

California Statewide Travel Demand Model: TAZ and Road Networks

ULTRANS: Nathaniel Roth, Giovanni Circella,
Ryan Boynton, Nico Linesch, Jackie Bjorkman,
Andy Holguin, Brandon Haydu, Ngoc-Thuy Le,
David Berman, and Laurel Torney

HBA: Kevin Stefan, Alan Brownlee

CSTDM 09 Tier 2 Training Workshop

March 8, 2011

Outline

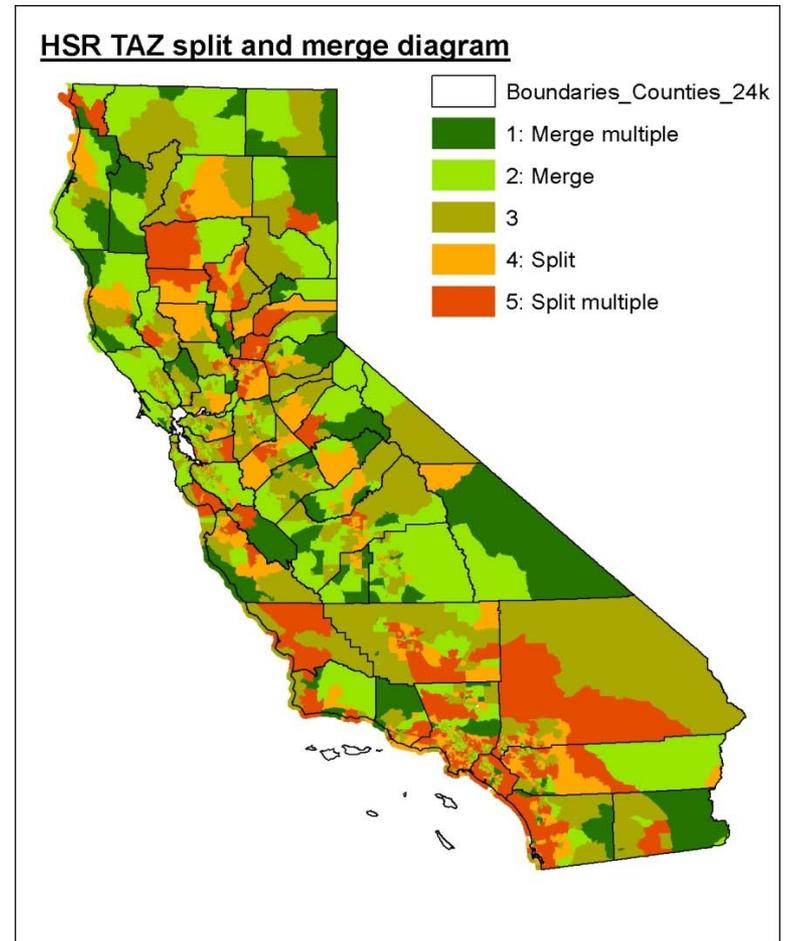
- TAZ
 - Guidelines
 - HSR Modifications
 - Block Groups
 - Splitting Block groups
 - PECAS LUZs
 - Miscellaneous challenges
- Networks
 - Guidelines
 - HSR network
 - 2008
 - 2000
 - Reversible Lanes/HOV
 - Tolls
 - Screenlines
- Public Transport - Rail
 - Our approach
 - Timetables
 - Fares
 - CUBE Network
 - CUBE scripts
 - Long Distance Rail

Guidelines for splitting/creating TAZ

- Based on HSR TAZ boundaries (with split/merge calculation, based on 2030 HSR)
- Respect County Boundaries
- Follow Block Group Boundaries
- Follow PECAS LUZ Boundaries
- Population Target: below 15,000 (2000 Census)
- Employment Target: below 10,000 (2000 Census)
- Consider:
 - Access routes to road network
 - Land use homogeneity
 - Resulting TAZ shape
- But:
 - Questions arose about the suitability of 2030 HSR projections
 - Block Groups with very large employment totals
 - Non-contiguous Block Groups

Modifications to the HSR TAZs

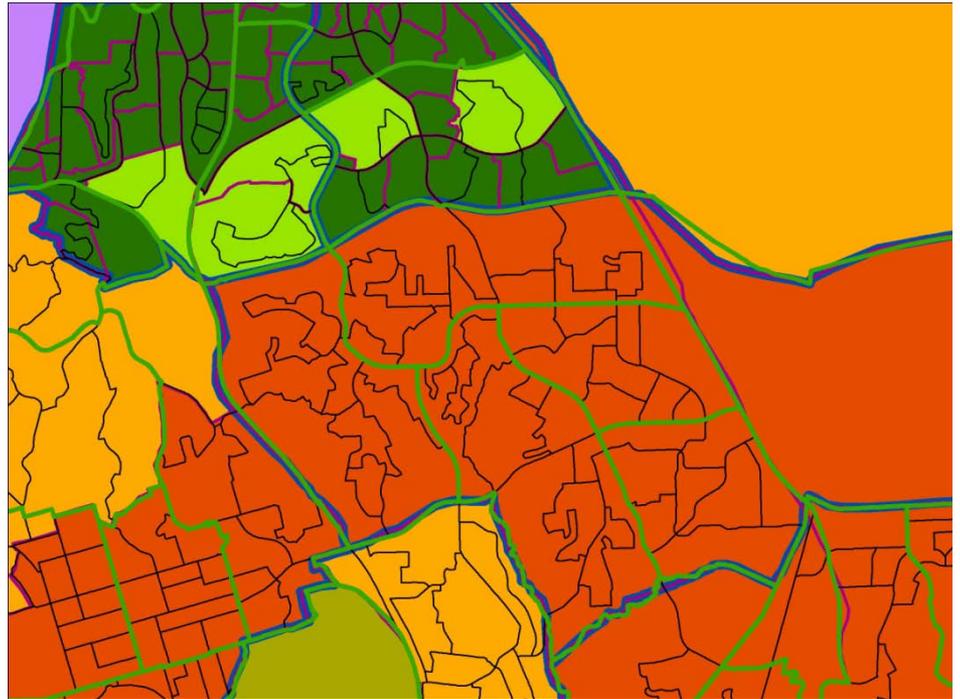
Score Value =	Max of 2030 Population OR 1.5 * 2030 Employment	
Code 5	Score > 30,000	Split (score/15,000)
Code 4	Score between 15,000 & 30,000	Split (score/15,000)
Code 3	Score between 6,000 & 15,000	No Change
Code 2	Score between 2,000 & 6,000	combine (into 2)
Code 1	Score < 2,000	combine (into more than 2)



Aggregating Block Groups

Process

- Create GIS dataset:
 - 2008 Release of the 2000 Block Groups
 - With Pop. and Emp. totals
 - With HSR TAZ ID



Splitting Block Groups

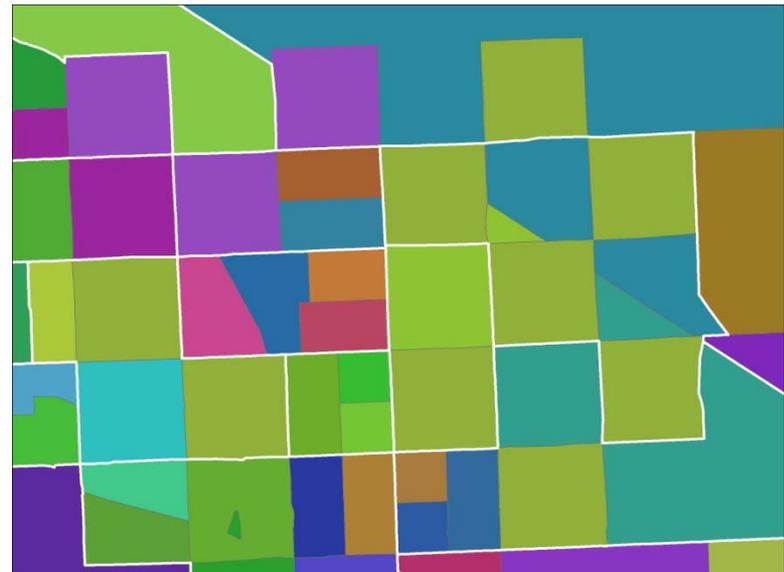


Large Employment Block Groups

- Irvine Business Complex
- Santa Clara
- Military Bases

Discontiguous Block Groups

- Riverside County



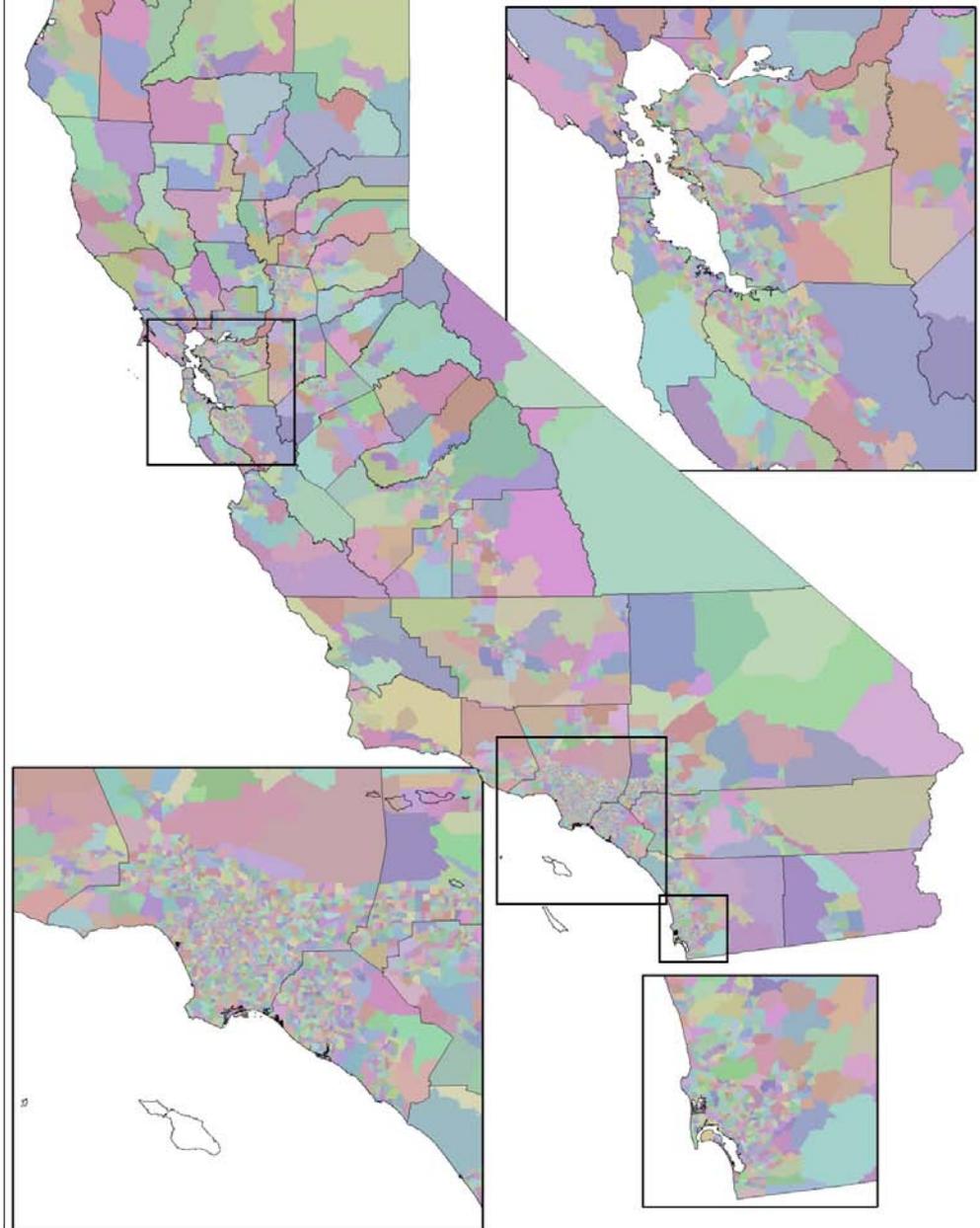
Other Changes (as necessary)

- County boundary changes
 - Fresno/Merced County boundary change
- LUZ Modifications
 - Add two LUZs for TRPA in Placer and El Dorado Counties
- Large Waterbody removal
 - SF Bay
 - SD Bay
 - Coastline

Results

Total number of TAZs	5,191
TAZs with 2000 Pop below 1,000	294
TAZs with 2000 Pop above 10,000	734
TAZs with 2000 Pop above 15,000	3
Mean TAZ Population	6,524
Minimum TAZ Population	0
Standard Deviation Population	3,150
Maximum TAZ Population	36,146
TAZs with Employment below 100	31
TAZs with Employment above 10,000	146
TAZs with Employment above 15,000	55
TAZs with Employment above 25,000	2
Mean TAZ Employment	2,749
Minimum TAZ Employment	0
Maximum TAZ Employment	34,645
Standard Deviation Employment	3,060

CSTM
 Transportation Analysis Zones
 with county boundaries



Networks: Guidelines

- Building off of the HSR network
 - A merging of multiple regional networks with a statewide network
- Roads for Inclusion:
 - Interstate Highways
 - State Highways
 - Major Arterials
 - Minor Arterials (when needed for connectivity)

Network Attributes and Feature Types

Field Name	Description	Data source
A	A node for 1-way link	Auto-generated in the Cube Software
B	B node for 1-way link	Auto-generated in the Cube Software
DISTANCE	Link length (miles)	Auto-calculated and checked for accuracy
LANES	Number of lanes (1 direction)	Google Earth version 5.
SPEED	Free flow speed (mph)	ESRI Street Maps 2008, with Street network data redistributed from TeleAtlas 2003
CAPACITY	Vehicles per lane per hour (see Tables 3, 4 and 5)	Tabular entry
FTYPE	Facility type (see Table 2)	GoogleEarth, ESRI 2008, TeleAtlas 2003
AREATYPE	Area type (see Table 5)	Zonal Attribute/Post Process
AREATYPENUM	Area type number (see Table 5)	Zonal Attribute/Post Process
USE	Vehicles allowed (see Table 6)	GoogleEarth
TOLL	Flag for link with toll (see Table 7)	Manual Entry/CalTrans
TIME_INIT	Initial travel times (minutes)	Calculated Distance*60/speed
FACILITY	Type of link (e.g. Walk Links)	n/a
NAME*	Street Name	Other source/TeleAtlas
EDITED	Edit status (see Table 8)	Manual Entry
ONRAMP	Flag for link with toll	Manual Entry
OFFRAMP	Flag for link with toll	Manual Entry
SCREENLINE	Flag for identifying links in screenlines	Manual Entry

FTYPE	Definition	Sources: TeleAtlas
1	Freeway	A1: All interchanges no signals
2	Expressway	A1-A2: Occasional signals
3	Major arterial	A3: Stoplights present
4	Minor arterial	A3: Stop signs present
5	Collectors	A4: Within a neighbourhood in and urban area.
6	Centroid Connectors	
7	Ramps	A63
8	Freeway - Freeway Connector	Note: not used at present
9	Rail Transit Node - Road Network	
10	Air Transit Node - Road Network	
11	Rail Transit Connection	

Capacities and Use Codes

Functional Class	Urban	Suburban	Rural
Freeway with no Signal	2,100	2,100	2,100
Expressway with Signal	1,200	1,200	1,400
Major Arterial - Signal	800	800	1,100
Minor Arterial - Signal	650	650	750
Collectors	650	650	650
Ramp	1,250	1,250	1,350
Fwy-Fwy Connector	1,950	1,950	1,950

USE	Definition
1	No restrictions
2	Shared ride 2 and above
3	Shared ride 3 and above
4	No trucks
5	Access Link to Transit
6	Rail Link

Editing Process

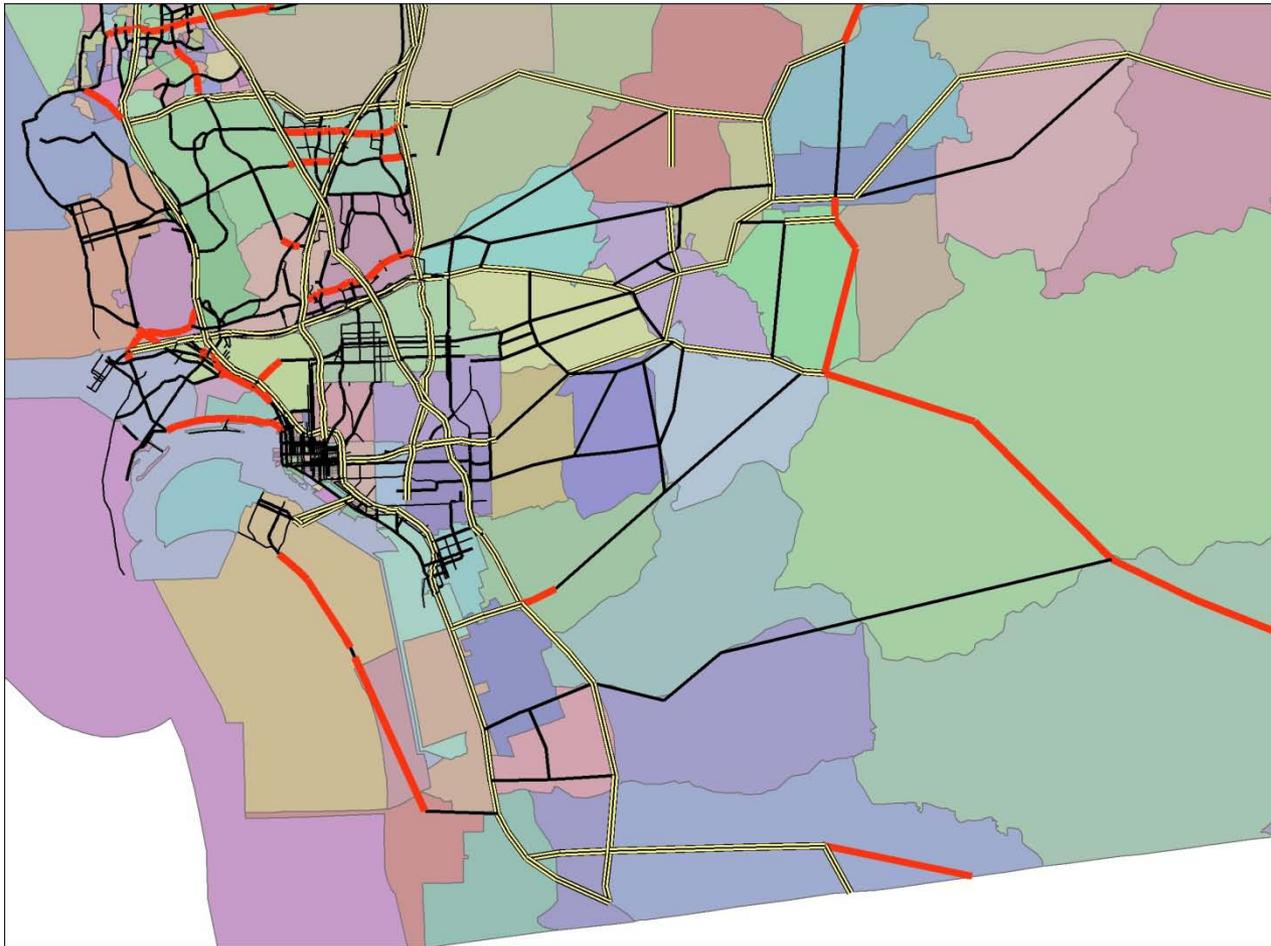
Editing Process

- Multiple Editor
 - Divide by Geographic Area
 - Daily Log File
 - Weekly Update of Master Network
 - Assigned blocks of node numbers
 - Maintain “Edited” field with editor ID#

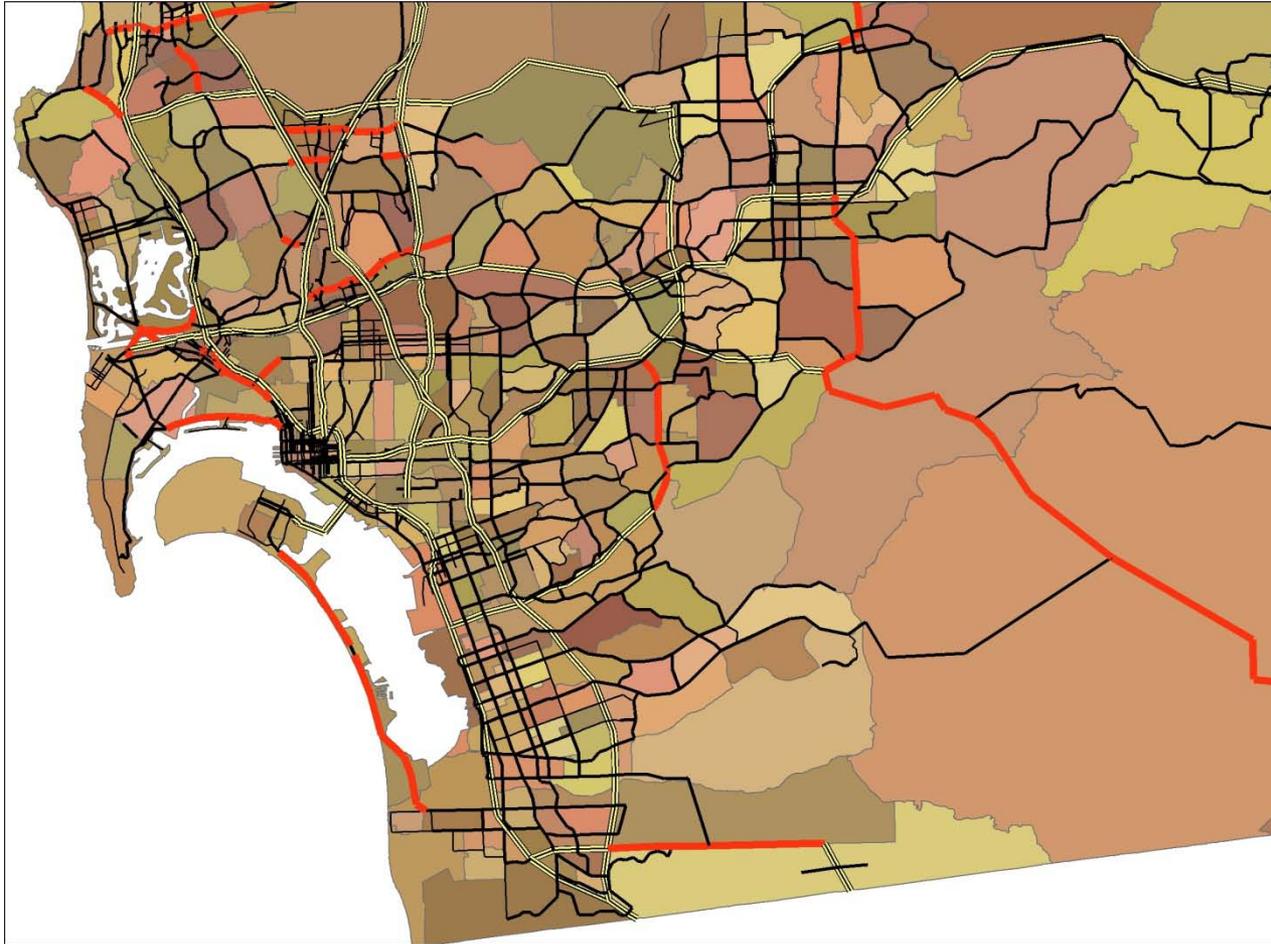
Data Sources

- 2008
 - 2003-4 Tele Atlas Data
 - Google Earth/Maps
 - 2008 Tiger Line Files*
 - HOV lane Data from CalTrans
 - Bridge and Tolling Authorities
- 2000
 - 2000 Tiger Line Files
 - CalTrans Road Networks
 - Bridge and Tolling Authorities
 - HSR List of Road Improvements

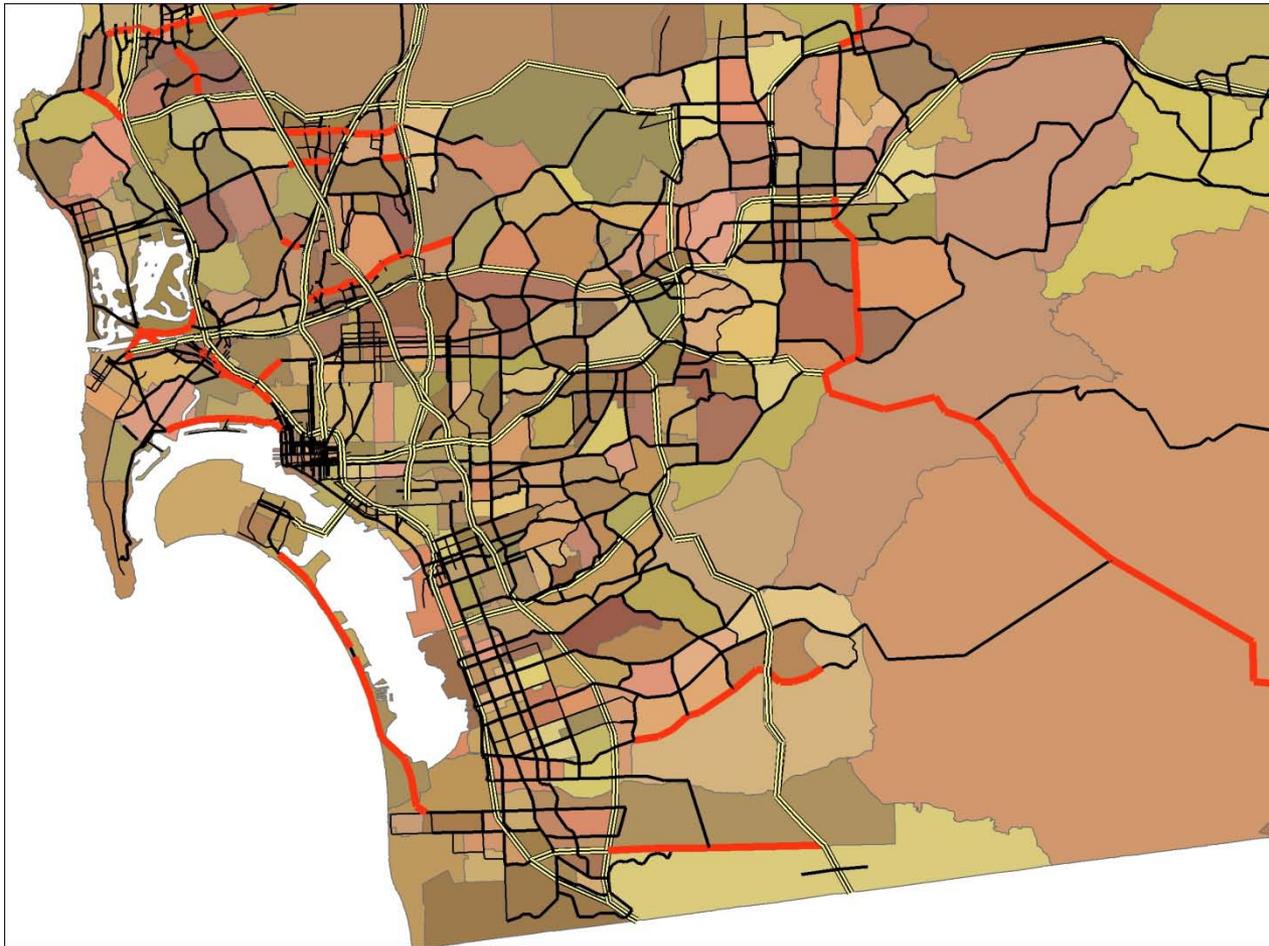
Networks: HSR



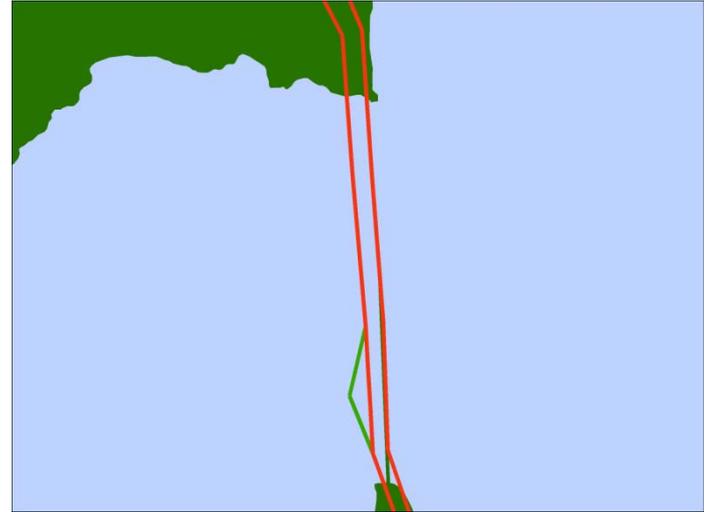
Network 2000



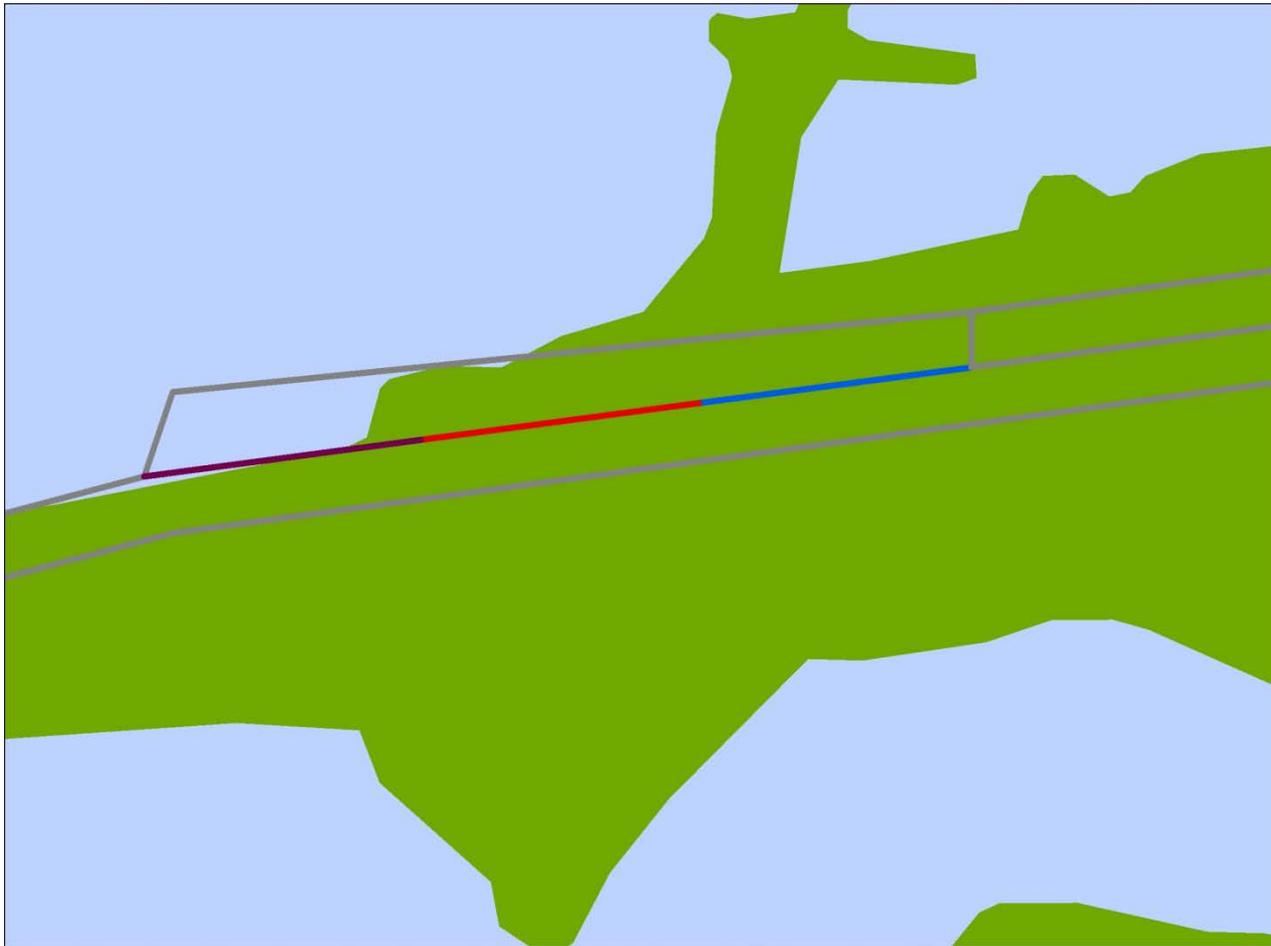
Network 2008



Reversible Lanes and HOV/Use Codes



Tolls



Screenlines



End Result

FType	HSR		2000		2008	
	Count	Distance (mi)	Count	Distance (mi)	Count	Distance (mi)
Freeway	11,480	10,469	12,521	10,462	12,935	10,743
Expressway	4,204	11,804	6,666	13,141	6,690	13,168
Major Arterial	41,568	23,609	66,117	31,547	66,129	31,548
Minor Arterial	41,561	16,059	52,668	18,235	52,650	18,231
Collector	36,879	18,692	40,777	17,701	40,777	17,701
Centroid Connector	19,864	9,423	39,266	32,665	39,266	32,665
Ramp	13,749	2,500	15,208	2,337	15,346	2,360
Freeway-Freeway Connector			12	2	12	2
Rail to Network Connector			798	119	798	119
Air Terminal to Network Connector			36	5	36	5
Rail Network Link			824	2,952	824	2,952
	169,305	92,556	234,893	129,166	235,463	129,494

California Statewide Travel Demand Model: Rail Transit

ULTRANS: Ryan Boynton, Giovanni
Circella, Ngoc-Thuy Le, Andy Holguin,
Laurel Torney, and Allie Scrivener

HBA: Kevin Stefan, Alan Brownlee

CSTDm 09 Tier 2 Training Workshop

March 8, 2011

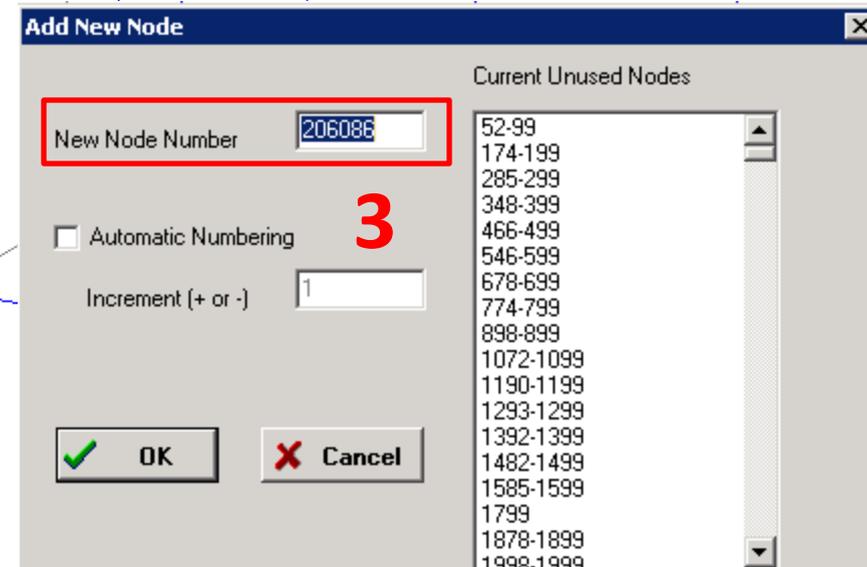
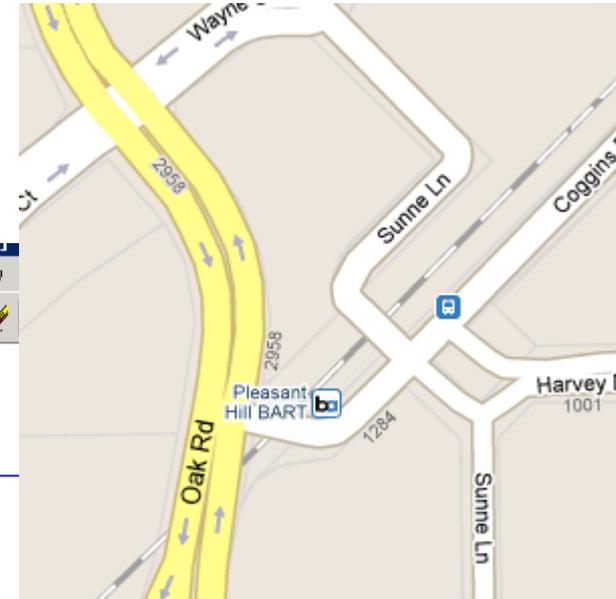
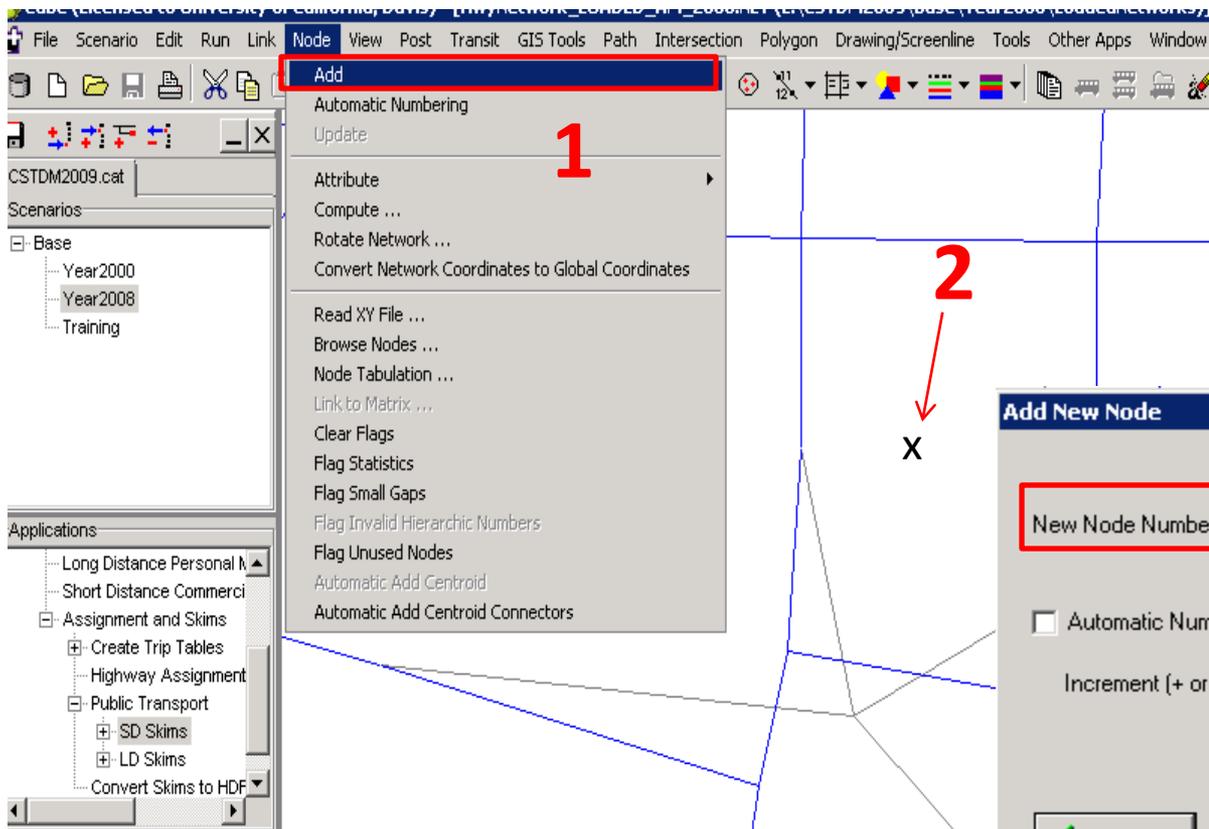
Public Transport

- A two-level approach
 - All rail & air services coded explicitly
 - Urban light & heavy rail systems*
 - Inter-regional rail systems*
 - Air services
 - Synthetic representation of local transit services
 - This will be covered in the next presentation

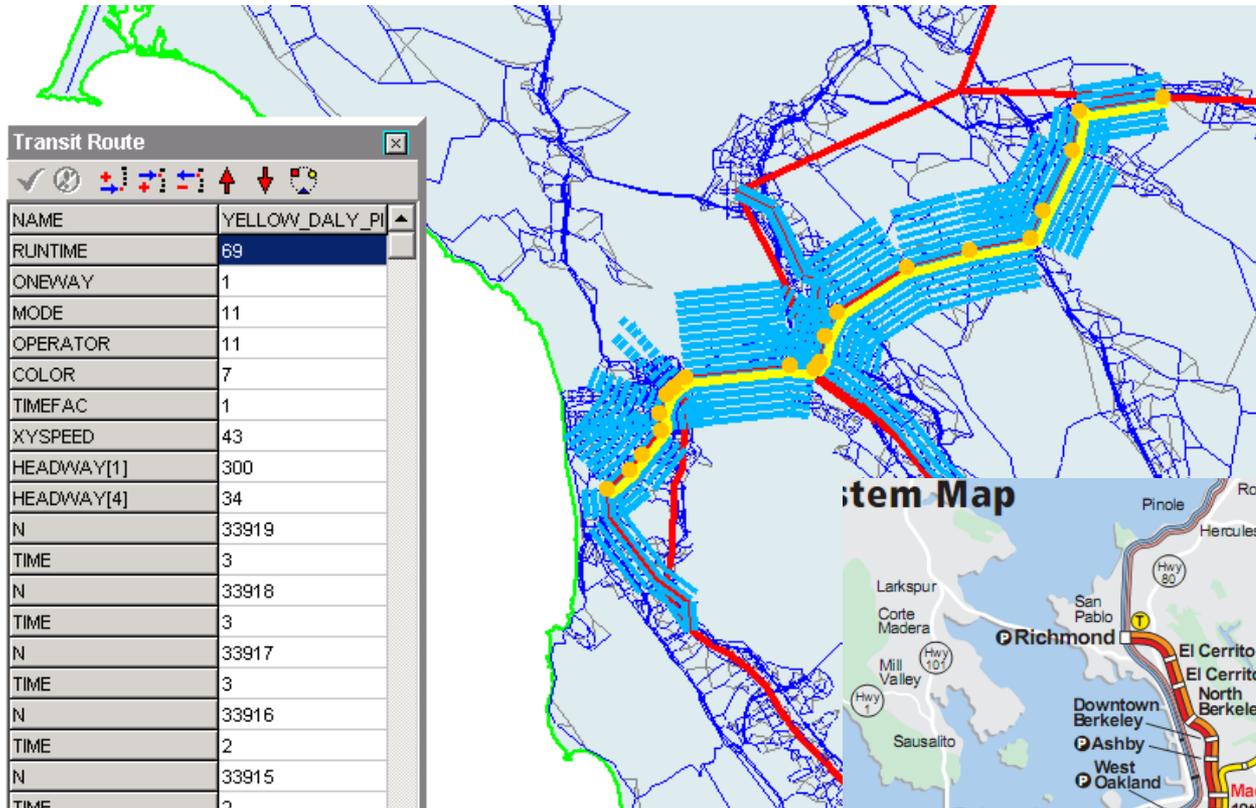
*Covered in this presentation

Coding the Rail Network

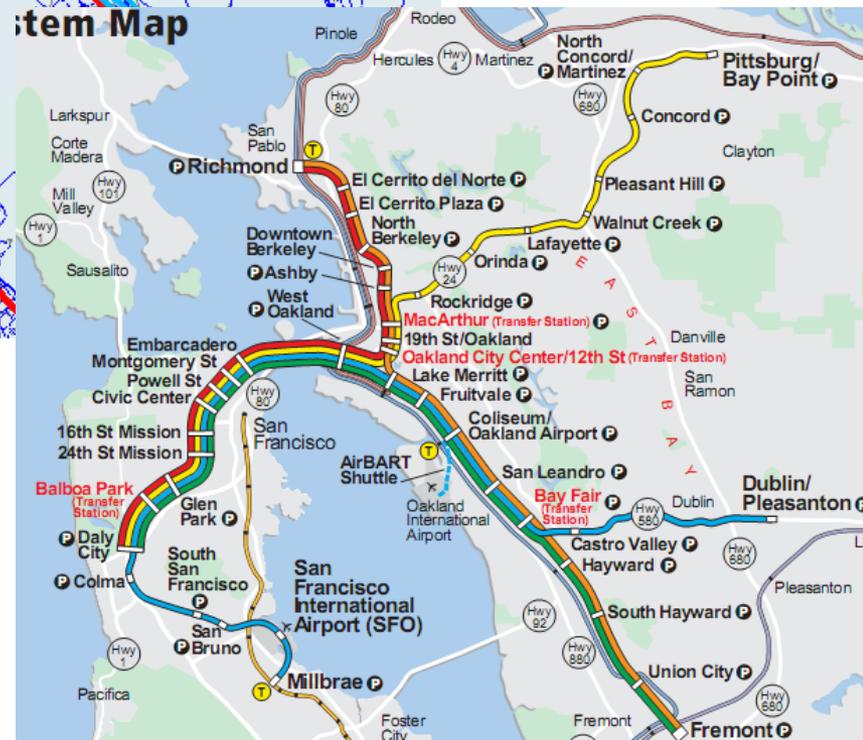
- Added a node for each station
- Connected this node to the road network



Coding the Rail Network (2)



- Added a link between each station
- Created line files in CUBE



Timetables

Pittsburg/Bay Point to Daly City

Bikes cannot enter or exit 12th and 19th Street Stations between 6:56–8:50 am and 4:35–6:40 pm.

Bikes must **not** be on trains during highlighted times. Violation of bicycle rules are subject to citation.

WEEKDAYS

BAY PT	N CNC	CONCD	PHILL	W CRK	LAFAY	ORNDA	ROCKR	MACAR	19ST	12ST	W OAK	EMBAR	MONTG	POWEL	CIVIC	16ST	24ST	GLNPK	BALPK	DALY
AM																				
4:02	4:08	4:12	4:17	4:20	4:24	4:29	4:34	4:38	4:41	4:42	4:46	4:54	4:55	4:57	4:59	5:01	5:03	5:06	5:08	5:12
4:17	4:23	4:27	4:32	4:35	4:39	4:44	4:49	4:53	4:56	4:57	5:01	5:09	5:10	5:12	5:14	5:16	5:18	5:21	5:23	5:27
4:32	4:38	4:42	4:47	4:50	4:54	4:59	5:04	5:08	5:11	5:12	5:16	5:24	5:25	5:27	5:29	5:31	5:33	5:36	5:38	5:42
4:47	4:53	4:57	5:02	5:05	5:09	5:14	5:19	5:23	5:26	5:27	5:31	5:39	5:40	5:42	5:44	5:46	5:48	5:51	5:53	5:57
5:02	5:08	5:12	5:17	5:20	5:24	5:29	5:34	5:38	5:41	5:42	5:46	5:54	5:55	5:57	5:59	6:01	6:03	6:06	6:08	6:12
5:17	5:23	5:27	5:32	5:35	5:39	5:44	5:49	5:53	5:56	5:57	6:01	6:09	6:10	6:12	6:14	6:16	6:18	6:21	6:23	6:27
5:32	5:38	5:42	5:47	5:50	5:54	5:59	6:04	6:08	6:11	6:12	6:16	6:24	6:25	6:27	6:29	6:31	6:33	6:36	6:38	6:42
5:47	5:53	5:57	6:02	6:05	6:09	6:14	6:19	6:23	6:26	6:27	6:31	6:39	6:40	6:42	6:44	6:46	6:48	6:51	6:53	6:57
6:02	6:08	6:12	6:17	6:20	6:24	6:29	6:34	6:38	6:41	6:42	6:46	6:54	6:55	6:57	6:59	7:01	7:03	7:06	7:08	7:12
6:17	6:23	6:27	6:32	6:35	6:39	6:44	6:49	6:53	6:56	6:57	7:01	7:09	7:10	7:12	7:14	7:16	7:18	7:21	7:23	7:27
6:32	6:38	6:42	6:47	6:50	6:54	6:59	7:04	7:08	7:11	7:12	7:16	7:24	7:25	7:27	7:29	7:31	7:33	7:36	7:38	7:42
6:42	6:48	6:52	6:57	7:00	7:04	7:09	7:14	7:18	7:21	7:22	7:26	7:34	7:35	7:37	7:39	7:41	7:43	7:46	7:48	7:52
6:47	6:53	6:57	7:02	7:05	7:09	7:14	7:19	7:23	7:26	7:27	7:31	7:39	7:40	7:42	7:44	7:46	7:48	7:51	7:53	7:57
6:57	7:03	7:07	7:12	7:15	7:19	7:24	7:29	7:33	7:36	7:37	7:41	7:49	7:50	7:52	7:54	7:56	7:58	8:01	8:03	8:07
7:02	7:08	7:12	7:17	7:20	7:24	7:29	7:34	7:38	7:41	7:42	7:46	7:54	7:55	7:57	7:59	8:01	8:03	8:06	8:08	8:12
7:17	7:23	7:27	7:32	7:35	7:39	7:44	7:49	7:53	7:56	7:57	8:01	8:09	8:10	8:12	8:14	8:16	8:18	8:21	8:23	8:27
7:32	7:38	7:42	7:47	7:50	7:54	7:59	8:04	8:08	8:11	8:12	8:16	8:24	8:25	8:27	8:29	8:31	8:33	8:36	8:38	8:42
7:47	7:53	7:57	8:02	8:05	8:09	8:14	8:19	8:23	8:26	8:27	8:31	8:39	8:40	8:42	8:44	8:46	8:48	8:51	8:53	8:57
8:02	8:08	8:12	8:17	8:20	8:24	8:29	8:34	8:38	8:41	8:42	8:46	8:54	8:55	8:57	8:59	9:01	9:03	9:06	9:08	9:12
8:17	8:23	8:27	8:32	8:35	8:39	8:44	8:49	8:53	8:56	8:57	9:01	9:09	9:10	9:12	9:14	9:16	9:18	9:21	9:23	9:27
8:32	8:38	8:42	8:47	8:50	8:54	8:59	9:04	9:08	9:11	9:12	9:16	9:24	9:25	9:27	9:29	9:31	9:33	9:36	9:38	9:42
8:47	8:53	8:57	9:02	9:05	9:09	9:14	9:19	9:23	9:26	9:27	9:31	9:39	9:40	9:42	9:44	9:46	9:48	9:51	9:53	9:57
9:02	9:08	9:12	9:17	9:20	9:24	9:29	9:34	9:38	9:41	9:42	9:46	9:54	9:55	9:57	9:59	10:01	10:03	10:06	10:08	10:12
9:17	9:23	9:27	9:32	9:35	9:39	9:44	9:49	9:53	9:56	9:57	10:01	10:09	10:10	10:12	10:14	10:16	10:18	10:21	10:23	10:27
9:32	9:38	9:42	9:47	9:50	9:54	9:59	10:04	10:08	10:11	10:12	10:16	10:24	10:25	10:27	10:29	10:31	10:33	10:36	10:38	10:42
9:47	9:53	9:57	10:02	10:05	10:09	10:14	10:19	10:23	10:26	10:27	10:31	10:39	10:40	10:42	10:44	10:46	10:48	10:51	10:53	10:57
10:02	10:08	10:12	10:17	10:20	10:24	10:29	10:34	10:38	10:41	10:42	10:46	10:54	10:55	10:57	10:59	11:01	11:03	11:06	11:08	11:12
10:17	10:23	10:27	10:32	10:35	10:39	10:44	10:49	10:53	10:56	10:57	11:01	11:09	11:10	11:12	11:14	11:16	11:18	11:21	11:23	11:27
10:32	10:38	10:42	10:47	10:50	10:54	10:59	11:04	11:08	11:11	11:12	11:16	11:24	11:25	11:27	11:29	11:31	11:33	11:36	11:38	11:42
10:47	10:53	10:57	11:02	11:05	11:09	11:14	11:19	11:23	11:26	11:27	11:31	11:39	11:40	11:42	11:44	11:46	11:48	11:51	11:53	11:57
11:02	11:08	11:12	11:17	11:20	11:24	11:29	11:34	11:38	11:41	11:42	11:46	11:54	11:55	11:57	11:59	12:01	12:03	12:06	12:08	12:12
11:17	11:23	11:27	11:32	11:35	11:39	11:44	11:49	11:53	11:56	11:57	12:01	12:09	12:10	12:12	12:14	12:16	12:18	12:21	12:23	12:27
11:32	11:38	11:42	11:47	11:50	11:54	11:59	12:04	12:08	12:11	12:12	12:16	12:24	12:25	12:27	12:29	12:31	12:33	12:36	12:38	12:42
11:47	11:53	11:57	12:02	12:05	12:09	12:14	12:19	12:23	12:26	12:27	12:31	12:39	12:40	12:42	12:44	12:46	12:48	12:51	12:53	12:57
PM																				
12:02	12:08	12:12	12:17	12:20	12:24	12:29	12:34	12:38	12:41	12:42	12:46	12:54	12:55	12:57	12:59	1:01	1:03	1:06	1:08	1:12
12:17	12:23	12:27	12:32	12:35	12:39	12:44	12:49	12:53	12:56	12:57	1:01	1:09	1:10	1:12	1:14	1:16	1:18	1:21	1:23	1:27
12:32	12:38	12:42	12:47	12:50	12:54	12:59	1:04	1:08	1:11	1:12	1:16	1:24	1:25	1:27	1:29	1:31	1:33	1:36	1:38	1:42
12:47	12:53	12:57	1:02	1:05	1:09	1:14	1:19	1:23	1:26	1:27	1:31	1:39	1:40	1:42	1:44	1:46	1:48	1:51	1:53	1:57
1:02	1:08	1:12	1:17	1:20	1:24	1:29	1:34	1:38	1:41	1:42	1:46	1:54	1:55	1:57	1:59	2:01	2:03	2:06	2:08	2:12
1:17	1:23	1:27	1:32	1:35	1:39	1:44	1:49	1:53	1:56	1:57	2:01	2:09	2:10	2:12	2:14	2:16	2:18	2:21	2:23	2:27
1:32	1:38	1:42	1:47	1:50	1:54	1:59	2:04	2:08	2:11	2:12	2:16	2:24	2:25	2:27	2:29	2:31	2:33	2:36	2:38	2:42
1:47	1:53	1:57	2:02	2:05	2:09	2:14	2:19	2:23	2:26	2:27	2:31	2:39	2:40	2:42	2:44	2:46	2:48	2:51	2:53	2:57
2:02	2:08	2:12	2:17	2:20	2:24	2:29	2:34	2:38	2:41	2:42	2:46	2:54	2:55	2:57	2:59	3:01	3:03	3:06	3:08	3:12
2:17	2:23	2:27	2:32	2:35	2:39	2:44	2:49	2:53	2:56	2:57	3:01	3:09	3:10	3:12	3:14	3:16	3:18	3:21	3:23	3:27
2:32	2:38	2:42	2:47	2:50	2:54	2:59	3:04	3:08	3:11	3:12	3:16	3:24	3:25	3:27	3:29	3:31	3:33	3:36	3:38	3:42
2:47	2:53	2:57	3:02	3:05	3:09	3:14	3:19	3:23	3:26	3:27	3:31	3:39	3:40	3:42	3:44	3:46	3:48	3:51	3:53	3:57
3:02	3:08	3:12	3:17	3:20	3:24	3:29	3:34	3:38	3:41	3:42	3:46	3:54	3:55	3:57	3:59	4:01	4:03	4:06	4:08	4:12

Timetables

Yellow Line

Line Name: Pittsburg/Bay Point to SFO (Millbrae) - 1

PIT_SFO

One-way

Station	Coded Time	LRTX
Pittsburg/Bay Point	6	33936
N.Concord/Martinez	4	33935
Concord	5	33901
Pleasant Hill	3	33902
Walnut Creek	4	33903
Lafayette	5	33904
Orinda	5	33905
Rockridge	4	33906
MacArthur	3	33907
19th St/Oakland	1	33908
Oakland City Ctr./12th St	4	33909
West Oakland	8	33910
Embarcadero	1	33911
Montgomery St	2	33912
Powell St	2	33913
Civic Center	2	33914
16th St Mission	2	33915
24th St Mission	3	33916
Glen Park	2	33917
Balboa Park	4	33918
Daly City	4	33919
Colma	3	33939
South San Francisco	4	33940
San Bruno	4	33941
SF Airport		33942
Millbrae		-32061
Run Time	85	
Headway 1 OFF		na
Headway 2 AM		15
Headway 3 MIDDAY		15
Headway 4 PM		15

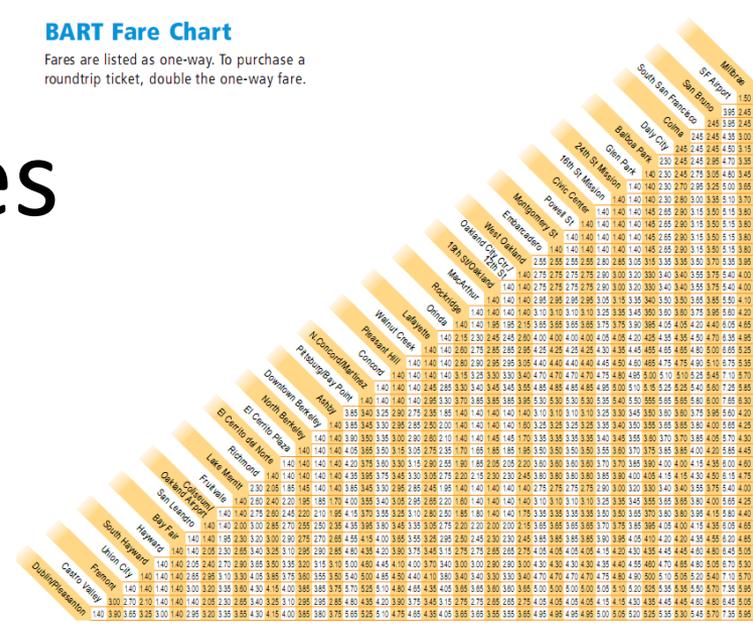
Schedule Time
6
4
5
3
4
5
5
4
3
1
4
8
1
2
2
2
2
3
2
4
4
3
4
4
7
92



Transit Route	
NAME	YELLOW_PIT_SFO
RUNTIME	85
ONEWAY	1
MODE	11
OPERATOR	11
COLOR	7
TIMEFAC	1
XYSPEED	38
HEADWAY[2]	15
HEADWAY[3]	15
HEADWAY[4]	15
N	33936
TIME	6
N	33935
TIME	4
N	33901
TIME	5
N	33902
TIME	3
N	33903
TIME	4
N	33904
TIME	5
N	33905
TIME	5
N	33906
TIME	4
N	33907
TIME	3
N	33908
TIME	1
N	33909
TIME	4

BART Fare Chart

Fares are listed as one-way. To purchase a roundtrip ticket, double the one-way fare.



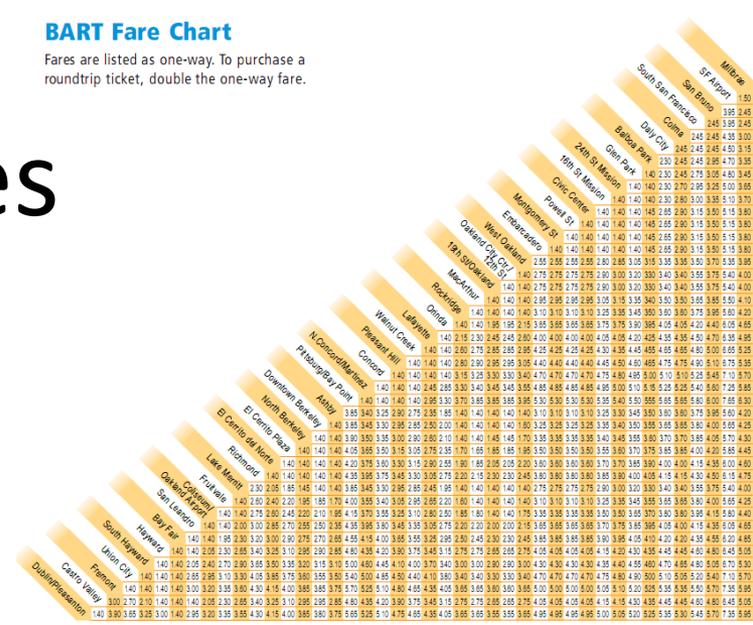
Fare Types

- FROMTO
 - Fare chart/matrix
 - Ex: BART
- FLAT
 - Flat fee
 - Ex: Sacramento LRT

 RT Passes Fares & Tickets			
Single & Daily Pass Fares			
<i>If you are:</i>	<i>Your fare is</i>	<i>Single</i>	<i>Daily Pass</i>
Age 19 - 61	Basic	\$2.50	\$6.00
Senior (62 & older)	Discount	1.25	3.00
Individuals with Disabilities	Discount	1.25	3.00
Medicare Cardholder	Discount	1.25	3.00
Student (age 5-18)	Discount	1.25	3.00

BART Fare Chart

Fares are listed as one-way. To purchase a roundtrip ticket, double the one-way fare.



Fare Types

- FROMTO
 - Fare chart/matrix
 - Ex: BART
- FLAT
 - Flat fee
 - Ex: Sacramento LRT
- COUNT
 - Zone systems
 - Ex: CalTrain



RT Passes Fares & Tickets

Single & Daily Pass Fares

If you are:	Your fare is	Single	Daily Pass
Age 19 - 61	Basic	\$2.50	\$6.00
Senior (62 & older)	Discount	1.25	3.00
Individuals with Disabilities	Discount	1.25	3.00
Medicare Cardholder	Discount	1.25	3.00

Adult Full Fare

Ticket Type	Valid for	Travel within					
		1 Zone	2 Zones	3 Zones	4 Zones	5 Zones	6 Zones
One Way	4 hours from time of purchase	\$2.50	\$4.50	\$6.50	\$8.50	\$10.50	\$12.50
Day Pass	the date of purchase, unlimited travel within zone limits	\$5.00	\$9.00	\$13.00	\$17.00	\$21.00	\$25.00
8-ride	60 days from date of purchase	\$17.00	\$30.50	\$44.25	\$57.75	\$71.50	\$85.00
Monthly Pass	month of purchase	\$68.25	\$119.25	\$172.25	\$225.25	\$278.25	\$331.25
Zone Upgrade	4 hours from time of purchase, one way when accompanying another valid ticket	\$2.00					

System File

- MODE and OPERATOR IDs
- Wait Curves defined

```
MODE NUMBER=41 NAME="PacSurf"  
MODE NUMBER=42 NAME="Amtrak-Capitol"  
MODE NUMBER=43 NAME="Amtrak-SJQ"  
  
MODE NUMBER=61 NAME="HSR"  
  
MODE NUMBER=71 LONGNAME="Air" NAME="Air"
```

```
OPERATOR NUMBER=41 NAME="PacSurf"  
OPERATOR NUMBER=42 NAME="Amtrak-Capitol"  
OPERATOR NUMBER=43 NAME="Amtrak-SJQ"  
  
OPERATOR NUMBER=61 NAME="HSR"  
  
OPERATOR NUMBER=71 LONGNAME="Air" NAME="Air"
```

```
WAITCRVDEF NUMBER=3 LONGNAME="Maximum wait time of 14 mins for Rail.",  
CURVE=1,3, 20,10, 30,14, 60,14, 160,14, 600,14|  
  
WAITCRVDEF NUMBER=4 LONGNAME="AIR - Wait time of 71 mins.",  
CURVE=1,71, 30,71, 60,71, 142,71, 600,250  
  
WAITCRVDEF NUMBER=5 LONGNAME="Maximum wait time of 14 mins for HSR.",  
CURVE=1,3, 20,10, 30,14, 60,14, 160,14, 600,14
```

Factor File

- FareSystem IDs
- Wait Curve Node Numbers
- Value of Time

```
FARESYSTEM=11, OPERATOR=11
FARESYSTEM=12, OPERATOR=12
FARESYSTEM=13, OPERATOR=13
FARESYSTEM=14, OPERATOR=14
FARESYSTEM=15, OPERATOR=15
FARESYSTEM=16, OPERATOR=16
FARESYSTEM=17, OPERATOR=17
FARESYSTEM=31, OPERATOR=31
FARESYSTEM=32, OPERATOR=32
FARESYSTEM=33, OPERATOR=33
FARESYSTEM=34, OPERATOR=34
FARESYSTEM=35, OPERATOR=35
FARESYSTEM=41, OPERATOR=41
FARESYSTEM=42, OPERATOR=42
FARESYSTEM=43, OPERATOR=43
;FARESYSTEM=44, OPERATOR=44
;FARESYSTEM=45, OPERATOR=45
;FARESYSTEM=51, OPERATOR=51
;FARESYSTEM=52, OPERATOR=52
;FARESYSTEM=53, OPERATOR=53
;FARESYSTEM=54, OPERATOR=54
FARESYSTEM=61, OPERATOR=61
FARESYSTEM=71, OPERATOR=71
```

```
WAITFACTOR=2.89, n=7000-206000
;REWAITMAX=600
;REWAITMIN=1
IWAITCURVE=1, nodes=7000-18500, 18521-168172, 168176-206000
IWAITCURVE=4, nodes=18501-18520
XWAITCURVE=1, nodes=7000-18500, 18521-168172, 168176-206000
XWAITCURVE=4, nodes=18501-18520
IWAITCURVE=5, nodes=168173-168175
XWAITCURVE=5, nodes=168173-168175
```

```
VALUEOFTIME[11]=8.21 ; example format for Mode 11 has Value of Time=8.21 per hour
VALUEOFTIME[12]=8.21 ; example format for Mode 12 has Value of Time=8.21 per hour
VALUEOFTIME[13]=8.21 ; example format for Mode 13 has Value of Time=8.21 per hour
VALUEOFTIME[14]=8.21 ; example format for Mode 14 has Value of Time=8.21 per hour
VALUEOFTIME[15]=8.21 ; example format for Mode 15 has Value of Time=8.21 per hour
VALUEOFTIME[16]=8.21 ; example format for Mode 16 has Value of Time=8.21 per hour
VALUEOFTIME[31]=8.21 ; example format for Mode 31 has Value of Time=8.21 per hour
VALUEOFTIME[32]=8.21 ; example format for Mode 32 has Value of Time=8.21 per hour
VALUEOFTIME[33]=8.21 ; example format for Mode 33 has Value of Time=8.21 per hour
VALUEOFTIME[34]=8.21 ; example format for Mode 34 has Value of Time=8.21 per hour
VALUEOFTIME[35]=8.21 ; example format for Mode 35 has Value of Time=8.21 per hour
VALUEOFTIME[41]=8.21 ; example format for Mode 41 has Value of Time=8.21 per hour
VALUEOFTIME[42]=8.21 ; example format for Mode 42 has Value of Time=8.21 per hour
VALUEOFTIME[43]=8.21 ; example format for Mode 43 has Value of Time=8.21 per hour
VALUEOFTIME[61]=8.21 ; example format for Mode 61 has Value of Time=8.21 per hour
```

Fare File

```
; Fare definition for BART
FARESYSTEM NUMBER=11, NAME="BART", STRUCTURE=FROMTO,
FAREZONES=NI.BARTZ,
FAREMATRIX=FMI.1.1 ;Bart.mat

; Fare definition for Sacramento LRT 2008
FARESYSTEM NUMBER=12, NAME="Sacramento LRT", STRUCTURE=FLAT, IBOARDFARE=1.87,
FAREFROMFS=99*1.87

; Fare definition for SANDAG Light Rail 2008
FARESYSTEM NUMBER=13, NAME="SANDAG Light Rail", STRUCTURE=FLAT, IBOARDFARE=1.87,
FAREFROMFS=99*1.87

; Fare definition for VTA 2008
FARESYSTEM NUMBER=14, NAME="VTA Fares", STRUCTURE=FLAT, IBOARDFARE=1.50,
FAREFROMFS=99*1.50

; Fare definition for the Muni System 2008
FARESYSTEM NUMBER=15, NAME="MUNI Fares", STRUCTURE=FLAT, IBOARDFARE=1.50,
FAREFROMFS=99*0.00

; Fare definition for SCAG Urban Rail 2008
FARESYSTEM NUMBER=16, NAME="SCAG Urban Rail", STRUCTURE=FLAT, IBOARDFARE=0.94,
FAREFROMFS=99*0.94

; Fare definition for San Diego Sprinter 2008
FARESYSTEM NUMBER = 17, NAME="San Diego Sprinter", STRUCTURE=FLAT, IBOARDFARE=1.50,
FAREFROMFS=99*1.50

; Fare definition for SANDAG Rail/Coaster 2008
FARESYSTEM NUMBER=31, NAME="SANDAG RAIL/COASTER", STRUCTURE=COUNT,
FAREZONES=NI.CTRZ,
FARETABLE=1-3.37,2-3.75,3-4.12,4-4.50

; Fare definition for SCAG Metrolink ORANGE LINE
FARESYSTEM NUMBER=32, NAME="SCAG Metrolink Orange", STRUCTURE=FROMTO,
FAREZONES=NI.MLKZ,
FAREMATRIX=FMI.2.1 ; metrolink.mat

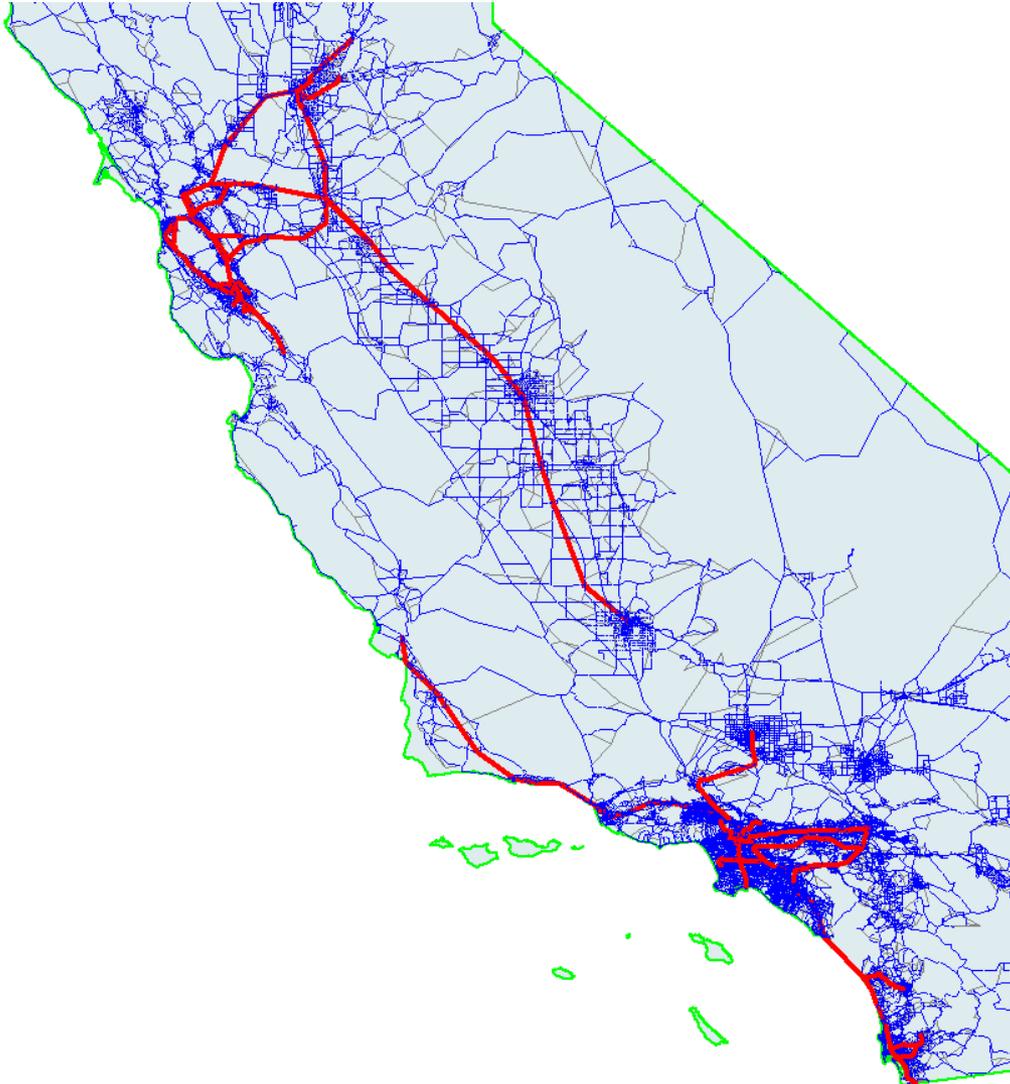
; Fare definition for SCAG Metrolink Other 2008
FARESYSTEM NUMBER=33, NAME="SCAG Metrolink Other", STRUCTURE=FROMTO,
FAREZONES=NI.MLKZ,
FAREMATRIX=FMI.7.1 ; metrolinkother.mat
```

- The Fare File:
 - Fare Type
 - If FROMTO
 - fare matrix
 - If FLAT
 - boarding and transfer fares
 - If COUNT,
 - fare for the number of zones crossed

Long Distance Rail

- Uses same line files and network as the Short Distance Personal Travel Model
- Requires 2 tables
 - A table that links the CUBE node number to the station
 - A table that links the Station to the appropriate Fare Matrix

Statewide Rail Network



Transit System	Type	Mode / Operator #	# of Lines in 2000	# of Lines in 2008
BART (San Francisco)	Urban Rail	11	9	17
Sacramento LRT	LRT	12	1	3
San Diego Trolley	LRT	13	8	10
Santa Clara Valley LRT	LRT	14	3	3
Muni Metro (San Francisco)	Metro	15	6	16
Los Angeles Metro	Urban Rail	16	12	15
San Diego Sprinter	LRT	17	0	2
San Diego Coaster	Commuter Rail	31	2	2
SCAG Metrolink Orange Line	Commuter Rail	32	2	9
SCAG Metrolink Other Lines	Commuter Rail	33	20	33
Altamont Commuter Express (Stockton / San Jose)	Commuter Rail	34	1	2
Caltrain (Gilroy / San Francisco)	Regional Rail	35	13	22
Pacific Surfliner	AMTRAK	41	4	10
Capital Corridor	AMTRAK	42	1	8
San Joaquin Valley	AMTRAK	43	4	4

Thank you!



- Presented by:
Ryan Boynton
Urban Land Use and Transportation Center
University of California, Davis
Office Phone: (530) 752-9614
Email: rmboynton@ucdavis.edu

