

Technical Report Comparing
MTC Fiscally Constrained Alternative ("Constrained")
and TRANSDEF Smart Growth Strategy Alternative ("Smart Growth")

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Constrained vs. Smart Growth, regional results: Trips and VMT

Constrained substantially increases auto trips. Smart Growth also increases auto trips but significantly less than Constrained.

Constrained increases transit, bicycle, and walk trips a little more than it increases auto trips, while Smart Growth increases these modes significantly more.

Smart Growth increases vehicle miles traveled, but Constrained increases VMT more.

Trips by Means of Transportation	Year 2000	2030 Constrained	increase	2030 Smart Growth	increase
Auto	17,597,259	23,704,583	6,107,324	22,615,003	5,017,744
% change			35%		29%
Transit	1,175,555	1,744,503	568,948	2,397,276	1,221,721
% change			48.4%		103.9%
Bicycle	310,589	403,813	93,224	433,004	122,415
% change			30.0%		39.4%
Walk	1,950,422	2,639,951	689,529	2,829,171	878,749
% change			35.4%		45.1%
Transit, bike, walk total	3,436,566	4,788,267	1,351,701	5,659,451	2,222,885
			39%		65%
Daily Vehicle Miles of Travel (VMT)					
	143,495,300	202,823,500	59,328,200	196,465,700	52,970,400
% change			41%		37%

DEIR Table 3.1-4

Constrained vs. Smart Growth, regional results: travel time

Smart Growth increases personal trip times slightly, especially for work trips. Transit riders are willing to spend more time on their trip than drivers because they can do other things while riding. If the time is adjusted for value of time, there may be little real difference between Constrained and Smart Growth. Paradoxically, Smart Growth puts people closer to work than Constrained. Access within 45 minutes is especially important. Smart Growth provides somewhat better access by auto and a very large improvement for job access by transit.

Average Travel Time per Trip	2030			2030		
	Year 2000	Constrained	increase	Smart Growth	increase	Smart Growth over Constrained
Work Trips, Total	28.4	31.1	2.7	31.8	3.4	42 seconds
Non-Work Trips, Total	15.8	16.0	0.2	16.2	0.4	12 seconds
Total Personal Trips	18.9	20.0	1.1	20.3	1.4	18 seconds
Total Truck Trips	11.4	11.4	0.0	11.3	(0.1)	

Accessibility to Jobs

Number of Total Jobs Accessible by Auto

Within 15 minutes	109,200	133,700	24,500	149,600	40,400
Within 30 minutes	476,800	567,300	90,500	609,000	132,200
Within 45 minutes	960,300	1,104,400	144,100	1,171,400	211,100
% change, 45 min. total	1,546,300	1,805,400	259,100	1,930,000	383,700
% change			17%		25%

Number of Total Jobs Accessible by Transit

Within 15 minutes	5,100	7,200	2,100	11,100	6,000
Within 30 minutes	41,200	58,400	17,200	83,400	42,200
Within 45 minutes	136,000	179,400	43,400	240,800	104,800
% change, 45 min. total	182,300	245,000	62,700	335,300	153,000
% change			34%		84%

Constrained vs. Smart Growth, regional results: congestion

Actual levels of congestion are less for Smart Growth than Constrained.

Congestion is measured as the ratio of the volume of traffic to the hypothetical capacity of the roadway.

Congestion increases under both Constrained and Smart Growth assumptions, but less under Smart Growth.

AM Peak Period Regional Volume to Capacity (V/C) Ratio

	Year 2000	Constrained	increase	Smart Growth	increase
Freeways > 1.00 V/C	819,500	1,782,500	963,000	1,741,900	922,400
% change			118%		113%
Expressways, arterials > 1.00 V/C	118,800	305,700	186,900	276,100	157,300
% change			157%		132%
All facilities > 1.00 V/C	938,300	2,088,200	1,149,900	2,018,000	1,079,700
% change			123%		115%

DEIR Table 3.1-9

Constrained vs. Smart Growth, regional results: households

Much of the result of the model are due to population increase. We can get a better sense of what is happening to the average family by looking at household data, thus controlling for population increase.

Constrained and Smart Growth assume the same increase in households, but Smart Growth increases transit boardings very significantly, and substantially reduces vehicle trips and vehicle miles traveled.

Households	Year 2000	2030	increase	2030	increase
		Constrained		Smart Growth	
Total Households	2,466,015	3,186,592	720,577	3,186,598	720,583
			29.2%		29.2%
Per Household					
Daily Transit Boardings per HH	0.695	0.797	0.102	1.133	0.438
			15%		63%
Daily Vehicle Trips per HH	6.933	7.390	0.456	7.113	0.179
			7%		3%
Daily Vehicle Miles of Travel (VMT) per HH	58.189	63.649	5.460	61.654	3.465
			9%		6%

Sources: DEIR Tables 3.1-4 and D-4

Constrained vs. Smart Growth, urban system change

Urban system change means a major change in land use, transportation mode, and transportation pricing. The Smart Growth Alternative was intended to support a specific kind of urban system change:

- * Land use: smart growth: higher densities, less parking, mixed use, walk design.
- * Mode change: from cars to transit, bike, and walk.
- * Pricing: reduce subsidies to cars and some transit, support cost-effective transit.

To evaluate success, the analysis focuses on TBW, short for transit, bike and walk personal trips. MTC uses 1,454 travel analysis zones in its model of the 9 county region. I selected 166 of these zones, which added up to the same 2030 total populations but had large differences between the Constrained and Smart Growth Alternatives. For some zones, Smart Growth preserved open space while Constrained had development. In other zones, Smart Growth had smart growth densities while Constrained had less development. The 166 zones thus illustrate the major land use differences between the two alternatives, while holding the total population the same.

Looking at work trips, Smart Growth more than doubles the number of TBW trips, compared to Constrained.

Looking at trips for all purposes, Smart Growth increases TBW trips by a little less than twice as much as Constrained.

Looking at mode split for the trip to work, Smart Growth increases TBW by almost four times as much as Constrained.

Looking at mode split for all purposes, Smart Growth increases TBW share 7 times as much as Constrained.

Urban system change	Year 2000	2030 Constrained	increase	2030 Smart Growth	increase
166 TAZ					
TBW trips, home-based work	61,998	148,800	86,802	243,281	181,283
Percent increase			140%		292%
TBW trips, all purposes	333,202	609,899	276,697	869,873	536,671
Percent increase			83%		161%
TBW as a % of home-based work	9%	12%	3%	20%	11%
Percent increase			32%		119%
TBW as a % of all trip purposes	12%	13%	1%	19%	7%
Percent increase			10%		60%

Italicized percent are percentage point increases. Bold percent are the percentage increases in mode split.

Transit, bike and walk (TBW) person trips as a percent of trips to/from production (residential) zones.

Constrained vs. Smart Growth, suburban zones

We expect Smart Growth to have the most impact in the systemic change zones. However, it is also interesting to look at the impact in neighborhoods that do not change, where mainly the pricing measures and some transit would have an impact. 327 zones have minimal land use and demographic differences between Constrained and Smart Growth.

We look at the mode split for work trips and for all trips. As expected, gains are modest compared with systemic change. Smart Growth increases TBW mode split three times as much as Constrained.

For all trip types, Smart Growth has a small gain in TBW while Constrained loses TBW mode share.

Neighborhood change, mode split for TBW

327 TAZ	Year 2000	2030		2030	
		Constrained	increase	Smart Growth	increase
home-based work	9%	10%	1%	12%	3%
Percent increase			14%		39%
trips for all purposes	9%	9%	-0%	11%	1%
Percent increase			-1%		14%

Italicized percent are percentage point increases. Bold percent are the percentage increases in mode split.
 Transit, bike and walk (TBW) person trips as a percent of trips to/from production (residential) zones.

Constrained vs. Smart Growth, access to jobs

A third important question is how people get to work in zones with severe job surpluses--areas where so little housing is available that housing has become unaffordable, commutes are long and slow and air becomes polluted.

Two areas stand out, Silicon Valley and San Francisco. Zones in these areas with a high surplus of jobs relative to employees were selected, totaling 102 zones.

San Francisco already has a very high TBW access rate. Constrained increased it somewhat, and Smart Growth increased it even more.

In Silicon Valley, Constrained increases TBW access by only one percentage point while Smart Growth increases it by four percentage points.

Access to jobs, mode split for TBW

102 TAZ	Year 2000	2030		2030	
		Constrained	increase	Smart Growth	increase
San Francisco	54%	62%	7%	66%	12%
Percent increase			13%		21%
Silicon Valley	7%	8%	1%	11%	4%
Percent increase			15%		58%

Italicized percent are percentage point increases. Bold percent are the percentage increases in mode split.
 Transit, bike and walk (TBW) person work trips as a percent of total work trips to/from attraction (work) zones

Traffic, Constrained vs. Smart Growth, Hayward

We can use the output from the model to look at specific corridors. I've looked at three corridors using a system of analysis that can be used on any corridor.

I looked first at a short corridor from the Hayward BART station to the Cal State University Hayward campus. I looked at the volumes on two major arterials and found that Smart Growth performs about the same as Constrained.

MTC staff informed me that they did not report ridership on the proposed rapid bus because the numbers involved are too small to be reliable.

Hayward BART to CSUH corridor	Year 2000	2030		2030	
		Constrained	increase	Smart Growth	increase
<i>AM volume, 2 hour peak</i>					
Foothill between A St. and Grove Way					
northbound (links 3552 to 3520)	1,643	2,851	1,208	2,585	942
Percent increase			74%		57%
southbound (links 3520 to 3522)	3,157	5,855	2,698	5,799	2,642
Percent increase			85%		84%
Mission between Jackson and Highland					
northbound (links 3580 to 3579)	2,076	2,158	82	3,446	1,370
Percent increase			4%		66%
southbound (links 3579 to 3580)	3,714	5,705	1,991	5,827	2,113
Percent increase			54%		57%
southbound total	6,871	11,560	4,689	11,626	4,755
Percent increase			68%		69%
BART to CSUH rapid bus		0	no data		no data

Source: MTC modelling data

Traffic, Constrained vs. Smart Growth, into Silicon Valley

In the corridor from I-580 at Altamont to Silicon Valley I looked at three links.

First, I looked at traffic coming west across the Altamont on 580 in the AM peak. Smart Growth produced the same number of trips as Constrained, probably because our land use assumptions were the same at the regional level.

Next, I looked at the traffic coming south on 880 and 680 as it crosses into Santa Clara County. Smart Growth produced substantially fewer trips than Constrained, alleviating congestion at this crucial bottleneck. Trips, in fact, increase by only about half as much as with Constrained.

880 and 680 at Alameda County line		2030		2030	
<i>AM volume, 2 hour peak</i>	Year 2000	Constrained	increase	Smart Growth	increase
I-880 at Alameda-Sta Clara line					
southbound (links 4485-5812)	14,775	14,845	70	17,130	2,355
southbound (links 9201-9046)	0	3,733	3,733	0	0
I-680 at Alameda-Sta Clara line					
southbound (links 3867-5773)	9,984	12,488	2,504	12,077	2,093
southbound (links 3867-9271)	0	3,297	3,297	664	664
Southbound 880 + 680	24,759	34,363	9,604	29,871	5,112
percent increase			39%		21%

Third, traffic goes into the housing deficit area of Silicon Valley on three roads-- SR 237, Tasman, and Montague. By this point the Smart Growth impact is diminished but it still has fewer trips than Constrained.

Meanwhile, commuter rail is serving many more passengers than Constrained. Constrained increases ridership from a low base, but Smart Growth increases ridership much more.

Into Silicon Valley from East side		2030		2030	
<i>AM volume, 2 hour peak</i>	2000	Constrained	increase	Smart Growth	increase
SR 237 westbound from I-880					
westbound (links 9038-9044)	1,184	3,214	2,030	2,519	1,335
westbound (links 5838-5809)	11,963	11,982	19	11,588	(375)
Tasman Dr					
westbound (links 5097-4253)	2,529	2,527	(2)	2,104	(425)
Montague Expwy					
westbound (links 5683-5709)	6,137	8,487	2,350	8,747	2,610
westbound (links 5683-9106)	781	1,353	572	1,249	468
Westbound total	22,594	27,563	4,969	26,207	3,613
percent increase			22%		16%

Total ridership (corridor and link ridership not available)					0
HSR (High speed rail) and ACE (intraregional riders only)	1,431	5,773	4,342	73,263	71,832
Amtrak	955	2,129	1,174	5,006	4,051
total	2,386	7,902	5,516	78,269	75,883
percent increase			231%		3180%

Note: traffic volumes include trips from outside the region but transit ridership does not.

Interregional transit is not modeled, due to lack of data.

Total ridership shows zero trips on Ace and HSR originating from outside the region.

Inclusion of inter-regional transit trips would show significantly more riders on transit, and less traffic congestion.

Source: MTC modelling data

Traffic, Constrained vs. Smart Growth, 101 in Sonoma and Marin

The third corridor I looked at was in Sonoma and Marin counties, at the southbound commute on 101. Smart Growth makes little difference in freeway traffic on the south side of Santa Rosa, and even makes traffic somewhat worse on 101 just south of San Rafael.

Constrained decreases transit ridership a bit while Smart Growth more than doubles it, increasing ridership by 126 percent.

Southbound on 101, Sonoma and Marin		2030		2030	
<i>AM volume, 2 hour peak</i>	Year 2000	Constrained	increase	Smart Growth	increase
South side of Santa Rosa					
Southbound 101 (links 8199-8058 [2000])	7,380				
(links 12258-8058 [Constrained, SG])		8,041	661	8,025	645
Southbound 101 (links 10023-11126)	0	1,524	1,524	1,497	1,497
Total	7,380	9,565	2,185	9,522	2,142
percent increase			30%		29%
South side of San Rafael before Richmond Bridge					
Southbound 101 (links 7903-7901)	13,855	13,339	(516)	14,036	181
Southbound 101 (links 9651-7901)	0	1,606	1,606	1,570	1,570
Total	13,855	14,945	1,090	15,606	1,751
percent increase			8%		13%
Note: Smart Growth includes the gap closure project, increasing highway capacity in San Rafael.					
GG Bus	34,307	20,988	(13,319)	50,658	16,351
GG Ferries	6,108	12,433	6,325	17,838	11,730
Sonoma Providers	10,091	15,894	5,803	45,539	35,448
Total	50,506	49,315	(1,191)	114,035	63,529
percent increase			-2%		126%
Marin and Novato Rapid buses are part of GG Transit. SMART is not reported.					
Petaluma, Rohnert Park-Cotati, and Santa Rosa rapid bus may be included in Sonoma providers.					
Source: MTC modelling data					