions that plan for and fund affordable housing near transit and are making significant progress toward Regional Housing Needs Assessment (RHNA) goals.

4. Create a transit-oriented affordable housing fund to finance affordable housing preservation and development near transit.

5. Ensure local compliance with AB744 and consider greater parking reductions for 100% affordable developments within a quarter mile of transit.

6. Increase height and density for affordable housing near transit beyond state density bonus law and expedite approvals for affordable housing near transit through affordable housing overlay zones or other mechanisms.

7. Invest in transit to link housing to jobs and services.

8. Identify transportation infrastructure investments to connect affordable housing to transit and support walking, biking, and transit use in order to leverage state funding through the Affordable Housing and Sustainable Communities (AHSC) program.

9. Foster cooperation and coordination between housing, planning, transportation, and public works departments to coordinate competitive AHSC applications.

Acknowledgements

San Diego Foundation
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About SDHF
Since 1990, the San Diego Housing Federation has worked to build and sustain a vital affordable housing program for the San Diego region by working to increase the variety and supply of safe, stable, and permanently affordable homes for lower income San Diegans.

About CNT
The Center for Neighborhood Technology is a nonprofit research and advocacy organization committed to improving urban economies and environments across the United States. We do this through innovation and by researching and analyzing urban problems; testing and promoting economically efficient and environmentally sound solutions; and demonstrating the value of investing in sustainable solutions.

About California Housing Partnership
California Housing Partnership is a nonprofit created by the California Legislature to help preserve the state's existing supply of affordable homes and to provide leadership on affordable housing policy and finance. In partnership with nonprofit and government housing agencies, CHPC provides the expertise, technical assistance, and advocacy leadership necessary to create and preserve homes affordable to lower income households in California.

Appendix Table 1.

Average Household Composition by Household Type of Residents of Transit Rich Areas

	Share	**Age Cohorts**					**Occupation**	
Income Group	% of Group	0-5	6-17	18-64	65+	Total	Work	Study
Extremely Low	100.0	0.3	0.6	1.3	0.3	2.5	0.8	0.3
Adults	42.3	0.0	0.0	1.4	0.1	1.5	0.9	0.5
Families	38.4	0.7	1.6	1.9	0.1	4.3	1.1	0.3
Seniors	19.3	0.0	0.0	0.0	1.1	1.1	0.2	0.0
Very Low	100.0	0.3	0.5	1.5	0.3	2.7	1.3	0.2
Adults	44.4	0.0	0.0	1.5	0.2	1.7	1.3	0.2
Families	38.2	0.7	1.3	2.2	0.1	**4.3**	1.7	0.3
Seniors	17.4	0.0	0.0	0.1	1.3	1.4	0.4	0.0
Low	100.0	0.2	0.5	1.8	0.3	2.8	1.6	0.2
Adults	53.1	0.0	0.0	1.8	0.2	2.0	1.6	0.3
Families	35.8	0.6	1.3	2.3	0.1	4.3	1.9	0.3
Seniors	11.1	0.0	0.0	0.0	1.4	1.5	0.3	0.0
Moderate	100.0	0.2	0.4	2.1	0.3	2.9	1.9	0.3
Adults	57.9	0.0	0.0	1.9	0.1	2.1	1.8	0.3
Families	33.3	0.6	1.2	2.8	0.2	4.8	2.5	0.4
Seniors	8.8	0.0	0.0	0.2	1.6	1.7	0.6	0.0
Middle	100.0	0.2	0.2	1.9	0.2	2.5	1.8	0.3
Adults	64.5	0.0	0.0	1.9	0.1	2.0	1.8	0.3
Families	25.3	0.7	0.9	2.5	0.0	4.2	2.2	0.3
Seniors	10.2	0.0	0.0	0.2	1.7	1.9	1.0	0.0
High	100.0	0.1	0.2	1.9	0.2	2.4	1.9	0.2
Adults	72.7	0.0	0.0	1.9	0.1	2.0	1.9	0.2
Families	19.7	0.6	0.9	2.5	0.1	**4.2**	2.4	0.3
Seniors	7.7	0.0	0.0	0.1	1.7	1.9	0.6	0.0

Appendix Table 2.

Spatial Differences by Household Cluster in Transit Rich Areas

Income Group	Share	Cars		Parking Spaces	Rooms in Unit			Share of Building		
	% of Group	Per HH	Per Person	% Difference from median	Per HH	Per Person	% Difference from median	Per HH	Per Person	% Difference from median
Extremely Low	100.0	1.0	0.4	-52.3%	3.6	1.4	-24.0%	0.41	0.17	-36.3%
Adults	42.3	1.0	0.6	-48.7%	3.4	2.2	-20.6%	0.36	0.24	-35.4%
Families	38.4	1.1	0.3	-51.8%	3.9	0.9	-28.8%	0.51	0.12	-34.0%
Seniors	19.3	0.6	0.6	-63.5%	3.5	3.1	-32.7%	0.35	0.31	-57.9%
Very Low	100.0	1.4	0.5	-33.0%	3.9	1.5	-17.2%	0.48	0.18	-25.6%
Adults	44.4	1.3	0.7	-31.9%	3.7	2.1	-12.2%	0.42	0.24	-23.8%
Families	38.2	1.6	0.4	-30.6%	4.1	1.0	-26.4%	0.52	0.12	**-32.2%**
Seniors	17.4	0.9	0.7	-45.5%	4.2	3.0	-19.4%	0.56	0.39	-32.8%
Low	100.0	1.6	0.6	-22.6%	4.3	1.6	-9.7%	0.54	0.20	-16.4%
Adults	53.1	1.5	0.7	-20.9%	4.0	2.0	-4.6%	0.47	0.23	-15.9%
Families	35.8	1.8	0.4	-23.7%	4.6	1.1	-16.9%	0.63	0.15	-18.2%
Seniors	11.1	1.2	0.8	-29.9%	4.5	3.1	-13.3%	0.64	0.43	-23.3%
Moderate	100.0	2.0	0.7	0.0%	4.8	1.6	0.0%	0.65	0.22	0.0%
Adults	57.9	1.9	0.9	0.0%	4.2	2.0	0.0%	0.55	0.27	0.0%
Families	33.3	2.4	0.5	0.0%	5.5	1.2	0.0%	0.77	0.16	0.0%
Seniors	8.8	1.7	1.0	0.0%	5.2	3.0	0.0%	0.83	0.48	0.0%
Middle	100.0	2.0	0.8	-2.0%	4.8	1.9	1.7%	0.61	0.24	-6.7%
Adults	64.5	1.8	0.9	-2.3%	4.3	2.2	1.9%	0.49	0.25	-11.5%
Families	25.3	2.4	0.6	3.3%	5.5	1.3	0.0%	0.81	0.19	5.6%
Seniors	10.2	1.8	1.0	4.4%	6.4	3.4	22.6%	0.83	0.44	0.1%
High	100.0	2.1	0.8	1.5%	5.3	2.2	10.5%	0.63	0.26	-3.7%
Adults	72.7	2.0	1.0	4.4%	4.9	2.4	16.3%	0.55	0.27	-0.1%
Families	19.7	2.5	0.6	5.2%	6.3	1.5	13.0%	0.86	0.21	**11.6%**
Seniors	7.7	1.9	1.0	6.5%	5.9	3.2	12.4%	0.72	0.39	-13.5%