

V. Changing Transit Zone Performance

The typology uses existing conditions to group together similar transit zones from all parts of the country. It is primarily oriented around the average household VMT in transit zones and can be used as a tool to determine how to lower the average VMT in an individual transit zone, effectively moving the transit zone from one place type to another.

Table 6 provides context for evaluating household VMT reductions, showing the ranges of VMT in each category. Reducing average VMT in a transit zone by approximately 2,500 would enable a transit zone to change its place type. However, even reductions of less than 2,500 can have a meaningful impact and reduce VMT and

Table 6. VMT Category Widths

VMT Category	VMT Range	Width
Low	< 9,100	
Low-Moderate	9,100-11,600	2,500
Moderate	11,600-14,300	2,700
High-Moderate	14,300-17,200	2,900
High	>17,200	

CO₂ emissions in the transit zone and the region, even if the place type does not change.

Key questions for users are 1) what needs to change to lower VMT, and 2) how much change is needed to significantly lower VMT. Previous work by CNT and CTOD has shown that residential household density and employment access are strong drivers behind the travel behavior of households.¹¹

While these scenarios show broad pictures of the VMT reductions possible with increases in housing and employment, planning for such increases in the real world should ensure that increasing housing means increasing the diversity of housing types affordable to a range of household incomes. Likewise, employment growth should be aimed at a wide range of job opportunities, with varying skills and salaries. Increasing employment access means strengthening existing job centers, not creating new ones or adding employment to every transit zone. New transit investments should also connect to existing job centers to enhance regional access.

As both housing and employment are inputs

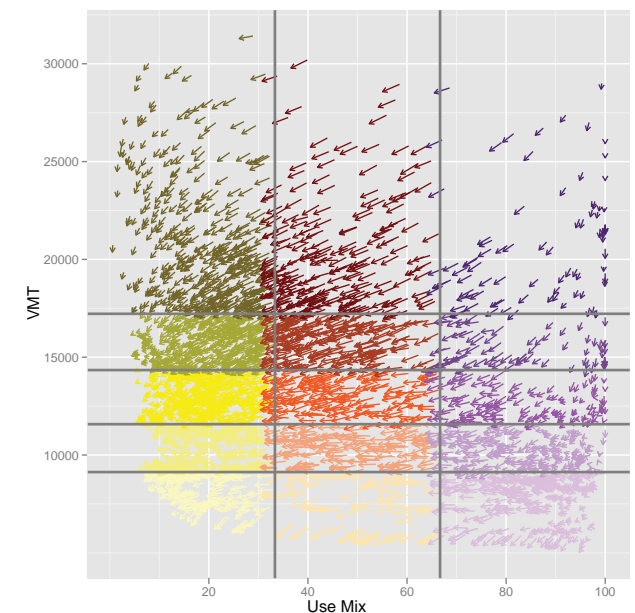
¹¹ CTOD and Center for Neighborhood Technology. "Transit Oriented Development and the Potential for VMT-Related Greenhouse Gas Emissions Reduction," March 2010.

to the model that CNT developed to predict household travel behavior, they can be used to show how changes might affect transit zone VMT.

Development Scenarios

New development can change both employment access and residential density. Regions plan for a finite number of new residents and jobs, and

Figure 21: Scenario A - Increased Employment Access & Households by 15 Percent



the Performance-Based TOD Typology can help prioritize areas for growth by showing where these changes can be most impactful. To illustrate the potential impacts of development on transit zone performance, it is useful to consider some hypothetical scenarios. In the following three scenarios, both the number of households and the employment access increase at the same time by 15 percent, 30 percent and 50 percent more than the existing conditions. These are designated scenarios A, B and C respectively. All transit zones will not be able to grow by these amounts, but these scenarios paint a picture of the VMT reductions that are possible overall.

To estimate the effects of these changes on VMT, household density and employment access for each transit zone included in the typology were increased in the VMT model to predict how household travel behavior could change. Adding more households or jobs to a transit zone may increase the travel in the area but will reduce the VMT of the average household. The use mix was also updated to account for the new residents and jobs that would be added to the transit zones in each scenario. Increasing employment access means increasing the total number of jobs in the region; some of these jobs were allocated to individual transit zones, in proportion to the existing ratio of jobs in the transit zone to total jobs in the region.

Figure 22: Scenarios A, B, C - Increased Employment Access & Households by 15, 30, and 50 Percent

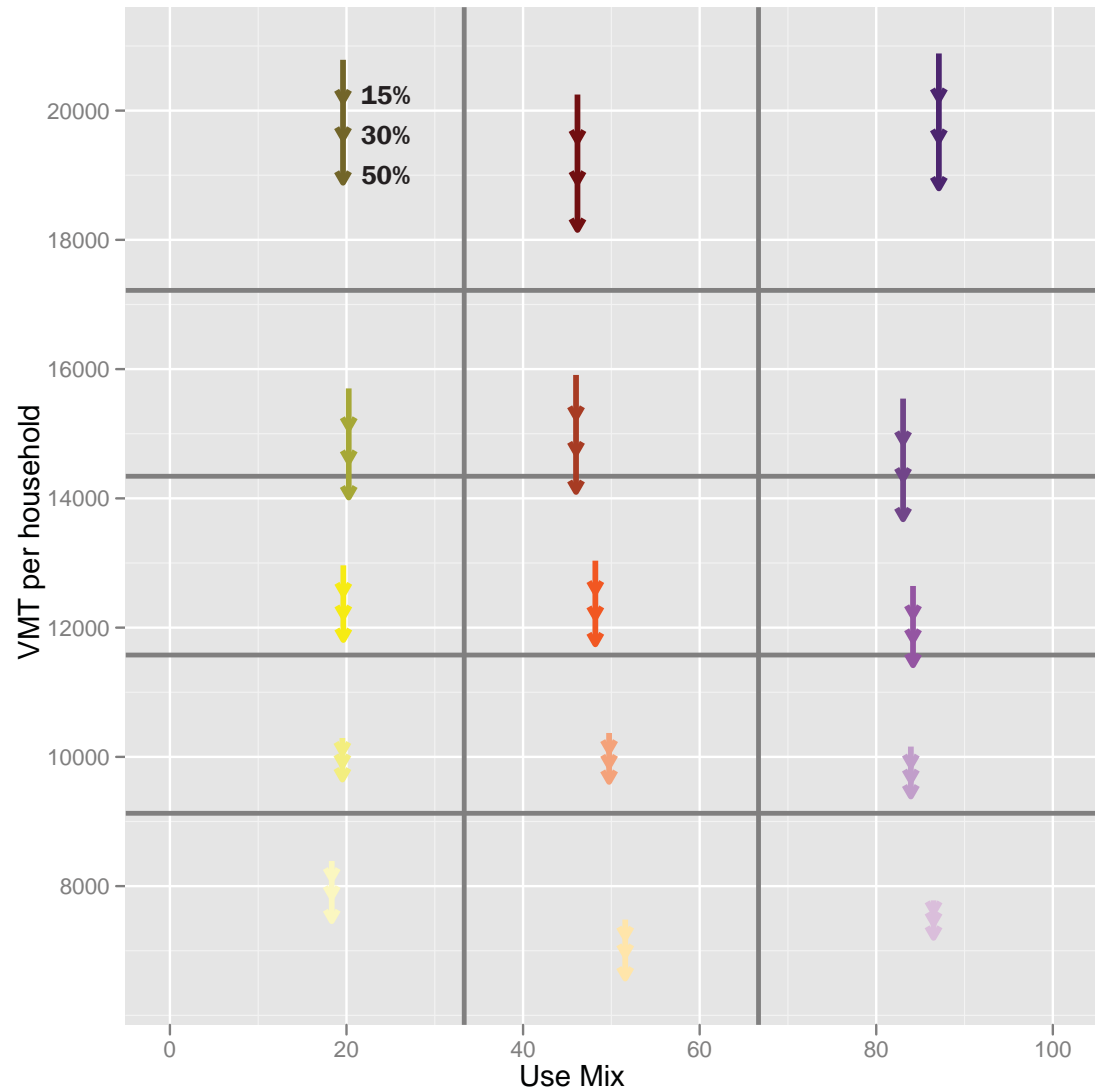


Figure 21 illustrates the effect of increasing both the number of households and employment access by 15% on all transit zones in the typology. While the impacts on individual transit zones differs a bit depending on the place type, there are some overall trends. Transit zones in higher VMT categories can reduce average household VMT by greater amounts than already low VMT places. Also, the potential to reduce VMT is not dependent on the use mix of the transit zone—residential, balanced, and employment places can all reduce average VMT by about the same degree.

Figure 22 shows a simplified version of all three scenarios, illustrating the average changes in household VMT and use mix. The arrows depict the average reduction in VMT possible in transit zones of each place type; each arrowhead marks a different scenario: 15 percent, 30 percent and 50 percent. The longest arrow corresponds to the largest change in density and employment.

Tables 7, 8, and 9 show the average VMT reductions under each scenario for each place type. The impact of each scenario on average household VMT are shown both as the reduction in miles driven and as a percentage. The Tables also include the potential reduction in annual CO₂ emissions per household. Table 7 shows the most modest scenario, a 15 percent increase

Table 7: Scenario A: Increase households & employment access by 15%

VMT Type	Use Mix Type	Increase in Households	Increase in employment access	Increase in Jobs in Station Area	Change in Household VMT	% Change in Household VMT	Change in Household CO ₂ emissions (tons annually)
Low	Residential	2,430	35,100	1,490	-288	-3%	-0.13
Low-moderate	Residential	1,150	19,100	692	-240	-2%	-0.11
Moderate	Residential	586	9,850	353	-449	-3%	-0.20
High-moderate	Residential	338	6,340	212	-624	-4%	-0.28
High	Residential	146	3,120	107	-643	-3%	-0.29
Low	Balanced	2,320	67,800	5,140	-289	-4%	-0.13
Low-moderate	Balanced	697	22,800	1,650	-289	-3%	-0.13
Moderate	Balanced	364	11,000	857	-494	-4%	-0.22
High-moderate	Balanced	220	6,200	476	-663	-4%	-0.30
High	Balanced	100	4,070	222	-727	-4%	-0.33
Low	Employment	1,020	59,400	14,500	-194	-2%	-0.09
Low-moderate	Employment	379	23,900	4,470	-301	-3%	-0.14
Moderate	Employment	129	14,900	1,640	-476	-4%	-0.22
High-moderate	Employment	70	8,810	722	-685	-4%	-0.31
High	Employment	18	4,830	301	-720	-3%	-0.33

Table 8: Scenario B: Increase households & employment access by 30%

VMT Category	Use Mix Category	Increase in Households	Increase in employment access	Increase in Jobs in Station Area	Change in Household VMT	% Change in Household VMT	Change in Household CO2 emissions (tons annually)
Low	Residential	4,860	70,200	2,980	-567	-7%	-0.26
Low-moderate	Residential	2,310	38,200	1,380	-432	-4%	-0.20
Moderate	Residential	1,170	19,700	705	-799	-6%	-0.36
High-moderate	Residential	676	12,700	425	-1,140	-7%	-0.52
High	Residential	292	6,240	214	-1,220	-6%	-0.55
Low	Balanced	4,640	136,000	10,300	-562	-8%	-0.26
Low-moderate	Balanced	1,390	45,700	3,310	-517	-5%	-0.23
Moderate	Balanced	729	22,000	1,710	-886	-7%	-0.40
High-moderate	Balanced	440	12,400	952	-1,210	-8%	-0.55
High	Balanced	201	8,140	443	-1,360	-7%	-0.62
Low	Employment	2,050	119,000	29,000	-367	-5%	-0.17
Low-moderate	Employment	757	47,700	8,940	-534	-5%	-0.24
Moderate	Employment	258	29,900	3,280	-848	-7%	-0.38
High-moderate	Employment	140	17,600	1,440	-1,250	-8%	-0.57
High	Employment	36	9,650	601	-1,350	-6%	-0.61

in households and employment access (or proximity.) While the percent change in VMT per household ranges from 2-4 percent for all place types, in raw numbers small changes can make significant reductions to average household VMT.

For example, increasing the number of households in a high VMT, residential transit zone by about 150 households, the average household VMT for those households can be reduced by nearly 650 miles a year.

Table 8 shows a similar pattern. Again, relatively small changes to higher VMT places can result in significant VMT reduction.

Thinking about VMT at the regional scale is also important. While reducing average household VMT in lower VMT places requires significant infill development and a long term outlook, because there are so many more people living in those places, the VMT savings are multiplied.

Table 9: Scenario C: Increase households & employment access by 50%

VMT Category	Use Mix Category	Increase in Households	Increase in employment access	Increase in Jobs in Station Area	Change in Household VMT	% Change in Household VMT	Change in Household CO2 emissions (tons annually)
Low	Residential	8,110	117,000	4,960	-932	-11%	-0.42
Low-moderate	Residential	3,840	63,700	2,310	-643	-6%	-0.29
Moderate	Residential	1,950	32,800	1,180	-1,160	-9%	-0.52
High-moderate	Residential	1,130	21,100	708	-1,690	-11%	-0.77
High	Residential	487	10,400	357	-1,900	-9%	-0.86
Low	Balanced	7,730	226,000	17,100	-914	-12%	-0.41
Low-moderate	Balanced	2,320	76,200	5,520	-757	-7%	-0.34
Moderate	Balanced	1,210	36,700	2,860	-1,290	-10%	-0.59
High-moderate	Balanced	734	20,700	1,590	-1,810	-11%	-0.82
High	Balanced	335	13,600	739	-2,100	-10%	-0.95
Low	Employment	3,410	198,000	48,400	-580	-7%	-0.26
Low-moderate	Employment	1,260	79,600	14,900	-773	-8%	-0.35
Moderate	Employment	431	49,800	5,470	-1,230	-10%	-0.56
High-moderate	Employment	233	29,400	2,410	-1,870	-12%	-0.85
High	Employment	60	16,100	1,000	-2,090	-10%	-0.95

Figure 23: Case Studies Under Scenario C

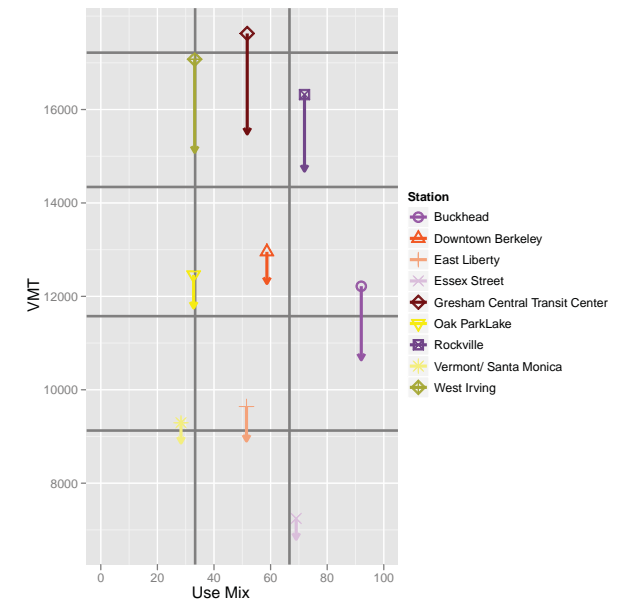
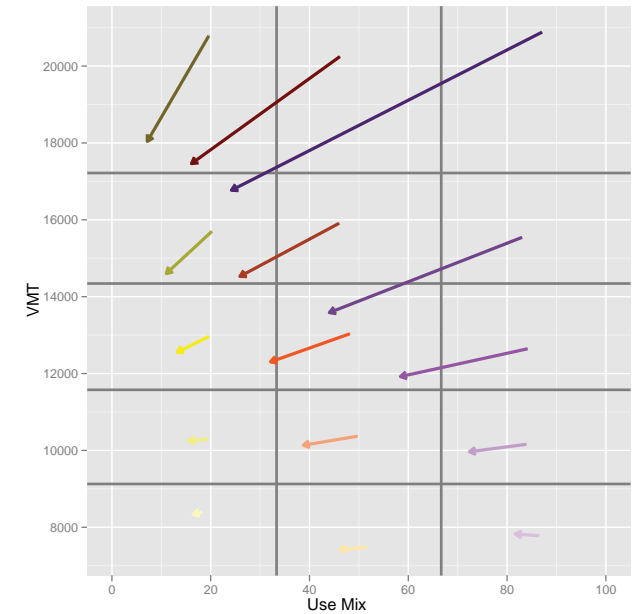


Table 9 shows the most aggressive scenario for reducing VMT by increasing residential density and employment access. However, these increases are not impossibly large. They could be folded into long range plans for cities and regions, especially since they can result in VMT reductions of about 10 percent across the board. Figure 23 shows how Scenario C would affect the case study transit zones. Four station areas would move to a lower VMT place type.

Table 10: Scenario D: Increase households by 2,000

VMT Category	Use Mix Category	Increase in Households	Increase in employment access	Increase in Jobs in Station Area	Change in Household VMT	% Change in Household VMT	Change in Household CO2 emissions (tons annually)
Low	Residential	2000	0	0	-48.1	-1%	-0.02
Low-moderate	Residential	2000	0	0	-39.9	0%	-0.02
Moderate	Residential	2000	0	0	-409	-3%	-0.19
High-moderate	Residential	2000	0	0	-1100	-7%	-0.50
High	Residential	2000	0	0	-2740	-13%	-1.24
Low	Balanced	2000	0	0	-66	-1%	-0.03
Low-moderate	Balanced	2000	0	0	-235	-2%	-0.11
Moderate	Balanced	2000	0	0	-733	-6%	-0.33
High-moderate	Balanced	2000	0	0	-1380	-9%	-0.63
High	Balanced	2000	0	0	-2780	-14%	-1.26
Low	Employment	2000	0	0	44.2	1%	0.02
Low-moderate	Employment	2000	0	0	-194	-2%	-0.09
Moderate	Employment	2000	0	0	-724	-6%	-0.33
High-moderate	Employment	2000	0	0	-1960	-13%	-0.89
High	Employment	2000	0	0	-4120	-20%	-1.86

Figure 24: Increase Households by 2,000



A different scenario is shown in Table 10 and Figure 24: how place types react to an increase of 2,000 households in all transit zones.¹² While use mix naturally changes dramatically with the influx of new households, this scenario's more significant finding is how increasing households affects different transit zones in different place types in different ways.

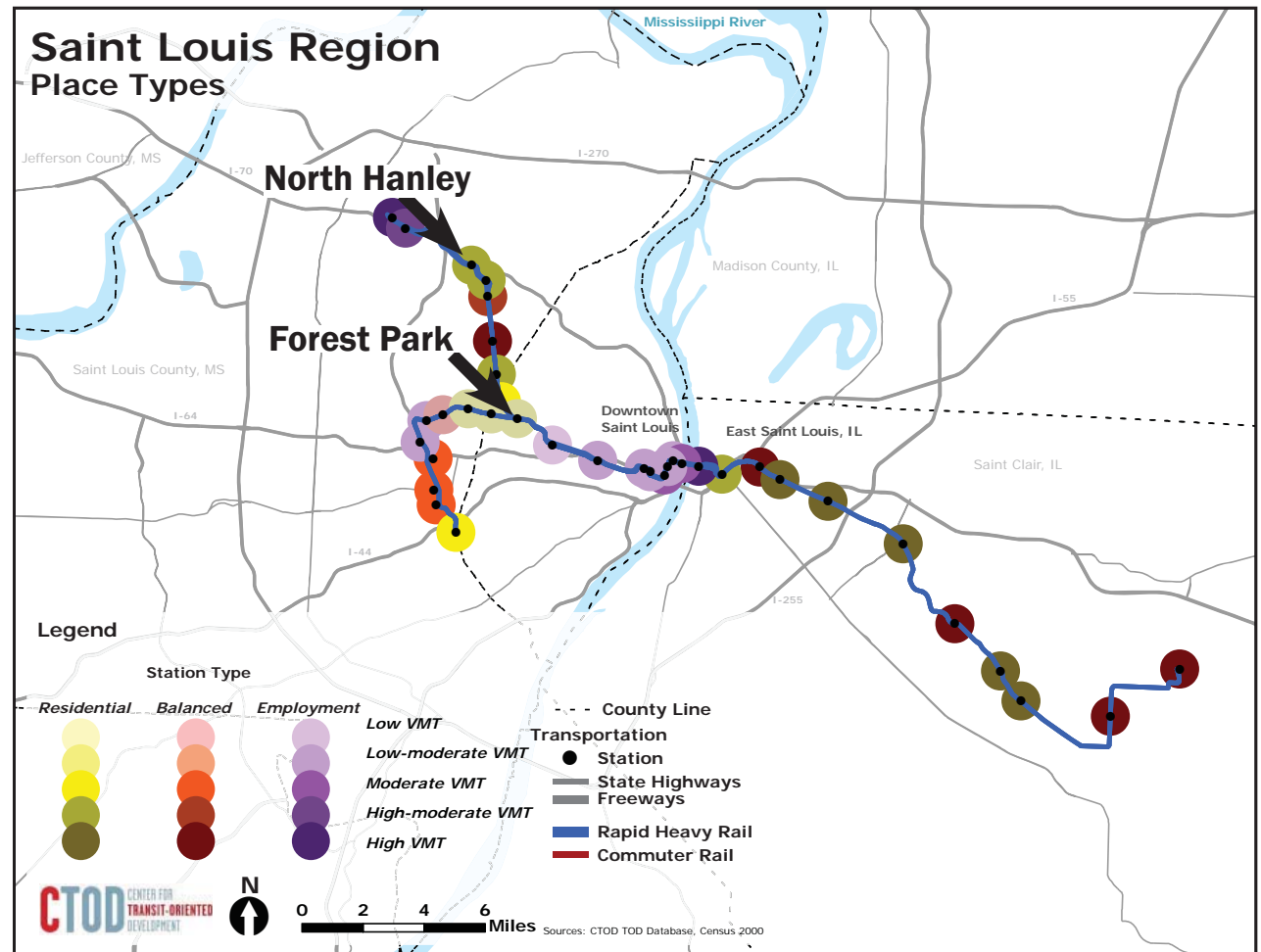
¹² Note: This scenario is meant to be a simplified illustration of how adding 2000 households to different transit zones affects those transit zones in different ways. In reality, 2000 new households would create many other affects not accounted for in the model, including new retail or local services that would be attracted to the new residential population.

Example: Adding 2000 Households in St. Louis

In Saint Louis, adding 2,000 new households to the Forest Park transit zone (a low-moderate VMT, residential place) would result in the average household in that area driving about 40 miles less a year. That's a reduction from about 10,540 miles a year to about 10,500, which may seem insignificant until that reduction is multiplied by the 2,600 old and 2,000 new households now living in the transit zone. Assuming that the new households in the transit zone would otherwise live in places where the average household drove closer to the regional average for VMT (18,900), the total regional VMT savings would be about 16,904,000 miles annually.

Compare this example to adding 2,000 households to the North Hanley transit zone, a high-moderate VMT, residential place. The average household VMT would decrease by about 1,100 miles a year (from about 15,800 to 14,700.) New and existing households would collectively reduce regional VMT by about 2,725,250 miles annually. The overall VMT savings obtained from having new residential growth happen near transit stations is significant in both examples. But because the number of people living around

Figure 25. Saint Louis Region Place Types



Forest Park is much higher, the benefits from even small reductions in VMT is also higher.

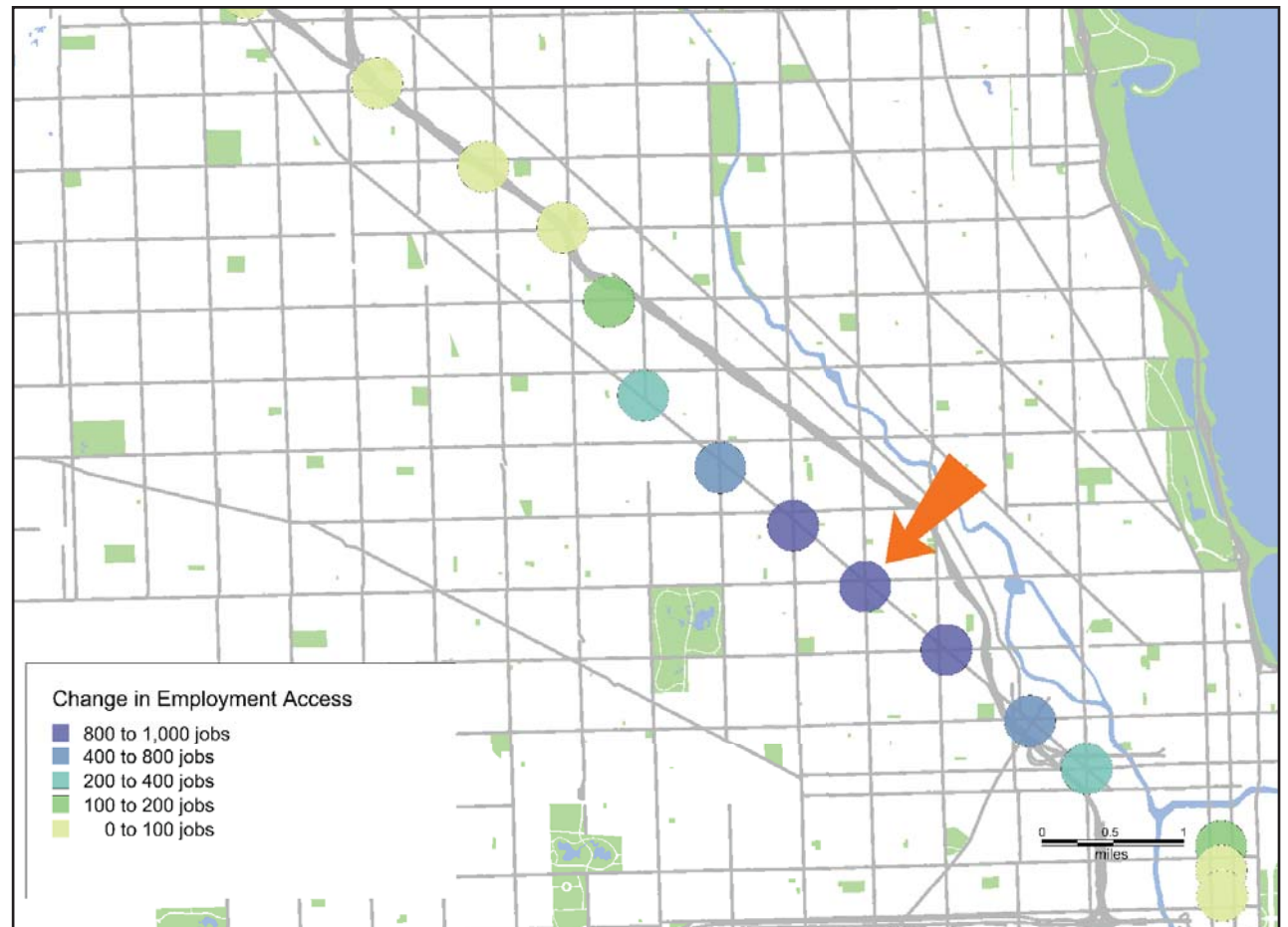
Changing Employment Access

As noted previously, increasing regional employment access has been found to be a stronger driver for reducing household VMT than changing the number of jobs within a transit zone. Increasing employment access by thousands of jobs might seem to be a daunting task at first. However, there are co-benefits to developing multiple station areas along a transit corridor.

As an example, Figure 26 shows the northwest branch of the Blue Line in Chicago. If 1,000 jobs are added to the Damen transit zone, then multiple adjacent stations along the line also see an increase in employment access. A cohesive development strategy along a transit corridor where development is taking place in multiple neighboring station areas could improve employment access in all transit zones, lowering the overall VMT of the entire corridor.

Another way to think about employment access follows. An increase in employment access of 5,000 jobs could be achieved by adding 5,000 jobs directly to the transit zone. However, adding jobs to existing employment centers nearby might be more realistic and can result in similar

Figure 26: Changing Employment Access at Damen Station in Chicago



benefits. Adding 3,000 jobs within 1 mile of the transit zone, plus 2,000 jobs two miles away and another 9,000 jobs three miles away would result in the same overall increase in employment access and could benefit other nearby transit

zones as well. In Chicago, even development two miles from the Damen station would likely have transit access, given the extensive rail system and connecting bus service.

Lessons Learned from Scenario Planning

1. Encouraging new development in transit zones, independent of the place type, can help reduce regional VMT, especially in regions where the average household VMT is higher than the average household VMT for even high VMT places.
2. High VMT transit zones (residential, balanced and employment) can see significant reductions in average household VMT from relatively moderate amounts of new development.
3. Prioritizing low VMT transit zones for new development can produce the largest reductions in total regional VMT.