

RIVERSIDE COUNTY

RAIL CROSSING PRIORITY ANALYSIS

FINAL REPORT



Prepared for:



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CHAPTER 1- INTRODUCTION

In the last two decades, Riverside County has grown to 1.8 million in population. One effect of the rapid growth has been the emergence of traffic congestion on roadways that previously operated at free flow, even during peak traffic hours. Long-distance commute patterns have created substantial peak hour congestion, particularly in corridors where topographic barriers limit the number of available roadways.

In addition, the movement of freight through Southern California is increasing at a rapid rate. From 2000 to 2005, freight tonnage shipped through the Ports of Los Angeles and Long Beach increased 60%, and is projected to triple between 2000 and 2020. Greater flows of goods result in higher volumes of trains passing through the region.

To accommodate increasing freight rail traffic leaving the Ports of Los Angeles and Long Beach, the Alameda Corridor has been constructed. The Alameda Corridor is a 20-mile freight line that connects the ports of Long Beach and Los Angeles to intermodal facilities near downtown Los Angeles (see Figure 1-1) and generally parallels Alameda Street along most of its route. Throughout the corridor, the rail line is separated from surface street traffic, so the high volume of freight trains does not delay street traffic. In the mid-corridor section, freight trains travel through a 10-mile, 33-foot-deep trench between SR-91 and 25th Street.

After leaving the Alameda Corridor, the majority of trains turn east, destined to intermodal terminals in the Inland Empire or to other parts of the country. This area is known as the Alameda Corridor East (ACE). The rail lines of the Alameda Corridor East pass through the San Gabriel Valley (Los Angeles County), Orange County, San Bernardino County, and Riverside County.

In 2001, the Riverside County Transportation Commission (RCTC) identified long-term needs for grade separation at grade crossings on the railroad mainlines passing through Riverside County, and prioritized the grade separation needs based on several technical criteria. Since then, freight movement and traffic conditions have changed, necessitating an update of the priority analysis. This report documents the updated priority evaluation and its results.

The evaluation of rail crossings addresses the five mainline freight rail lines in Riverside County (see Figure 1-2):

- Union Pacific (Los Angeles Subdivision)
- Burlington Northern Santa Fe (San Bernardino Subdivision)
- Burlington Northern Santa Fe & Union Pacific (Riverside)
- Burlington Northern Santa Fe & Union Pacific (San Bernardino Subdivision)
- Union Pacific (Yuma Main)

(Note: The San Jacinto Branch Line and the spur line off the Union Pacific line do not carry regional rail traffic, and are therefore were not included in the analysis.)

These rail lines accommodate line haul freight service as well as Metrolink commuter rail service and Amtrak passenger service. Currently 71 freight trains per day pass through Riverside County, and the number is projected to increase to 107 by 2030. The increase in train volume means that rail crossing gates will be down for longer periods of time, further delaying Riverside County motorists at the rail crossings. In 2030, with the projected growth of rail traffic and population, several arterials will be blocked by trains for over six hours per day, driver waiting time will increase by more than a factor of four, idling vehicles will generate 468 tons of extra

pollutants annually, and more accidents will occur due to the combined increase in train traffic and automobile volumes. Therefore, safety and delay issues at rail crossings are becoming an increasingly important concern.

The remainder of this report presents the methodology by which the rail crossing improvements were prioritized, potential benefits of grade separations, and the results and recommendations of the prioritization analysis.

LOS ANGELES

SAN BERNARDINO

ORANGE

RIVERSIDE

— Alameda Corridor
- - - Alameda Corridor East

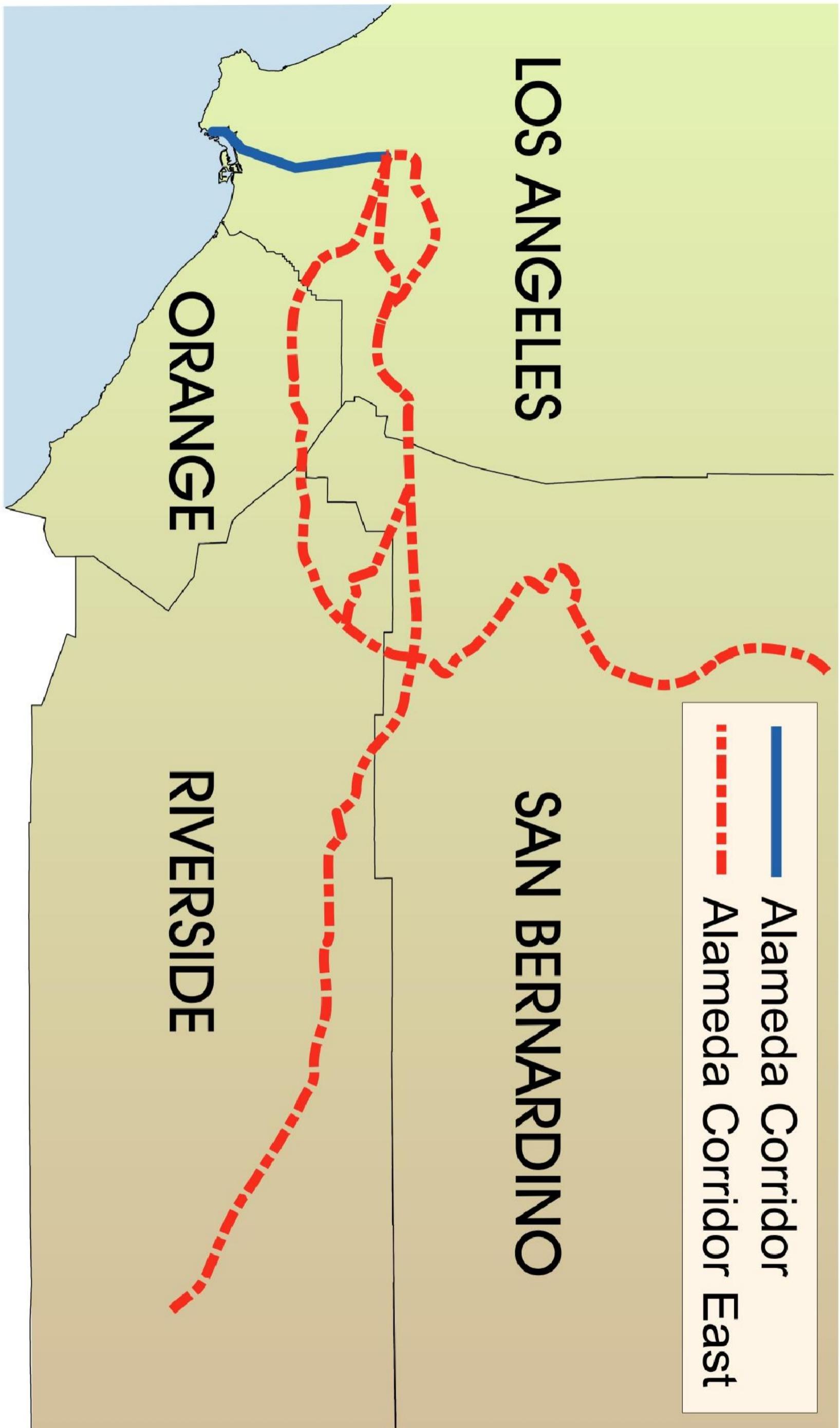


FIGURE 1-1
Alameda Corridor and ACE Rail Lines

At-Grade Crossings of Mainline Freight Rail Lines

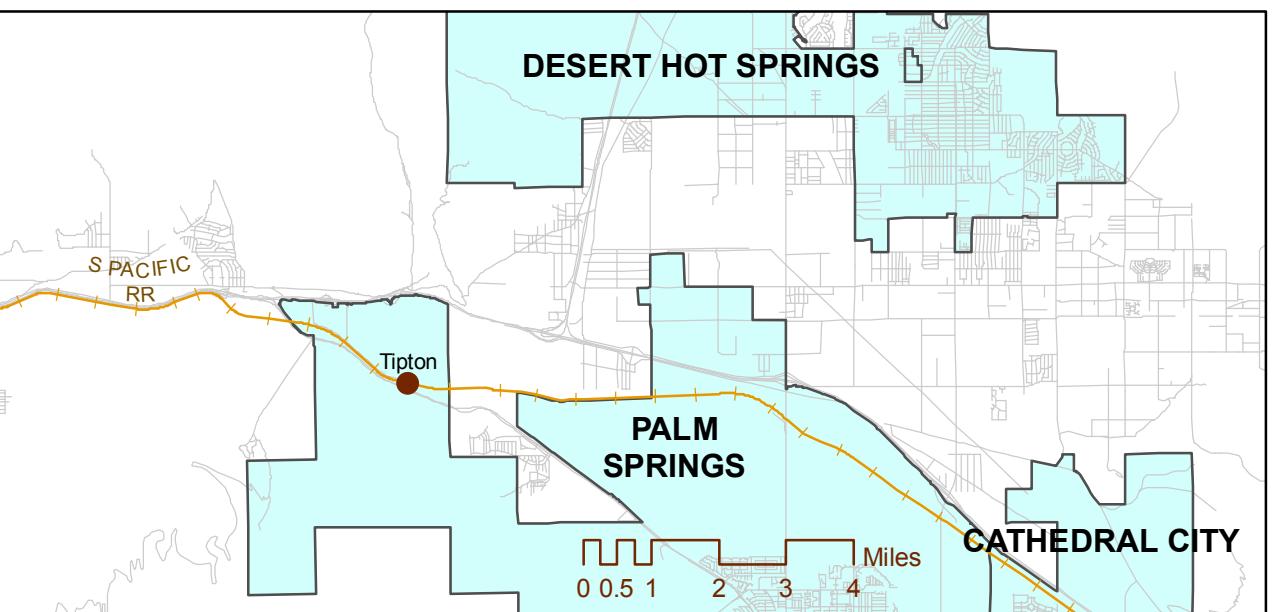
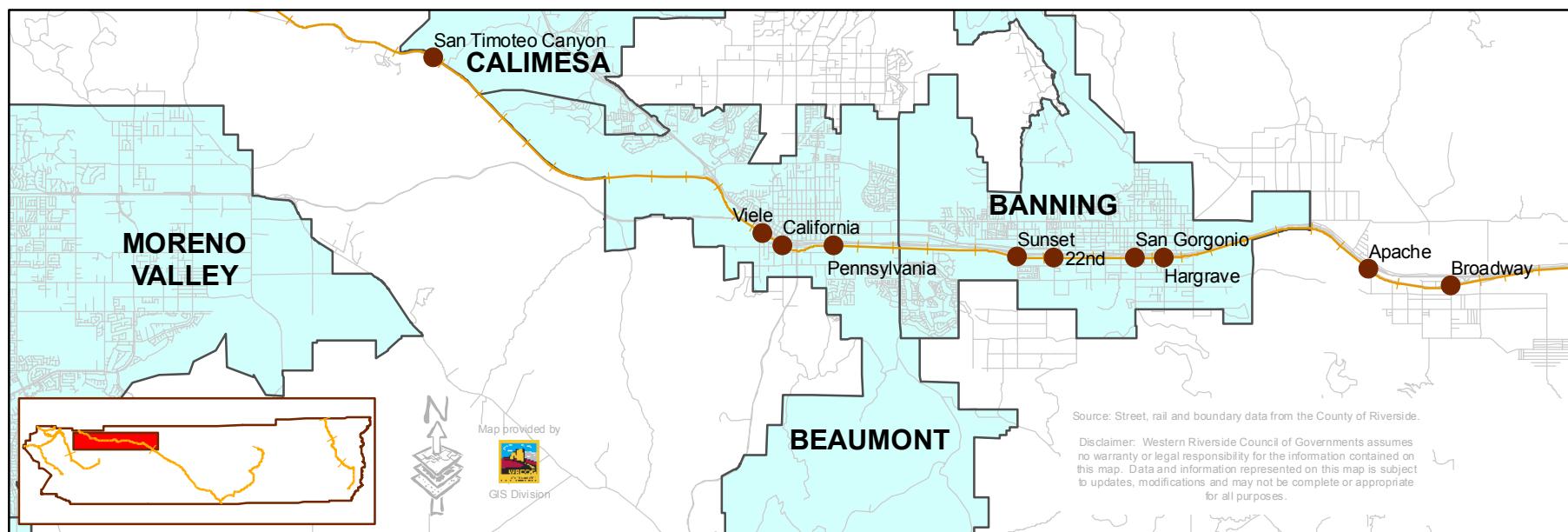
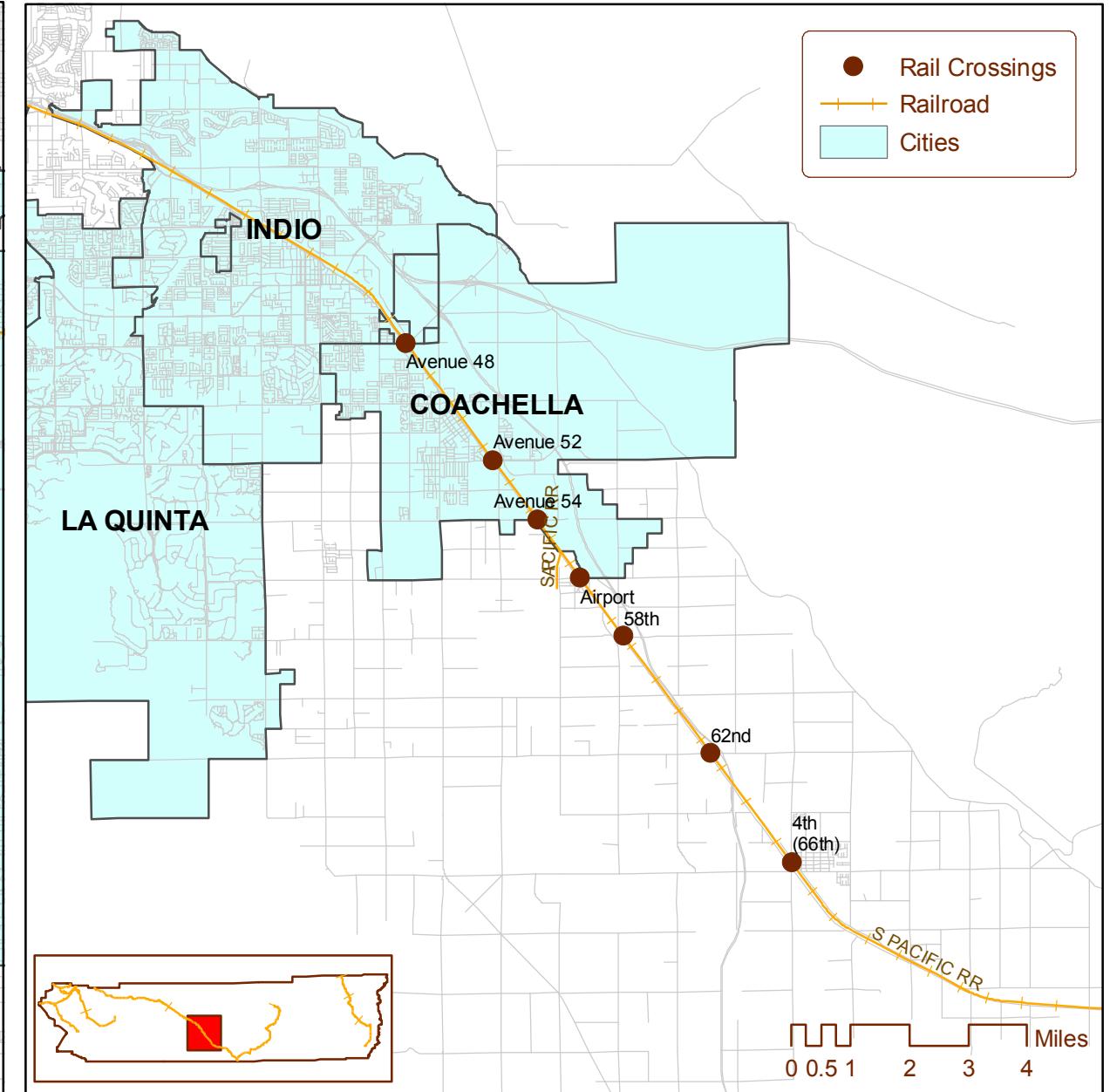
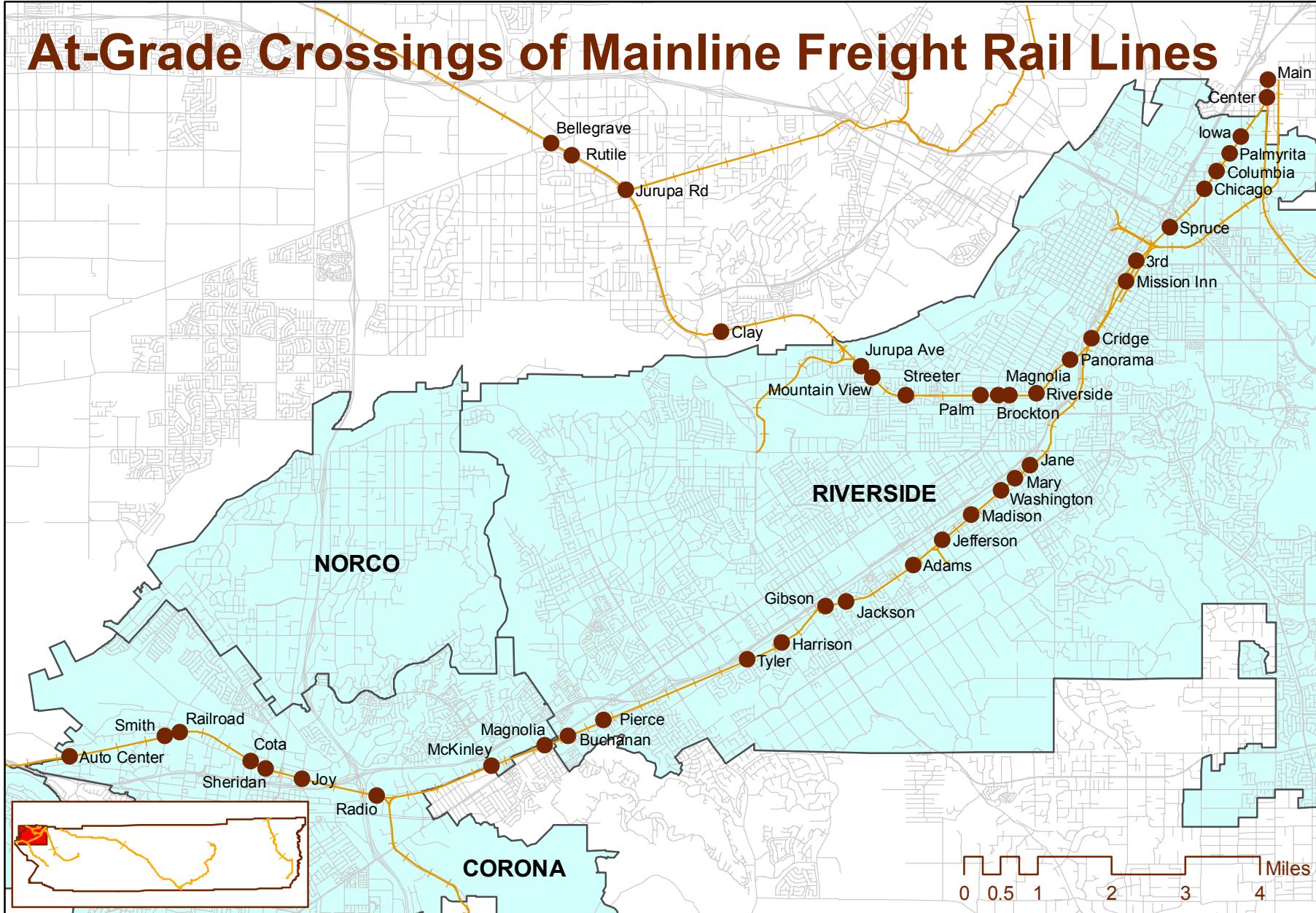


Figure 1-2

CHAPTER 2 - METHODOLOGY

The purpose of this rail crossing priority analysis is to update the 2001 Riverside County Rail Crossing Priority Analysis and to identify rail crossing locations with the greatest need for improvement in Riverside County. This study uses the approved methodology from the 2001 study for the evaluation of updated data. In this analysis, the same seven factors were considered in determining the priority; they were confirmed in consultation with technical staff of the affected jurisdictions, and approved by elected officials on the Riverside County Transportation Commission (RCTC). The factors include:

- Safety - Accident Score Rating (combination of frequency and severity)
- Delay - 2005 Daily Vehicle Delay
- Delay - 2030 Daily Vehicle Delay
- Emissions
- Noise
- Adjacent grade separations
- Local priority ranking

Each rail crossing was evaluated in terms of each of the seven factors, and a score was assigned based on the potential for benefits from grade separation. For example, a location with a high accident rating was given a high score because of the potential to improve safety through grade separation. A location with a high delay was given a high score because of the potential to reduce delay through grade separation.

The scores for each factor were weighted to achieve the relative importance approved by the RCTC Commissioners. The weighted factor scores were combined to achieve an overall score for each location. The overall scores were used to assign each location a relative priority of 1-5, with priority #1 and #2 locations being the locations with greatest need.

The following discussion describes each factor used in the prioritization analysis, and how it was evaluated and scored.

Methodology for Safety Evaluation

Recent rail crossing accident data was obtained from the Federal Railroad Administration (FRA). The Federal Railroad Administration maintains a database of incidents involving rail equipment (both passenger and freight trains) at the crossings. From this database, accident data for each crossing was obtained, representing the accident history for each crossing over a 10-year period (1995-2004).

An overall accident rate was developed for each rail crossing based on the 10 years of recorded incidents. The accident rate took into account both frequency (number of accidents per million vehicles) and severity (property damage only, injury accident, fatality). The calculation produces an overall accident rating that is weighted according to the total number of injury and fatality accidents. Each location was assigned a safety score of 0-5 based on its overall accident rating.

$$\begin{aligned}\text{Overall accident rating} > 0.20 &= 5 \\ 0.15 - 0.20 &= 4 \\ 0.10 - 0.15 &= 3 \\ 0.05 - 0.10 &= 2 \\ 0.001 - 0.05 &= 1 \\ 0.0 &= 0\end{aligned}$$

Methodology for Rail Crossing Delay

Delay impacts at highway/rail grade crossing are characterized in terms of total gate down time in minutes and vehicle-hours of delay per day.

The grade crossing delay analysis used for this study followed the same methodology used in the Riverside County Rail Crossing Priority Analysis (November 2001). This analytical methodology was employed to estimate existing and future levels of delay at each of the grade crossings being studied, including consideration of delays to vehicles on parallel roads adjacent to the rail line. The delay for each grade crossing was calculated two ways. The first method of calculation was based on through train traffic only. The next method of delay calculation includes the delay attributable to switching and operational delays.

The calculation produces the total crossing-gate down-time and vehicle-hours of delay experienced by roadway traffic at each grade crossing location. In addition, it produces an estimate of the length of roadway traffic queue due to the gate down interval caused by trains passing through the crossing. The formulas are as follows:

- *Gate down time (for each train)* = $0.603 + \frac{60 * (\text{train length} + 50 + (12 * \# \text{lanes}))}{5280 * \text{train speed}}$
- *Vehicle delay (for each train)* = $\frac{(\text{gate down time})^2 * \text{vehicle queue per lane}}{2 * (1 - \frac{\text{vehicle queue per lane}}{\text{vehicle departure rate}})} * \frac{1}{60} * \# \text{lanes}$
- *Queue length (for each train)* = *gate down time* * *vehicle queue per lane* * avg. *vehicle length*

Vehicle hours of delay at grade crossings were calculated for both 2005 and 2030 conditions based on existing and future train volumes and traffic volumes.

Existing train activity was determined by means of train observations conducted at 16 grade crossings throughout the study area. These locations were chosen to be geographically representative of the study area and to include all crossings where switching activity occurs. The grade crossings were observed during three day-time periods of 5 AM – 8 PM, and one night-time period of 8 PM – 5 AM. The observations recorded the following information:

- Land use of the surrounding area
- Number of tracks
- The time at which the bell rings for each train arrival and departure
- Total gate down time for each train
- The time it takes for the train to travel through the crossing
- Speed of the train
- Type of train (freight or passenger)
- Train company
- Direction of train travel
- Number of locomotives
- Number of cars
- If the train stops, backs up, or travels through without delay
- Time and quantity of any emergency vehicles using the grade crossing

Observations were made at the following 16 grade crossing locations during December 2005 and January 2006 (the Jurupa Avenue crossing was observed in March 2006).

- Jurupa Road
- Clay Street
- Jurupa Avenue
- Streeter Avenue
- Brockton Avenue
- Magnolia Avenue (UP LA SUB)
- Riverside Avenue
- Auto Center Drive
- McKinley Street
- Adams Street
- 7th Street
- Center Street
- Sunset Avenue
- 22nd Street
- Hargrave Street
- Avenue 54

Information on existing passenger train operations was obtained from Metrolink and Amtrak timetables. Forecasts of freight train and passenger train growth were obtained from studies conducted by the Southern California Association of Governments (SCAG), Metrolink, and freight forecasts for the Ports of Los Angeles and Long Beach.

Existing average daily traffic volumes on roadways crossing the railroad tracks were obtained from the local jurisdictions. To forecast traffic volumes in 2030, the SCAG RIVSAN CTP model and the Coachella Valley Area Transportation Study (CVATS) model were used to determine how much the existing volume would increase by the year 2030. To obtain the 2030 traffic forecast at each location, the actual vehicle counts provided by the localities were factored upwards based on the amount of growth projected by SCAG's regional traffic models.

The delay criterion includes in its calculation the delay experienced at intersections within 200-300 feet of the grade crossing. Delay could potentially occur to through traffic on the parallel street if the through traffic is inhibited by traffic queuing to turn left across the rail line. Delay for these situations was factored into the calculation based on traffic volumes and left turn lane pocket lengths at the locations with adjacent intersections.

As directed by the Riverside County Transportation Commission, the 2001 Study analysis methodology for calculating delay was supplemented to include delay attributable to switching activity or operational delay at the grade crossing locations. The train observation data were used to ascertain the switching and operational delays at each location. Trains were considered to experience switching or operational delay when comparison of count data on adjacent crossings on the same date showed that individual trains did not travel though the adjacent crossings during comparative times. These trains were considered to add "switching/operational delay" to the crossing if their speeds were slow (<20 mph), their gate down time was substantial (>1:00), and they were not overly lengthy (< 10 cars). If adjacent crossing comparisons were not available, "switching/operational delay" was determined based on trains which had slow speeds (<20 mph), substantial gate down time (>1:00), and were not overly lengthy (< 10 cars). For unobserved crossings, a typical operational delay was assigned based on the operational delay observed at other crossings on that line where switching activity was not observed. The typical

operational delay was applied as the minimum switching/operational delay for each crossing on that rail line.

Existing and future vehicle delay at each crossing was calculated two ways: delay attributable to through trains only and total delay including delay attributable to switching and operational delay. Based on these calculations, each location was assigned a score of 0-5 based on the average daily vehicle delay as follows:

2005 Average Daily Vehicle Delay	2030 Average Daily Vehicle Delay	Score
> 30 veh hrs/day	>100 veh hrs/day	= 5
20-30 veh hrs/day	75-100 veh hrs/day	= 4
15-20 veh hrs/day	50-75 veh hrs/day	= 3
10-15 veh hrs/day	25-50veh hrs/day	= 2
5-10 veh hrs/day	10-25 veh hrs/day	= 1
<5 veh hrs/day	< 10 veh hrs/day	= 0

Methodology for Vehicle Emissions

Vehicle emissions resulting from grade crossing delays were calculated for both existing and future years by multiplying the estimated daily delay by the idling vehicle emissions established by the USEPA and published in the April 1998 EPA Emission Facts and summarized in Table 2-1 (<http://www.epa.gov/otaq/consumer/f98014.pdf>, February 2004). As different emission factors are provided for different vehicle classifications, total delay is broken down proportional to vehicle classification. In the absence of a specific estimated vehicle classification breakdown for each grade crossing, vehicle classifications were assumed to be proportional to the 2004 estimated total vehicles for the State of California as published in the Caltrans November 2004 *Motor Vehicle Stock, Travel and Fuel Forecast* and summarized in Tables 2-2 and 2-3. The formula used for calculating the vehicle emissions for each vehicle classification is as follows:

$$VC_{ie} = vhd * ms * vc * ef$$

where

VC_{ie} is idle emissions for vehicle classification type

vhd is total vehicle hours of delay at crossing

ms is vehicle type mode split at crossing

vc is vehicle type classification split by mode for State of California (from Table 2-3 below)

ef is emissions factor for vehicle and fuel type (from Table 2-1)

The total vehicle idle emissions resulting from grade crossing delay is obtained by summing the idle emissions for each vehicle classification type.

Table 2-1 – Emission Factors

Pollutant (g/hr)	Gasoline				Diesel		
	Autos	Light Trucks	Heavy Trucks	Motor- cycles	Autos	Light Trucks	Heavy Trucks
VOC	16.1	24.1	35.8	19.4	3.5	4.6	12.5
CO	229	339	738	435	10	11	94
NO _x	4.7	5.7	10.2	1.7	6.5	6.7	55.0
PM ₁₀	0	0	0	0	2.6	2.6	2.6

Source: Idling Vehicle Emissions, Summer Conditions, EPA, *Emission Facts*, April 1998

Table 2-2 – State of California 2004 Total Vehicles by Classification

Total (millions)	Gasoline				Diesel		
	Autos	Light Trucks	Heavy Trucks	Motor- cycles	Autos	Light Trucks	Heavy Trucks
25.16	21.32	2.30	0.15	0.52	0.18	0.27	0.43
100.00%	84.7%	9.1%	0.6%	2.1%	0.7%	1.1%	1.7%

Source: California Total Vehicles, Caltrans, *California Motor Vehicle Stock, Travel and Fuel Forecast*, November 2004

Table 2-3 – State of California 2004 Total Vehicles Classification by Mode

Automobiles				Trucks				
Total (millions)	Auto - Gas	Motor- cycles	Auto - Diesel	Total (millions)	Light - Gas	Heavy - Gas	Light - Diesel	Heavy - Diesel
22.01	21.32	0.52	0.18	3.15	2.30	0.15	0.27	0.43
100.00%	96.8%	2.4%	0.8%	100.00%	73.1%	4.7%	8.6%	13.7%

Source: California Total Vehicles, Caltrans, *California Motor Vehicle Stock, Travel and Fuel Forecast*, November 2004

Using the combined delay data of 2005 and 2030, each location is assigned an emissions score of 0-100 based on the total daily emissions generated by delayed traffic.

Methodology for Noise Impacts

Noise impacts resulting from mandatory whistle blowing at grade crossings was determined by plotting whistle noise profiles as concentric rings corresponding to estimated decibel levels and judging intrusion into residential areas. Noise profiles are based on a whistle noise level of 108 dBA at 100 feet from the source (FRA, *Determination of a Sound Level for Railroad Horn Regulatory Compliance*, Final Report, October 2002), extending ¼ mile (1,320 feet) on either side of the subject crossing. This level is consistent with the upper portion of the allowed maximum range of whistle levels and the maximum warning distance prescribed in the December 18, 2003 FRA *Interim Final Rule for Use of Locomotive Horns at Highway-Rail Grade Crossings*. Concentric rings corresponding to each 15 dBA reduction in noise level (noise levels typically reduce by 7.5 dBA with each doubling in distance from the source) are drawn until a level of 55 dBA is observed. A noise level of 55 dBA is considered to be below the ambient noise level of a typical residential neighborhood, and therefore the impact of a whistle below this level is considered insignificant. The concentric rings correspond to the distances indicated in Table 2-4, although actual observed distances could vary based on topological and climatic conditions. Each location was assigned a noise score of 0-100 based on a weighted percentage of existing residential development within 1600 foot and 6400 foot contours, and based on the number of trains per day that pass through each crossing. This noise score takes current conditions into consideration as well as future 2030 population and train number projections.

Table 2-4 – Noise Level from Source

Noise Level (dBA)	108	93	78	63	55.5
Distance from Source (feet)	100	400	1,600	6,400	12,800

Source: Derived from FRA, *Use of Locomotive Horns at Highway-Rail Grade Crossings, Interim Final Rule*, December 2003

Methodology for Distance to Nearest Grade Separation

The distance to the nearest adjacent grade separation was measured using map and field information. Each grade crossing location was assigned a score of 0-5 for adjacent grade separations based on the distance to the nearest grade separation, as follows:

Distance to nearest grade separation >1.0 mile = 5

.5 – 1.0 mile = 3

.25 – .5 mile = 1

< .25 mile = 0

Methodology for Local Agency Priority

Local agency priorities were determined through a survey of the affected local agencies, and the results were scaled so that the highest priority location in each jurisdiction received the highest score and the lowest priority location in each jurisdiction received the lowest score. Rankings from the cities of Coachella and Beaumont were taken from the previous 2001 study. Each crossing was assigned a score of 1-25 for local priority, with the local agency's highest priority location receiving 25 points, with lower priority locations receiving points in a descending scale so that in each jurisdiction the lowest priority location received $25/x$ points (where x is the number of crossings in that jurisdiction). Following is an example from the City of Corona:

Cross Street	Local Rank	Score
McKinley St	1	25
Auto Center Dr	2	22
Railroad St	3	19
Smith Av	4	16
Radio Rd	5	13
Cota St	6	9
Joy St	7	6
Sheridan St	8	3

Weighting Points

Each criterion was evaluated separately before the scores for each criterion were combined into an overall score for the crossing. In calculating the overall score, the individual criteria were weighted as follows:

- Existing delay: 20 percent of total score
- Future delay: 20 percent of total score
- Accident reduction: 20 percent of total score
- Distance to nearest grade separation: 10 percent of total score
- Local priority: 10 percent of total score
- Emissions reduction: 10 percent of total score
- Noise reduction: 10 percent of total score

The relative weighting applied to the various criteria were approved by elected officials representing Riverside County and the local agencies on the Riverside County Transportation Commission.

To achieve the desired weighting, each score was multiplied by a weighting factor that was applied in order to: (1) normalize all the scores relative to each other; and (2) apply the additional weighting to the delay and safety scores. The following table shows the scoring and weighting factors applied to each criterion:

Criterion	Maximum Score	Weighting Factor	Maximum Possible Weighted Score
Safety	5	200	1000
2005 Delay	5	200	1000
2030 Delay	5	200	1000
Emissions	100	5	500
Noise	100	5	500
Nearest Grade Separation	5	100	500
Local Priority	25	20	500

Priority Groupings

From the evaluation of these factors, the rail crossings were separated into five groups to indicate their relative priority for improvement, with the crossings grouped according to their overall score and Group #1 representing the highest priority locations.

CHAPTER 3 – BENEFITS OF GRADE SEPARATIONS

The methodologies described in Chapter 2 were applied to each of the seven evaluation factors. Two separate scoring calculations were performed: the first includes delay calculations pertaining to through trains only, and the second includes switching and operational delay. The resulting analysis data gives insight into the potential benefits associated with grade separation construction for each crossing in the study area.

The train operating characteristics are summarized in the following three tables. Table 3-1 summarizes the current (observed) and future (estimated) train volumes applied in the analysis.

**TABLE 3-1
TRAIN VOLUMES**

Rail Line	2005			2030		
	Freight	Metrolink	Amtrak	Freight	Metrolink	Amtrak
UP (LA SUB)	30	12	0	45	28	0
BNSF (SB SUB)	41	25	2	62	38	4
BNSF & UP (Cridge)	71	33	2	107	62	4
BNSF & UP	71	8	2	107	24	4
UP (YUMA)	36	0	1	54	0	1

Notes: Metrolink trains include 91 line and Inland Empire-OC line (normal operating schedule)

Year 2005 freight train volumes were increased by 50% to estimate 2030 volumes

Table 3-2 shows the allocation of trains by time period during the day – this is important because nighttime train movements involve lower volumes of traffic at the rail crossings.

**TABLE 3-2
TRAIN VOLUMES BY TIME PERIOD**

Rail Line	2005			Time Period	2030		
	# of Freight Trains	# of Metrolink Trains	# of Amtrak Trains		# of Freight Trains	# of Metrolink Trains	# of Amtrak Trains
UP (LA SUB)	13	2	0	Eve/Night	20	7	0
	7	7	0	Peak	10	14	0
	10	3	0	Midday	15	7	0
BNSF (SB SUB)	22	3	0	Eve/Night	33	4	0
	10	14	2	Peak	15	22	4
	9	8	0	Midday	14	12	0
BNSF & UP	34	4	0	Eve/Night	51	9	0
	19	19	2	Peak	29	34	4
	18	10	0	Midday	27	19	0
BNSF & UP	34	1	0	Eve/Night	51	5	0
	19	5	2	Peak	29	12	4
	18	2	0	Midday	27	7	0
UP (YUMA)	13	0	0	Eve/Night	20	0	0
	11	0	1	Peak	17	0	1
	12	0	0	Midday	18	0	0

Peak Hours = 5 am - 8 am and 3 pm - 7 pm

Midday Hours = 8am - 3 pm

Evening/Night Hours = 7 pm - 5 am

Table 3-3 reports the observed train speeds and lengths on each line.

TABLE 3-3
TRAIN SPEEDS AND LENGTHS

Rail Road Line	2005				
	Freight Speed	Passenger Speed	Freight Length (ft)	Metrolink Length (ft)	Amtrak Length (ft)
UP (LA SUB)	30 _(a)	60 _(a)	4000	500	
BNSF (SB SUB)	40	55 _(b)	4900	500	1000
BNSF & UP	30	45	4700	500	1000
UP (YUMA)	25	40	4300		1000
UP (YUMA) Coachella _(c)	40	50	4300		1000

- (a) Riverside crossing has a freight speed of 25 mph and a passenger speed of 45 mph due to slow speed approaching the merge with the BNSF rail line
- (b) Lower passenger speed of 40 mph at Auto Center crossing due to adjacent station
- (c) faster speeds through Coachella (Ave 48 - Ave 66)

Note: freight and Metrolink train lengths assumed to increase by 50% for Year 2030

The analysis evaluates several areas of concern for Riverside County residents that affect existing daily life and would increasingly affect daily life in the forecasted year 2030. Table 3-4 summarizes the gate down time and vehicle hours of delay per day for 2005 and 2030. The total gate down time per day was measured in hours for each crossing, and is the number of hours every day that the crossing gates are down. In the forecast year 2030 it is estimated that the crossing gates will be down for all crossings in Riverside County for a total of 223 hours (including switching and operational delay). Vehicle hours of delay per day takes queue length into consideration and quantifies how many hours drivers are delayed per day at each crossing due to train activity. In the forecast year 2030 it is estimated that the drivers will experience 5,279 hours of delay for train activity that includes switching and operational delay. These benefits can only be achieved if it were possible to grade separate all crossings.

Air pollution emissions associated with delay from train activity at each grade crossing was measured in tons per year for particulate matter (PM₁₀), nitrogen oxide (NO_x), volatile organic compounds (VOC), and carbon monoxide (CO). Table 3-5 summarizes the emissions in tons per year for 2005 and 2030. In the forecast year 2030 it is estimated that 568 tons of the various emissions will pollute Riverside County air due to traffic delays attributable to train activity that includes switching and operational delay.

Table 3-6 shows the accident history and noise-impacted population for all study crossings. A total of 63 accidents over a ten year period might be avoidable if all crossings were grade separated. The noise analysis shows the population surrounding each grade crossing affected by 78 and 63 dB levels from train whistles. In 2030, a single grade separation could eliminate 63 dB train whistle impacts on as many as 35,000 people.

TABLE 3-4
GATE DOWN TIME AND VEHICLE DELAY

Rail Line	Cross Street	Jurisdiction	Total Train Activity Including Switching and Operational Delay			
			Year 2005 Total Gate Down Time in Mins.	Year 2030 Total Gate Down Time in Mins.	Year 2005 Vehicle Hours of Delay Per Day	Year 2030 Vehicle Hours of Delay Per Day
UP (LA SUB)	Bellgrave Av	Riverside County	82.9	161.9	10.9	48.5
UP (LA SUB)	Rutile St	Riverside County	82.9	161.9	13.7	41.4
UP (LA SUB)	Jurupa Rd	Riverside County	126.9	205.9	105.4	291.7
UP (LA SUB)	Clay St	Riverside County	84.3	163.5	42.5	131.8
UP (LA SUB)	Jurupa Ave	Riverside	83.3	162.5	16.4	48.7
UP (LA SUB)	Mountain View Av	Riverside	82.9	161.9	2.9	10.4
UP (LA SUB)	Streeter Av	Riverside	91.5	170.7	29.2	72.8
UP (LA SUB)	Palm Av	Riverside	82.9	161.9	16.0	44.7
UP (LA SUB)	Brockton Av	Riverside	83.3	162.5	19.7	53.2
UP (LA SUB)	Magnolia Av	Riverside	96.7	175.9	99.3	187.3
UP (LA SUB)	Riverside Av	Riverside	114.6	206.0	88.3	139.4
UP (LA SUB)	Panorama Rd	Riverside	114.5	206.0	30.9	58.7
BNSF (SB SUB)	Auto Center Dr	Corona	114.4	214.6	23.3	264.1
BNSF (SB SUB)	Smith Av	Corona	104.8	203.5	19.7	126.1
BNSF (SB SUB)	Railroad St	Corona	104.8	203.5	10.6	91.3
BNSF (SB SUB)	Cota St	Corona	104.3	202.8	5.8	36.8
BNSF (SB SUB)	Sheridan St	Corona	104.3	202.8	2.8	9.1
BNSF (SB SUB)	Joy St	Corona	104.3	202.8	6.3	31.3
BNSF (SB SUB)	Radio Rd	Corona	104.3	202.8	4.8	15.7
BNSF (SB SUB)	McKinley St	Corona	106.2	204.9	65.2	276.7
BNSF (SB SUB)	Magnolia Av	Riverside County	104.8	203.5	24.8	103.4
BNSF (SB SUB)	Buchanan St	Riverside	104.3	202.8	4.3	24.2
BNSF (SB SUB)	Pierce St	Riverside	104.3	202.8	12.1	50.8
BNSF (SB SUB)	Tyler St	Riverside	104.8	203.5	16.9	81.5
BNSF (SB SUB)	Harrison St	Riverside	104.3	202.8	6.9	24.6
BNSF (SB SUB)	Gibson St	Riverside	104.3	202.8	2.9	9.5
BNSF (SB SUB)	Jackson St	Riverside	104.8	203.5	7.7	22.5
BNSF (SB SUB)	Adams St	Riverside	104.8	203.5	38.4	114.5
BNSF (SB SUB)	Jefferson St	Riverside	104.3	202.8	8.7	29.2
BNSF (SB SUB)	Madison St	Riverside	104.8	203.5	14.7	38.8
BNSF (SB SUB)	Washington St	Riverside	104.3	202.8	10.3	37.4
BNSF (SB SUB)	Mary St	Riverside	104.8	203.5	13.2	49.9
BNSF (SB SUB)	Jane St	Riverside	104.3	202.8	5.0	16.5
BNSF & UP (RIV)	Cridge St	Riverside	170.6	343.4	13.7	48.1
BNSF & UP (SB SUB)	7th St	Riverside	186.1	383.6	21.6	146.5
BNSF & UP (SB SUB)	3rd St	Riverside	185.6	383.4	37.4	148.0
BNSF & UP (SB SUB)	Spruce St (BNSF)	Riverside	185.6	383.4	4.4	54.2
BNSF & UP (SB SUB)	Chicago Av	Riverside	185.6	383.4	33.0	168.1
BNSF & UP (SB SUB)	Columbia Av (BNSF)	Riverside	185.6	383.4	33.9	145.4
BNSF & UP (SB SUB)	Palmyrita Av (UP)	Riverside	184.9	382.2	5.5	49.0
BNSF & UP (SB SUB)	Iowa Av (BNSF)	Riverside	185.6	383.4	51.8	254.1
BNSF & UP (SB SUB)	Center St	Riverside County	187.4	385.2	20.0	85.0
BNSF & UP (SB SUB)	Main St	Riverside County	184.9	382.2	5.8	24.1
UP (YUMA MAIN)	San Timoteo Canyon Rd	Calimesa	101.2	200.6	0.6	2.0
UP (YUMA MAIN)	Viele Av	Beaumont	101.2	200.6	0.2	0.6
UP (YUMA MAIN)	California Av	Beaumont	101.2	201.2	8.9	100.2
UP (YUMA MAIN)	Pennsylvania Av	Beaumont	101.2	201.2	3.8	64.6
UP (YUMA MAIN)	Sunset Av	Banning	101.2	200.6	40.4	194.0
UP (YUMA MAIN)	22nd St	Banning	103.5	202.9	39.9	97.7
UP (YUMA MAIN)	San Gorgonio Av	Banning	101.2	200.6	28.0	102.8
UP (YUMA MAIN)	Hargrave St	Banning	111.8	211.2	68.0	534.3
UP (YUMA MAIN)	Apache Trail	Riverside County	101.2	200.6	3.3	144.9
UP (YUMA MAIN)	Broadway	Riverside County	101.2	200.6	10.0	33.9
UP (YUMA MAIN)	Tipton Rd	Palm Springs	101.2	200.6	0.2	0.6
UP (YUMA MAIN)	Avenue 48/Dillon Road	Indio/Coachella	74.5	140.9	12.9	81.5
UP (YUMA MAIN)	Avenue 52	Coachella	74.5	140.9	15.2	45.4
UP (YUMA MAIN)	Avenue 54	Coachella	80.8	147.1	1.9	4.3
UP (YUMA MAIN)	Airport Drive	Riverside County	74.3	140.9	6.5	18.3
UP (YUMA MAIN)	Avenue 58	Riverside County	74.3	140.5	1.6	4.7
UP (YUMA MAIN)	Avenue 62	Riverside County	74.3	141.2	2.6	110.6
UP (YUMA MAIN)	Avenue 66	Riverside County	74.3	140.5	11.0	33.5
TOTALS (hours per day)			114	223	1,262	5,279

TABLE 3-5
VEHICLE EMISSIONS

Rail Line	Cross Street	Jurisdiction	Total Train Activity Including Switching and Operational Delay								
			2005 Delay Emissions PM10 (g/day)	2030 Delay Emissions PM10 (g/day)	2005 Delay Emissions NOx (g/day)	2030 Delay Emissions NOx (g/day)	2005 Delay Emissions VOC (g/day)	2030 Delay Emissions VOC (g/day)	2005 Delay Emissions CO (kg/day)	2030 Delay Emissions CO (kg/day)	
UP (LA SUB)	Bellgrave Av	Riverside County	1.45	6.43	68.52	303.85	187.50	831.43	2.68	11.88	
UP (LA SUB)	Rutile St	Riverside County	1.82	5.49	86.02	259.60	235.38	710.36	3.36	10.15	
UP (LA SUB)	Jurupa Rd	Riverside County	13.98	38.68	660.44	1,827.52	1,807.19	5,000.73	25.83	71.47	
UP (LA SUB)	Clay St	Riverside County	5.63	17.48	265.98	826.01	727.81	2,260.26	10.40	32.30	
UP (LA SUB)	Jurupa Ave	Riverside	0.80	2.37	82.68	245.64	267.70	795.32	3.86	11.45	
UP (LA SUB)	Mountain View Av	Riverside	0.14	0.51	14.62	52.48	47.33	169.93	0.68	2.45	
UP (LA SUB)	Streeter Av	Riverside	1.42	3.55	147.53	367.57	477.66	1,190.11	6.88	17.14	
UP (LA SUB)	Palm Av	Riverside	0.78	2.18	80.90	225.83	261.93	731.20	3.77	10.53	
UP (LA SUB)	Brockton Av	Riverside	1.51	4.08	107.59	290.31	327.69	884.21	4.71	12.70	
UP (LA SUB)	Magnolia Av	Riverside	7.62	14.36	541.83	1,021.39	1,650.31	3,110.93	23.70	44.69	
UP (LA SUB)	Riverside Av	Riverside	6.77	10.69	481.53	760.31	1,466.63	2,315.72	21.07	33.26	
UP (LA SUB)	Panorama Rd	Riverside	1.51	2.86	156.02	296.19	505.15	959.00	7.28	13.81	
BNSF (SB SUB)	Auto Center Dr	Corona	3.09	35.01	145.83	1,654.46	399.04	4,527.19	5.70	64.70	
BNSF (SB SUB)	Smith Av	Corona	2.62	16.72	123.70	789.94	338.49	2,161.56	4.84	30.89	
BNSF (SB SUB)	Railroad St	Corona	1.40	12.10	66.12	571.83	180.94	1,564.73	2.59	22.36	
BNSF (SB SUB)	Cota St	Corona	0.77	4.88	36.27	230.62	99.25	1,564.73	1.42	22.36	
BNSF (SB SUB)	Sheridan St	Corona	0.29	0.95	16.32	53.12	47.01	153.01	0.67	2.19	
BNSF (SB SUB)	Joy St	Corona	0.83	4.15	39.39	196.21	107.78	536.89	1.54	7.67	
BNSF (SB SUB)	Radio Rd	Corona	0.63	2.08	29.89	98.32	81.79	269.04	1.17	3.84	
BNSF (SB SUB)	McKinley St	Corona	6.82	28.96	381.78	1,621.52	1,099.66	4,670.56	15.75	66.92	
BNSF (SB SUB)	Magnolia Av	Riverside County	2.59	10.82	145.19	606.06	418.20	1,745.66	5.99	25.01	
BNSF (SB SUB)	Buchanan St	Riverside	0.45	2.54	25.44	142.00	73.28	409.00	1.05	5.86	
BNSF (SB SUB)	Pierce St	Riverside	1.26	5.32	70.75	297.75	203.79	857.64	2.92	12.29	
BNSF (SB SUB)	Tyler St	Riverside	1.30	6.25	92.29	444.67	281.10	1,354.36	4.04	19.45	
BNSF (SB SUB)	Harrison St	Riverside	0.72	2.58	40.34	144.27	116.18	415.54	1.66	5.95	
BNSF (SB SUB)	Gibson St	Riverside	0.31	0.99	17.10	55.71	49.25	160.47	0.71	2.30	
BNSF (SB SUB)	Jackson St	Riverside	0.37	1.10	38.74	113.70	125.44	368.13	1.81	5.30	
BNSF (SB SUB)	Adams St	Riverside	4.02	11.98	225.01	670.98	648.10	1,932.67	9.29	27.69	
BNSF (SB SUB)	Jefferson St	Riverside	0.91	3.05	51.05	171.05	147.05	492.67	2.11	7.06	
BNSF (SB SUB)	Madison St	Riverside	1.13	2.98	80.33	211.76	244.68	644.97	3.51	9.26	
BNSF (SB SUB)	Washington St	Riverside	0.79	2.87	56.44	204.23	171.90	622.04	2.47	8.94	
BNSF (SB SUB)	Mary St	Riverside	1.01	3.82	71.90	271.96	218.98	828.32	3.15	11.90	
BNSF (SB SUB)	Jane St	Riverside	0.38	1.26	27.31	89.76	83.19	273.39	1.19	3.93	
BNSF & UP (RIV)	Cr ridge St	Riverside	1.82	6.38	85.77	301.32	234.71	824.51	3.35	11.78	
BNSF & UP (SB SUB)	7th St	Riverside	2.26	15.34	126.75	858.67	365.07	2,473.26	5.23	35.43	
BNSF & UP (SB SUB)	3rd St	Riverside	4.96	19.62	234.20	927.28	640.85	2,537.35	9.16	36.26	
BNSF & UP (SB SUB)	Spruce St (BNSF)	Riverside	0.58	7.18	27.62	339.47	75.59	928.92	1.08	13.28	
BNSF & UP (SB SUB)	Chicago Av	Riverside	3.45	17.59	193.22	985.07	556.54	2,837.35	7.97	40.65	
BNSF & UP (SB SUB)	Columbia Av (BNSF)	Riverside	4.50	19.29	212.56	911.28	581.64	2,493.58	8.31	35.64	
BNSF & UP (SB SUB)	Palmyrita Av (UP)	Riverside	0.73	6.50	34.73	307.21	95.03	840.62	1.36	12.01	
BNSF & UP (SB SUB)	Iowa Av (BNSF)	Riverside	5.42	26.60	303.35	1,489.17	873.75	4,289.33	12.52	61.45	
BNSF & UP (SB SUB)	Center St	Riverside County	2.65	11.27	125.39	532.49	343.10	1,457.07	4.90	20.82	
BNSF & UP (SB SUB)	Main St	Riverside County	0.76	3.20	36.11	151.07	98.80	413.39	1.41	5.91	
UP (YUMA MAIN)	San Timoteo Canyon Rd	Calimesa	0.03	0.10	3.04	10.05	9.83	32.55	0.14	0.47	
UP (YUMA MAIN)	Viele Av	Beaumont	0.02	0.06	1.03	3.42	2.97	9.85	0.04	0.14	
UP (YUMA MAIN)	California Av	Beaumont	0.93	10.48	52.04	586.86	149.90	1,690.36	2.15	24.22	
UP (YUMA MAIN)	Pennsylvania Av	Beaumont	0.40	6.76	22.56	378.42	64.97	1,089.99	0.93	15.62	
UP (YUMA MAIN)	Sunset Av	Banning	3.10	14.88	220.43	1,057.82	671.38	3,221.89	9.64	46.28	
UP (YUMA MAIN)	22nd St	Banning	3.06	7.49	217.54	532.91	662.57	1,623.13	9.52	23.31	
UP (YUMA MAIN)	San Gorgonio Av	Banning	3.71	13.63	175.40	643.92	479.95	1,761.99	6.86	25.18	
UP (YUMA MAIN)	Hargrave St	Banning	9.02	70.85	426.32	3,347.77	1,166.57	9,160.67	16.67	130.92	
UP (YUMA MAIN)	Apache Trail	Riverside County	0.16	7.06	16.77	731.36	54.31	2,368.00	0.78	34.10	
UP (YUMA MAIN)	Broadway	Riverside County	0.76	2.60	54.28	184.70	165.33	562.56	2.37	8.08	
UP (YUMA MAIN)	Tipton Rd	Palm Springs	0.01	0.03	0.98	3.25	3.17	10.52	0.05	0.15	
UP (YUMA MAIN)	Avenue 48/Dillon Road	Indio/Coachella	0.63	3.97	65.10	411.46	210.79	1,332.22	3.04	19.19	
UP (YUMA MAIN)	Avenue 52	Coachella	0.74	2.22	76.51	229.43	247.73	742.85	3.57	10.70	
UP (YUMA MAIN)	Avenue 54	Coachella	0.09	0.21	9.72	21.53	31.47	69.70	0.45	1.00	
UP (YUMA MAIN)	Airport Drive	Riverside County	0.32	0.89	32.99	92.25	106.81	298.70	1.54	4.30	
UP (YUMA MAIN)	Avenue 58	Riverside County	0.08	0.23	8.00	23.59	25.91	76.37	0.37	1.10	
UP (YUMA MAIN)	Avenue 62	Riverside County	0.13	5.39	12.99	558.09	42.07	1,806.98	0.61	26.02	
UP (YUMA MAIN)	Avenue 66	Riverside County	0.54	1.63	55.41	169.07	179.40	547.40	2.58	7.88	
TOTALS (grams per day)			126	551	7,306	30,906	21,238	90,013	304,406	1,289,637	
TOTALS (tons per year)			0.05	0.22	2.94	1					

TABLE 3-6
ACCIDENT HISTORY AND NOISE-IMPACTED POPULATION

Rail Line	Cross Street	Jurisdiction	Accidents				Noise *	
			Non-Injury Accidents	Injury Accidents	Fatal Accidents	Total # of Accidents	Population 1600'	Population 6400'
UP (LA SUB)	Bellgrave Av	Riverside County	3	0	0	3	541	8,261
UP (LA SUB)	Rutile St	Riverside County	0	0	0	0	614	8,709
UP (LA SUB)	Jurupa Rd	Riverside County	3	2	1	6	972	9,856
UP (LA SUB)	Clay St	Riverside County	0	1	0	1	1,247	9,227
UP (LA SUB)	Jurupa Ave	Riverside	1	1	0	2	2,811	21,987
UP (LA SUB)	Mountain View Av	Riverside	1	0	0	1	2,811	21,987
UP (LA SUB)	Streeter Av	Riverside	0	0	1	1	2,898	24,226
UP (LA SUB)	Palm Av	Riverside	0	0	0	0	3,312	25,429
UP (LA SUB)	Brockton Av	Riverside	0	1	0	1	2,138	25,436
UP (LA SUB)	Magnolia Av	Riverside	1	0	0	1	1,233	24,520
UP (LA SUB)	Riverside Av	Riverside	1	0	1	2	1,253	21,936
UP (LA SUB)	Panorama Rd	Riverside	0	0	0	0	2,071	24,072
BNSF (SB SUB)	Auto Center Dr	Corona	1	0	0	1	843	18,169
BNSF (SB SUB)	Smith Av	Corona	0	0	0	0	1,612	26,062
BNSF (SB SUB)	Railroad St	Corona	0	0	0	0	1,612	27,409
BNSF (SB SUB)	Cota St	Corona	0	0	0	0	1,403	34,951
BNSF (SB SUB)	Sheridan St	Corona	0	0	0	0	1,200	33,801
BNSF (SB SUB)	Joy St	Corona	0	0	0	0	1,210	27,919
BNSF (SB SUB)	Radio Rd	Corona	0	0	0	0	800	18,837
BNSF (SB SUB)	McKinley St	Corona	2	0	1	3	2,851	20,202
BNSF (SB SUB)	Magnolia Av	Riverside County	2	3	1	6	2,851	23,596
BNSF (SB SUB)	Buchanan St	Riverside	0	0	3	3	2,485	22,661
BNSF (SB SUB)	Pierce St	Riverside	1	0	0	1	2,699	25,527
BNSF (SB SUB)	Tyler St	Riverside	1	0	0	1	1,925	21,398
BNSF (SB SUB)	Harrison St	Riverside	0	0	0	0	1,524	20,515
BNSF (SB SUB)	Gibson St	Riverside	0	0	0	0	1,918	21,386
BNSF (SB SUB)	Jackson St	Riverside	1	0	0	1	2,952	24,068
BNSF (SB SUB)	Adams St	Riverside	1	0	0	1	2,630	24,406
BNSF (SB SUB)	Jefferson St	Riverside	1	0	0	1	1,581	22,834
BNSF (SB SUB)	Madison St	Riverside	1	0	1	2	1,691	22,621
BNSF (SB SUB)	Washington St	Riverside	0	0	0	0	1,575	22,375
BNSF (SB SUB)	Mary St	Riverside	0	1	0	1	2,060	21,946
BNSF (SB SUB)	Jane St	Riverside	0	0	0	0	2,099	23,330
BNSF & UP (RIV)	Cridge St	Riverside	0	0	0	0	2,119	27,058
BNSF & UP (SB SUB)	7th St	Riverside	0	0	0	0	2,446	24,985
BNSF & UP (SB SUB)	3rd St	Riverside	1	0	0	1	1,140	26,686
BNSF & UP (SB SUB)	Spruce St (BNSF)	Riverside	1	0	0	1	819	26,523
BNSF & UP (SB SUB)	Chicago Av	Riverside	3	1	0	4	1,264	21,672
BNSF & UP (SB SUB)	Columbia Av (BNSF)	Riverside	1	0	0	1	1,082	12,937
BNSF & UP (SB SUB)	Palmyrita Av (UP)	Riverside	0	0	1	1	1,088	12,426
BNSF & UP (SB SUB)	Iowa Av (BNSF)	Riverside	1	0	0	1	524	9,325
BNSF & UP (SB SUB)	Center St	Riverside County	0	0	0	0	965	9,989
BNSF & UP (SB SUB)	Main St	Riverside County	0	0	0	0	1,153	8,510
UP (YUMA MAIN)	San Timoteo Canyon Rd	Calimesa	1	1	0	2	37	414
UP (YUMA MAIN)	Viele Av	Beaumont	0	2	0	2	323	7,065
UP (YUMA MAIN)	California Av	Beaumont	0	0	0	0	505	7,554
UP (YUMA MAIN)	Pennsylvania Av	Beaumont	0	0	0	0	436	6,779
UP (YUMA MAIN)	Sunset Av	Banning	1	0	0	1	921	8,334
UP (YUMA MAIN)	22nd St	Banning	0	0	0	0	832	8,931
UP (YUMA MAIN)	San Gorgonio Av	Banning	1	0	0	1	969	9,620
UP (YUMA MAIN)	Hargrave St	Banning	1	0	0	1	390	7,213
UP (YUMA MAIN)	Apache Trail	Riverside County	0	0	0	0	143	780
UP (YUMA MAIN)	Broadway	Riverside County	0	0	1	1	711	1,074
UP (YUMA MAIN)	Tipton Rd	Palm Springs	0	0	0	0	0	0
UP (YUMA MAIN)	Avenue 48/Dillon Road	Indio/Coachella	2	0	0	2	582	7,400
UP (YUMA MAIN)	Avenue 52	Coachella	0	0	0	0	900	10,311
UP (YUMA MAIN)	Avenue 54	Coachella	0	0	0	0	113	3,132
UP (YUMA MAIN)	Airport Drive	Riverside County	0	1	0	1	167	2,565
UP (YUMA MAIN)	Avenue 58	Riverside County	0	0	0	0	176	4,260
UP (YUMA MAIN)	Avenue 62	Riverside County	0	1	0	1	143	2,261
UP (YUMA MAIN)	Avenue 66	Riverside County	0	0	3	3	537	3,677
TOTALS			34	15	14	63	81,907	1,001,140

* Populations may overlap at adjacent crossings - Totals likely include double-counting

CHAPTER 4 - RESULTS

The individual scores for each of the seven criteria factors were calculated, and are reported in Table 4-1 for total train activity including switching and operational delay. (Results for base activity including only through train delay are provided in the Appendix.) An overall weighted score was calculated and represents the sum of the individual factor scores after being multiplied by their respective weighting factors.

Priority groupings were assigned as follows:

- Group 1: Overall weighted score ≥ 3700
- Group 2: Overall weighted score > 2630 and < 3700
- Group 3: Overall weighted score > 2090 and ≤ 2630
- Group 4: Overall weighted score > 1075 and < 2090
- Group 5: Overall weighted score ≤ 1075

A total of ten crossings are in the highest priority group (Group 1) and eighteen are in the second highest priority group. Eleven crossings were grouped into priority group 3 and sixteen crossings were put in priority group 4. Only six crossings received the lowest priority in group 5. Figure 4-1 and Table 4-2 show the priority group ranking for all crossings based on the switching and operational delay analysis. Figure 4-2 and Table 4-3 show those locations that received the highest priority scores and ranked in Group 1 or Group 2.

The total quantitative benefits for the construction of grade crossings in existing conditions and the forecasted year 2030 for the top two priority tiers are summarized in Table 4-4. If all crossings in the top two tiers were grade separated by the year 2030, a total of approximately 115 hours of gate down time per day would be avoided, vehicle hours of delay per day would be reduced by over 4,000 hours, 43 accidents might be avoided over a ten year period, 431 tons of air pollutants would not be released into the atmosphere, and a few hundred thousand people would experience less noise from train whistles.

TABLE 4-1
Priority Factors Scoring with Switching/Operational Delay

Ref No.	Rail Line	Cross Street	Jurisdiction	Rating Points						
				Year 2005 Veh Hrs of Delay Per Day	Year 2030 Veh Hrs of Delay Per Day	Overall Accident Score	Adjacent Grade Separations	Local Ranking	Emissions Score	Residential Noise Score
1	UP (LA SUB)	Bellgrave Av	Riverside County	2	2	3	1	21	65	20
2		Rutile St	Riverside County	2	2	0	5	17	60	20
3		Jurupa Rd	Riverside County	5	5	4	5	23	100	30
4		Clay St	Riverside County	5	5	1	3	19	100	30
5		Jurupa Ave	Riverside	3	2	2	5	25	55	50
6		Mountain View Av	Riverside	0	1	3	5	0	20	50
7		Streeter Av	Riverside	4	3	1	5	12	75	50
8		Palm Av	Riverside	3	2	0	5	7	55	70
9		Brockton Av	Riverside	3	3	1	5	10	60	50
10		Magnolia Av	Riverside	5	5	1	5	24	100	40
11		Riverside Av	Riverside	5	5	2	5	13	95	30
12		Panorama Rd	Riverside	5	3	0	3	2	55	50
13	BNSF (SB SUB)	Auto Center Dr	Corona	4	5	1	5	22	100	40
14		Smith Av	Corona	3	5	0	5	16	100	70
15		Railroad St	Corona	2	4	0	1	19	80	80
16		Cota St	Corona	1	2	0	5	9	50	80
17		Sheridan St	Corona	0	0	0	1	3	20	80
18		Joy St	Corona	1	2	0	0	6	45	60
19		Radio Rd	Corona	0	1	0	3	13	25	40
20		McKinley St	Corona	5	5	1	3	25	100	90
21		Magnolia Av	Riverside County	4	5	3	5	25	80	90
22		Buchanan St	Riverside	0	1	5	5	5	40	80
23		Pierce St	Riverside	2	3	1	3	17	60	90
24		Tyler St	Riverside	3	4	1	3	20	80	80
25		Harrison St	Riverside	1	1	0	1	6	40	60
26		Gibson St	Riverside	0	0	0	0	1	20	80
27		Jackson St	Riverside	1	1	1	1	4	20	90
28		Adams St	Riverside	5	5	1	1	22	95	90
29		Jefferson St	Riverside	1	2	1	5	9	40	70
30		Madison St	Riverside	2	2	2	5	22	50	60
31		Washington St	Riverside	2	2	0	5	14	40	60
32		Mary St	Riverside	2	2	1	5	22	60	80
33		Jane St	Riverside	1	1	0	1	3	20	80
34	BNSF & UP (RIV)	Cridge St	Riverside	2	2	0	1	15	65	100
35	BNSF & UP (SB SUB)	7th St	Riverside	4	5	0	0	18	100	90
36		3rd St	Riverside	5	5	1	5	23	100	70
37		Spruce St (BNSF)	Riverside	0	3	4	5	11	65	50
38		Chicago Av	Riverside	5	5	3	5	19	100	70
39		Columbia Av (BNSF)	Riverside	5	5	1	5	25	100	50
40		Palmyrita Av (UP)	Riverside	1	2	5	5	8	65	50
41		Iowa Av (BNSF)	Riverside	5	5	1	5	21	100	30
42		Center St	Riverside County	4	4	0	5	15	80	40
43		Main St	Riverside County	1	1	0	5	12	40	40
44	UP (YUMA MAIN)	San Timoteo Canyon Rd	Calimesa	0	0	5	5	25	20	0
45		Viele Av	Beaumont	0	0	5	5	17	20	10
46		California Av	Beaumont	1	5	0	0	25	80	20
47		Pennsylvania Av	Beaumont	0	3	0	1	8	70	10
48		Sunset Av	Banning	5	5	1	5	25	100	20
49		22nd St	Banning	5	4	0	5	13	80	30
50		San Gorgonio Av	Banning	4	5	1	3	6	85	30
51		Hargrave St	Banning	5	5	1	5	19	100	10
52		Apache Trail	Riverside County	0	5	0	5	4	95	0
53		Broadway	Riverside County	1	2	2	5	8	40	10
54		Tipton Rd	Palm Springs	0	0	0	5	25	20	0
55	UP (YUMA MAIN)	Avenue 48/Dillon Road	Indio/Coachella	2	4	2	5	25	75	20
56		Avenue 52	Coachella	3	2	0	5	17	55	30
57		Avenue 54	Coachella	0	0	0	5	8	20	0
58		Airport Drive	Riverside County	1	1	2	5	10	20	0
59		Avenue 58	Riverside County	0	0	0	5	2	20	10
60		Avenue 62	Riverside County	0	5	3	3	13	75	0
61		Avenue 66	Riverside County	2	2	3	5	6	40	10

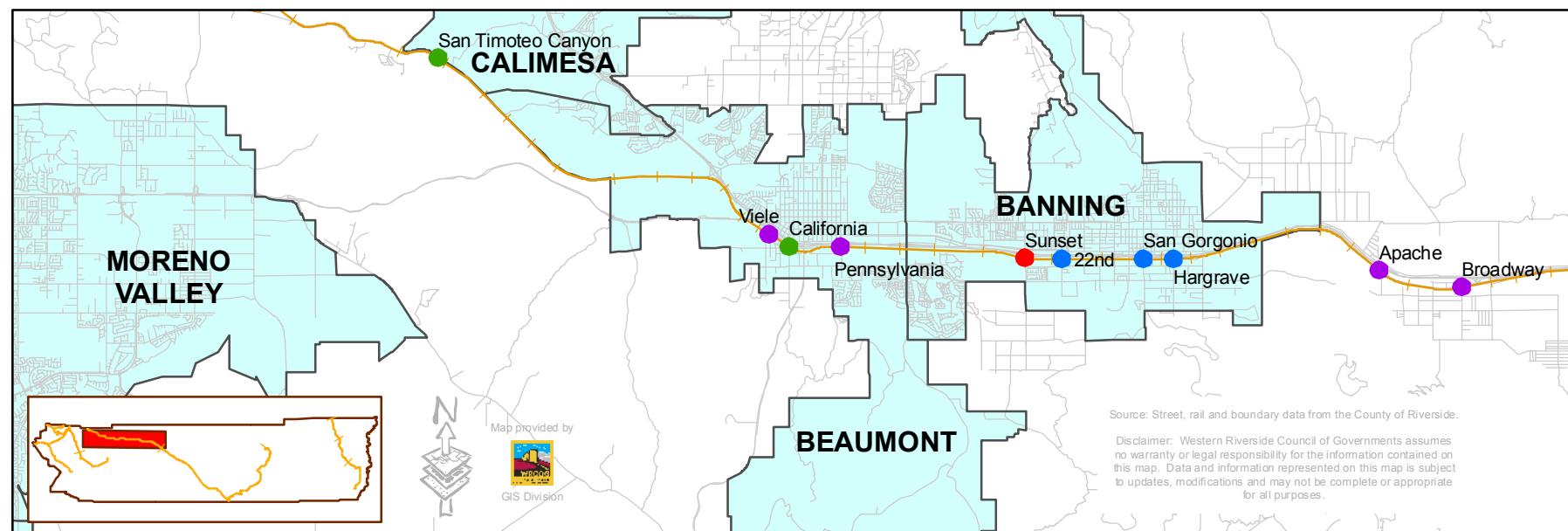
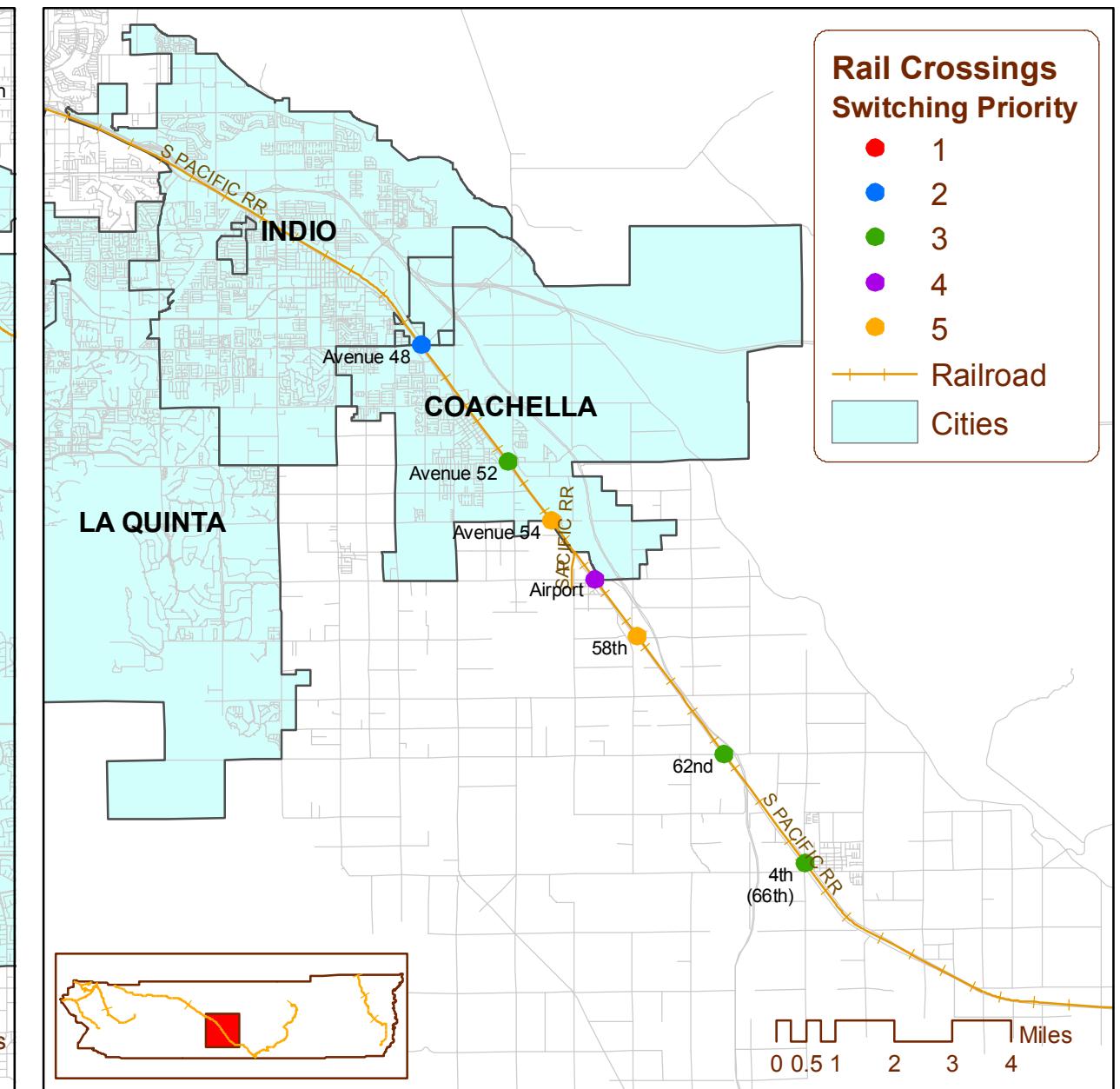
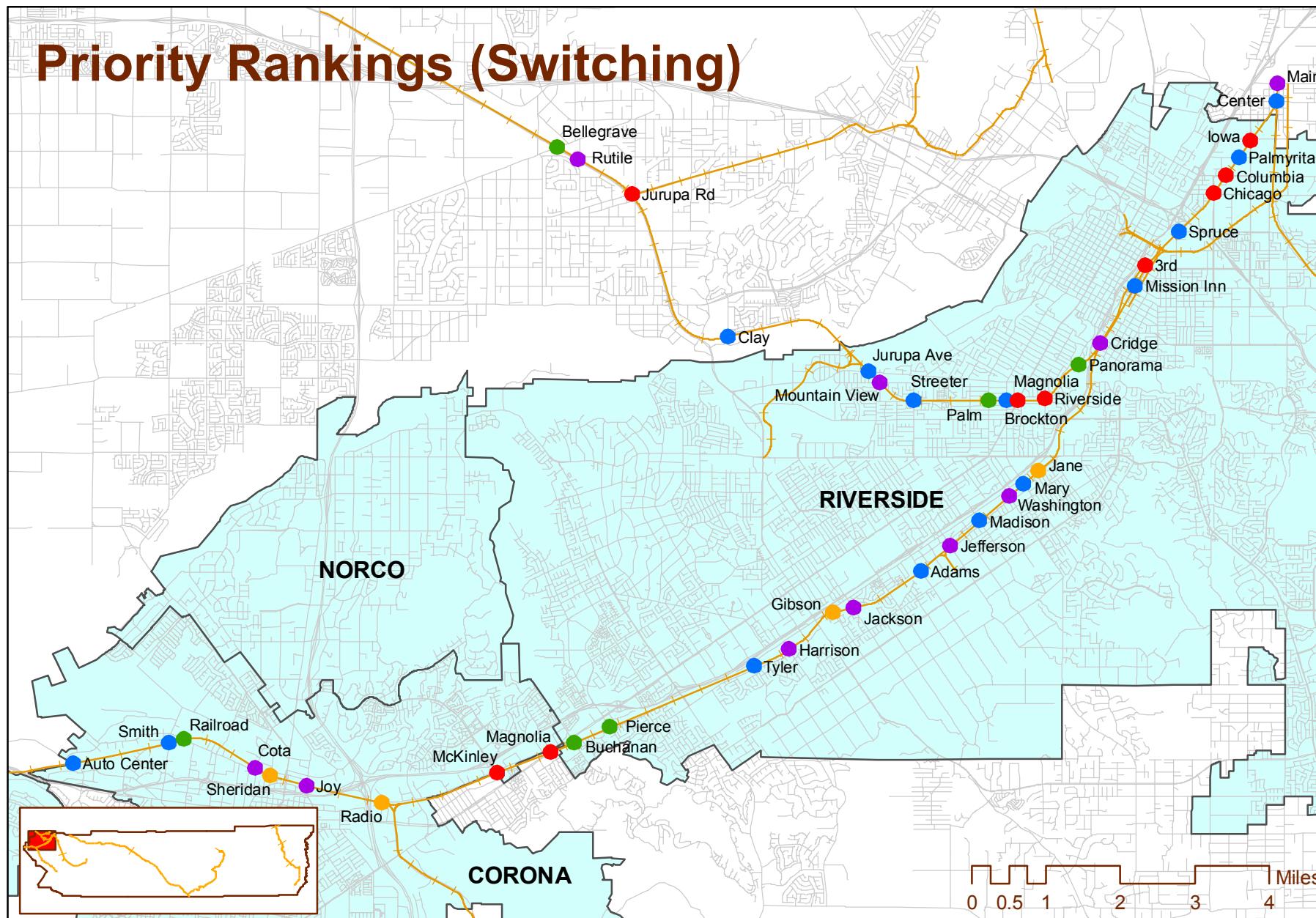


Figure 4-1

Table 4-2
Rail Crossing Priority List - Total Train Activity Including Switching and Operational Delay

Rail Line	Cross Street	Jurisdiction	Overall Weighted Score	Group
UP (LA SUB)	Jurupa Rd	Riverside County	4412	1
BNSF & UP (SB SUB)	Chicago Av	Riverside	4330	1
BNSF (SB SUB)	Magnolia Av	Riverside County	4250	1
BNSF & UP (SB SUB)	3rd St	Riverside	4010	1
BNSF (SB SUB)	McKinley St	Corona	3950	1
BNSF & UP (SB SUB)	Columbia Av (BNSF)	Riverside	3950	1
UP (LA SUB)	Magnolia Av	Riverside	3880	1
UP (YUMA MAIN)	Sunset Av	Banning	3800	1
UP (LA SUB)	Riverside Av	Riverside	3785	1
BNSF & UP (SB SUB)	Iowa Av (BNSF)	Riverside	3770	1
BNSF (SB SUB)	Adams St	Riverside	3665	2
BNSF (SB SUB)	Auto Center Dr	Corona	3638	2
UP (YUMA MAIN)	Hargrave St	Banning	3625	2
UP (LA SUB)	Clay St	Riverside County	3535	2
BNSF (SB SUB)	Smith Av	Corona	3263	2
BNSF & UP (SB SUB)	7th St	Riverside	3110	2
UP (YUMA MAIN)	22nd St	Banning	3100	2
BNSF (SB SUB)	Tyler St	Riverside	3100	2
UP (YUMA MAIN)	Avenue 48/Dillon Road	Indio/Coachella	3075	2
BNSF & UP (SB SUB)	Center St	Riverside County	3008	2
UP (YUMA MAIN)	San Gorgonio Av	Banning	3000	2
UP (LA SUB)	Streeter Av	Riverside	2965	2
UP (LA SUB)	Jurupa Ave	Riverside	2925	2
BNSF & UP (SB SUB)	Palmyrita Av (UP)	Riverside	2835	2
BNSF & UP (SB SUB)	Spruce St (BNSF)	Riverside	2695	2
BNSF (SB SUB)	Madison St	Riverside	2690	2
UP (LA SUB)	Brockton Av	Riverside	2650	2
BNSF (SB SUB)	Mary St	Riverside	2640	2
BNSF (SB SUB)	Pierce St	Riverside	2590	3
UP (YUMA MAIN)	Avenue 62	Riverside County	2544	3
BNSF (SB SUB)	Railroad St	Corona	2475	3
UP (LA SUB)	Panorama Rd	Riverside	2465	3
BNSF (SB SUB)	Buchanan St	Riverside	2400	3
UP (LA SUB)	Bellgrave Av	Riverside County	2348	3
UP (YUMA MAIN)	Avenue 66	Riverside County	2265	3
UP (LA SUB)	Palm Av	Riverside	2265	3
UP (YUMA MAIN)	Avenue 52	Coachella	2258	3
UP (YUMA MAIN)	California Av	Beaumont	2200	3
UP (YUMA MAIN)	San Timoteo Canyon Rd	Calimesa	2100	3
BNSF (SB SUB)	Washington St	Riverside	2080	4
UP (YUMA MAIN)	Apache Trail	Riverside County	2052	4
UP (LA SUB)	Rutile St	Riverside County	2046	4
BNSF (SB SUB)	Jefferson St	Riverside	2030	4
BNSF & UP (RIV)	Cridge St	Riverside	2025	4
UP (YUMA MAIN)	Viele Av	Beaumont	1983	4
BNSF (SB SUB)	Cota St	Corona	1938	4
UP (YUMA MAIN)	Broadway	Riverside County	1904	4
UP (LA SUB)	Mountain View Av	Riverside	1650	4
UP (YUMA MAIN)	Airport Drive	Riverside County	1592	4
BNSF & UP (SB SUB)	Main St	Riverside County	1531	4
BNSF (SB SUB)	Jackson St	Riverside	1330	4
UP (YUMA MAIN)	Pennsylvania Av	Beaumont	1267	4
BNSF (SB SUB)	Joy St	Corona	1250	4
BNSF (SB SUB)	Harrison St	Riverside	1120	4
UP (YUMA MAIN)	Tipton Rd	Palm Springs	1100	4
BNSF (SB SUB)	Radio Rd	Corona	1075	5
BNSF (SB SUB)	Jane St	Riverside	1060	5
UP (YUMA MAIN)	Avenue 54	Coachella	767	5
UP (YUMA MAIN)	Avenue 58	Riverside County	688	5
BNSF (SB SUB)	Sheridan St	Corona	663	5
BNSF (SB SUB)	Gibson St	Riverside	520	5

Highest Priority Rankings (Switching)

The map displays the highest priority rankings for switching across various locations in Riverside, California. The areas shown are NORCO, CORONA, and RIVERSIDE. The network of orange lines connects numerous locations, with blue dots representing some and red dots representing others. The locations are labeled as follows:

- Blue Dots (Switching Locations): Smith, Auto Center, McKinley, Magnolia, Tyler, Adams, Madison, Mary, Brockton, Streeter, Magnolia, Riverside, 3rd, Spruce, Mission Inn, Center.
- Red Dots (Other Locations): Jurupa Rd, Iowa, Palmyrita, Columbia, Chicago, Jurupa Ave.

A scale bar at the bottom right indicates distances from 0 to 4 miles.

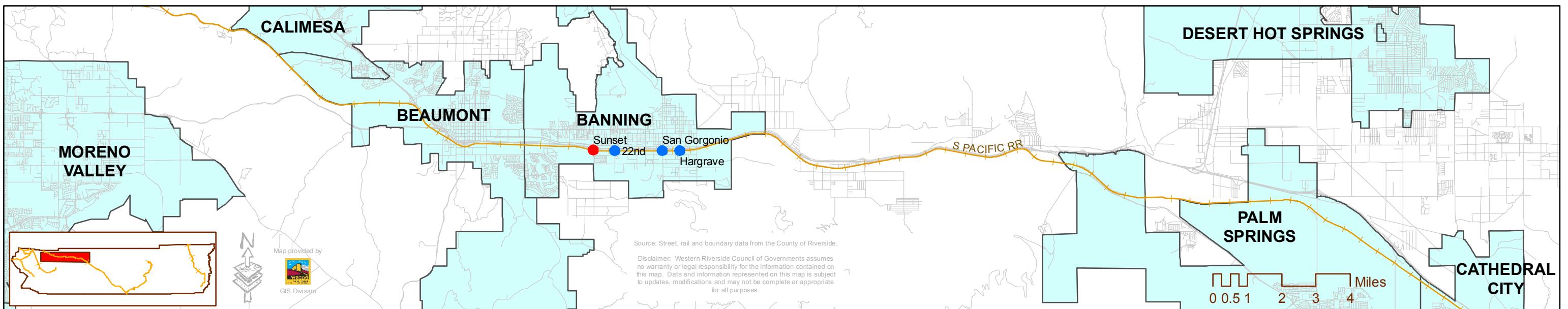
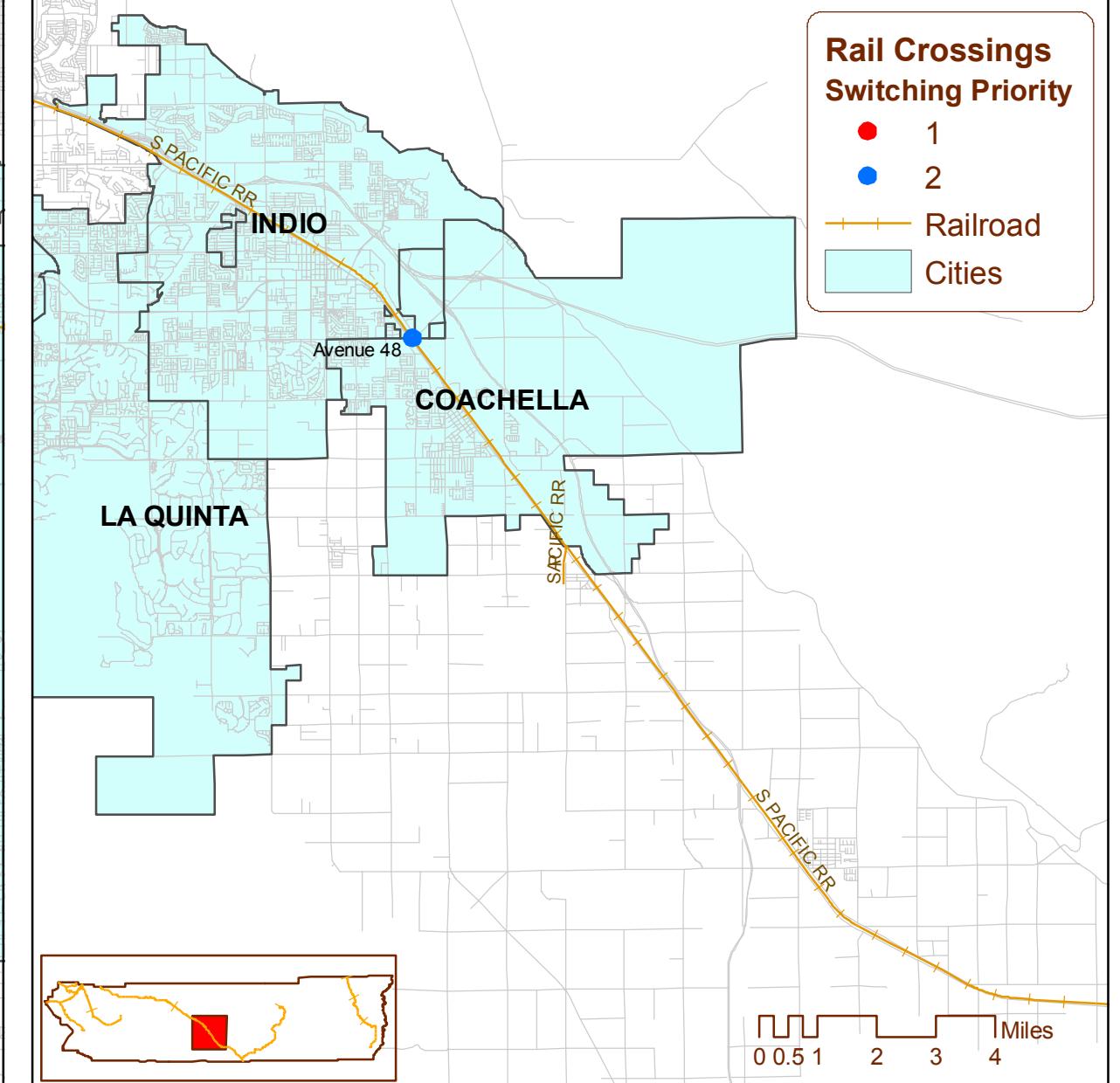


Figure 4-2

TABLE 4-3 - HIGHEST PRIORITY GRADE CROSSINGS
Total Train Activity Including Switching and Operational Delay

Rail Line	Cross Street	Jurisdiction	Overall Weighted Score	Priority Group
UP (LA SUB)	Jurupa Rd	Riverside County	4412	1
BNSF & UP (SB SUB)	Chicago Av	Riverside	4330	1
BNSF (SB SUB)	Magnolia Av	Riverside County	4250	1
BNSF & UP (SB SUB)	3rd St	Riverside	4010	1
BNSF (SB SUB)	McKinley St	Corona	3950	1
BNSF & UP (SB SUB)	Columbia Av (BNSF)	Riverside	3950	1
UP (LA SUB)	Magnolia Av	Riverside	3880	1
UP (YUMA MAIN)	Sunset Av	Banning	3800	1
UP (LA SUB)	Riverside Av	Riverside	3785	1
BNSF & UP (SB SUB)	Iowa Av (BNSF)	Riverside	3770	1
BNSF (SB SUB)	Adams St	Riverside	3665	2
BNSF (SB SUB)	Auto Center Dr	Corona	3638	2
UP (YUMA MAIN)	Hargrave St	Banning	3625	2
UP (LA SUB)	Clay St	Riverside County	3535	2
BNSF (SB SUB)	Smith Av	Corona	3263	2
BNSF & UP (SB SUB)	7th St	Riverside	3110	2
UP (YUMA MAIN)	22nd St	Banning	3100	2
BNSF (SB SUB)	Tyler St	Riverside	3100	2
UP (YUMA MAIN)	Avenue 48/Dillon Road	Indio/Coachella	3075	2
BNSF & UP (SB SUB)	Center St	Riverside County	3008	2
UP (YUMA MAIN)	San Gorgonio Av	Banning	3000	2
UP (LA SUB)	Streeter Av	Riverside	2965	2
UP (LA SUB)	Jurupa Ave	Riverside	2925	2
BNSF & UP (SB SUB)	Palmyrita Av (UP)	Riverside	2835	2
BNSF & UP (SB SUB)	Spruce St (BNSF)	Riverside	2695	2
BNSF (SB SUB)	Madison St	Riverside	2690	2
UP (LA SUB)	Brockton Av	Riverside	2650	2
BNSF (SB SUB)	Mary St	Riverside	2640	2

TABLE 4-4
Quantitative Benefit Totals for Priority Groups 1&2
Total Train Activity including Switching and Operational Delay

Accidents at Rail Crossings (10 years)	43
Noise -- population affected by train whistles (78 dB)*	42,037
Noise -- population affected by train whistles (63 dB)*	501,629

* Populations may overlap at adjacent crossings - Totals likely include double-counting

	2005	2030
Gate Down Time (hours per day)	58	115
Vehicle hours of delay per day	1,014	4,041
Emissions from vehicle delay (PM₁₀ -- tons/year)	0.04	0.18
Emissions from vehicle delay (NO_x -- tons/year)	2.38	9.64
Emissions from vehicle delay (VOC -- tons/year)	6.88	27.51
Emissions from vehicle delay (CO -- tons/year)	98.56	394.00
Emissions from vehicle delay (total -- tons/year)	108	431

Recommendations

While many of the rail crossings in Riverside County are projected to experience high levels of delay by the Year 2030, the prioritization of rail grade crossings is based on the factors approved by the Riverside County Transportation Commission. Twenty-eight crossings have been identified with the highest priority for improvements (priority groups 1 and 2) based on total train activity including switching and operational delay. (The priority listing based on through trains only is included in the Appendix.) The rail crossings in priority groups 1 and 2 are typically characterized by high train and vehicular traffic volumes, extensive vehicle delay and emissions, and one or more traffic incidents in recent years. These crossings have the highest priority for near-term improvement and it is recommended that these locations be programmed for improvements as funding becomes available.

APPENDIX

TABLE A-1
GATE DOWN TIME AND VEHICLE DELAY

Rail Line	Cross Street	Jurisdiction	Through Train Activity			
			Year 2005 Total Gate Down Time in Mins.	Year 2030 Total Gate Down Time in Mins.	Year 2005 Vehicle Hours of Delay Per Day	Year 2030 Vehicle Hours of Delay Per Day
UP (LA SUB)	Bellgrave Av	Riverside County	72.9	151.9	7.9	42.6
UP (LA SUB)	Rutile St	Riverside County	72.9	151.9	10.0	36.4
UP (LA SUB)	Jurupa Rd	Riverside County	72.9	151.9	13.4	86.0
UP (LA SUB)	Clay St	Riverside County	73.3	152.5	30.5	115.2
UP (LA SUB)	Jurupa Ave	Riverside	73.3	152.5	11.9	42.8
UP (LA SUB)	Mountain View Av	Riverside	72.9	151.9	2.1	9.1
UP (LA SUB)	Streeter Av	Riverside	73.3	152.5	12.3	48.4
UP (LA SUB)	Palm Av	Riverside	72.9	151.9	11.6	39.3
UP (LA SUB)	Brockton Av	Riverside	73.3	152.5	14.3	46.8
UP (LA SUB)	Magnolia Av	Riverside	73.3	152.5	21.5	80.0
UP (LA SUB)	Riverside Av	Riverside	82.6	174.1	21.0	65.0
UP (LA SUB)	Panorama Rd	Riverside	82.6	174.1	7.4	27.4
BNSF (SB SUB)	Auto Center Dr	Corona	104.1	204.3	12.2	192.4
BNSF (SB SUB)	Smith Av	Corona	102.8	201.5	19.1	124.3
BNSF (SB SUB)	Railroad St	Corona	102.8	201.5	10.2	90.0
BNSF (SB SUB)	Cota St	Corona	102.3	200.8	5.6	36.3
BNSF (SB SUB)	Sheridan St	Corona	102.3	200.8	2.7	8.9
BNSF (SB SUB)	Joy St	Corona	102.3	200.8	6.1	30.9
BNSF (SB SUB)	Radio Rd	Corona	102.3	200.8	4.6	15.5
BNSF (SB SUB)	McKinley St	Corona	102.8	201.5	58.7	265.2
BNSF (SB SUB)	Magnolia Av	Riverside County	102.8	201.5	23.9	102.0
BNSF (SB SUB)	Buchanan St	Riverside	102.3	200.8	4.2	23.9
BNSF (SB SUB)	Pierce St	Riverside	102.3	200.8	11.7	50.1
BNSF (SB SUB)	Tyler St	Riverside	102.8	201.5	16.4	80.4
BNSF (SB SUB)	Harrison St	Riverside	102.3	200.8	6.7	24.3
BNSF (SB SUB)	Gibson St	Riverside	102.3	200.8	2.8	9.4
BNSF (SB SUB)	Jackson St	Riverside	102.8	201.5	7.4	22.2
BNSF (SB SUB)	Adams St	Riverside	102.8	201.5	37.1	112.9
BNSF (SB SUB)	Jefferson St	Riverside	102.3	200.8	8.4	28.8
BNSF (SB SUB)	Madison St	Riverside	102.8	201.5	14.2	38.3
BNSF (SB SUB)	Washington St	Riverside	102.3	200.8	10.0	36.9
BNSF (SB SUB)	Mary St	Riverside	102.8	201.5	12.7	49.2
BNSF (SB SUB)	Jane St	Riverside	102.3	200.8	4.8	16.2
BNSF & UP (RIV)	Cridge St	Riverside	168.6	341.4	13.4	47.7
BNSF & UP (SB SUB)	7th St	Riverside	179.6	377.4	19.6	141.6
BNSF & UP (SB SUB)	3rd St	Riverside	179.6	377.4	34.2	143.4
BNSF & UP (SB SUB)	Spruce St (BNSF)	Riverside	179.6	377.4	4.0	52.5
BNSF & UP (SB SUB)	Chicago Av	Riverside	179.6	377.4	30.2	143.4
BNSF & UP (SB SUB)	Columbia Av (BNSF)	Riverside	179.6	377.4	31.1	141.0
BNSF & UP (SB SUB)	Palmyrita Av (UP)	Riverside	178.9	376.2	5.1	47.5
BNSF & UP (SB SUB)	Iowa Av (BNSF)	Riverside	179.6	377.4	47.4	246.2
BNSF & UP (SB SUB)	Center St	Riverside County	179.6	377.4	17.1	80.3
BNSF & UP (SB SUB)	Main St	Riverside County	178.9	376.2	5.3	23.4
UP (YUMA MAIN)	San Timoteo Canyon Rd	Calimesa	94.2	193.6	0.5	1.9
UP (YUMA MAIN)	Viele Av	Beaumont	94.2	193.6	0.2	0.6
UP (YUMA MAIN)	California Av	Beaumont	94.2	194.2	7.8	95.4
UP (YUMA MAIN)	Pennsylvania Av	Beaumont	94.2	194.2	3.4	61.6
UP (YUMA MAIN)	Sunset Av	Banning	94.2	193.6	35.4	184.7
UP (YUMA MAIN)	22nd St	Banning	94.2	193.6	30.8	88.5
UP (YUMA MAIN)	San Gorgonio Av	Banning	94.2	193.6	24.5	97.9
UP (YUMA MAIN)	Hargrave St	Banning	94.2	193.6	31.8	386.4
UP (YUMA MAIN)	Apache Trail	Riverside County	94.2	193.6	2.9	138.0
UP (YUMA MAIN)	Broadway	Riverside County	94.2	193.6	8.7	32.3
UP (YUMA MAIN)	Tipton Rd	Palm Springs	94.2	193.6	0.2	0.6
UP (YUMA MAIN)	Avenue 48/Dillon Road	Indio/Coachella	67.5	133.9	10.1	73.8
UP (YUMA MAIN)	Avenue 52	Coachella	67.5	133.9	11.9	41.2
UP (YUMA MAIN)	Avenue 54	Coachella	67.5	133.9	0.9	2.9
UP (YUMA MAIN)	Airport Drive	Riverside County	67.3	133.9	5.1	16.6
UP (YUMA MAIN)	Avenue 58	Riverside County	67.3	133.5	1.2	4.2
UP (YUMA MAIN)	Avenue 62	Riverside County	67.3	134.2	2.0	100.2
UP (YUMA MAIN)	Avenue 66	Riverside County	67.3	133.5	8.6	30.3
TOTALS (hours per day)			106	215	837	4,421

Table A-2
Queue Length

Train Line	Location	Jurisdiction	Through Train Activity		Total Train Activity Including Switching and Operational Delay	
			Total Daily Queue Length (miles) 2005	Total Daily Queue Length (miles) 2030	Total Daily Queue Length (miles) 2005	Total Daily Queue Length (miles) 2030
UP (LA SUB)	Bellgrave Av	Riverside County	0.93	3.31	1.05	3.52
UP (LA SUB)	Rutile St	Riverside County	1.13	2.94	1.27	3.13
UP (LA SUB)	Jurupa Rd	Riverside County	1.43	5.21	2.23	6.63
UP (LA SUB)	Clay St	Riverside County	1.56	4.08	1.77	4.35
UP (LA SUB)	Jurupa Ave	Riverside	0.62	1.63	0.70	1.73
UP (LA SUB)	Mountain View Av	Riverside	0.23	0.76	0.26	0.80
UP (LA SUB)	Streeter Av	Riverside	0.64	1.81	0.79	2.03
UP (LA SUB)	Palm Av	Riverside	1.10	2.70	1.24	2.87
UP (LA SUB)	Brockton Av	Riverside	0.76	1.83	0.85	1.94
UP (LA SUB)	Magnolia Av	Riverside	1.06	2.82	1.46	3.33
UP (LA SUB)	Riverside Av	Riverside	1.66	3.74	2.29	4.42
UP (LA SUB)	Panorama Rd	Riverside	0.67	1.81	0.93	2.14
BNSF (SB SUB)	Auto Center Dr	Corona	0.88	6.63	1.01	7.14
BNSF (SB SUB)	Smith Av	Corona	1.30	5.03	1.33	5.11
BNSF (SB SUB)	Railroad St	Corona	0.75	4.01	0.77	4.07
BNSF (SB SUB)	Cota St	Corona	0.81	3.41	0.84	3.46
BNSF (SB SUB)	Sheridan St	Corona	0.38	0.92	0.39	0.93
BNSF (SB SUB)	Joy St	Corona	0.88	3.00	0.90	3.04
BNSF (SB SUB)	Radio Rd	Corona	0.68	1.66	0.70	1.68
BNSF (SB SUB)	McKinley St	Corona	2.78	7.23	2.92	7.42
BNSF (SB SUB)	Magnolia Av	Riverside County	1.44	4.07	1.49	4.13
BNSF (SB SUB)	Buchanan St	Riverside	0.58	2.23	0.59	2.27
BNSF (SB SUB)	Pierce St	Riverside	1.42	4.02	1.46	4.08
BNSF (SB SUB)	Tyler St	Riverside	1.01	3.28	1.03	3.33
BNSF (SB SUB)	Harrison St	Riverside	0.88	2.27	0.90	2.30
BNSF (SB SUB)	Gibson St	Riverside	0.40	0.96	0.41	0.98
BNSF (SB SUB)	Jackson St	Riverside	0.47	1.03	0.48	1.05
BNSF (SB SUB)	Adams St	Riverside	2.03	4.38	2.09	4.44
BNSF (SB SUB)	Jefferson St	Riverside	1.08	2.61	1.11	2.65
BNSF (SB SUB)	Madison St	Riverside	0.89	1.77	0.92	1.79
BNSF (SB SUB)	Washington St	Riverside	1.20	3.08	1.23	3.12
BNSF (SB SUB)	Mary St	Riverside	0.81	2.20	0.83	2.23
BNSF (SB SUB)	Jane St	Riverside	0.63	1.53	0.65	1.55
BNSF & UP (RIV)	Cridge St	Riverside	1.77	4.57	1.80	4.61
BNSF & UP (SB SUB)	7th St	Riverside	0.98	4.74	1.02	4.84
BNSF & UP (SB SUB)	3rd St	Riverside	1.76	5.19	1.83	5.29
BNSF & UP (SB SUB)	Spruce St	Riverside	0.23	2.13	0.24	2.17
BNSF & UP (SB SUB)	Chicago Av	Riverside	1.45	5.32	1.51	5.43
BNSF & UP (SB SUB)	Columbia Av	Riverside	1.61	5.11	1.68	5.22
BNSF & UP (SB SUB)	Palmyrita Av	Riverside	0.57	3.66	0.60	3.73
BNSF & UP (SB SUB)	Iowa Av	Riverside	2.14	7.34	2.24	7.48
BNSF & UP (SB SUB)	Center St	Riverside County	0.94	3.14	0.99	3.21
BNSF & UP (SB SUB)	Main St	Riverside County	0.59	1.92	0.62	1.95
UP (YUMA MAIN)	San Timoteo Canyon Rd	Calimesa	0.05	0.12	0.05	0.13
UP (YUMA MAIN)	Viele Av	Beaumont	0.02	0.04	0.02	0.04
UP (YUMA MAIN)	California Av	Beaumont	0.69	2.77	0.74	2.87
UP (YUMA MAIN)	Pennsylvania Av	Beaumont	0.32	1.91	0.34	1.98
UP (YUMA MAIN)	Sunset Av	Banning	2.29	6.86	2.47	7.11
UP (YUMA MAIN)	22nd St	Banning	2.08	4.31	2.30	4.54
UP (YUMA MAIN)	San Gorgonio Av	Banning	1.97	5.16	2.12	5.35
UP (YUMA MAIN)	Hargrave St	Banning	2.38	10.18	2.87	11.21
UP (YUMA MAIN)	Apache Trail	Riverside County	0.25	5.69	0.27	5.90
UP (YUMA MAIN)	Broadway	Riverside County	0.73	1.91	0.79	1.98
UP (YUMA MAIN)	Tipton Rd	Palm Springs	0.02	0.04	0.02	0.04
UP (YUMA MAIN)	Avenue 48/ Dillon Rd	Indio/Coachella	0.56	2.62	0.62	2.76
UP (YUMA MAIN)	Avenue 52	Coachella	0.65	1.64	0.72	1.72
UP (YUMA MAIN)	Avenue 54	Coachella	0.05	0.13	0.07	0.15
UP (YUMA MAIN)	Airport Boulevard	Riverside County	0.57	0.72	0.63	0.76
UP (YUMA MAIN)	Avenue 58	Riverside County	0.15	0.38	0.17	0.40
UP (YUMA MAIN)	Avenue 62	Riverside County	0.24	2.43	0.27	2.56
UP (YUMA MAIN)	Avenue 66	Riverside County	0.9	2.3	1.0	2.4

TABLE A-3
VEHICLE EMISSIONS

Rail Line	Cross Street	Jurisdiction	Through Train Activity							
			2005	2030	2005	2030	2005	2030	2005	2030
			Delay Emissions PM10 (g/day)	Delay Emissions PM10 (g/day)	Delay Emissions NOx (g/day)	Delay Emissions NOx (g/day)	Delay Emissions VOC (g/day)	Delay Emissions VOC (g/day)	Delay Emissions CO (kg/day)	Delay Emissions CO (kg/day)
UP (LA SUB)	Bellgrave Av	Riverside County	1.05	5.65	49.69	266.74	135.98	729.88	1.94	10.43
UP (LA SUB)	Rutile St	Riverside County	1.32	4.82	62.38	227.89	170.69	623.58	2.44	8.91
UP (LA SUB)	Jurupa Rd	Riverside County	1.78	11.40	84.04	538.77	229.97	1,474.26	3.29	21.07
UP (LA SUB)	Clay St	Riverside County	4.04	15.28	190.94	722.07	522.47	1,975.85	7.47	28.24
UP (LA SUB)	Jurupa Ave	Riverside	0.58	2.08	60.12	215.81	194.64	698.76	2.80	10.06
UP (LA SUB)	Mountain View Av	Riverside	0.10	0.45	10.61	46.08	34.34	149.20	0.49	2.15
UP (LA SUB)	Streeter Av	Riverside	0.60	2.36	62.19	244.11	201.35	790.38	2.90	11.38
UP (LA SUB)	Palm Av	Riverside	0.57	1.91	58.67	198.24	189.95	641.87	2.74	9.24
UP (LA SUB)	Brockton Av	Riverside	1.10	3.59	78.22	255.06	238.23	776.85	3.42	11.16
UP (LA SUB)	Magnolia Av	Riverside	1.65	6.13	117.02	436.17	356.43	1,328.48	5.12	19.08
UP (LA SUB)	Riverside Av	Riverside	1.61	4.99	114.77	354.71	349.56	1,080.38	5.02	15.52
UP (LA SUB)	Panorama Rd	Riverside	0.36	1.34	37.34	138.54	120.92	448.58	1.74	6.46
BNSF (SB SUB)	Auto Center Dr	Corona	1.62	25.51	76.36	1,205.21	208.94	3,297.88	2.99	47.13
BNSF (SB SUB)	Smith Av	Corona	2.53	16.49	119.51	779.07	327.02	2,131.80	4.67	30.47
BNSF (SB SUB)	Railroad St	Corona	1.35	11.94	63.91	564.06	174.89	1,543.47	2.50	22.06
BNSF (SB SUB)	Cota St	Corona	0.74	4.81	35.05	227.49	95.90	622.51	1.37	8.90
BNSF (SB SUB)	Sheridan St	Corona	0.28	0.94	15.77	52.43	45.43	151.00	0.65	2.16
BNSF (SB SUB)	Joy St	Corona	0.81	4.10	38.06	193.56	104.14	529.65	1.49	7.57
BNSF (SB SUB)	Radio Rd	Corona	0.61	2.05	28.88	97.02	79.03	265.47	1.13	3.79
BNSF (SB SUB)	McKinley St	Corona	6.14	27.75	343.73	1,554.04	990.08	4,476.19	14.18	64.13
BNSF (SB SUB)	Magnolia Av	Riverside County	2.50	10.68	140.24	597.80	403.95	1,721.87	5.79	24.67
BNSF (SB SUB)	Buchanan St	Riverside	0.44	2.50	24.59	140.10	70.82	403.53	1.01	5.78
BNSF (SB SUB)	Pierce St	Riverside	1.22	5.24	68.32	293.68	196.80	845.89	2.82	12.12
BNSF (SB SUB)	Tyler St	Riverside	1.25	6.17	89.18	438.67	271.63	1,336.10	3.90	19.19
BNSF (SB SUB)	Harrison St	Riverside	0.70	2.54	38.97	142.34	112.25	409.98	1.61	5.87
BNSF (SB SUB)	Gibson St	Riverside	0.30	0.98	16.53	54.98	47.60	158.36	0.68	2.27
BNSF (SB SUB)	Jackson St	Riverside	0.36	1.08	37.46	112.21	121.27	363.32	1.75	5.23
BNSF (SB SUB)	Adams St	Riverside	3.88	11.82	217.22	661.80	625.68	1,906.22	8.96	27.31
BNSF (SB SUB)	Jefferson St	Riverside	0.88	3.01	49.32	168.75	142.05	486.05	2.04	6.96
BNSF (SB SUB)	Madison St	Riverside	1.09	2.94	77.63	208.96	236.45	636.44	3.40	9.14
BNSF (SB SUB)	Washington St	Riverside	0.77	2.83	54.51	201.47	166.04	613.63	2.38	8.81
BNSF (SB SUB)	Mary St	Riverside	0.98	3.77	69.48	268.34	211.64	817.31	3.04	11.74
BNSF (SB SUB)	Jane St	Riverside	0.37	1.25	26.39	88.57	80.39	269.77	1.15	3.87
BNSF & UP (RIV)	Cridge St	Riverside	1.78	6.33	84.10	299.16	230.14	818.60	3.29	11.70
BNSF & UP (SB SUB)	7th St	Riverside	2.05	14.81	114.98	829.44	331.17	2,389.08	4.74	34.23
BNSF & UP (SB SUB)	3rd St	Riverside	4.54	19.02	214.54	898.72	587.07	2,459.20	8.39	35.15
BNSF & UP (SB SUB)	Spruce St (BNSF)	Riverside	0.54	6.97	25.34	329.16	69.34	900.70	0.99	12.87
BNSF & UP (SB SUB)	Chicago Av	Riverside	3.16	17.05	177.05	954.68	509.95	2,749.81	7.31	39.40
BNSF & UP (SB SUB)	Columbia Av (BNSF)	Riverside	4.12	18.69	194.75	883.22	532.91	2,416.81	7.62	34.54
BNSF & UP (SB SUB)	Palmyrita Av (UP)	Riverside	0.67	6.30	31.83	297.76	87.09	814.77	1.24	11.64
BNSF & UP (SB SUB)	Iowa Av (BNSF)	Riverside	4.96	25.77	277.77	1,442.78	800.07	4,155.70	11.46	59.54
BNSF & UP (SB SUB)	Center St	Riverside County	2.27	10.65	107.43	503.07	293.96	1,376.57	4.20	19.67
BNSF & UP (SB SUB)	Main St	Riverside County	0.70	3.10	33.09	146.46	90.55	400.78	1.29	5.73
UP (YUMA MAIN)	San Timoteo Canyon Rd	Calimesa	0.03	0.09	2.66	9.58	8.62	31.03	0.12	0.45
UP (YUMA MAIN)	Viele Av	Beaumont	0.02	0.06	0.91	3.26	2.61	9.39	0.04	0.13
UP (YUMA MAIN)	California Av	Beaumont	0.81	9.99	45.60	559.25	131.35	1,610.82	1.88	23.08
UP (YUMA MAIN)	Pennsylvania Av	Beaumont	0.35	6.44	19.77	360.67	56.95	1,038.84	0.82	14.88
UP (YUMA MAIN)	Sunset Av	Banning	2.71	14.17	192.91	1,007.54	587.55	3,068.76	8.44	44.08
UP (YUMA MAIN)	22nd St	Banning	2.36	6.79	167.77	482.78	510.99	1,470.45	7.34	21.12
UP (YUMA MAIN)	San Gorgonio Av	Banning	3.25	12.98	153.54	613.28	420.13	1,678.16	6.00	23.98
UP (YUMA MAIN)	Hargrave St	Banning	4.22	51.24	199.49	2,421.22	545.88	6,625.30	7.80	94.69
UP (YUMA MAIN)	Apache Trail	Riverside County	0.14	6.73	14.70	696.55	47.61	2,255.28	0.69	32.48
UP (YUMA MAIN)	Broadway	Riverside County	0.67	2.47	47.56	175.98	144.86	536.00	2.08	7.70
UP (YUMA MAIN)	Tipton Rd	Palm Springs	0.01	0.03	0.86	3.10	2.78	10.03	0.04	0.14
UP (YUMA MAIN)	Avenue 48/Dillon Road	Indio/Coachella	0.49	3.60	51.04	372.57	165.27	1,206.31	2.38	17.37
UP (YUMA MAIN)	Avenue 52	Coachella	0.58	2.01	59.98	207.83	194.19	672.91	2.80	9.69
UP (YUMA MAIN)	Avenue 54	Coachella	0.04	0.14	4.42	14.83	14.32	48.03	0.21	0.69
UP (YUMA MAIN)	Airport Drive	Riverside County	0.25	0.81	25.82	83.60	83.61	270.69	1.20	3.90
UP (YUMA MAIN)	Avenue 58	Riverside County	0.06	0.21	6.27	21.37	20.30	69.18	0.29	1.00
UP (YUMA MAIN)	Avenue 62	Riverside County	0.10	4.88	10.18	505.65	32.95	1,637.18	0.47	23.58
UP (YUMA MAIN)	Avenue 66	Riverside County	0.42	1.48	43.34	153.03	140.33	495.47	2.02	7.14
TOTALS (grams per day)			85	461	4,865	25,971	14,099	74,920	202,058	1,073,473
TOTALS (tons per										

TABLE A-4
Priority Factors Scoring for Through Train Activity

Ref No.	Rail Line	Cross Street	Jurisdiction	Rating Points						
				Year 2005 Veh Hrs of Delay Per Day	Year 2030 Veh Hrs of Delay Per Day	Overall Accident Score	Adjacent Grade Separations	Local Ranking	Emissions Score	Residential Noise Score
1	UP (LA SUB)	Bellgrave Av	Riverside County	1	2	3	1	21	60	20
2		Rutile St	Riverside County	1	2	0	5	17	50	20
3		Jurupa Rd	Riverside County	2	4	4	5	23	80	30
4		Clay St	Riverside County	5	5	1	3	19	100	30
5		Jurupa Ave	Riverside	2	2	2	5	25	50	50
6		Mountain View Av	Riverside	0	0	3	5	0	20	50
7		Streeter Av	Riverside	2	2	1	5	12	55	50
8		Palm Av	Riverside	2	2	0	5	7	50	70
9		Brockton Av	Riverside	2	2	1	5	10	60	50
10		Magnolia Av	Riverside	4	4	1	5	24	75	40
11		Riverside Av	Riverside	4	3	2	5	13	60	30
12		Panorama Rd	Riverside	1	2	0	3	2	35	50
13	BNSF (SB SUB)	Auto Center Dr	Corona	2	5	1	5	22	100	40
14		Smith Av	Corona	3	5	0	5	16	100	70
15		Railroad St	Corona	2	4	0	1	19	80	80
16		Cota St	Corona	1	2	0	5	9	50	80
17		Sheridan St	Corona	0	0	0	1	3	20	80
18		Joy St	Corona	1	2	0	0	6	45	60
19		Radio Rd	Corona	0	1	0	3	13	25	40
20		McKinley St	Corona	5	5	1	3	25	100	90
21		Magnolia Av	Riverside County	4	5	3	5	25	80	90
22		Buchanan St	Riverside	0	1	5	5	5	40	80
23		Pierce St	Riverside	2	3	1	3	17	60	90
24		Tyler St	Riverside	3	4	1	3	20	75	80
25		Harrison St	Riverside	1	1	0	1	6	40	60
26		Gibson St	Riverside	0	0	0	0	1	20	80
27		Jackson St	Riverside	1	1	1	1	4	20	90
28		Adams St	Riverside	5	5	1	1	22	80	90
29		Jefferson St	Riverside	1	2	1	5	9	40	70
30		Madison St	Riverside	2	2	2	5	22	40	60
31		Washington St	Riverside	1	2	0	5	14	40	60
32		Mary St	Riverside	2	2	1	5	22	60	80
33		Jane St	Riverside	0	1	0	1	3	20	80
34	BNSF & UP (RIV)	Cridge St	Riverside	2	2	0	1	15	65	100
35	BNSF & UP (SB SUB)	7th St	Riverside	3	5	0	0	18	100	90
36		3rd St	Riverside	5	5	1	5	23	100	70
37		Spruce St (BNSF)	Riverside	0	3	4	5	11	65	50
38		Chicago Av	Riverside	5	5	3	5	19	100	70
39		Columbia Av (BNSF)	Riverside	5	5	1	5	25	100	50
40		Palmyrita Av (UP)	Riverside	1	2	5	5	8	65	50
41		Iowa Av (BNSF)	Riverside	5	5	1	5	21	100	30
42		Center St	Riverside County	3	4	0	5	15	80	40
43		Main St	Riverside County	1	1	0	5	12	40	40
44	UP (YUMA MAIN)	San Timoteo Canyon Rd	Calimesa	0	0	5	5	25	20	0
45		Viele Av	Beaumont	0	0	5	5	17	20	10
46		California Av	Beaumont	1	4	0	0	25	80	20
47		Pennsylvania Av	Beaumont	0	3	0	1	8	65	10
48		Sunset Av	Banning	5	5	1	5	25	100	20
49		22nd St	Banning	5	4	0	5	13	80	30
50		San Gorgonio Av	Banning	4	4	1	3	6	85	30
51		Hargrave St	Banning	5	5	1	5	19	100	10
52		Apache Trail	Riverside County	0	5	0	5	4	95	0
53		Broadway	Riverside County	1	2	2	5	8	40	10
54		Tipton Rd	Palm Springs	0	0	0	5	25	20	0
55	UP (YUMA MAIN)	Avenue 48/Dillon Road	Indio/Coachella	2	3	2	5	25	75	20
56		Avenue 52	Coachella	2	2	0	5	17	50	30
57		Avenue 54	Coachella	0	0	0	5	8	20	0
58		Airport Drive	Riverside County	1	1	2	5	10	20	0
59		Avenue 58	Riverside County	0	0	0	5	2	20	10
60		Avenue 62	Riverside County	0	5	3	3	13	75	0
61		Avenue 66	Riverside County	1	2	3	5	6	40	10

Table A-5
Rail Crossing Priority List - Through Train Activity

Rail Line	Cross Street	Jurisdiction	Overall Weighted Score	Group
BNSF & UP (SB SUB)	Chicago Av	Riverside	4330	1
BNSF (SB SUB)	Magnolia Av	Riverside County	4250	1
BNSF & UP (SB SUB)	3rd St	Riverside	4010	1
BNSF (SB SUB)	McKinley St	Corona	3950	1
BNSF & UP (SB SUB)	Columbia Av (BNSF)	Riverside	3950	1
UP (YUMA MAIN)	Sunset Av	Banning	3800	1
BNSF & UP (SB SUB)	Iowa Av (BNSF)	Riverside	3770	1
UP (YUMA MAIN)	Hargrave St	Banning	3625	2
BNSF (SB SUB)	Adams St	Riverside	3590	2
UP (LA SUB)	Clay St	Riverside County	3535	2
UP (LA SUB)	Jurupa Rd	Riverside County	3512	2
UP (LA SUB)	Magnolia Av	Riverside	3355	2
BNSF (SB SUB)	Smith Av	Corona	3263	2
BNSF (SB SUB)	Auto Center Dr	Corona	3238	2
UP (YUMA MAIN)	22nd St	Banning	3100	2
BNSF (SB SUB)	Tyler St	Riverside	3075	2
UP (LA SUB)	Riverside Av	Riverside	3010	2
BNSF & UP (SB SUB)	7th St	Riverside	2910	2
UP (YUMA MAIN)	Avenue 48/Dillon Road	Indio/Coachella	2875	2
BNSF & UP (SB SUB)	Palmyrita Av (UP)	Riverside	2835	2
BNSF & UP (SB SUB)	Center St	Riverside County	2808	2
UP (YUMA MAIN)	San Gorgonio Av	Banning	2800	2
UP (LA SUB)	Jurupa Ave	Riverside	2700	2
BNSF & UP (SB SUB)	Spruce St (BNSF)	Riverside	2695	2
BNSF (SB SUB)	Madison St	Riverside	2640	2
BNSF (SB SUB)	Mary St	Riverside	2640	2
BNSF (SB SUB)	Pierce St	Riverside	2590	3
UP (YUMA MAIN)	Avenue 62	Riverside County	2544	3
BNSF (SB SUB)	Railroad St	Corona	2475	3
BNSF (SB SUB)	Buchanan St	Riverside	2400	3
UP (LA SUB)	Streeter Av	Riverside	2265	3
UP (LA SUB)	Brockton Av	Riverside	2250	3
UP (LA SUB)	Bellgrave Av	Riverside County	2123	3
UP (YUMA MAIN)	San Timoteo Canyon Rd	Calimesa	2100	3
UP (YUMA MAIN)	Avenue 66	Riverside County	2065	4
UP (YUMA MAIN)	Apache Trail	Riverside County	2052	4
UP (LA SUB)	Palm Av	Riverside	2040	4
UP (YUMA MAIN)	Avenue 52	Coachella	2033	4
BNSF (SB SUB)	Jefferson St	Riverside	2030	4
BNSF & UP (RIV)	Cridge St	Riverside	2025	4
UP (YUMA MAIN)	California Av	Beaumont	2000	4
UP (YUMA MAIN)	Viele Av	Beaumont	1983	4
BNSF (SB SUB)	Cota St	Corona	1938	4
UP (YUMA MAIN)	Broadway	Riverside County	1904	4
BNSF (SB SUB)	Washington St	Riverside	1880	4
UP (LA SUB)	Rutile St	Riverside County	1796	4
UP (YUMA MAIN)	Airport Drive	Riverside County	1592	4
BNSF & UP (SB SUB)	Main St	Riverside County	1531	4
UP (LA SUB)	Mountain View Av	Riverside	1450	4
UP (LA SUB)	Panorama Rd	Riverside	1365	4
BNSF (SB SUB)	Jackson St	Riverside	1330	4
BNSF (SB SUB)	Joy St	Corona	1250	4
UP (YUMA MAIN)	Pennsylvania Av	Beaumont	1242	4
BNSF (SB SUB)	Harrison St	Riverside	1120	4
UP (YUMA MAIN)	Tipton Rd	Palm Springs	1100	4
BNSF (SB SUB)	Radio Rd	Corona	1075	5
BNSF (SB SUB)	Jane St	Riverside	860	5
UP (YUMA MAIN)	Avenue 54	Coachella	767	5
UP (YUMA MAIN)	Avenue 58	Riverside County	688	5
BNSF (SB SUB)	Sheridan St	Corona	663	5
BNSF (SB SUB)	Gibson St	Riverside	520	5

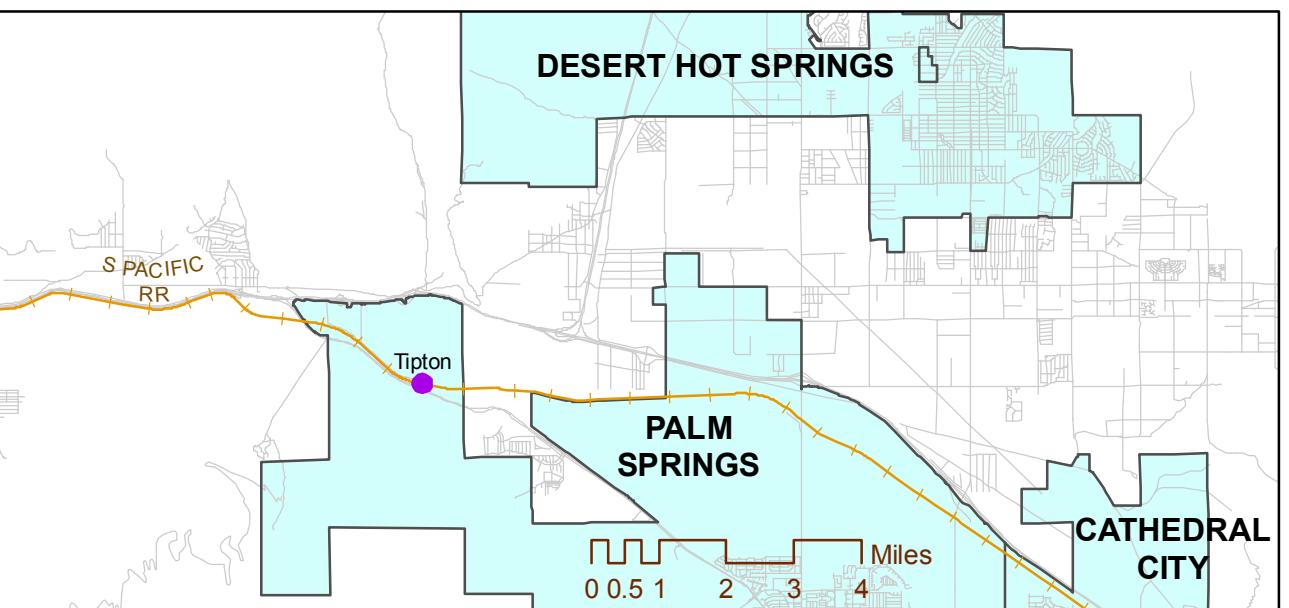
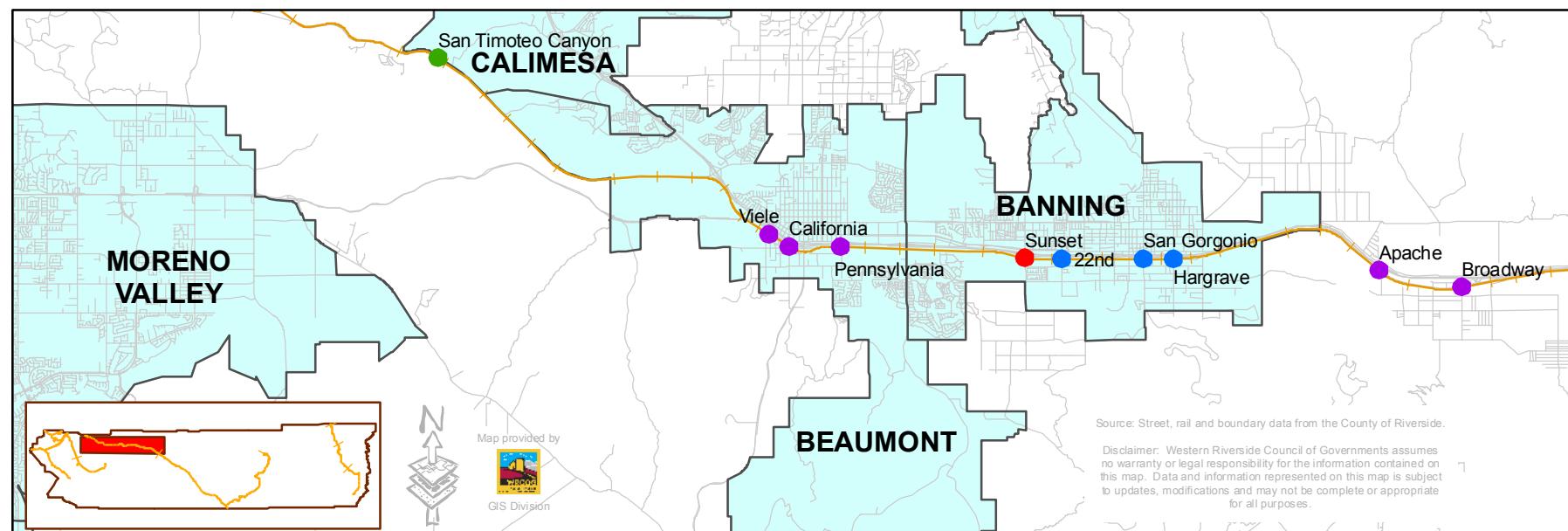
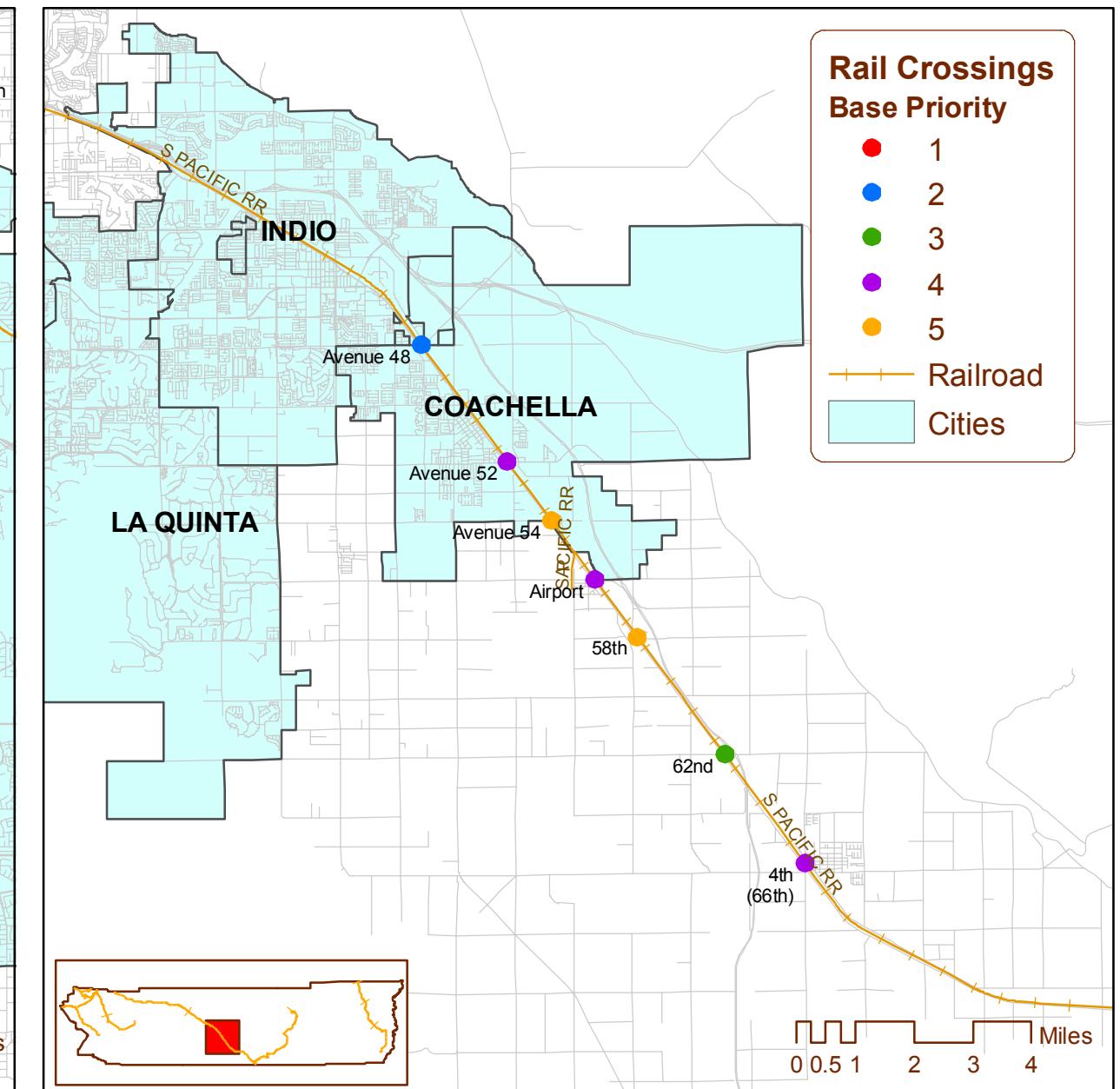
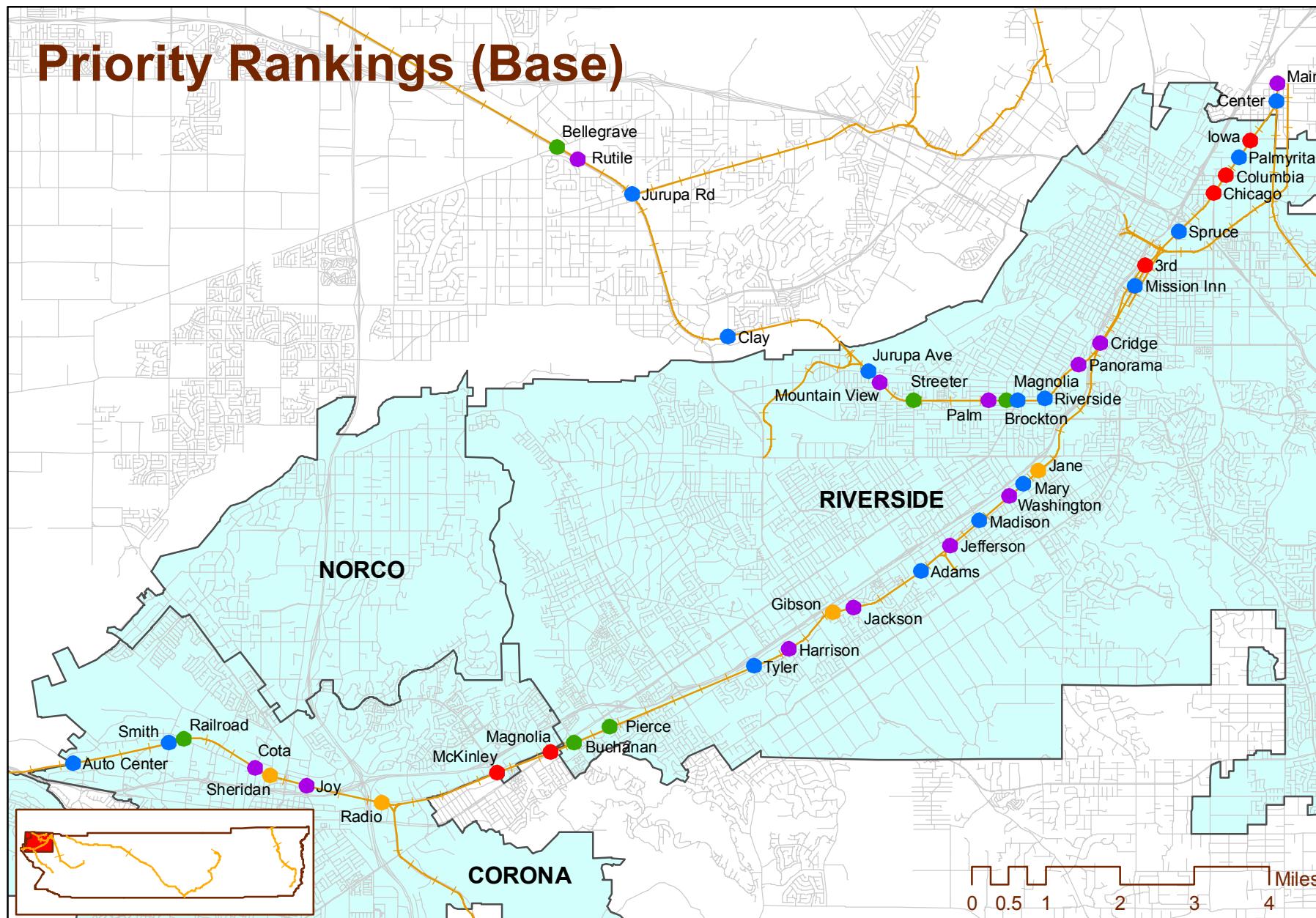


Figure A-1

TABLE A-6 - HIGHEST PRIORITY GRADE CROSSINGS
Through Train Delay Activity

Rail Line	Cross Street	Jurisdiction	Overall Weighted Score	Priority Group
BNSF & UP (SB SUB)	Chicago Av	Riverside	4330	1
BNSF (SB SUB)	Magnolia Av	Riverside County	4250	1
BNSF & UP (SB SUB)	3rd St	Riverside	4010	1
BNSF (SB SUB)	McKinley St	Corona	3950	1
BNSF & UP (SB SUB)	Columbia Av (BNSF)	Riverside	3950	1
UP (YUMA MAIN)	Sunset Av	Banning	3800	1
BNSF & UP (SB SUB)	Iowa Av (BNSF)	Riverside	3770	1
UP (YUMA MAIN)	Hargrave St	Banning	3625	2
BNSF (SB SUB)	Adams St	Riverside	3590	2
UP (LA SUB)	Clay St	Riverside County	3535	2
UP (LA SUB)	Jurupa Rd	Riverside County	3512	2
UP (LA SUB)	Magnolia Av	Riverside	3355	2
BNSF (SB SUB)	Smith Av	Corona	3263	2
BNSF (SB SUB)	Auto Center Dr	Corona	3238	2
UP (YUMA MAIN)	22nd St	Banning	3100	2
BNSF (SB SUB)	Tyler St	Riverside	3075	2
UP (LA SUB)	Riverside Av	Riverside	3010	2
BNSF & UP (SB SUB)	7th St	Riverside	2910	2
UP (YUMA MAIN)	Avenue 48/Dillon Road	Indio/Coachella	2875	2
BNSF & UP (SB SUB)	Palmyrita Av (UP)	Riverside	2835	2
BNSF & UP (SB SUB)	Center St	Riverside County	2808	2
UP (YUMA MAIN)	San Gorgonio Av	Banning	2800	2
UP (LA SUB)	Jurupa Ave	Riverside	2700	2
BNSF & UP (SB SUB)	Spruce St (BNSF)	Riverside	2695	2
BNSF (SB SUB)	Madison St	Riverside	2640	2
BNSF (SB SUB)	Mary St	Riverside	2640	2

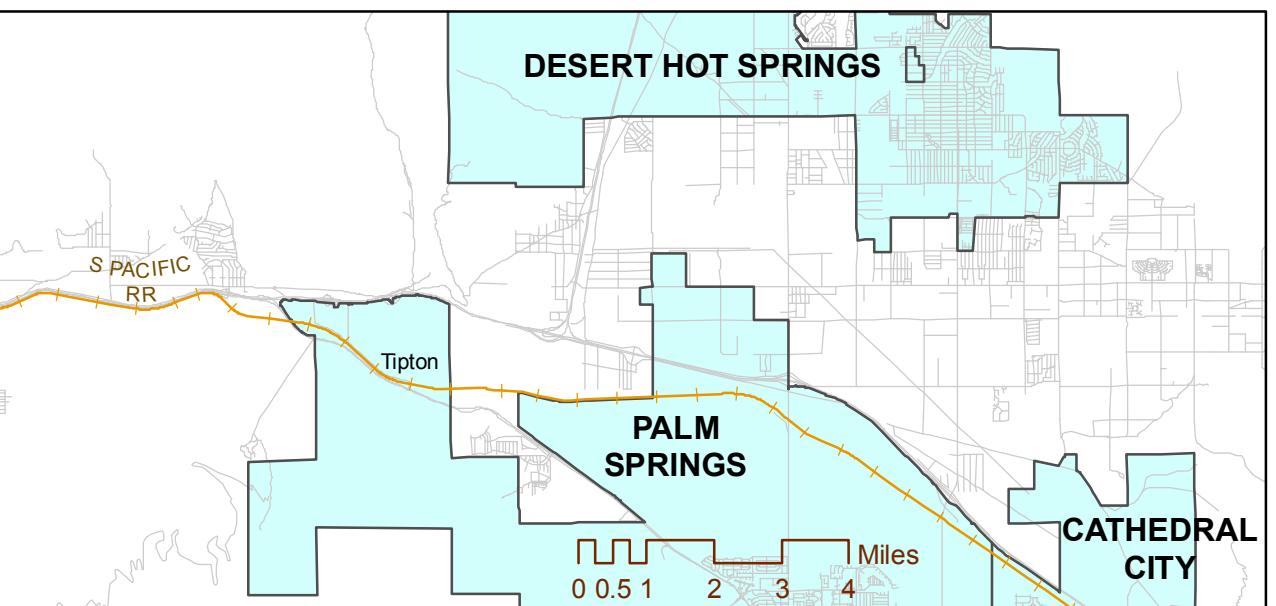
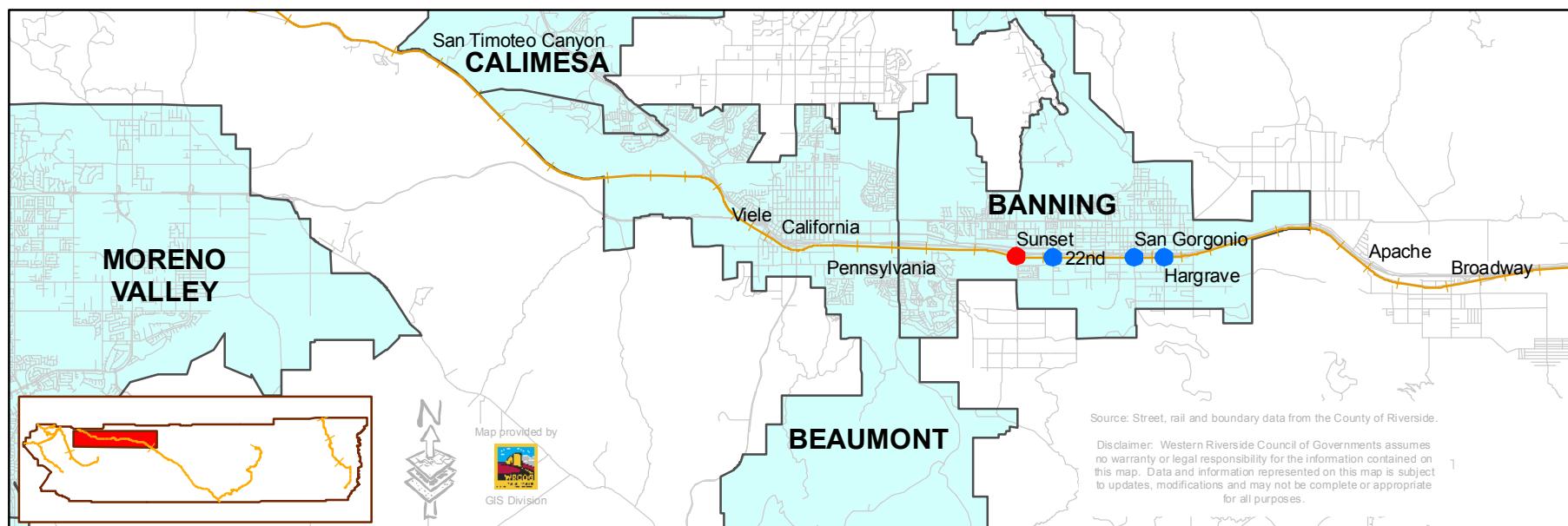
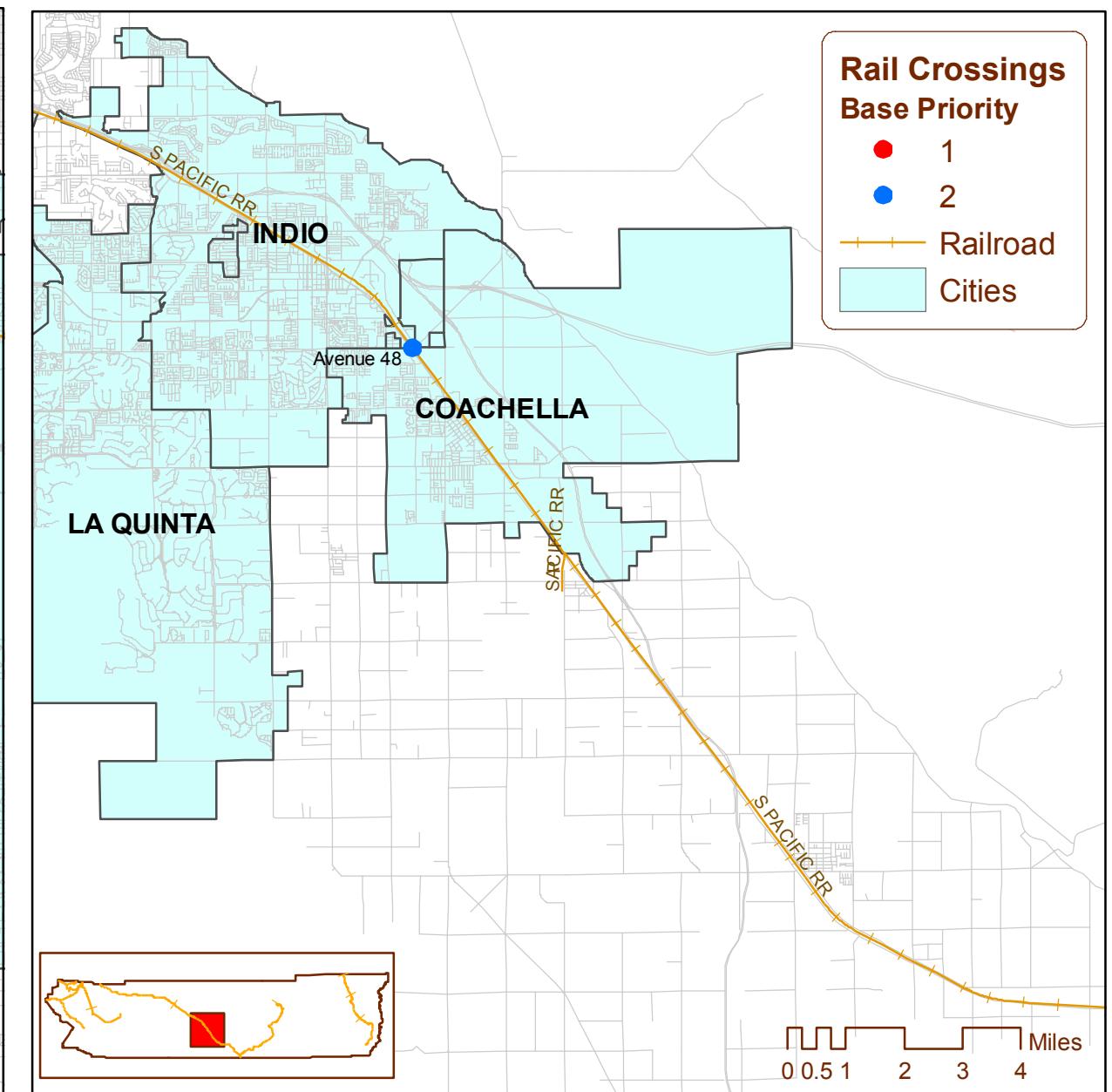
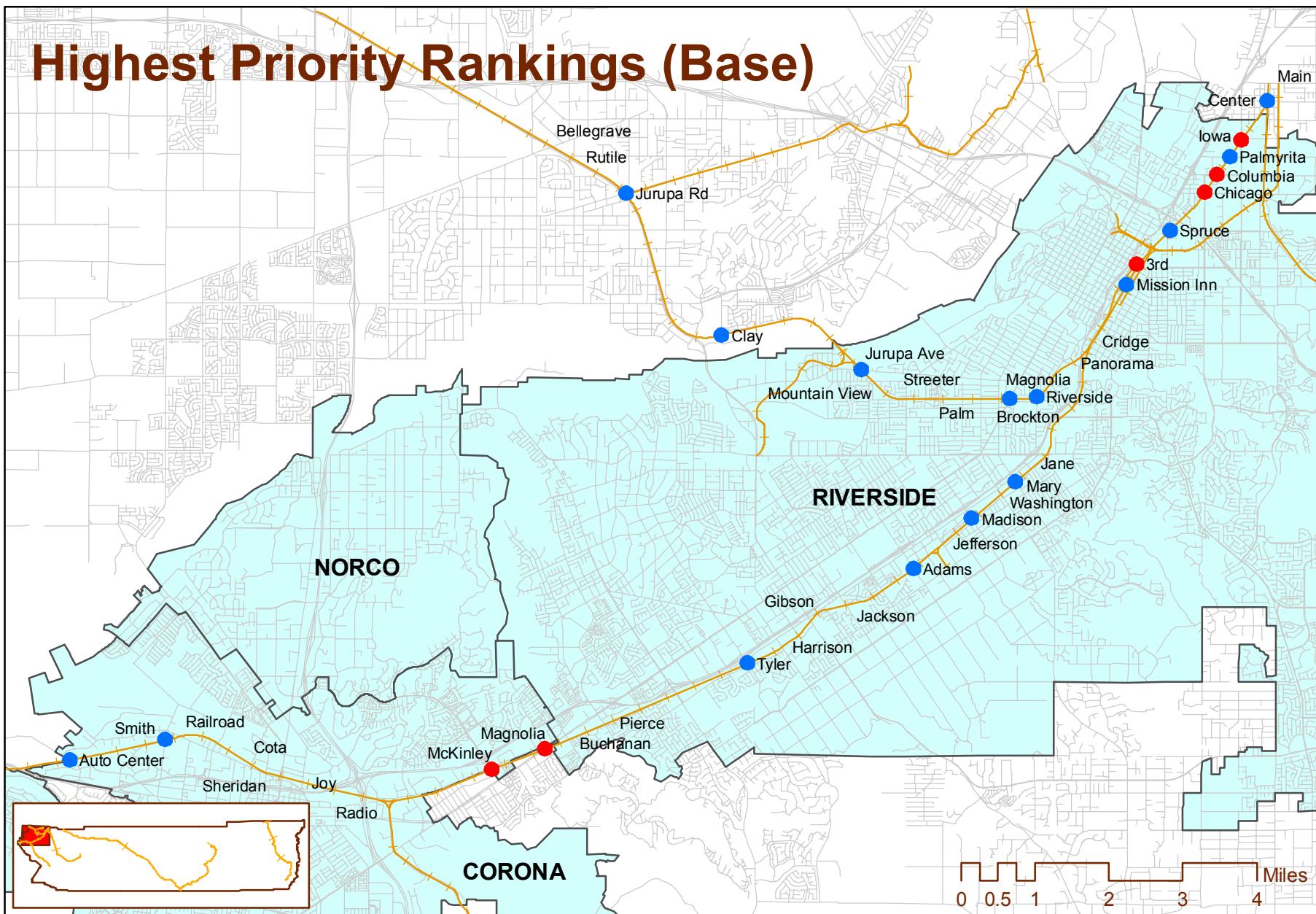


Figure A-2

TABLE A-7
Quantitative Benefit Totals for Priority Groups 1&2
Through Train Activity

Accidents at Rail Crossings (10 years)	41
Noise -- population affected by train whistles (78 dB)*	37,001
Noise -- population affected by train whistles (63 dB)*	451,967

* Populations may overlap at adjacent crossings - Totals likely include double-counting

	2005	2030
Gate Down Time (hours per day)	51	105
Vehicle hours of delay per day	614	3,181
Emissions from vehicle delay (PM₁₀ -- tons/year)	0.03	0.14
Emissions from vehicle delay (NO_x -- tons/year)	1.45	7.65
Emissions from vehicle delay (VOC -- tons/year)	4.17	21.80
Emissions from vehicle delay (CO -- tons/year)	59.77	312.23
Emissions from vehicle delay (total -- tons/year)	65	342