Lessons learned from five case studies of Italian and German Transit-Oriented Developments

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Abstract

All across the country transit-oriented development (TOD) is on the rise. TOD projects, however, face many hurdles in the USA. TOD requires local policy decisions that are often hindered by a series of "Catch 22" scenarios. In contrast, in TOD developments in Europe, policies are more coordinated. American planners can benefit from a comparative examination of recent TOD developments in Italy and Germany where transit is taken for granted and land use planning has evolved concurrently. This paper describes the findings from the author's research fellowship in late 2009 which was funded by the German Marshall Fund of the United States (www.gmfus.org/cdp/). Five recent developments in Turin, Milan and Genoa in Italy, and Stuttgart and Hamburg in Germany were studied in terms of the density and parking requirements allowed or required by the respective city. The cities were chosen to be comparable to the U.S. experience in terms of being former industrial cities undergoing redevelopment and also being relatively auto-oriented. Seven lessons-learned were identified and are described along with their application to California and the United States.

Introduction

Across the United States, metropolitan regions are increasingly turning to transit-oriented development (TOD) as a logical alternative to the auto-dependent land development patterns of the last six decades. Over the past 15 years, California has seen an increasing trend of high-density mixed-use projects both near **and** far from transit stations, and with **and** without bicycle and pedestrian infrastructure. These variations and other decisions regarding land use densities, parking, and the role of traffic impact studies inhibit the effectiveness of the project. For example more often than not, the same standards for parking and for evaluating traffic "impacts" were applied to TOD projects as to urban sprawl projects. [1]

The problem boils down to this: (For the purposes of this paper, Bus Rapid Transit (BRT), Light Rail (LRT), subways, and commuter rail are collectively referred to as "mass transit", to differentiate them from local bus service.)

> Mass transit can help reduce traffic congestion. However, mass transit is only tenable with high ridership. High ridership is achieved through denser land uses. Yet, unless mass transit service is already in place, density often leads to increased traffic congestion. Traffic congestion is a significant impact and must be mitigated. Hence, TOD projects cause traffic congestion and are opposed by NIMBY's as well as some citizens and policy makers.

For my fellowship, I wanted to learn how European planners made crucial decisions regarding land use density, parking, and traffic studies in the planning and approval of land-development projects in order to identify lessons for American policies and practices in TOD.

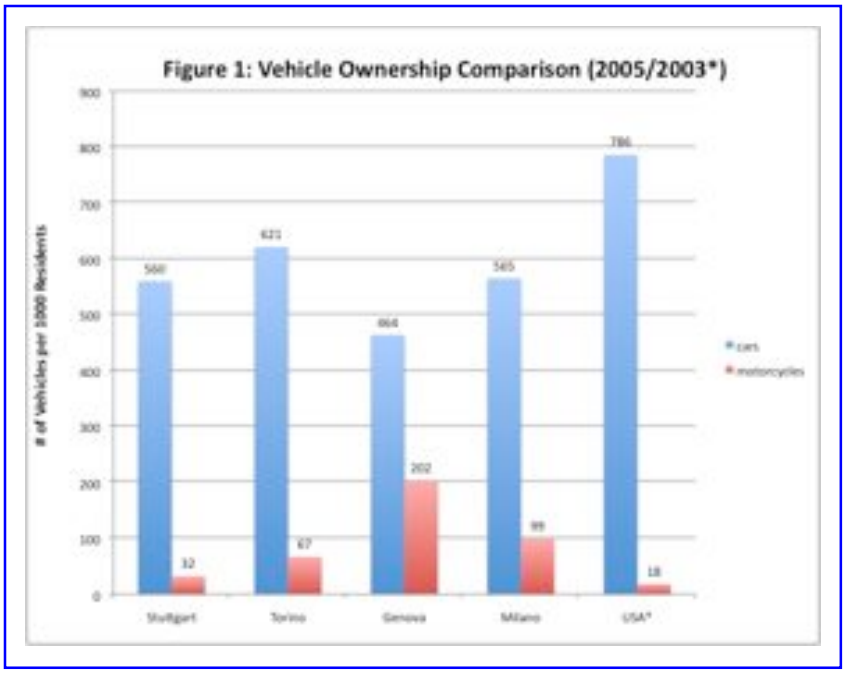
I selected five cities in Italy and Germany[2] not generally known for being particularly innovative or aggressive in discouraging car use: Turin, home to Fiat, and Stuttgart, home to Mercedes–Benz and Porsche, are relatively auto-dependent as reflected in their auto-ownership rates shown in Figure 1. Genoa and Hamburg are major seaports with many port-related industries. The fifth city, Milan, also has a large industrial base. Therefore, their policies may be more transferable to car-centric American cities than those of other European cities. For each case study, I interviewed city planners, architects and engineers about the process for determining land use mix and densities as well as parking and traffic study requirements. All case studies were located within city limits at a mass transit station: commuter rail in Hamburg and Genoa; light rail / tram stations in Stuttgart, Turin, and Milan; and a metro station in Milan and Turin. All were built (or had components built) since 2000 and are occupied, with the exception of the Milan project, currently under construction.

Five Italian and German Case Studies

The five case study projects are outlined here with just a few pertinent points due to space constraints. For a fuller description of each project in terms of how decisions were made regarding density, parking and traffic, and the project context, please refer to the full policy brief on the GMF website or my blog.

<u>Turin Project name- Spina 2 PRIN</u>

Former Land Use: industrial
New Land Use: 260 apartments in three multistory buildings with 2,300 m^2 retail and 5,000 m^2 office. (The City required that the buildings have ground floor retail/office uses.
Density: Maximum FAR was 0.7; Project ia about 20 d.u./acre over the full 12.7-acre site; net density is 64 due./acre on the 4.1 acre parcel allowed to be developed. considering office and retail, the net density is over 80 d.u./acre.
Transit: adjacent to two tram lines; 300 meters from the Porta Susa train & metro station.
Parking: Generally 1 space per d.u and 1 sq. meter of parking for every 1 sq. meter of office. Turin's parking rates have not changed since 1977, and adhere to regional and national standards, set in 1968. As planning continues for the remainder of Spina 2, it is apparent that current parking requirement will be extremely expensive to provide. Given its proximity to Turin's main transit hub, Porta Susa, city planners are realizing the absurdity of investing hundreds of millions of Euros in transit only to require parking at the same ratios as before.



Traffic: While studies were conducted of future transportation conditions with the new land uses and transportation infrastructure including increased railway capacity, new metro line, and a new boulevard atop the undergrounded rail, there was no "traffic study " of Spina 2-PRIN alone. The boulevard serving the project was designed with four-lanes, wide medians, sidewalks, and bike paths based on the city's desire for aesthetics and the needs of all users; not based on a series of traffic level-of-service (LOS) calculations, as is standard practice in California and much of the U.S.

Milan Project Name: City Life

Former Land Use Fairgrounds about 0.6 kilometers km^2 (over 100 acres)

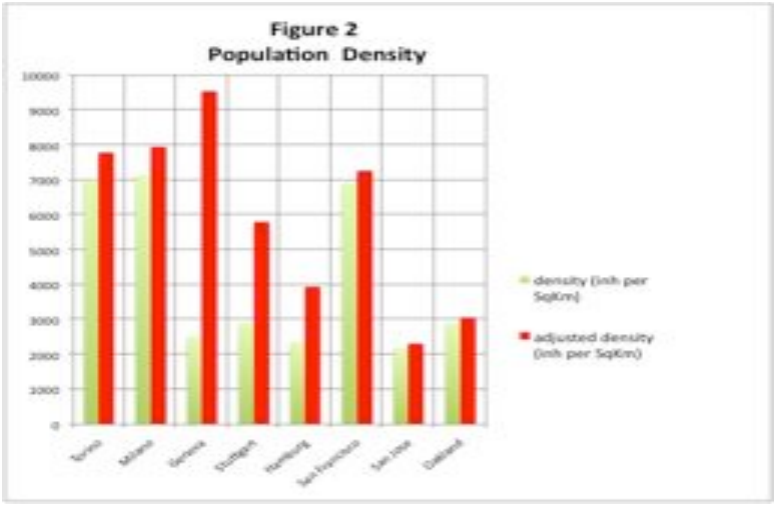
New Land Use: Mixed-use development, still under construction, was chosen via a design competition; includes three 27 story residential towers, 500 d.u. each, office buildings, retail, museum, parks and open space and a new metro line / station underneath the site. FAR=1.0

Density The three residential buildings each have 500 d.u. on 36 acres, equivalent to 41 d.u./acre. 19 acres (55%) will be donated to the public, creating a net density of 85 d.u./acre

Transit: A fourth metro line is being designed, and a new station will be directly underneath the project site.

Parking: Parking is all underground; the parking supply was reduced from 4000 spaces as required by code to 1000 due to its location at a (future) metro stop.

Traffic Studies: Traffic studies for City Life concluded there would be significant congestion on one of the main access roads and recommended that it be undergrounded directly into the project's parking garage. The community and neighbors objected since the funds to build the road are to benefit the entire neighborhood, and they deemed the underpass would only "benefit" the project's tenants /customers. Thus, it will not be built. Currently, metro and other public transportation provide alternatives to driving.



See end note 3 for definition of adjusted net density.

Genoa Project name: Fiumara

Former Land Use: several factories near the coast and port.

New Land Use: Three residential towers, shopping center, movie complex, gym/sports center, several office buildings; extensive parks.

Density: To maximize open space, city planners concentrated housing in three 19-story towers The resulting 270 d.u. on 9.2 acres is 29 d.u./acre. Adjusted for the land donation to the public, the net density is 63 d.u./acre. Genoa's steep terrain concentrates the urbanized area on 64 of the city's 240 km^2. Thus, Genoa is one of the densest cities in Italy (and the densest case study, as shown in Figure 2); significant open space was therefore considered essential. [3]

Transit: Directly served by a commuter train service called "linea metropolitana.

Parking: A five story parking garage plus underground parking for the residential towers, all provided per code, since public parking places in Genoa are scarce

Figure 3 Extensive parks at Genoa's Fiumara project

.Stuttgart Project name- Möhringen

Former Land Use: freight rail yard and industrial

New Land Use: residential, retail, office, super market, services.

Density: The five residential buildings have four stories with 36 d.u. each and ground floor office/ retail. This calculates to 42 d.u./acre.

****Unique Policy:** The city rezoned existing low density residential near this station to higher density to allow for future redevelopment to align with current practices and policies.

Parking: Parking standards in Germany are set by the state, in this case the state of Baden-Württemburg, which mandates 0.8 space per unit of multifamily housing. Stuttgart required that parking for the apartmenst be underground (three handicapped spaces per building were allowed at-grade). Public parking for visitors and shoppers is only available on the street. For non residential, parking standards are more flexible, and required supply can be reduced depending on the site's proximity to a mass transit station and other factors. (See http://wp.me/pzsSt-5l) The law, passed in1996, reduced the required nonresidential parking for this site by 40%.

Traffic Studies: Traffic studies and an EIR were performed but do not affect the density or the development fees; the fees are based on a formula, and appear to be less than Italy (especially considering the required land donations in Italy). Since more housing is desired by the City of Stuttgart, residential development is encouraged and thus is subject to fewer fees compared to other land uses.

Hamburg Project name: Allermöhe

Former Land Use: agricultural

New Land Use: apartments, lower density townhouses, retail, office, services, schools, parks. Allermöhe is essentially a stand-alone development since it is not contiguous with an existing developed area of the city, it resembles a California-style "subdivision" project, with four key differences:

1) Deliberately sited next to a commuter rail line and a new train station built for the development;
2) Includes a mix of uses (retail, office, community center, sport fields, schools from daycare through high school);
3) Two distinct styles of homes, for socio-economic and demographic diversity;
4) Designed to make it easier to walk rather than drive to the train station and shops. Canals that help with flood control and offer recreational opportunities are also effectively used to facilitate bike and pedestrian circulation, although car access to the shops and between homes is possible.

Figure 4 Bridge connecting rail station plaza with residences

Density: Allermöhe is sandwiched between a railroad line and a freeway, and surrounding land uses will remain agricultural. Density for the apartments was set 61 d.u. / acre and townhomes to 23 d.u./acre. Schools and retail areas were allowed higher building footprints.
Parking: Hamburg has the most local control of parking requirements of all the case studies because it is both a city and a state. In Allermöhe, the full parking ratio was required: 0.8 space per apartment and 1.0 space per townhouse.

Transit: Commuter rail: a new train station was built on an existing line to serve the planned population of 12,000.

Traffic Studies: An EIR was conducted for the project but the main concern was mitigation of noise from the adjacent freeway. Traffic was not an issue; it was estimated that internal traffic would be low and that external trips would utilize the freeway or the train.

Lessons Learned from the Five Case Studies

From these case studies, I developed seven lessons for American practitioners. Some of the lessons below are applied to San Francisco Bay Area projects, but the lessons can potentially be applied to other metropolitan areas as well.

1. Mass transit is essential to a livable city.

My research of TOD projects was not specifically about transit service, yet the transit setting in Italy and Germany cannot be ignored. All five case study cities had at least two forms of mass transit, [4] with excellent coverage throughout the entire urban area. The commitment to provide

and fund both mass transit and local bus service was so ingrained that it is considered one of the essential components of a livable city, along with clean water, sanitation, and garbage collection. In short, frequent, affordable, and fast mass transit enables hundreds of thousands of human beings to live in dense urban areas; it is accepted that the government will provide (or contract for) transit service. Note that these two forms of mass (rail) transit do not count regional train service provided by the state or interurban rail service provided by the national railway. The transit modes provided are summarazied in Table 1; most often each mode has more than one line and as many as 16.

Table 1
Mass Transit Modes present in the Five Case Study Cities
Compared to the San Francisco Bay Area

Mode	Turin (910,000/ 2,300,000)	Milan (1,300,000/ 3,200,000)	Genoa (610,000/ 900,000)	Stuttgart (600,000/ 2,700,000)	Hamburg (1,780,000/ 3,300,000)	SF Bay Area (850,000/ 8,000,000)
Tram/LRT	Yes (8)	Yes (6)	No	Yes (16)	No	VTA (2) SFMTA (5)
Metro/ Underground	Yes (1+)	Yes (3+)	Yes (1)	No	Yes (4)	No
Commuter Rail	Yes (4)	Yes (4)	Yes (2)	Yes (4)	Yes (5)	Yes (3)*

(population of city/ population of metro area)
(#): the number of individual lines of this rail mode
(+) plus an additional line under construction
VTA= Santa Clara Valley Transp.Authority (one of the nine counties of the SF Bay Area)
SFMTA= San Francisco Municipal Transportation Agency
* BART has 2 lines in 4 counties and Caltrain has one line in 3 counties of the nine-county SF Bay Area)

2. Density and mass transit must be planned in concert.

Mass transit needs density and density (and society) benefits from mass transit. Allowing high densities where there is no mass transit is as shortsighted as allowing low densities at mass transit stations. Long-range transit planning is essential. This can be as visionary and pro-active as 1920s Hamburg constructing five commuter rail lines and preserving adjacent land for future infill development, or late 20th century catch-up projects such as Turin opening its metro line in 2006. Furthermore mass transit must be an integral part of every development project. Of all my case studies, the underlying assumption was that if a large project was being developed, then the train, metro, or tram would be extended to serve it. This will only work if there is a train, metro, or tram to extend.

In Santa Clara County, the proposed Coyote Valley project in south San Jose is located along the Caltrain commuter rail line; a new station is planned to serve the site. In Oakland, however, the largest redevelopment opportunity is the former Oakland Army base; the only mass transit line (BART) is over one mile away. Although BRT is in the planning stages, it is not currently planned to serve this site. Since the base redevelopment project is on hold, it is hard to criticize

the lack of planning for BRT. But when the project is revived, the City of Oakland should ensure that it indeed has mass transit so that the mistakes of the past fifty years are avoided.

3. Density Should Not Be Feared or Avoided

In both Italy and Germany, density and land use are decided by assessing the surrounding area to determine the new site's density. The proposed land-use mix then undergoes a public process to determine what land uses/services are missing from the neighborhood. While cities are expected to have more multistory buildings than the suburbs, density is not uniform throughout the city; it varies based on factors such as topography and transportation infrastructure. The two cities that chose more dense development, Stuttgart and Milan, based decisions on proximity to major transit stations. Two cities justified the same densities for the same reason. One city made the decision that the site should be less dense due to the neighborhood's lack of open space. (However it must be noted that this "less dense" development was the equivalent of 63 dwelling units (d.u.) per acre; for comparison, San Jose's highest residential density zoning is 20-50 d.u./acre.)

The most significant influence on density was proximity to transit. It is accepted practice in both Italy and Germany that denser developments must be closer to mass transit. Surprisingly, this key TOD practice was not officially adopted policy.

4. Parking Requirements cannot be "One Size Fits All"

Parking supply regulation is one area where U.S. policies appear more effective than in Italy or Germany. German and Italian cities must comply with nationally mandated overly high parking requirements. Typically in the U.S., each city has the flexibility to set parking requirements for new development. However, local control does not always result in effective parking policies; each city must independently recognize the impacts of overly strict parking standards and change its ordinances. For instance, Italian and German cities are required to provide bicycle parking, in contrast to the city-by-city ordinances in the U.S. that often fail to address this need. In sum, context is important: one size does not fit all cities or all neighborhoods. Both Turin and Milan have realized that national parking standards are too high for land uses next to mass transit. The state of Baden-Württemburg, where Stuttgart is located, has adopted, and the City of Milan is about to adopt, lower parking ratios for office/retail developments located near mass transit. (See pp 4 and http://wp.me/pzsSt-3N). The developer funds that would have built parking are used for other City services; the developer doesn't benefit from building less parking - the public does.

****Unique Policy:** The city and state of Hamburg has developed a list of criteria that allows an 80% reduction in required parking supply for residential developments. It also has codified alternatives to providing the required parking at commercial sites. (See http://wp.me/pzsSt-3Y)

5. Developer fees for transportation impacts should be based on a set formula applied equally across the metropolitan area rather than on a case-by-case basis.

Italy and Germany have standard development fees for public works projects, and Italy also has fees to improve the public space (in addition to land donation). In California, traffic impact fees are often determined through project-specific traffic studies, a method which benefits those

projects developed first, when roadways could still absorb the traffic. It also encourages suburban sprawl. Thus, many California communities have implemented or are considering traffic impact development fees or ways to allocate costs proportionately to fund future transportation improvements. However, improvement projects are typically roadway projects; impact fees to fund transit capital or operating costs are rare. Improvements are almost always confined to one city; regional cooperation is extremely difficult. Finally, travel forecasting models used to predict future traffic volumes and future roadway needs are calibrated on historical trip-making patterns, which are the result of auto-dependent land use. Standard fees citywide would be more equitable than project-by-project, but region-wide fees, which would keep developers from playing one city against another to obtain the lowest fees, would be even better.

6. Mixed land use is a component of a successful project.

All five of my case studies were part of a mixed-use project, which included at a minimum residential, office space, retail and at least one other land use. In some cases the residential buildings were themselves mixed use, in that they incorporated ground-floor retail and office; in other cases the land uses were segregated into separate buildings. Nevertheless, the case studies showed that an area as small as 12 acres benefits from the synergy of varying land uses and even varying residential uses (including student housing in Turin and Stuttgart, and owner-occupied row houses in Hamburg).

7. Vibrant cities will have traffic congestion

While traffic studies were conducted at various stages, traffic impacts did not affect, let alone rule, the density decision. Furthermore, a good mass transit system enables the construction of high density developments without having to "mitigate" traffic congestion. As Milan's CityLife project forecast, drivers will pay the price by waiting in traffic, but the metro riders will be unaffected. Building more freeways and roadways is a vicious cycle; if there is anything that California has learned in the last 50 years, it is that "if you build it (freeways and wider roadways), they (motorists) will come". Robert Cervero wrote that there is "good congestion and bad congestion" and that the incremental congestion caused by TOD should be considered good congestion.[5] Another point to consider is that mass transit often only becomes more attractive than driving when driving is subject to congestion.

Conclusion

Many areas of the U.S. will continue to experience population growth, primarily concentrated in metropolitan areas composed of several, if not dozens, of different political jurisdictions, not to mention transit agencies. While some cities have gotten the message with respect to density, many of these projects were built far from existing mass transit stations. For example Santana Row in San Jose is a highly successful mixed use dense development, but is not located in downtown San Jose nor near any of the light rail stations. As shown in Figure 6 it is only served by a local bus route. Fortunately, current plans for Bus Rapid Transit (BRT) do include a BRT line that would serve Santana Row, but this is by accident, not design since Santana Row was planned and built prior to BRT planning. However it is hard to find fault when there is a paucity of high-capacity transit systems and no long-range plan of where such routes might be.

To guide TOD, a bold new approach is needed to answer the question of what comes first – transit or density. The solution? Region-wide master planning for mass transit networks without regard to political boundaries. Just as in 1956, when the federal government committed to funding the Interstate System[6], the United States needs a similar visionary commitment to plan, construct, and operate efficient, affordable mass transit systems in every urban area as small as 200,000 residents. It should be possible to traverse the metropolitan area via one or more mass transit modes without regard to artificial boundaries, just as we can hop on an Interstate and drive unaware of city and county boundaries. The larger the urban area, the more modes and lines per mode are needed.[7] Identification of these future mass transit routes would provide the needed framework on which local governments would then base their land use zoning plans.

Figure 6 Local bus route serving Santana Row

Figure 7 Future BRT on Stevens Creek Blvd

Clearly leadership and coordination at the state and federal levels are needed. Successful models in the U.S. exist for region-wide transit: New York's MTA, Trimet in the Portland, OR region, and the newly formed transit board in Greater Atlanta. European cities have had a regional perspective for decades: state governments ensure interurban options such as commuter and regional rail, while cities cooperate with their suburbs on where and how to extend metros and LRT beyond city limits. Fare reciprocity is standard procedure between transit service providers within an urban area; this, along with schedule coordination, is an essential component of effective region-wide transit.

This approach could be the needed catalyst to free development impact studies from their focus on intersection LOS. Transportation impact studies, while still necessary, could concentrate on multimodal solutions. Development fees and savings from reduced parking should be set aside to pay for regional transit's capital and operating costs. Now that the United States has a world-class interstate system, it is time to catch up with rest of the world by providing high quality mass transit in all of our metropolitan areas.

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Ms. DeRobertis was a German Marshall Fund fellow in the fall of 2009 in Italy and Germany studying land use, transportation and parking policies. This paper is based on the policy brief she prepared of her research of the five case studies. The GMF policy brief, with more detail about the case studies can be found at: http://www.gmfus.org/template/page.cfm?page_id=294. Michelle documented many other transportation findings on her blog at http://cittastadt.wordpress.com. She looks forward to the day when rail transit returns to Oakland and the east side of San Francisco Bay.

Michelle is currently the Bicycle Program Manager for the VTA where she works on all things bicycle including programming and working with the 15 cities in the county. She was the author of VTA's Bicycle Technical Guidelines. Other current issues include bicycle access to transit, 24-hour access to bike paths and bike sharing. She is a registered Civil and Traffic Engineer in California.

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[1] Robert Cervero, "TOD and Carsharing: A Natural Marriage", University of California Transportation Center, ACCESS, #35, Fall 2009.

[2] Italy and Germany are similar in size and structure: Italy (pop. 60 million) has 20 states called "regione;" Germany (pop. 82 million) has 16 states called "bundesland".

[3] Net adjusted density divides the population by developable land area, which does not include land that has been designated as protected parks or forest, or that is very steep and thus has not been and will not ever be developed. For example, 40% of Stuttgart's land area is the famous Black Forest and is protected from development and another 10% is set aside permanently as agricultural /climate control. Five percent was used as the default value if information was not available.

[4] This is in addition to regional train service provided by the state and interurban rail service provided by the national railway.

[5] Robert Cervero, ibid

[6] Another unprecedented and visionary public project was the State of California's 1960 *Master Plan for Higher Education,* which among other things, established tuition-free community (2-year) colleges for all California residents.

[7] A note about the SF Bay Area where I live and work: the City and County of San Francisco is well-served by multiple rail modes, but at 49 sq. miles and 800,000 residents, this is only 1% of the land and 11% of the population of the metropolitan area. San Jose is the most populous city, almost 1,000,000; portions have both commuter rail and light rail, but much of the city has neither. While Alameda and Contra Costa Counties have BART lines, BART is functionally a commuter-train; these two counties have no metro or light rail. To fill these gaps, BRT planning is underway in San Francisco, Alameda and Santa Clara; however it suffers from typical American transit planning limitations: short-range vision due to chronic budget crises endured by American transit agencies. This situation is exacerbated by the current recession and budget crises faced by many states including California. The current emphasis on jobs creation should recognized that transit operations and construction create jobs just as building roads does. In the 2009 American Recovery and Reinvestment Act (ARRA), only 17 % of the transportation funding was for transit.