Commuter Rail Transit and Economic Development

Arthur C. Nelson
Professor of Planning and Real Estate Development
College of Architecture, Planning and Landscape Architecture
University of Arizona
Tucson, Arizona 85719
520.621.4004
acnelson@ArthurCNelson.com

Acknowledgements
Support for this article came from the National Institute of Transportation and Communities with numerous co-sponsors including Utah Transit Authority, Portland Metro, TriMet, Lane County Transit, City of Provo, Utah, and Transportation for America (a subsidiary of Smart Growth America). The author acknowledges especially the assistance of Matt Miller. The contents of this article reflect the views of the author, who is solely responsible for the facts and the accuracy of the material and information presented herein.

December 2016

Commuter Rail Transit and Economic Development

Abstract

Commuter rail transit (CRT) is a form of rail passenger service connecting downtowns and other major activity centers with suburban commuter towns and beyond. Between 1834 and 1973, only three public CRT systems were built in the U.S. serving New York, Chicago and then Boston. There are now 25 such systems. Modern CRT systems aim to expand economic development in metropolitan areas. But do they? This article evaluates the economic development performance of five modern CRT systems built in the South and West: "Tri Rail" connecting the metropolitan areas of Miami and West Palm Beach, Florida; "Rail Runner "connecting the metropolitan areas of Albuquerque and Santa Fe, New Mexico; "FrontRunner" connecting the metropolitan areas of Ogden and Salt Lake City, Utah; "Coaster" serving metropolitan San Diego; and "Sounder" connecting the metropolitan areas of Tacoma and Seattle. For all metropolitan areas combined, areas within 0.50 mile of CRT stations lost share in the change of jobs. All CRT station areas gained share of jobs in the office and health care economic groups, and most gained share in the knowledge economic group. All CRT station areas lost share of jobs in manufacturing, and nearly all lost share in the retail-lodging-food service economic group. Yet, station areas served by the FrontRunner CRT system gained share of jobs overall as well for nearly all economic groups. Planning and policy implications are offered.

Introduction

Commuter rail transit (CRT) is a form of rail passenger service connecting downtowns and other major activity centers with suburban and exurban places. Historically, CRT systems connected distant suburbs with downtowns in the northeast and Great Lakes regions, serving mostly affluent business people working in downtowns. In *The Exurbanites*, for instance, August Spectorsky (1955) chronicled the lifestyles of families who lived in Bucks County, Pennsylvania but whose breadwinners commuted daily to work through New Jersey into midtown or downtown Manhattan via privately operated railroads. Amtrak now provides those longer-distance commuter services, notably between Boston and Washington, DC.

In recent years, commuter rail service has been introduced to metropolitan areas in the South and West. One implicit purpose of these systems is to generate economic development especially around commuter rail stations. But there is scant empirical analysis of whether and the extent to which commuter rail stations are associated with economic development. Based on analysis of five commuter rail systems, this article explores the connection between CRT systems and economic development around CRT stations. It begins with an overview of commuter rail transit including its role in facilitating economic development; presents the research design, analytic approach, data and study areas; reports results with interpretations; and offers overall implications for CRT planning and economic development.

Overview of Commuter Rail Transit and its Relation to Economic Development

The nation's first public commuter rail service was launched in 1834: the Metropolitan Transit Authority's Long Island Rail Road connecting Long Island with Manhattan Island, New York. Nearly 70 years later, the nation's second public commuter rail service started (in 1903)

connecting South Bend, Indiana with Chicago. It took nearly another 70 years (1973) before the nation's third public commuter rail service was launched, connecting Boston with its suburbs. Since 1983, another 22 public CRT systems have been initiated. Table 1 shows key features of all public systems in place as of 2013.

CRT service areas extend 10 to 100 miles from downtowns, traveling at speeds from about 30 to more than 100 miles per hour. According to the American Public Transit Association (APTA 2015), the average trip was nearly 25 miles in 2013 or about five times the distance of light rail passengers. Because of longer travel distances and travel times, CRT cars offer more seating options than light rail, and often with Wi-Fi, food and beverage services. Most CRT lines run along commercial rails, by agreement with commercial carriers. They are also driven by diesel engines though occasionally with electrical drive trains.

While the chief function of CRTs is to connect workers living in suburban and exurban areas to their workplaces, literature suggests that a collateral purpose can be to advance economic development at CRT stations (APTA, 1997; Ayvalik and Khisty, 2002; Deka and Marchwinski, 2014; Kennedy, 2002; Seskin, Cervero and Zupan, 1996). CRT systems tend to run along major transportation corridors. A key impetus for their construction is to lessen congestion along highways, and in doing so facilitate agglomeration economies of downtowns and other employment centers (Boarnet and Haughwout, 2000; Ciccone and Hall, 1996; Glaeser, 2011; Voith, 1998). But there is scant research into the connection between CRT systems and economic development, especially outside downtowns. One view is that CRT systems are an under-utilized economic development strategy especially in moderate and smaller metropolitan areas outside the densely developed areas of the Northeast and Great Lakes regions. To test this assertion, five CRT systems in the South and West are analyzed, as described below.

Table 1. Summary of U.S. Commuter Rail Systems

Rank	System	Major cities served	Annual Ridership (2013)	Ave. Weekday Ridership (Q4 2013)	Route miles	Ridership per mile (Q4 2013)	Lines	Stations	Year Opened
1	MTA Long Island Rail Road	New York	97,090,300	334,100	335.9	994.6	11	124	1834
2	MTA Metro-North Railroad	New York	83,326,200	298,700	329.6	777.9	5	121	1983
3	New Jersey Transit Rail	New York / Philadelphia	81,942,000	302,500	398.2	758.4	11	164	1983
4	Metra	Chicago	73,603,100	292,600	487.7	600.0	11	241	1984
5	SEPTA Regional Rail	Philadelphia	36,532,900	130,900	280.0	467.5	13	153	1983
6	MBTA Commuter Rail	Boston	34,865,700	124,400	368.0	338.0	13	127	1973
7	Caltrain	San Francisco / San Jose	16,294,900	50,800	77.0	659.7	1	32	1987
8	Metrolink	Los Angeles / San Bernardino	11,543,600	40,800	388.0	105.2	7	55	1992
9	MARC Train	Baltimore / Washington, D.C.	9,147,000	34,100	187.0	182.4	3	43	1984
10	Virginia Railway Express	Washington, D.C.	4,520,600	15,900	90.0	138.7	2	18	1992
11	Tri-Rail	Miami	4,351,000	14,800	70.9	208.7	1	18	1987
12	UTA FrontRunner	Salt Lake City / Ogden / Provo	3,800,400	14,700	88.0	167.0	1	16	2008
13	NICTD South Shore Line	Chicago / South Bend	3,606,800	11,600	90.0	128.9	1	20	1903
14	Sounder Commuter Rail	Seattle / Tacoma	3,035,500	11,900	80.0	148.8	2	9	2000
15	Trinity Railway Express	Dallas / Fort Worth	2,144,900	8,000	34.0	235.3	1	10	1996
16	NCTD Coaster	San Diego / Oceanside	1,689,200	5,200	41.0	126.8	1	8	1995
17	Capitol Corridor	San Jose / Oakland / Sacramento	1,615,400	4,300	168.0	25.6	1	15	1991
18	New Mexico Rail Runner Express	Albuquerque	1,082,400	3,500	97.0	36.1	1	13	2006
19	Altamont Corridor Express (ACE)	San Jose / Stockton	1,019,700	4,100	86.0	47.7	1	10	1998
20	Capital MetroRail	Austin	817,300	2,400	32.0	75.0	1	9	2010
21	Northstar Line	Minneapolis	787,300	2,500	40.0	62.5	1	6	2009
22	Shore Line East	New Haven	658,000	2,200	59.0	37.3	1	13	1990
23	A-Train	Denton	521,700	2,000	21.0	95.2	1	6	2011
24	Westside Express Service	Beaverton	478,600	2,000	15.0	133.3	1	5	2010
25	Music City Star	Nashville	245,900	900	32.0	28.1	1	6	2006
Total			474,720,400	1,714,900	3,895	6,579		1,242	

Source: Adapted from http://en.wikipedia.org/wiki/List_of_United_States_commuter_rail_systems_by_ridership

Economic development can be measured in many ways, employment change being one of them. The focus of this article is to estimate the extent to which there is a link between CRT stations and employment change over time. Theoretically, areas proximate to commuter rail stations should have much better accessibility. By reducing the effects of congestion, CRT systems should abet the preservation of existing agglomeration economies and the creation of new ones. Without the diseconomies of congestion, existing employment clusters should continue to grow, and the relative concentration of employment within clusters served by a CRT should continue to increase.

Secondly, CRT systems may benefit certain economic sectors but not others. In their recent study of employment within one-half mile of transit stations serving 34 transit systems, Belzer, Srivastava and Austin (2011) found that while jobs increase in the arts, entertainment, and recreation sector as well as the food and accommodation, and health care and social assistance sectors, they fell in the manufacturing sector. They also found that public administration had the greatest share of jobs found near transit stations. Several other sectors also concentrated around transit stations such as professional, scientific, and technical services, and retail. On the other hand, as a whole the station areas experienced declining shares of jobs relative to their regions, with the exception of jobs in the utilities, information, and the arts, entertainment, and recreation sectors. Belzer, Srivastava and Austin surmised that much of the metropolitan job growth continues to favor auto-oriented locations. Their study did not report results for individual systems or even types of systems. Also, with a study period from 2002 to 2008, it did not include the Great Recession. In sum, there is no research directly linking CRT to economic development. This article builds on prior research with special reference to CRT systems and economic development.

Research Design, Analytic Approach, Data and Study Areas

The research question is:

> *Do areas within 0.50 miles of CRT stations ("station areas") gain share of regional change in jobs over time overall and with respect to economic sectors combined into economic groups?*

As the research question addresses change over time, a longitudinal quasi-experimental study design is appropriate. Further, as the research question addresses change in jobs within CRT station areas compared the region, shift-share analysis is a reasonable analytic approach the details of which will be described below.

Because the research question requires small-area data on jobs disaggregated to economic sectors, the appropriate source of data is the Longitudinal Employee-Household Dynamics (LEHD) database, which is available annually for most metropolitan areas at the census block level since 2002. LEHD data are collected in 20 economic sectors defined by the North American Industrial Classification System (NAICS). Only those sectors that involve occupying physical spaces are considered, meaning that the two natural resources sectors and the construction sector are removed from analysis. The remaining 17 sectors are combined into eight economic groups in the manner shown in Table 2.

Table 2
Combinations of NAICS Sectors into Economic Groups for Analysis

NAICS Code	NAICS Sector Title and Economic Group Name
	Manufacturing
31-33	Manufacturing
	Light Industrial
22	Utilities
42	Wholesale Trade
48-49	Transportation and Warehousing
	Retail-Lodging-Food (also "Ret-Lodg-Food")
44-45	Retail Trade
72	Accommodation and Food Services
	Knowledge
51	Information
54	Professional, Scientific, and Technical Services
	Office
52	Finance and Insurance
53	Real Estate and Rental and Leasing
55	Management of Companies and Enterprises
56	Administrative and Support and Waste Management and Remediation Services
81	Other Services (except Public Administration)
92	Public Administration
	Education
61	Educational Services
	Health
62	Health Care and Social Assistance
	Arts-Entertainment-Recreation (also "Arts-Ent-Rec")
71	Arts, Entertainment, and Recreation

Source: Adapted from the North American Industrial Classification System.

The study areas were selected as follows. They should be in growing areas so that the attractiveness of CRT station areas can be reasonably detected. Metropolitan areas in the South and West census regions lend themselves to this first filter. CRT systems should also be sufficiently large, measured in ridership, to also generate reasonably detectible results; more than one million riders in 2013 are selected as the second filter (see Table 1). Finally, CRT systems selected for analysis should not be within very large metropolitan areas that have multiple transit systems as size and variety of transit options can complicate analysis. The final filter thus rules out the top 10 largest combined statistical areas. The study areas selected for this analysis include the following, arrayed clockwise from southeast to northwest:

- Tri Rail serving the metropolitan areas of Miami, Ft. Lauderdale and Palm Beach, Florida;
- Rail Runner serving the metropolitan areas of Albuquerque and Santa Fe, New Mexico, and the counties between them;
- FrontRunner serving the Salt Lake City combined statistical area and the Ogden metropolitan area, Utah;
- Coaster serving metropolitan San Diego; and
- Sounder serving the Seattle combined statistical area

Images 1 through 5 illustrate the routes of these CRT systems. Key features of each study area will be described in the results and interpretations section.

Shift-share analysis, the method used to guide the overall analytic approach, assigns the change or shift in the number of jobs with respect to the region, other economic sectors, and the local area. The “region” can be any level of geography and is often the nation or the state. In this case, the regions are the study areas described above. The ‘local” area is often a city or county or

even state but it can be any geographic unit that is smaller than the region. In this study, it is the station areas within 0.50 miles of the nearest CRT station. This is called the "CRT station area." As shifts in the share of jobs may vary by sector over time because of changes in economic sector mixes there is also an "industry mix" adjustment that are called "sector mix". Adapting notations by the Carnegie Mellon Center for Economic Development (no date), the shift-share formula is used in this analysis is as follows:

$SS_i = MA_i + SM_i + CRT_i$

Where

SS_i = Shift-Share

RA_i = Regional Area share

SM_i = Sector Mix

CRT_i = CRT station area shift

The Regional Area (MA) share measures by how much total employment in a CRT station area changed because of change in the metropolitan area economy during the period of analysis. If metropolitan area employment grew by 10 percent during the analysis period, then employment in the CRT station area would have also grown by 10 percent. The Sector Mix (SM) identifies fast growing or slow growing economic sectors in a CRT station area based on the metropolitan area growth rates for the individual economic sectors. For instance, a CRT station area with an above-average share of the metropolitan area's high-growth sectors would have grown faster than a CRT station area with a high share of low-growth sectors. The CRT station area shift, also called the "competitive effect", is the most relevant component. It identifies the portion of the change in jobs attributable to characteristics of the local area (station area). A leading sector is one where that sector's CRT station area growth rate is greater than its

metropolitan area growth rate. A lagging sector is one where the sector's CRT station area growth rate is less than its metropolitan area growth rate.

The equations for each component of the shift-share analysis are:

$RA = ({}_{i}\text{CRT station area}_{t-1} \bullet RA_{t} / RA_{t-1})$;

$SM = [({}_{i}\text{CRT station area}_{t-1} \bullet {}_{i}RA_{t} / {}_{i}RA_{t-1}) - RA]$; and

$CRT = [{}_{i}\text{CRT station area}_{t-1} \bullet ({}_{i}\text{CRT station area}_{t} / {}_{i}\text{CRT station area}_{t-1} - {}_{i}RA_{t} / {}_{i}RA_{t-1})]$.

Where:

${}_{i}\text{CRT station area}_{t-1}$ = number of jobs in the CRT station area sector (i) at the beginning of the analysis period (t-1);

${}_{i}\text{CRT station area}_{t}$ = number of jobs in the CRT station area in sector (i) at the end of the analysis period (t);

RA_{t-1} = total number of jobs in the regional area at the beginning of the analysis period (t-1);

RA_{t} = total number of jobs in the regional area at the end of the analysis period (t);

${}_{i}RA_{t-1}$ = number of jobs in the regional area in sector (i) at the beginning of the analysis period (t-1); and

${}_{i}RA_{t}$ = number of jobs in the regional area in sector (i) at the end of the analysis period (t).

The study period extends from 2002 through 2011, the latest year for which data were available for the analysis. Future research may update the study period. The study period extends from just after the recession of the early 2000s through the Great Recession and into recovery.

Results and interpretations are presented next.

Results and Interpretations

Results and interpretations are presented for each CRT system and for all CRT systems as a whole. Descriptions of each CRT system are also included for context.

Tri Rail

Tri Rail is a heavy rail rapid transit system that opened in 1984. It is the oldest system included in this analysis. At the time of analysis, it had 70 miles of track along a freight rail corridor with 19 park and ride stations. The corridor was intended as congestion relief for the parallel I-95 corridor. It has gradually added several additional stations over the past few years. As a commuter rail system, its length is extensive as it connects multiple metropolitan areas running along the narrow strip of land between the Atlantic Ocean and Lake Okeechobee, traversing the three metropolitan areas of Miami, Ft. Lauderdale, and Palm Beach. Table 3 reports descriptive changes over the period from 2002 through 2011as well as shift-share results for each economic group and all jobs. Figure 1 illustrates the CRT station area share of shift in jobs by economic group.

Overall, CRT station areas lost share of the change of jobs in the region. Losses in share of jobs were especially large among the manufacturing, light industrial and retail-lodging-food economic groups. In other words, the rest of the region gained shares of jobs in these economic groups. One reason may be that low-value and land-extensive manufacturing and light industrial activities are outbid for locations near CRT stations. Why the retail-lodging-food economic group would lose share is not entirely clear.

On the other hand, the CRT station areas gained important regional shares of jobs in the knowledge, office, education, and health economic groups. It is important to note that the Tri-Rail system has stops at or near major government and education centers; indeed, the system was designed to access these kinds of centers.

Rail Runner

The Rail Runner runs along a 97 mile corridor from south of Albuquerque to Santa Fe. It began with 3 stations in 2006 and was expanded to 13 stations by 2013(see Figure 2). Only the stations operating during the study period are used. It was developed as part of an ongoing project to connect Albuquerque with Santa Fe and relieve congestion along I-25, and almost more of a regional rail system than a commuter rail, requiring over two hours of travel from one end to the other. It makes use of existing freight rail right of way, and consists largely of single track with passing sidings. Descriptive changes and shift-share results are reported in Table 4 while Figure 2 illustrates results for shift-share analysis.

Compared to the study area region, CRT stations along Rail Runner lost share of jobs overall and in nearly all the economic groups during the study period. For the most part, it appears that not only do the rails run mostly through industrial or otherwise undevelopable areas, stations were not located to maximize access to existing employment areas or perhaps even to stimulate new development.

Table 3
Descriptive Change and Shift-Share Analysis for Tri Rail CRT, 2002-2011

Economic Group	2002 CRT	2011 CRT	2002 Region	2011 Region	Regional Area Share	Sector Mix Share	CRT Station Share
Manufacturing	7,948	4,617	116,900	77,390	7,527	(2,265)	(645)
Light Industrial	14,496	11,932	333,526	299,815	13,728	(697)	(1,099)
Retail-Lodging-Food	9,973	8,234	448,922	538,136	9,444	2,511	(3,721)
Knowledge	22,452	25,384	536,089	567,244	21,262	2,495	1,627
Office	7,855	8,497	205,680	203,725	7,439	342	717
Education	236	651	181,973	188,476	223	21	407
Health	4,596	6,723	253,427	317,431	4,352	1,404	966
Arts-Ent-Rec	932	1,067	40,789	43,596	883	114	71
Total	68,488	67,105	2,117,306	2,235,813	64,858	3,924	(1,677)

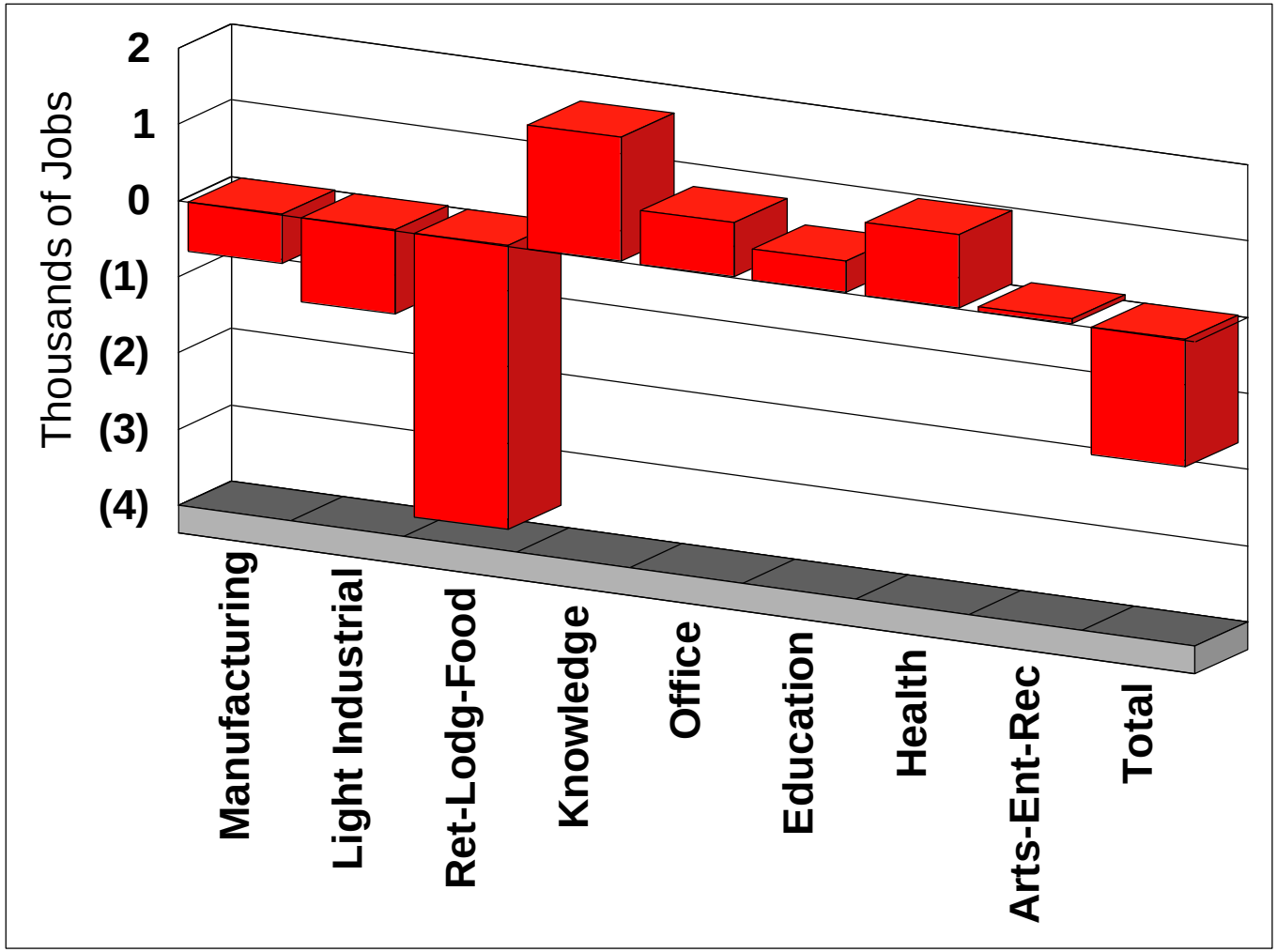

Figure 1
Shift-Share Analysis for Tri Rail CRT, 2002-2011

Table 4
Descriptive Change and Shift-Share Analysis for Rail Runner CRT, 2002-2011

Economic Group	2002 CRT	2011 CRT	2002 Region	2011 Region	Regional Area Share	Sector Mix Share	CRT Station Share
Manufacturing	576	407	26,189	20,189	532	(88)	(37)
Light Industrial	2,854	2,477	54,296	49,580	2,636	(30)	(129)
Retail-Lodging-Food	7,070	6,234	89,852	98,901	6,529	1,253	(1,548)
Knowledge	6,018	3,867	45,701	37,417	5,558	(631)	(1,060)
Office	15,171	17,726	87,854	97,211	14,011	2,776	939
Education	3,024	1,131	35,895	42,897	2,793	821	(2,483)
Health	2,144	4,012	45,017	71,501	1,980	1,425	607
Arts-Ent-Rec	2,066	1,084	9,910	9,700	1,908	114	(938)
Total	38,923	36,938	394,714	427,396	35,947	5,641	(4,650)

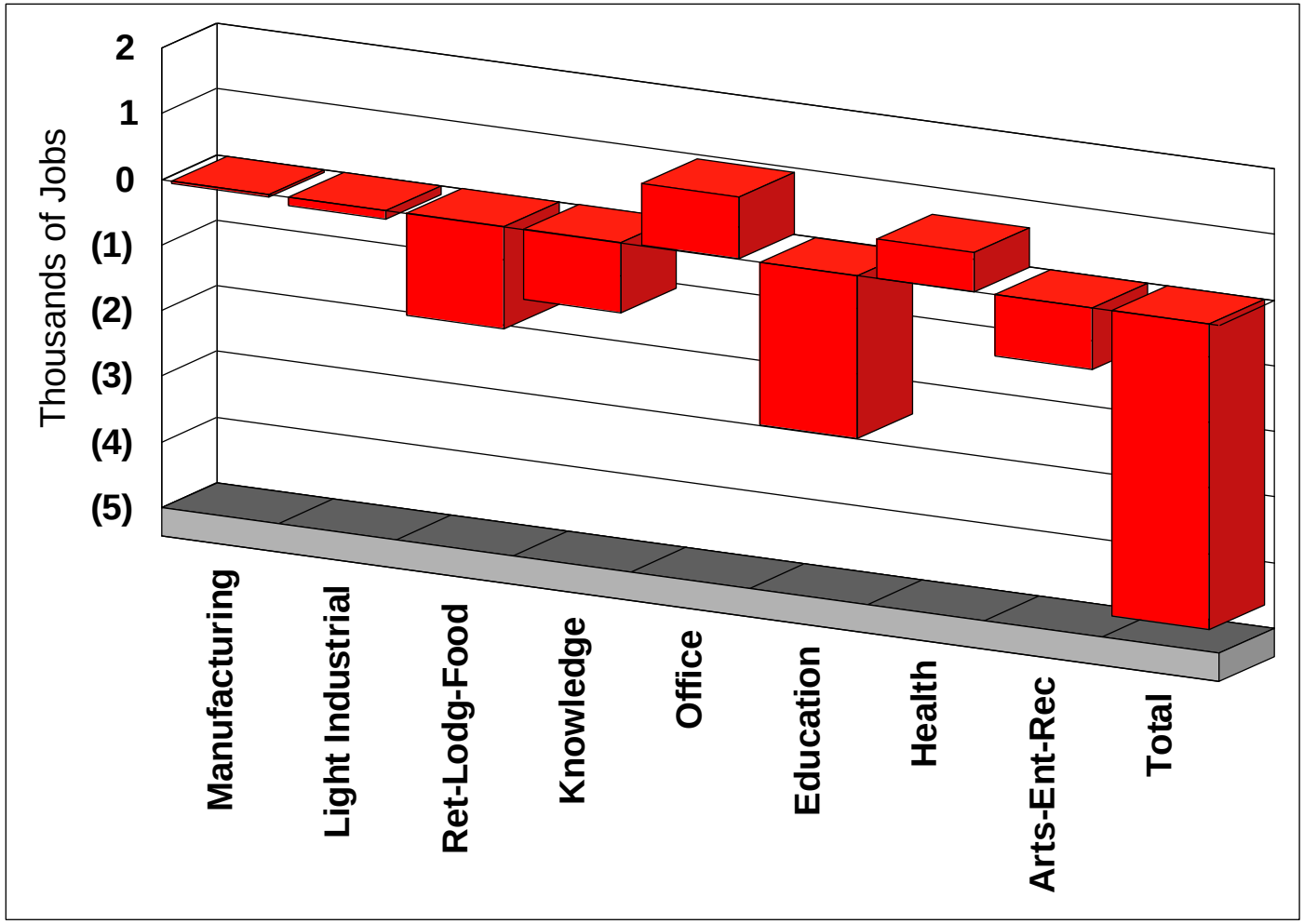

Figure 2
Shift-Share Analysis for Rail Runner CRT, 2002-2011

FrontRunner

The Utah Transit Authority's Front Runner commuter rail system started operations in 2005. It has since been extended to almost double its length. Only the initial segment between downtown Ogden and downtown Salt Lake City is used in the analysis, as only it was operating through the study period. The study corridor thus has 8 stations along 42 miles of track. The corridor was intended as congestion relief for the parallel I-15 corridor. Though it is the newest system studied, the local market was fully knowledgeable of the planning and investment since at least 2002.

As revealed throughout this analysis, the FrontRunner CRT systems is the only one in which realized positive net increase in share of jobs relative to its region (see Table 5 and Figure 3). It also enjoyed positive share in the shift of regional jobs in all economic groups except manufacturing and retail-lodging-food. For its part, as manufacturing operations tend to require substantial areas of land, they will often be outbid for locations near transit stations.

The largest gain in the share of regional jobs is with respect to the office economic group. As part of its station area planning, the Utah Transit Authority (UTA), operator of the CRT system, worked with local governments to assure that station areas had land use designations that allowed a mix of land uses, notably offices. Station area plans also included residential development, analysis of which is the subject of future work.

A key element of economic development success near FrontRunner CRT stations are public-private partnerships between the UTA and developers/investors. To build CRT stations, the UTA acquired large tracts of land. Surplus land is used an incentive to facilitate economic development around CRT stations.

Table 5
Descriptive Change and Shift-Share Analysis for FrontRunner CRT, 2002-2011

Economic Group	2002 CRT	2011 CRT	2002 Region	2011 Region	Regional Area Share	Sector Mix Share	CRT Station Share
Manufacturing	2,295	1,088	93,384	92,489	2,009	264	(1,185)
Light Industrial	1,882	2,223	122,196	131,150	1,647	372	203
Retail-Lodging-Food	2,742	2,856	173,091	186,468	2,400	554	(98)
Knowledge	2,552	3,283	71,951	91,363	2,234	1,007	42
Office	2,684	10,687	190,164	220,660	2,349	765	7,573
Education	146	404	81,094	93,544	128	41	236
Health	618	1,095	77,414	110,036	541	337	217
Arts-Ent-Rec	641	938	18,018	19,390	561	129	248
Total	13,560	22,574	827,312	945,100	11,870	3,468	7,236

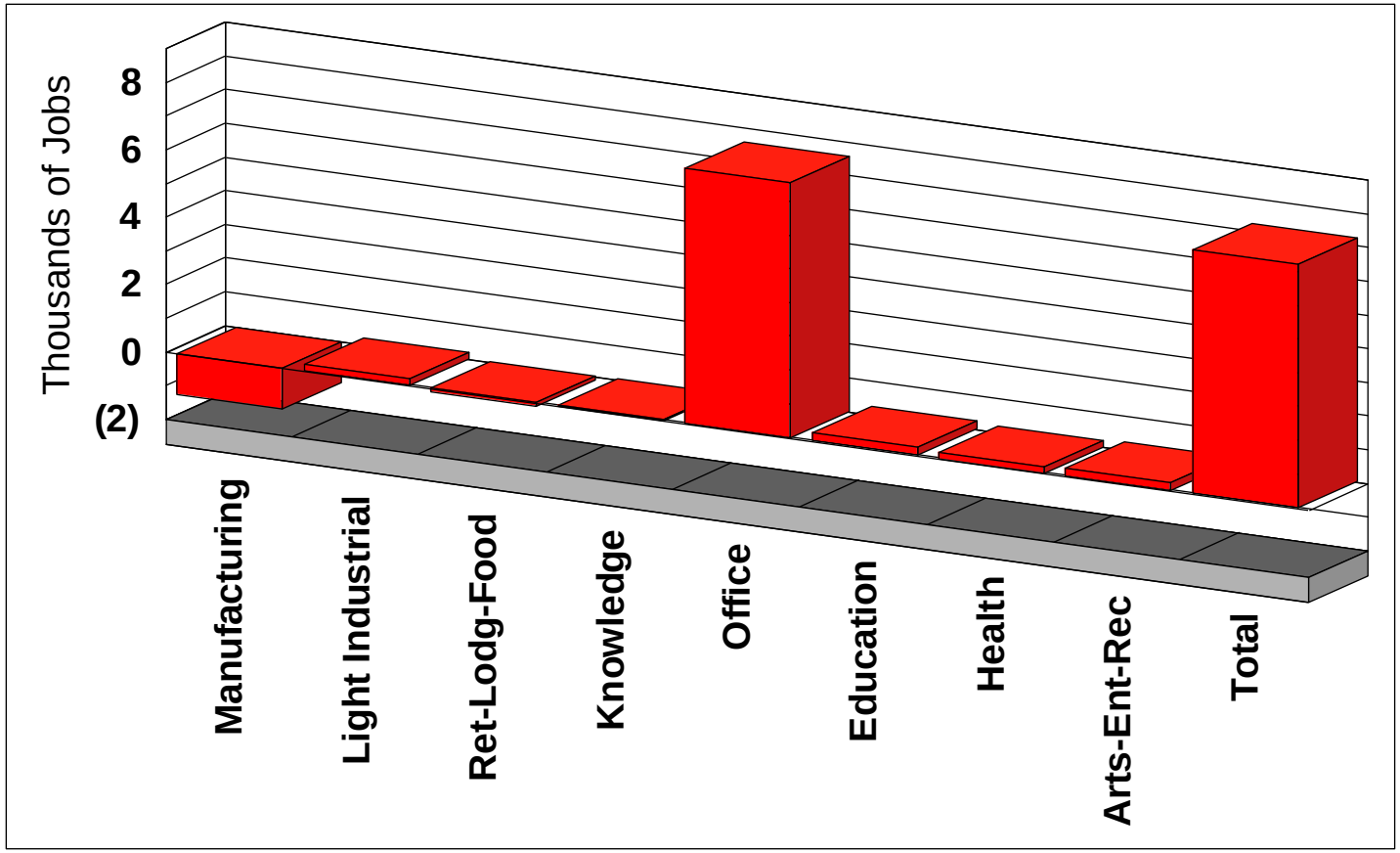

Figure 3
Shift-Share Analysis for FrontRunner CRT, 2002-2011

Coaster

The Coaster is a commuter rail service that operates in the central and northern coastal regions of San Diego County, California. The service is operated by TransitAmerica Services through a contract with North County Transit District (NCTD). The Coaster has 8 stations along 41 miles of track. It serves substantially commuter needs and runs parallel to major north-south highways, thereby reducing potential congestion. It tends to operate mostly during peak commuting times during workdays.

In many ways, the Coaster CRT systems performed the worst from an economic development perspective among all the CRT systems studied. Not only did it lose the largest share of jobs relative to its region but it lost share of jobs in nearly all economic groups, the principal exception being light manufacturing.

One interpretation is that is its lack of economic development performance is by design. Stations tend to be more distant from each other and set in freight rail yards where existing land uses tend to serve freight rail services. While this is also the case in many other CRT systems, it seems especially to be the case in San Diego. Moreover, it appears to have the most restrictive operating schedule among the systems analyzed. Finally, it is not apparent that CRT station area planning encourages other than freight-rail related development in them. In a separate study, Cervero and Duncan (2002) found the same limitations and their analysis of commercial and residential property values near Coaster CRT stations.

Table 6
Descriptive Change and Shift-Share Analysis for Coaster CRT, 2002-2011

Economic Group	2002 CRT	2011 CRT	2002 MSA	2011 MSA	Metropolitan Area Share	Sector Mix Share	CRT Station Share
Manufacturing	1,860	766	115,957	96,145	1,739	(197)	(776)
Light Industrial	5,183	5,447	142,502	122,668	4,846	(384)	985
Retail-Lodging-Food	13,078	12,422	240,954	260,760	12,228	1,925	(1,731)
Knowledge	13,657	9,704	143,849	158,426	12,769	2,272	(5,337)
Office	32,640	36,029	251,614	281,802	30,518	6,038	(527)
Education	1,793	795	119,433	131,856	1,676	303	(1,185)
Health	1,582	2,128	108,745	142,958	1,479	601	48
Arts-Ent-Rec	1,353	1,294	28,525	37,053	1,265	492	(464)
Total	71,146	68,585	1,151,579	1,231,668	66,520	11,051	(8,986)

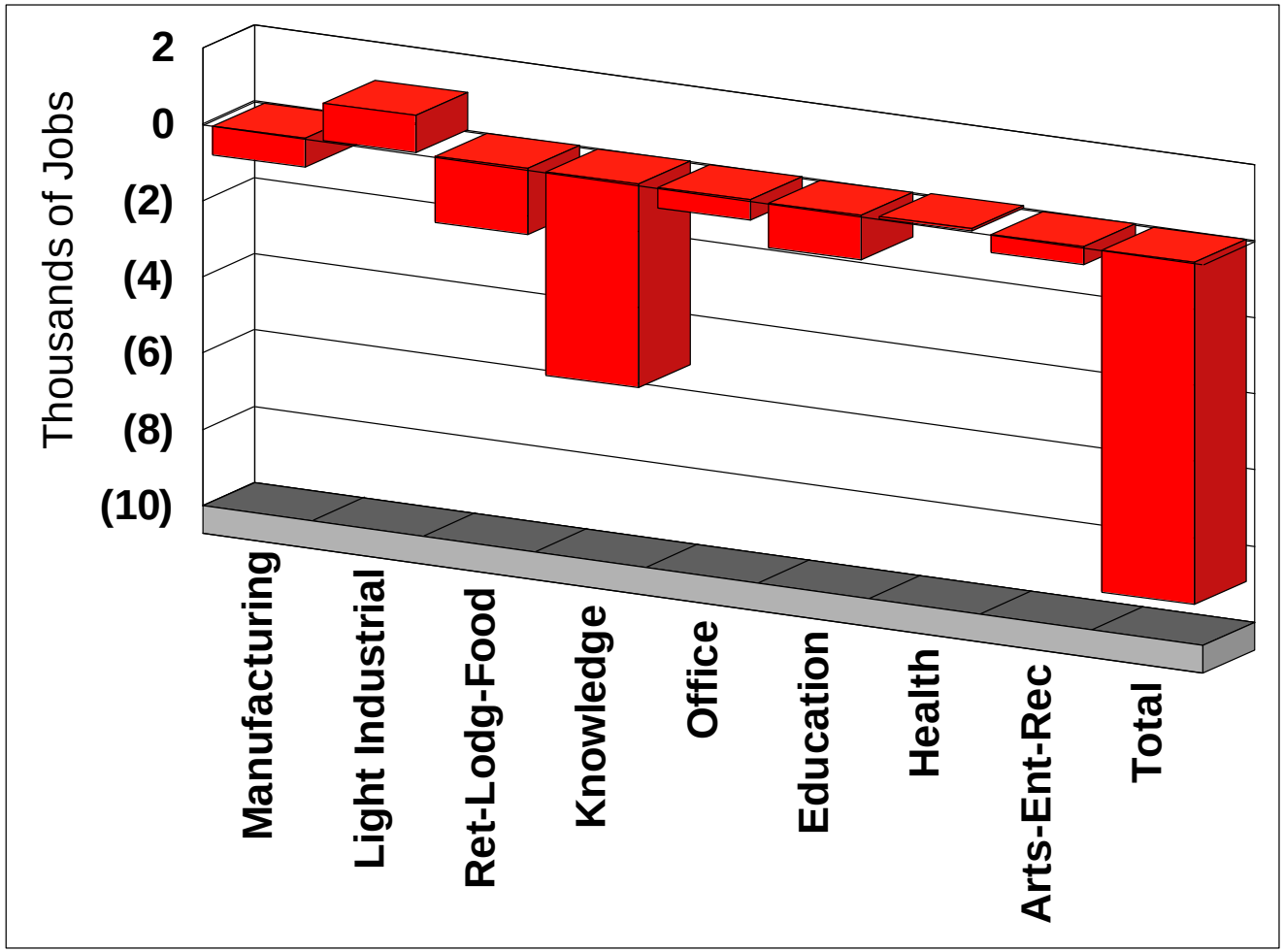

Figure 4
Shift-Share Analysis for Coaster CRT, 2002-2011

Sounder

Sounder commuter rail is a regional rail service operated by the Burlington Northern-Santa Fe Railroad on behalf of Sound Transit serving the greater Seattle metropolitan area. Service began in 2000 and by 2013 it had 9 stations along 80 miles of track. The corridor was intended as congestion relief for the parallel I-5 corridor between Everett and Seattle.

As with nearly all the other CRT systems, Sounder CRT station areas lost share regional job growth overall in nearly all economic groups (see Table 7 and Figure 5). The principal exceptions are the manufacturing and light industrial economic groups. Among the CRT systems, however, it may have the most challenging physical constraints. From Seattle northward, the tracks run parallel to Puget Sound often below steep banks upland from the water. Even where the system runs inland, it passes through substantially built-out areas and often protected landscapes such as wetlands and agricultural preserves. Like the Coaster CRT, station area planning does not appear to anticipate economic development opportunities.

Overall implications for CRT planning and economic development are addressed in the last section of this article.

Table 7
Descriptive Change and Shift-Share Analysis for Sounder CRT, 2002-2011

Economic Group	2002 CRT	2011 CRT	2002 MSA	2011 MSA	Metropolitan Area Share	Sector Mix Share	CRT Station Share
Manufacturing	2,149	2,166	167,680	167,626	1,919	229	18
Light Industrial	5,796	6,404	226,220	228,556	5,176	679	548
Retail-Lodging-Food	6,568	7,390	289,050	308,906	5,866	1,153	371
Knowledge	8,103	9,103	177,427	222,907	7,237	2,943	(1,077)
Office	23,545	23,798	354,774	401,918	21,028	5,646	(2,876)
Education	4,350	4,679	132,488	143,112	3,885	814	(20)
Health	4,379	4,616	166,546	218,300	3,911	1,829	(1,124)
Arts-Ent-Rec	1,671	1,742	31,887	39,805	1,492	594	(344)
Total	56,561	59,898	1,546,072	1,731,130	50,515	13,887	(4,504)

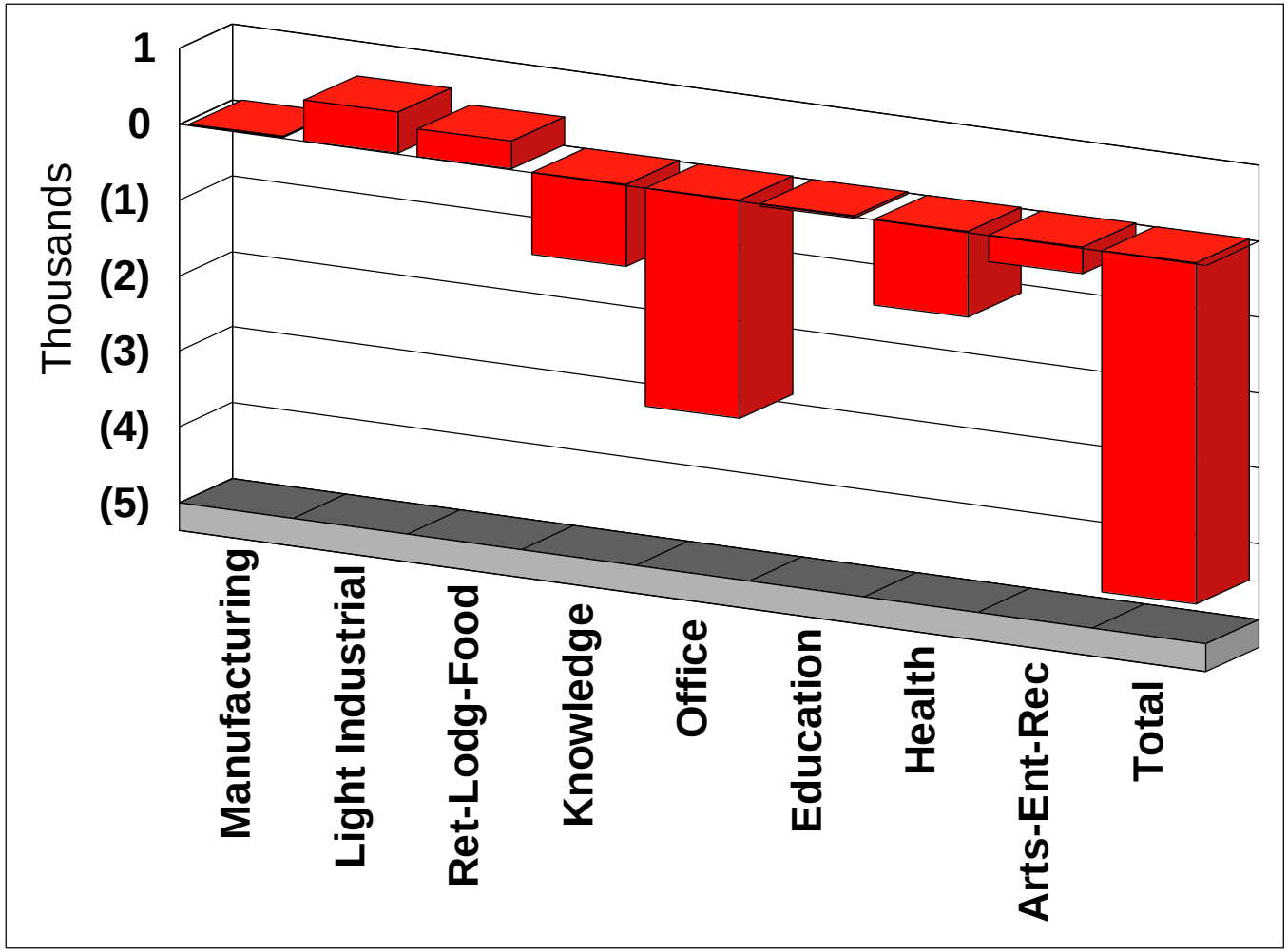

Figure 5
Shift-Share Analysis for <u>Sounder</u> CRT, 2002-2011

Implications for CRT Planning and Economic Development

Until now there has been very little analysis of the association between commuter rail transit stations and economic development. Although there are important differences between the five CRT systems studied there are also some important similarities. These similarities will be reviewed first. This will be followed by an overall comparison of the systems and then implications for converting what may be considered under-performing economic development opportunities into performing ones.

Table 8 combines the data for all systems into an overall analysis, which is illustrated in Figure 6. Bear in mind that figures in Table 8 include employment data for all systems and are not averages. Taken as a whole, these five CRT systems lost share of regional change in jobs over the study period, 2002 through 2011. Indeed, only the office economic group gained substantial share. This is similar to findings for three of the five individual CRT systems presented earlier. At first blush, CRT systems do not result in much—and may detract from—economic development at least within CRT station areas.

Table 9 suggests (illustrated in Figure 7) that CRT station area outcomes are varied for reasons that will be explored here. Three systems stand out for their lack of performance: Coaster, Rail Runner and Sounder. Google Earth inspections of CRT station areas suggests what the data confirm: most are surrounded by asphalted park-and-ride lots, older and even derelict manufacturing, light industrial, warehousing and related structures, natural development constraints such as water, wetlands, open space preserves, and other land uses or constraints that seem to inhibit economic development. It as is though CRT rail stations built by these systems were not intended to advance economic development; at least that is what the outcomes suggest. Indeed, it seems reasonable to asset based on the data and analysis that as a whole, CRT station

areas serving these three systems do not generate substantial economic development and in fact discourage it.

In contrast, two systems stand out for their positive economic development outcomes: Tri Rail and FrontRunner. Station areas for both CRT systems either lost share of regional growth or performed minimally among the manufacturing, light industrial and retail-lodging-food economic groups. They also gained share of regional job growth in all other economic groups. Overall, FrontRunner CRT station areas gained job share relative to their regions while Tri Rail CRT stations lost a small share—otherwise performance of these two systems is remarkably similar. Why?

Unlike the other three systems analyzed, the Tri Rail and FrontRunner CRT systems included station area plans geared to attracting mostly nonmafacturing and related development. For instance, Tri Rail stations are often located at or near employment centers as well as public institutions such as government centers and higher education facilities. For their part, FrontRunner stations are closely proximate to commercial centers and have station area plans calling explicitly for office, institutional, and residential development. (Future research will address residential development in and near the station areas of all five CRT systems.) Inspection of Google Earth images confirms what the data and analysis shows: most CRT rail stations serving these systems are near employment centers, if not undergoing development within their 0.50 mile station areas. Nonetheless, Google Earth inspection also reveals that many CRT station areas are similar to those of Coaster, Rail Runner and Sounder CRT station areas for their location constraints and apparent unattractiveness to economic development.

Table 8
Descriptive Change and Shift-Share Analysis for <u>All Five</u> CRT Systems, 2002-2011

Economic Group	2002 CRT	2011 CRT	2002 MSA	2011 MSA	Metropolitan Area Share	Sector Mix Share	CRT Station Share
Manufacturing	14,828	9,044	520,110	509,765	13,623	(684)	(3,895)
Light Industrial	30,211	28,483	878,740	1,030,889	27,755	841	(113)
Retail-Lodging-Food	39,431	37,136	1,241,869	1,347,782	36,226	8,009	(7,099)
Knowledge	38,185	34,454	644,608	670,094	35,081	7,205	(7,832)
Office	96,492	113,624	1,420,495	1,541,730	88,649	17,920	7,055
Education	9,549	7,660	550,883	580,962	8,773	1,626	(2,738)
Health	13,319	18,574	651,149	735,160	12,236	5,359	978
Arts-Ent-Rec	6,663	6,125	129,129	148,685	6,121	1,595	(1,591)
Total	248,678	255,100	6,036,983	6,565,067	228,465	41,870	(15,235)

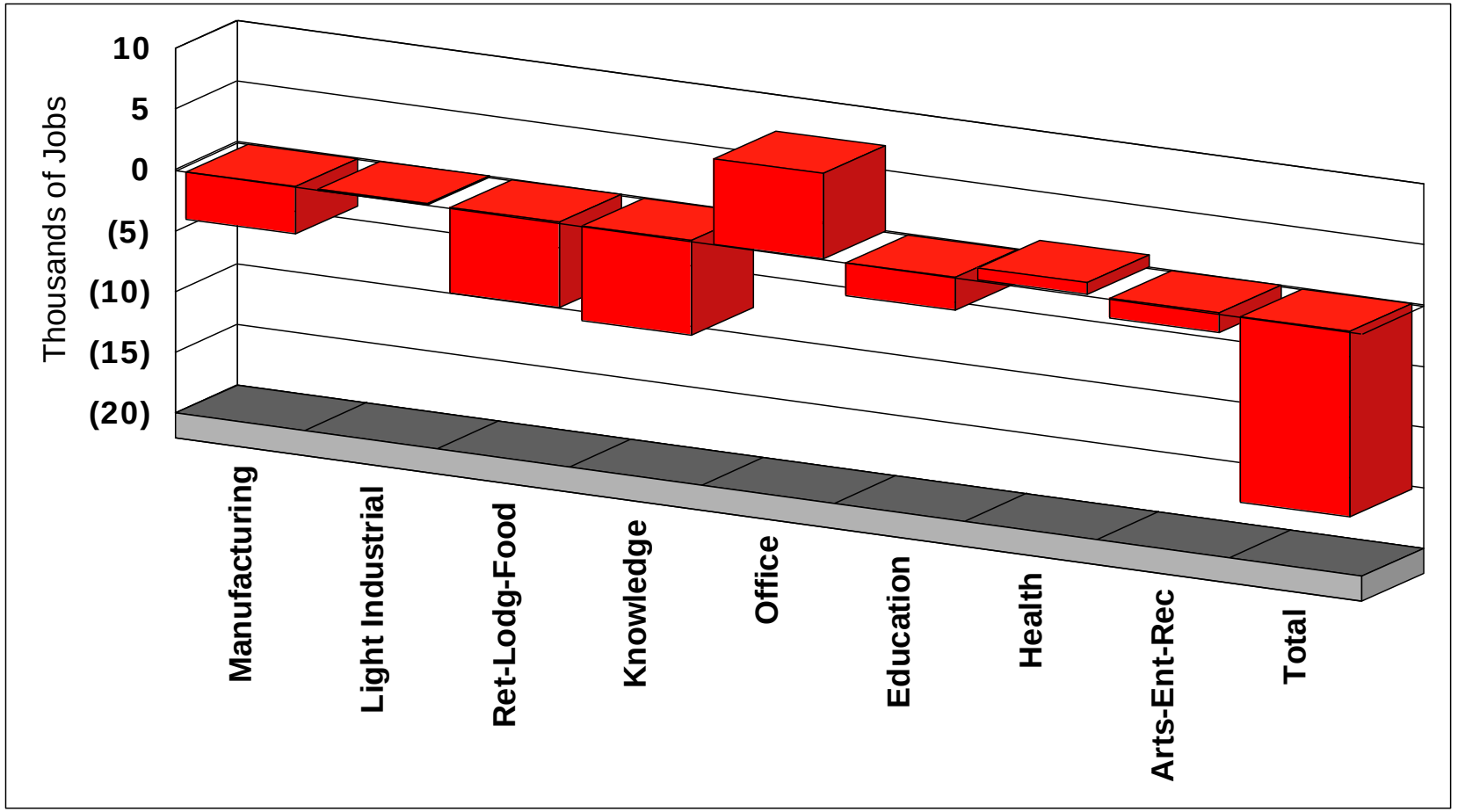

Figure 6
Shift-Share Analysis for <u>All Five</u> CRT Systems, 2002-2011

Table 9
CRT Station Area Shares for Each of Five CRT Systems, 2002-2011

Economic Group	Miami	Albuquerque	Salt Lake	San Diego	Seattle
Manufacturing	(645)	(37)	(1,185)	(776)	18
Light Industrial	(1,099)	(129)	203	985	548
Retail-Lodging-Food	(3,721)	(1,548)	(98)	(1,731)	371
Knowledge	1,627	(1,060)	42	(5,337)	(1,077)
Office	717	939	7,573	(527)	(2,876)
Education	407	(2,483)	236	(1,185)	(20)
Health	966	607	217	48	(1,124)
Arts-Ent-Rec	71	(938)	248	(464)	(344)
Total	(1,677)	(4,650)	7,236	(8,986)	(4,504)

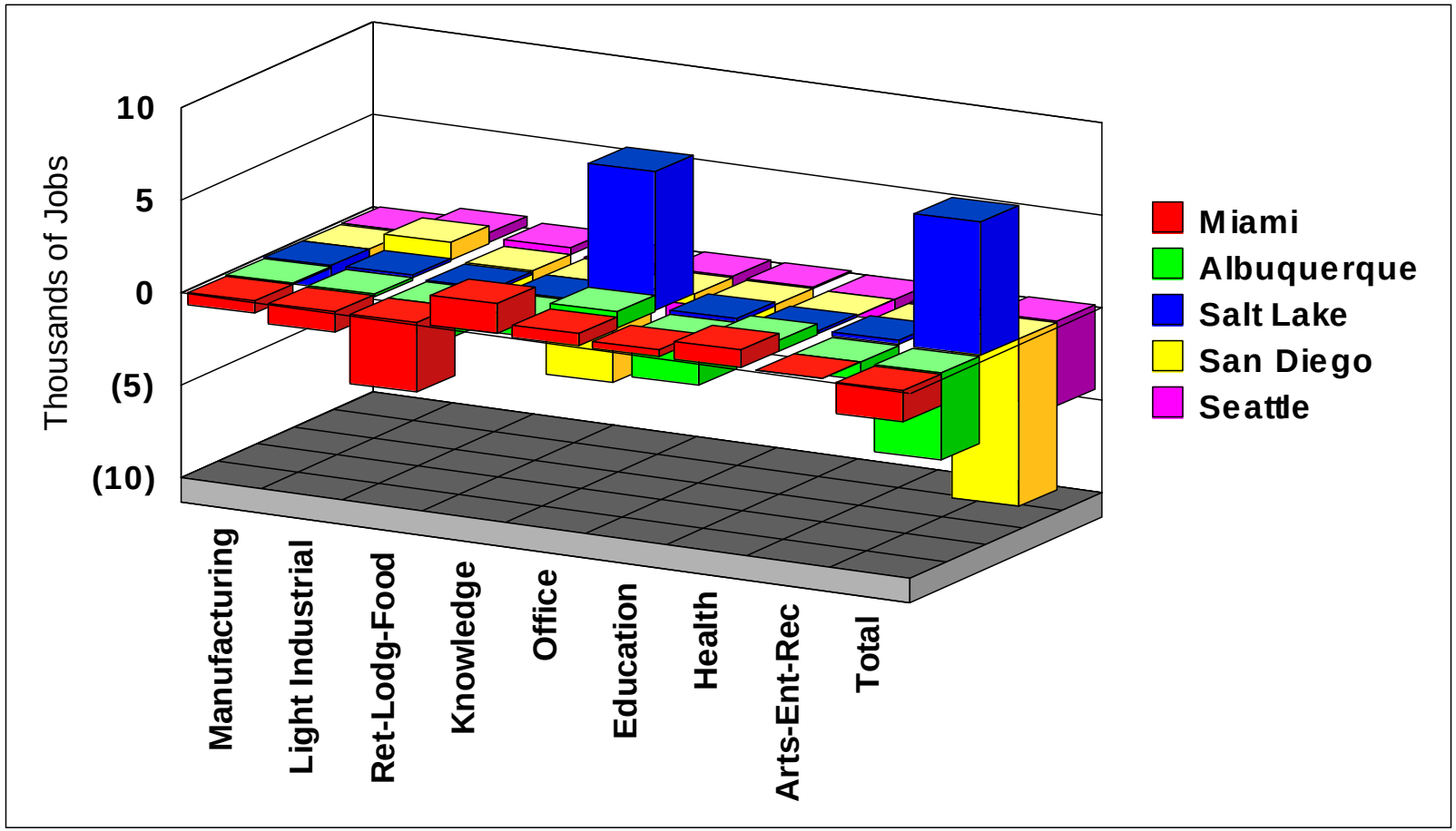

Figure 7
Shift-Share Analysis for Each of Five CRT Systems, 2002-2011

Billions of dollars have been spent building these CRT systems. Tens if not hundreds of millions of dollars are spent annually operating and maintaining these systems. Yet for the most part there is very little to show from an economic development perspective. How can CRT system officials and planners unlock their economic development potential?

First of all, it may only be a matter of time before the market recognizes the strategic investment opportunities these systems present. Derelict buildings and park-and-ride lots may become opportunities for redevelopment especially through public-private partnerships (Nelson 2014). But long range planning may be needed to facilitate this. Such planning can include market studies revealing long-term opportunities, infrastructure upgrades, and the occasional acquisition of land by public development agencies.

Second, it is as though many of these CRT stations are designed with shame, being positioned behind buildings and across unattractive landscapes, and themselves nothing more than drab platforms. It is as though these are unwanted places. Planners, urban designers and architects can convert these into desired places. While train activities can seem noxious they can also seem quaint and even attractive, at least to certain market segments and land uses.

Third, the forgotten element in CRT station areas seems to be people. It is as though it is assumed that people do not want to live near trains, especially in derelict industrial areas. Perhaps most people do not want to but there is growing evidence from surveys that millions of American households would live near transit options, including CRT, if they had the opportunity and presumably if land use planning, urban design, and urban amenities addressed their preferences (see Nelson 2013).

In sum, unlocking the economic development potential of commuter rail station areas ought to be the next priority of many of America's rail transit systems.

References

American Public Transportation Association (2015). *Ridership Report Archives.* http://www.apta.com/resources/statistics/Pages/RidershipArchives.aspx. Retrieved December 27, 2016.

American Public Transportation Association (1997). *Commuter Rail: Serving America's Emerging Suburban/Urban Economy.*" http://www.apta.com/resources/reportsandpublications/Documents/Commuter_Rail_Suburban_Urban_Economy_1997.pdf. Retrieved December 27, 2016.

Ayvalik, Cemal and C. Jotin Khisty (2002). Heuristic analysis of impacts of commuter rail station consolidation on pedestrian access. *Transportation Research Record: Journal of the Transportation Research Board* 1793: 47-54.

Belzer, Dena, Sujata Srivastava, and Mason Austin. 2011. *Transit and regional economic development*. No. FTA CA-26-1007-03. 2011.

Boarnet, Marlon G. and Andrew F. Haughwout. 2000. *Do Highways Matter? Evidence and Policy Implications of Highways Influence on Metropolitan Development*. Washington, DC: The Brookings Institution, Center on Urban and Metropolitan Policy.

Carnegie Mellon Center for Economic Development. Undated. *Methods of regional analysis: Shift-share*. Pittsburgh, PA: H. John Heinz School of Public Policy and Management, Carnegie Mellon University. http://www.andrew.cmu.edu/user/jp87/URED/readings/Shift_Share.pdf retrieved December 27, 2016.

Cervero, Rovert and Michael Duncan. (2002a). *Land Value Impacts of Rail Transit Services in San Diego County.* Washington, DC: Urban Land Institute.

Ciccone, Antonio and Robert E. Hall. (1996) “Productivity and the Density of Economic Activity.” *American Economic Review*. 86(1): 54-70.

Deka, Devajyoti, Michael Lahr, and Thomas Marchwinski, and Maia de la Calle (2015). Economic Impacts of Rail Transit on Recreational Shore Communities–The Case of the North Jersey Coast Line. *Transportation Research Board 94th Annual Meeting*, no. 15-1546.

Glaeser, Edward. (2011). *The Triumph of the City: How Our Greatest Invention Makes Us Richer, Smarter, Greener, Healthier and Happier*. New York: NY: Penguin Press.

Kennedy, Christopher A. (2002). A comparison of the sustainability of public and private transportation systems: Study of the Greater Toronto Area." *Transportation* 29(4): 459-493.

Nelson, Arthur C. (2013). *Reshaping Metropolitan America: Development Trends and Opportunities to 2030*. Washington, DC: Island Press, 2013.

Nelson, Arthur C. (2014). *Foundations of Real Estate Development Finance: A Guide for Public-Private Partnerships*. Washington, DC: Island Press.

Seskin, Sam, Robert Cervero, Jeffrey Zupan, and Jane Howard (1996). *Transit and urban form*. Washington, DC: Federal Transit Administration.

Spectorsky, August. (1955). *The Exurbanites*. Philadelphia, PA: Lippincott.

Voith, Richard. (1998). Parking, Transit, and Employment in a Central Business District, *Journal of Urban Economics* 44(1): 43-48.

CRT Route Map Images

To the editor:

The following images may be included but are not strictly necessary.

Image 1
Tri Rail route map
Source: www.tri-rail.com/train-schedules/System_Map_MIC_Construction_2012_Edited.pdf

Image 2
Rail Runner route map
Source: http://riometro.org/images/general/system-map-rr.jpg

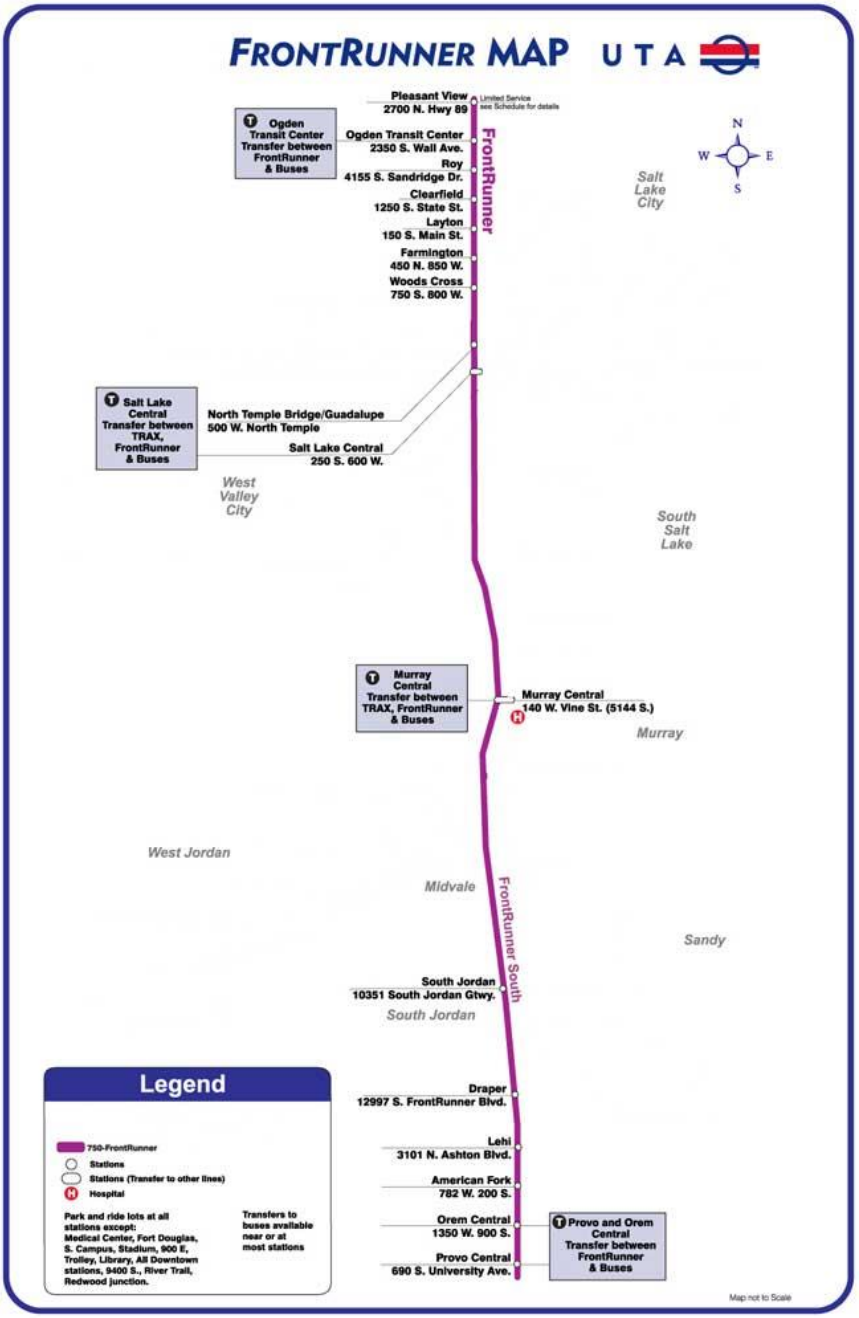

Image 3
FrontRunner route map
Note: The study area extends from Ogden to Salt Lake City.
Source:
http://68.media.tumblr.com/7cc4cd6d5b4b3eddb8537361e056deed/tumblr_mlczfqedvs1r54c4oo2_1280.jpg

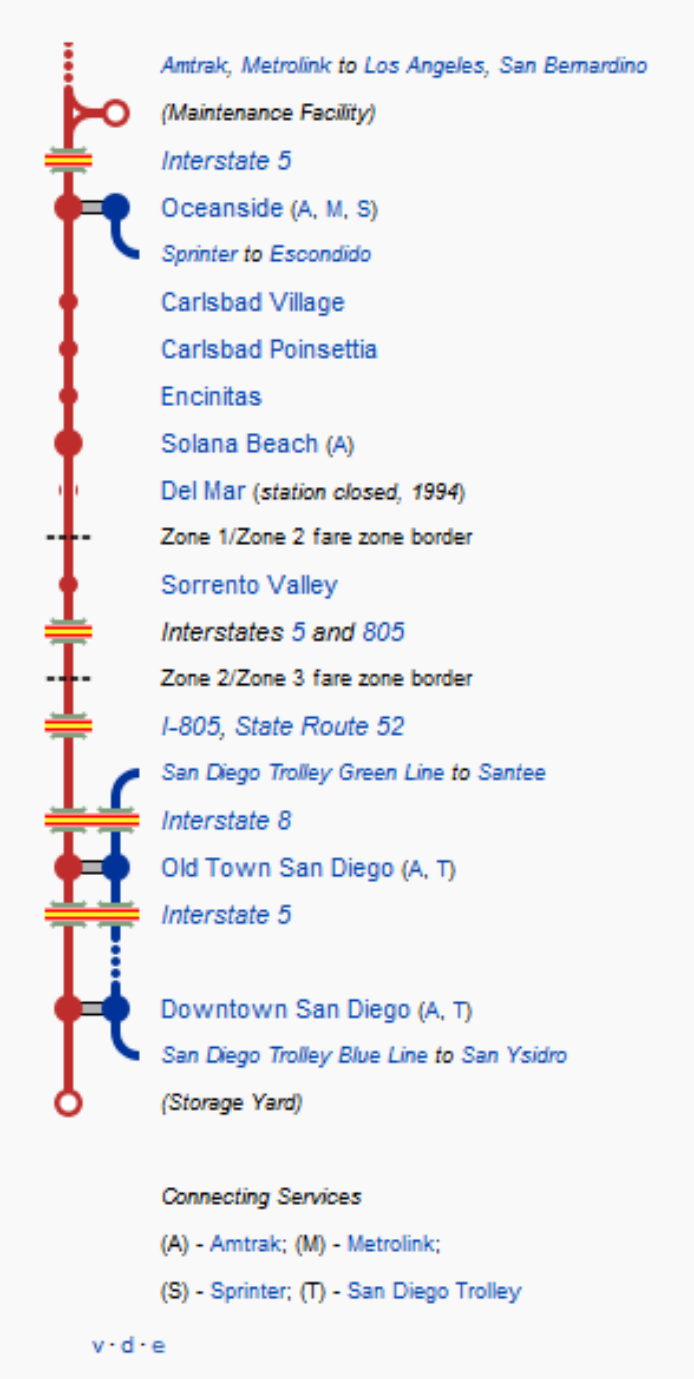

Image 4
Coaster route map
Source: http://www.sandiegoasap.com/gfx/coastal-station-stop-points.png

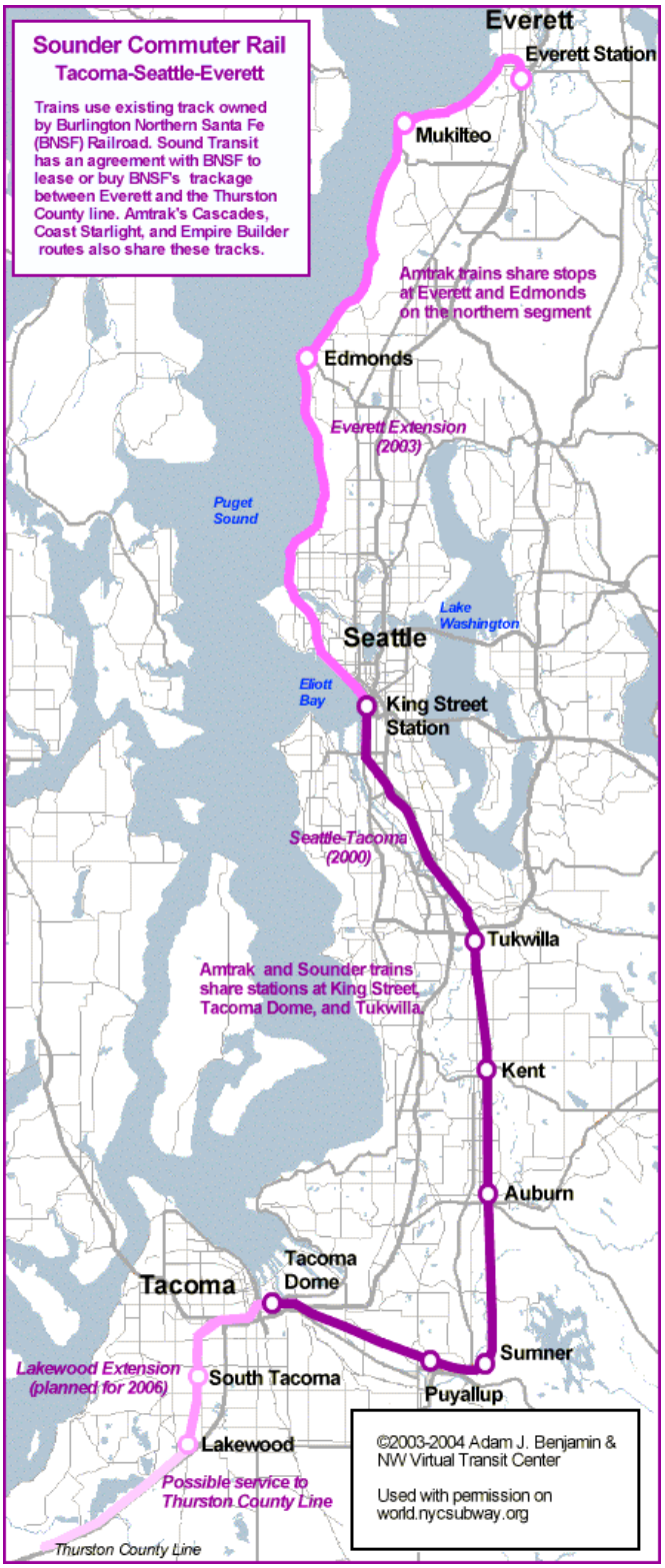

Image 5
Sounder route map
Source: http://nycsubway.org.s3.amazonaws.com/images/maps/soundermap.gif