APPENDIX

DEVELOPMENT OF RIDERSHIP FORECASTS FOR THE SAN BERNARDINO INFRASTRUCTURE IMPROVEMENT STUDY

INTRODUCTION:

This Appendix presents a general description of the analysis method used in forecasting the daily ridership on the San Bernardino commuter rail line under different operating assumptions. Ridership demand was forecast for the years 2020 and 2035 using a set of computer-based supply and demand models, developed and maintained by the Southern California Association of Governments (SCAG). The models account for future study area population, projected employment in the Central Business District and other major activity centers, socio-economic characteristics of study area residents, travel time and cost characteristics of the competing highway and transit modes of travel.

HDR obtained the base year (2008) and forecast year (2020 and 2035) models and related inputs from SCAG staff and applied them to simulate and forecast rail ridership on the San Bernardino line for eight different alternatives. A complete description of these alternatives and the estimated ridership results are also discussed in detail in this Appendix.

BRIEF DESCRIPTION OF THE SCAG MODEL

The SCAG Regional Travel Demand Model provides travel forecasting capabilities for the analysis of SCAG's plans and programs. The model is a trip-based model and was Peer Reviewed in May 2011. The model structure and method of application were found to be consistent with the state-of-the-practice in the transportation planning industry. Currently, this model is the only approved model for regional transportation plans and program analysis within the SCAG region.

The SCAG model set simulates travel on the entire highway and transit system in the counties of Ventura, Los Angeles, Orange, San Bernardino, Riverside and Imperial in southern California. The model contains information on service frequency (i.e. how often trains and buses arrive at any given transit stop), routing, intermodal connections, travel time and transit fares for all transit lines. The highway system includes all express highways and principal arterial roadways as well as minor arterial and some local roadways. Outputs of the model set contain detailed information relating to the transportation system. The highway side of the model provides output data on traffic volumes, congested travel speeds, vehicle miles traveled, and average travel times on the roadway links. The transit side provides output information relating to the average weekday ridership on different transit sub modes (rail, local buses, express buses and commuter buses), station boardings, park-and-ride demand, and peak load volumes.

The SCAG model is one of the most sophisticated travel models in the country. It has several sub models and is fully integrated with land use and demographic forecasting models. Shown in **Figure 1** is SCAG's integrated modeling and forecasting framework. As the framework indicates, the modeling process is set up to account for the interactions between transportation network and land use development.

The SCAG model set is of the same type as those used in most large urban areas in North America. It is based on the traditional **Four-Step, sequential process** known as:

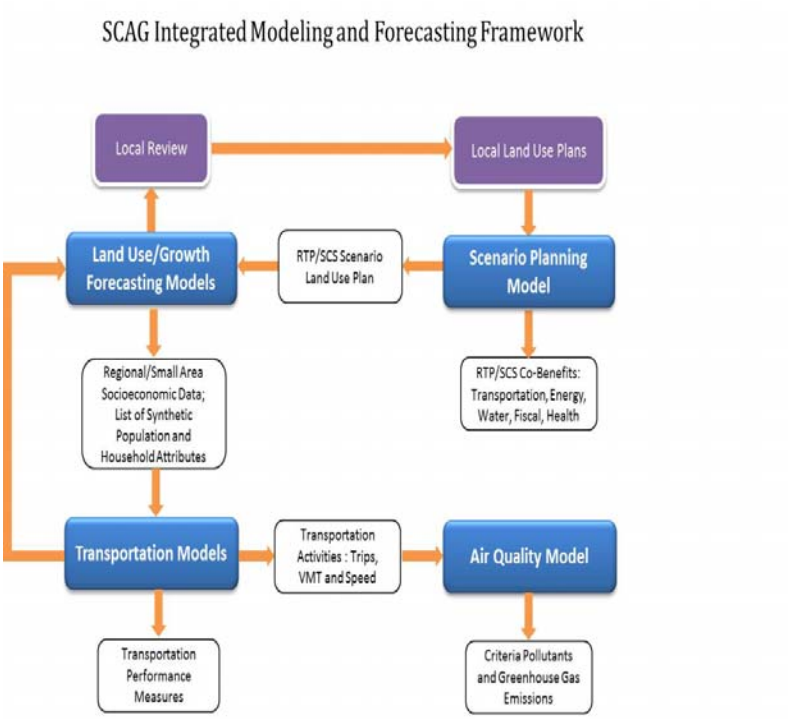
- **Trip Generation;**
- **Trip Distribution;**
- **Mode Choice; and**
- **Trip Assignment.**

This Four Step process is used to estimate the average daily transit ridership, based on the best available population and employment forecasts, projected highway travel conditions (including downtown parking costs) and projected transit service. The geographic area represented in the SCAG model is divided into smaller areas known as **Traffic Analysis Zones (TAZs)**. There are 4,109 Tier 1 TAZs and 11,267 Tier 2 TAZs in the SCAG model. All calculations in the model are performed at the TAZ level. In addition, the model contains 70,000 + street segments, 2000+ transit routes, sufficient information on Seaports (heavy duty trucks), Airports (passenger and cargo trips) and external trips to capture the interaction with other regions and pass-through trips.

The following paragraphs briefly describe the four step process.

Step 1 - Trip Generation: In the first step, the model estimates the number of trips produced in and attracted to each traffic zone. To accomplish this, the model uses estimates of projected population, employment and other socioeconomic and household characteristics of each zone. Trips are divided in to major trip categories such as home-based work trips, home-based non-work trips, social-recreation trips, college /university trips and non-home based trips. A trip generation model run is executed for each trip purpose. The output of the trip generation model feeds into the rest of the model chain.

Figure 1: SCAG's Travel Demand Modeling Process



Step 2 - Trip Distribution: In this step, the distribution model links the trip ends[1] estimated from trip generation to form zonal trip interchanges[2]. The output of the second step is a trip table, a matrix containing the number of trips occurring between every origin-destination zone combination. Trip distribution is performed for each trip purpose. In a system of 4,109 zones, 16.9 million trip origin-destination combinations are possible.

Step 3 - Mode Choice: In this step, the mode choice model allocates the person trips estimated from the trip distribution step to the two primary competing modes; automobile and transit. This allocation estimates the desirability or utility of each choice a traveler faces, based on the attributes of that choice and the characteristics of the individual. The resulting output of the mode choice model is the percentage of trips that use the automobile and transit for each trip interchange.

The transit trips are further divided into two modes of access: walk-access transit trips and drive-access transit trips (park-and-ride trips). The auto trips are further divided into single-occupancy and multiple occupancy trips.

[1] Trip ends represent the point from which the trip is produced or to which it is attracted.
[2] Movements between two zones.

Step 4 - Trip Assignment: In this final step, the model assigns the transit trips to different transit modes such as Local Bus, Express Bus, Commuter Rail etc. The model uses all the available transit paths from one zone to another. This path may involve just one transit mode, such as Local Bus or Commuter Rail or multiple modes, such as Local Bus with a transfer to rail line. Highway trips are assigned to the highway network. Thus, future year traffic volumes on highways and forecasted transit ridership on transit lines can be obtained from the model outputs.

Preparing the Model for Application

Before the model is applied to a specific study, it is first run and adjusted several times until it has replicated the existing highway volumes and transit ridership data at an acceptable level of accuracy. This adjustment is called model **Calibration.** It is done by adjusting several parameters in the model components. For a more specific application such as a transit corridor, additional fine tuning is necessary and that is usually done by modifying how the access[3] to the transit system is represented in the model as well as by adjusting the parameters that determine transit paths. Once the highway and transit components of the model are well calibrated to simulate the current conditions, it is ready for forecasting. The forecast year inputs are then created and the entire model set is run to simulate future year travel.

MODEL APPLICATION METHODOLOGY

By design, the SCAG travel demand model is a regional model. It is well suited to answer questions at the regional and major corridor level. It is also well calibrated to produce transit ridership forecasts at the sub mode level (Local Bus, Express Bus, Commuter Rail). However, the model is not sensitive enough to capture certain types of transit network improvements, such as adding an express train in the peak period, changing an existing train's stop pattern or reducing the travel times between certain segments of the rail alignment. Many of the alternatives that were to be analyzed as part of the San Bernardino study involve such minor network improvements (from a regional context). Therefore, in consultation with SCAG staff, an alternative approach was adopted for this study. In this approach, a two stage process was utilized.

In Stage 1, the future year ridership forecasts for the No Build conditions were determined through the application of the SCAG model. In Stage 2, the impact of subsequent network improvements (i.e. different Build alternatives) were determined by applying elasticity based adjustments to the No Build results.

The elasticity based approach was discussed with SCAG staff in December 2014 and formal approval was obtained prior to conducting the elasticity analysis.

[3] How the passenger gets to the station, either by walking or driving to the park and ride lot.

Definition and Application of Transit Service Elasticity

In economics, price sensitivity to demand is measured using elasticities, defined as the percentage change in consumption resulting from a 1 percent change in price, all else held constant. For example, if the elasticity of transit ridership with respect to transit fares is –0.35, this means that each 1.0 percent increase in transit fares will most likely cause a 0.35 percent reduction in ridership, so a 10 percent fare increase will cause ridership to decline by about 3.5 percent. The converse is also true, i.e., a 10 percent reduction in fares can cause a 3.5 percent increase in ridership. The negative sign indicates the reciprocal behavior of the demand and supply variables.

Similar to fare elasticities, there are **service elasticities** that can be applied to measure the ridership impact of improved or reduced transportation service. For this study, a service elasticity of -0.50 was used to measure the ridership impact of adding express trains and modifying the overall transit times on the San Bernardino rail line. This value falls in the range often seen in the literature[4] and is also quite consistent with empirical observations made in Boston on their commuter rail system.

For each alternative developed in this study, the percent improvement in rail service (headways, travel time improvements) relative to No Build alternative was determined based on the proposed operating plans. Then, the elasticity factor mentioned above was applied to the No Build model results to generate the ridership forecasts for different alternatives.

ALTERNATIVES MODELED

As part of the San Bernardino Infrastructure Improvement Study, eight alternatives were analyzed for their ridership potential. They are:

Alternative A (No Build 2020): The existing Metrolink San Bernardino Line to include the current 42 train schedule in addition to the Downtown San Bernardino Passenger Rail Project (DSBPRP). DSBPRP is the extension to the new San Bernardino Transit Center at E Street. The forecast year is 2020. This alternative essentially represents the No Build condition in 2020. The No Build alternative provides a benchmark against which the ridership potential of all the Build alternatives will be compared and evaluated.

Alternative B: Assumes that the DSBPRP is constructed and one current “all stop” roundtrip local train is converted to full express service that includes stops at the Rancho Cucamonga and Covina Metrolink stations. The forecast year is 2020.

[4] Victoria Transport Policy Institute, Vtpi.org and TCRP Report 95-Transit Cooperative Research Program, Title: Transit Scheduling and Frequency: Traveler Response to Transportation System Changes

Alternative C: Assumes that the DSBPRP is constructed and two current "all stop" roundtrip local trains are converted to full express service that includes stops at the Rancho Cucamonga and Covina Metrolink stations. The forecast year is 2020.

Alternative D: The existing Metrolink San Bernardino Line with the current 42 train schedule that includes the DSBPRP and Redlands Passenger Rail Project (RPRP) extension to University of Redlands in 2020. Service on the RPRP will utilize 30 minute headways in the peak and one hour headways in the off peak. The RPRP will be a stand alone system where only the express trains will traverse from Los Angeles to the Downtown Redlands Station and a transfer between systems will have to occur at the San Bernardino Transit Center (SBTC) for passengers on non-express trains.

Alternative E: Assumes the construction of the Lone Hill Avenue to CP White double track project and includes one additional express round trip train for a total of 44 trains in 2020. The model will include the DSBPRP and RPRP extensions since SANBAG believes both extension projects will be constructed by then.

Alternative F: Assumes the construction of the Lone Hill Avenue to CP White and CP Rancho to CP Lilac Double Track Projects where Metrolink will be running 48 trains. In this alternative, three additional round trip express trains relative to the current train schedule will be added and the model will include the DSBPRP and RPRP. The forecast year is 2020.

Alternative G: Assumes that both double track projects have been constructed and no additional service has been added relative to 2020 operations. The model will include the DSBPRP and RPRP. In other words, this alternative is identical to *Alternative F* except the forecast year is 2035.

Alternative H: Assumes that both double track projects have been constructed and additional service has been accomplished by adding trains during peak and non-peak periods. The total number of trains in this alternative would be 56. The model will include the DSBPRP and RPRP projects. The forecast year is 2035.

RIDERSHIP RESULTS

Base Year (2008) Results

As part of the base year (2008) model calibration, the peak and off-peak headway assumptions and station to station travel times were thoroughly examined and updated in the Base year SCAG model. The base year model with updated inputs generated ridership that was about 22 percent lower than the observed ridership counts on the San Bernardino line. In consultation with SCAG staff, a decision was made to post process the model results by accounting for the model under estimation. This post processing method involves calculating the difference between the passenger boardings estimated

by the model and the observed boardings for each station on the San Bernardino line and applying those differences directly to the model generated numbers for the base year as well as the forecast year. Shown in **Table 1** are the adjusted model results of the base year model. As seen, the total line ridership in the 2008 model was 10,600 boardings.

Table 1: Base Year (2008) Model Results

Station Name	Weekday Boardings estimated by model
San Bernardino Transit Center	0
San Bernardino	475
Rialto	275
Fontana	350
Rancho Cucamonga	1,100
Upland	500
Montclair	450
Clairmont	375
Pomona	400
Covina	925
Baldwin Park	400
El Monte	600
Cal State L.A.	650
LA Union Station	4,100
Total Line Ridership	**10,600**

Source: HDR Engineering

2020 No Build Results (Alternative A)

The calibrated base year model was applied using 2020 model inputs and the same post processing adjustments that were made for the base year results were carried forward for the 2020 model results. Shown in **Table 2** are the 2020 ridership results for the No Build scenario. As seen, the total ridership on the San Bernardino line is projected to increase from 10,600 in 2008 to 15,875 in 2020. This increase may appear somewhat excessive in light of the current ridership on the line but it should be noted that several unanticipated factors such as the economic recession, service cuts, increase in telecommuting and high fluctuations in gas prices have caused a wide variation in demand on this line in recent years. For example, just before the 2008 recession, this line carried nearly 14,000 riders a day. In 2010 and 2011, ridership dropped to 11,000 -12,000 range and in the middle of 2012, it increased to nearly 13,000.

The travel model is not designed to capture the impacts of unanticipated factors such as those mentioned above. It should be noted the ridership estimates produced by the model heavily depends on the population and employment projections, estimated level of future congestion on the highways, downtown parking costs and transit levels of service. Noting that the economic recovery

from the 2008 recession has finally begun and is improving at a healthy rate, it is likely the full ridership impact of the projected population and employment growth will eventually be felt by the forecast year. Of the 15,875 daily boardings projected for the No Build scenario, 875 would be on the Express train and the remaining 15,000 on the local trains.

Table 2: 2020 No Build Ridership Results

Station Name	Weekday Boardings estimated by model	
	Local Train	Express train
San Bernardino Transit Center	750	100
San Bernardino	450	75
Rialto	375	-
Fontana	550	-
Rancho Cucamonga	1,000	250
Upland	650	-
Montclair	575	-
Clairmont	500	-
Pomona	600	-
Covina	975	150
Baldwin Park	625	-
El Monte	1,050	-
Cal State L.A.	1,300	-
LA Union Station	5,600	300
Total	**15,000**	**875**
2020 No Build Total Line Ridership	**15,875**	

Ridership Results for Alternative Scenarios

Alternatives B and C: *Conversion of local service to express service*

For Alternatives B and C, the conversion of local service to express service was modeled using the SCAG model. The ridership results of those two alternatives were found to be reasonable based on the magnitude of ridership diversion from local train to express service. Therefore, no further adjustments using elasticity factor were made to these two alternatives. However, please note SCAG is in the process of updating and recalibrating the commuter rail component of their model. Once those improvements have been incorporated, it may be necessary to update these forecasts by rerunning these alternatives.

In *Alternative B*, one local train service is converted to an express service with stops at the Rancho Cucamonga and Covina Metrolink stations. In *Alternative C,* two local trains are converted to two express trains with stops at the Rancho Cucamonga and Covina Metrolink stations. As presented in **Table 3**, in both these alternatives, the model results indicate the local trains would lose some ridership for two reasons:

- For those passengers currently boarding the local trains at San Bernardino Transit Center, San Bernardino station, Rancho Cucamonga and traveling directly to L.A. Union Station, the increase in express service provides a faster alternative, thus causing some ridership to shift from local to express
- The reduction in local service (one or two less trains) would result in minor ridership loss

The overall results indicate there would be a slight reduction in the total ridership on this line for both *Alternative B* and *C* when compared to the *No Build* alternative. However, the reduction is so minor, it can be considered within the margin of error of the modeling process. Therefore, for all practical purposes, these two alternatives will not result in any ridership changes when compared to the *No Build* alternative.

Alternative D: *42 Train scenario with RPRP in place*
Alternative D is identical to the No Build with one exception. The Redlands Passenger Rail Service is assumed to be in place as a stand alone project. Transfer opportunities are available from RPRP to SB line at the E Street station, although peak headways differ between the services (every 20 minutes for the San Bernardino Line and every 30 minutes for the Redlands service). This alternative also assumes the current express train is interlined with RPRP line. In this case, as shown in **Table 3**, the ridership on the local and express service is projected to increase modestly. The total line ridership would be about 16,300 a day.

Alternatives E and F: *Addition of two and three Express train sets*
Alternative E involves providing one additional express train service using two additional trains. It assumes the double tracking project between Lone Hill Ave and CP White will be completed and the travel time and operational benefits resulting from that improvement will be realized. Both the RPRP project and E Street extension are assumed to be completed. As shown in **Table 4**, our model results indicate this alternative would carry almost 1,000 more riders on the express train when compared to the *No Build* alternative. As seen in the previous alternatives, there would be some diversion of trips from local service to the enhanced express service. The overall line ridership is estimated to be about 16,500.

Alternative F involves adding six additional trains (relative to No Build) and providing three additional express train services. It assumes that both the Lone Hill to CP White and CP Rancho to CP Lilac double tracking projects will be completed with the resulting operational and travel time advantages. Both the RPRP project and E Street extension are assumed to be completed. Our model results indicate this alternative would carry about 1,300 more riders **(Table 4)** on the express train when compared to the *No Build* alternative. As seen in the previous alternatives, there would be some diversion of trips from local service to

the enhanced express service. The overall line ridership is estimated to be about 16,550. It should be noted that one of the three additional express trains operates very early in the morning (@3:45 am) and thus does not really add to the improvement of peak period service. As a result, the ridership increase for this alternative, in comparison to *Alternative E* is negligible.

Although ridership increases for both Alternatives E and F may be interpreted as slight, it is important to note that both infrastructure improvement projects (Lone Hill to CP White and CP Rancho to CP Lilac) are required to be able to operate the 56 daily train service plan needed to support the expected ridership growth on the line by 2035.

Table 3: 2020 Ridership Results for Alternatives B, C and D

	Alternative A No Build 2020		Alternative B Convert 1 local to 1 Exp		Alternative C Convert 2 local to 2 Exp		Alternative D Interline Exp service with RPRP	
Network Assumptions →	No Double tracking E St extension in place		No Double tracking E St extension in place		No Double tracking E St extension in place		No Double tracking E St extension in place RPRP in place Exp train interlined	
No: of trains→	42 Trains		42 Trains		42 Trains		42 Trains	
STATION	**Local ridership**	**Express ridership**	**Local ridership**	**Express ridership**	**Local ridership**	**Express ridership**	**Local ridership**	**Express ridership**
San Bernardino Transit Center	750	100	700	150	650	200	875	125
San Bernardino	450	75	425	100	300	150	450	75
Rialto	375	-	350	-	300	-	375	-
Fontana	550	-	550	-	500	-	550	-
Rancho Cucamonga	1,000	250	925	350	850	400	1,000	250
Upland	650	-	625	-	600	-	650	-
Montclair	575	-	550	-	525	-	575	-
Clairmont	500	-	475	-	450	-	500	-
Pomona	600	-	575	-	550	-	600	-
Covina	975	150	925	225	900	350	975	175
Baldwin Park	625	-	600	-	575	-	625	-
El Monte	1,050	-	1,000	-	950	-	1,050	-
Cal State L.A.	1,300	-	1,250	-	1,200	-	1,300	-
LA Union Station	5,600	300	5,350	700	5,200	900	5,600	550
Total	***15,000***	***875***	***14,300***	***1,525***	***13,550***	***2,000***	***15,125***	***1,175***
Line Ridership	**15,875**		**15,825**		**15,550**		**16,300**	
Ridership increase relative to 2020 No Build			**-0.31 %**		**-2.05%**		**2.68%**	

Source: HDR Engineering

Alternatives G and H: *Addition of three Express train sets and off-peak service improvement*

Alternative G is identical to *Alternative F* except for the fact the forecast year is 2035. Our model results indicate the 2035 ridership for *Alternative G* would be about 18,500 boardings a day of which 16,100 would be on the local train service and 2,400 would be on the express train service. In order to asses the incremental performance of *Alternatives G* and *H*, we estimated the ridership projection for the No Build alternative in 2035. As shown in **Table 5**, the No Build[5] alternative is projected to carry a total of 17,800 trips in 2035. When compared to 2035 No Build, *Alternative G* would carry 4 % higher ridership.

Alternative H is identical to *Alternative G* except the off-peak period headways are improved using six additional trains and one of the express trains is interlined with the RPRP, providing a one-seat ride from Redlands University station to LA Union station. In this alternative, a total of 56 trains were assumed to operate. Our model results indicate the ridership on this alternative would be about 20,500 boardings a day, of which 17,850 would be on the local service and 2,650 would be on the express service. The ridership in this alternative is projected to be about 15.3 percent higher than the 2035 No Build.

[5] The 2035 No Build alternative assumes the RPRP would be in place in addition to the E Street extension of the San Bernardino line. It however, does not assume any double tracking improvements.

Table 4: 2020 Ridership Results for Alternatives E and F

	Alternative A No Build 2020		Alternative E Add 1 express train		Alternative F Add 3 express trains	
Network Assumptions →	No Double tracking E St extension in place		Lone Hill Ave to CP White Double tracking in place E St extension in place RPRP in place		Lone Hill Ave to CP White & CP Ranch To CP Lilac double tracking in place E St extension in place RPRP in place	
No: of trains →	42 Trains		44 Trains		48 Trains	
STATION	**Local ridership**	**Express ridership**	**Local ridership**	**Express ridership**	**Local ridership**	**Express ridership**
San Bernardino Transit Center	750	100	650	150	600	175
San Bernardino	450	75	400	100	400	150
Rialto	375	-	400	-	400	-
Fontana	550	-	600	-	600	-
Rancho Cucamonga	1,000	250	950	350	850	500
Upland	650	-	650	-	650	-
Montclair	575	-	600	100	600	100
Clairmont	500	-	500	-	500	-
Pomona	600	-	600	-	600	-
Covina	975	150	950	200	950	200
Baldwin Park	625	-	650	-	650	-
El Monte	1,050	-	1,100	-	1,100	-
Cal State L.A.	1,300	-	1,150	150	1,050	175
LA Union Station	5,600	300	5,500	750	5,450	850
Total	***15,000***	***875***	***14,700***	***1,800***	***14,400***	***2,150***
Line Ridership	**15,875**		**16,500**		**16,550**	
Ridership increase relative to 2020 No Build			**3.94 %**		**4.25%**	

Source: HDR Engineering

Table 5: 2035 Ridership Results for Alternatives G and H

	Alternative A No Build 2035		Alternative G Add 3 express trains		Alternative H Add 3 express trains	
Network Assumptions →	**No Double tracking E St extension in place RPRP in place**		**Lone Hill Ave to CP White Double tracking in place E St extension in place RPRP in place**		**Lone Hill Ave to CP White, CP Ranch To CP Lilac double tracking in place E St extension in place Off-peak service improved RPRP in place. One exp train interlined**	
No: of trains →	**42 Trains**		**48 Trains**		**56 Trains**	
STATION	**Local ridership**	**Express ridership**	**Local ridership**	**Express ridership**	**Local ridership**	**Express ridership**
San Bernardino Transit Center	850	125	725	200	750	225
San Bernardino	500	100	400	150	500	175
Rialto	425	0	450	-	500	-
Fontana	600	0	675	-	750	-
Rancho Cucamonga	1125	275	950	550	1,050	600
Upland	725	0	725	-	800	-
Montclair	650	0	675	100	750	100
Clairmont	550	0	550	-	600	-
Pomona	675	0	675	-	750	-
Covina	1100	175	1,050	250	1,150	275
Baldwin Park	700	0	725	-	800	-
El Monte	1175	0	1,225	-	1,350	-
Cal State L.A.	1450	0	1,175	200	1,300	225
LA Union Station	6275	325	6,100	950	6,800	1,050
Total	***16,800***	***1,000***	***16,100***	***2,400***	***17,850***	***2,650***
Line Ridership	**17,800**		**18,500**		**20,500**	
Ridership increase relative to 2035 No Build			**4 %**		**15.3%**	

Source: HDR Engineering

Sources of Ridership

As discussed earlier, in each alternative, there would be some diversion of trips from local to express as improvements are made in express train service levels. However, the overall increase in line ridership, relative to the No Build scenario would be as a result of diversion from auto mode to transit mode. This is mainly because there is no competing line-haul service to the San Bernardino line. As shown in **Table 6**, the new transit trips (those diverted from auto mode) may vary from 425 to 2,700, depending on the alternative. These new transit trips represent a reduction in auto trips on the highway system. This reduction will translate to some reductions in vehicle miles of travel on the highway system which result in some reductions in air pollution. Since the elasticity-based approach we used in this study does not provide detailed travel statistics such as average trip lengths for auto and trail trips, we have not been able to quantify the reduction in air pollution in this analysis.

Table 6: Trips Diverted from the Highway System (New Transit Trips)

Alternative	Forecast Year	No Build Ridership	Build Ridership	New Trips (diverted from the highway system)
A	2020	15,875	-	-
B	2020	15,875	15,825	0
C	2020	15,875	15,550	0
D	2020	15,875	16,300	425
E	2020	15,875	16,500	625
F	2020	15,875	16,550	675
G	2035	17,800	18,500	700
H	2035	17,800	20,500	2,700

Source: HDR Engineering

Major Conclusions:

The major findings from the ridership analysis are summarized below:

- Based on the projected population & employment forecasts, levels of future highway congestion, transit levels of service, downtown parking costs etc., for the southern California region, the ridership on San Bernardino Line is expected to reach about 15,875 trips a day by 2020.

- Converting one or two local service trains to express is not expected to significantly increase or decrease the overall ridership on San Bernardino line.

- Assuming both the DSBPRP and RPRP projects are in place by 2020, but without double tracking improvements, additional train service and/or the interlining of the current express train with RPRP, the ridership on the San

Bernardino line in 2020 would be around 16,300 passenger trips a day, which represents a 2.7 percent increase from the 2020 No Build scenario.

- Assuming that the DSBPRP and RPRP projects and the Lone Hill to CP White double tracking improvements are in place by 2020, and adding one express train service (44 train scenario), the ridership on San Bernardino line in 2020 would be around 16,500 passenger trips a day, which represents about 3.8 percent increase from the 2020 No Build scenario.

- Assuming that the DSBPRP and RPRP projects, the Lone Hill to CP White and CP Rancho to CP Lilac double tracking improvements are all in place by 2020, and adding three express train services (48 train scenario), the ridership on San Bernardino line in 2020 would be around 16,550 passenger trips a day which represents about a 4.0 percent increase from the 2020 No Build scenario.
  In 2035, the projected ridership in this scenario would be around 18,500 passenger trips a day, which represents about a 4.0 percent increase from the 2035 No Build scenario.

- Assuming that the DSBPRP and RPRP projects, the Lone Hill to CP White and CP Rancho to CP Lilac double tracking improvements are all in place by 2035, and adding three express train service (one of which is interlined with RPRP) and improving off-peak headways (56 train scenario), the ridership on San Bernardino line in 2035 is expected to reach around 20,500 passenger trips a day, which represents about a 15.3 percent increase from the 2035 No Build scenario..
