El Paso to Las Cruces Proposed Rail Service – Estimated Ridership and Proposed Schedule

Ridership estimation is a central consideration when assessing the feasibility of a proposed transit line. A sketch model is a simplified ridership estimation method used in the initial stages of a project. It is summarized as a mathematical relationship between different local demographic and socio-economic characteristics. Sketch models are effective, time-saving and produce realistic results without requiring complex travel demand modeling.

While numerous region specific models have successfully attempted this task, very few models exist at the national level. We examined two different sketch models endorsed by the Transportation Research Boards before deciding on the one used in these estimates. This model incorporates local characteristics in ways that maintain the mathematical relationships of the sketch model and produce convincing results.

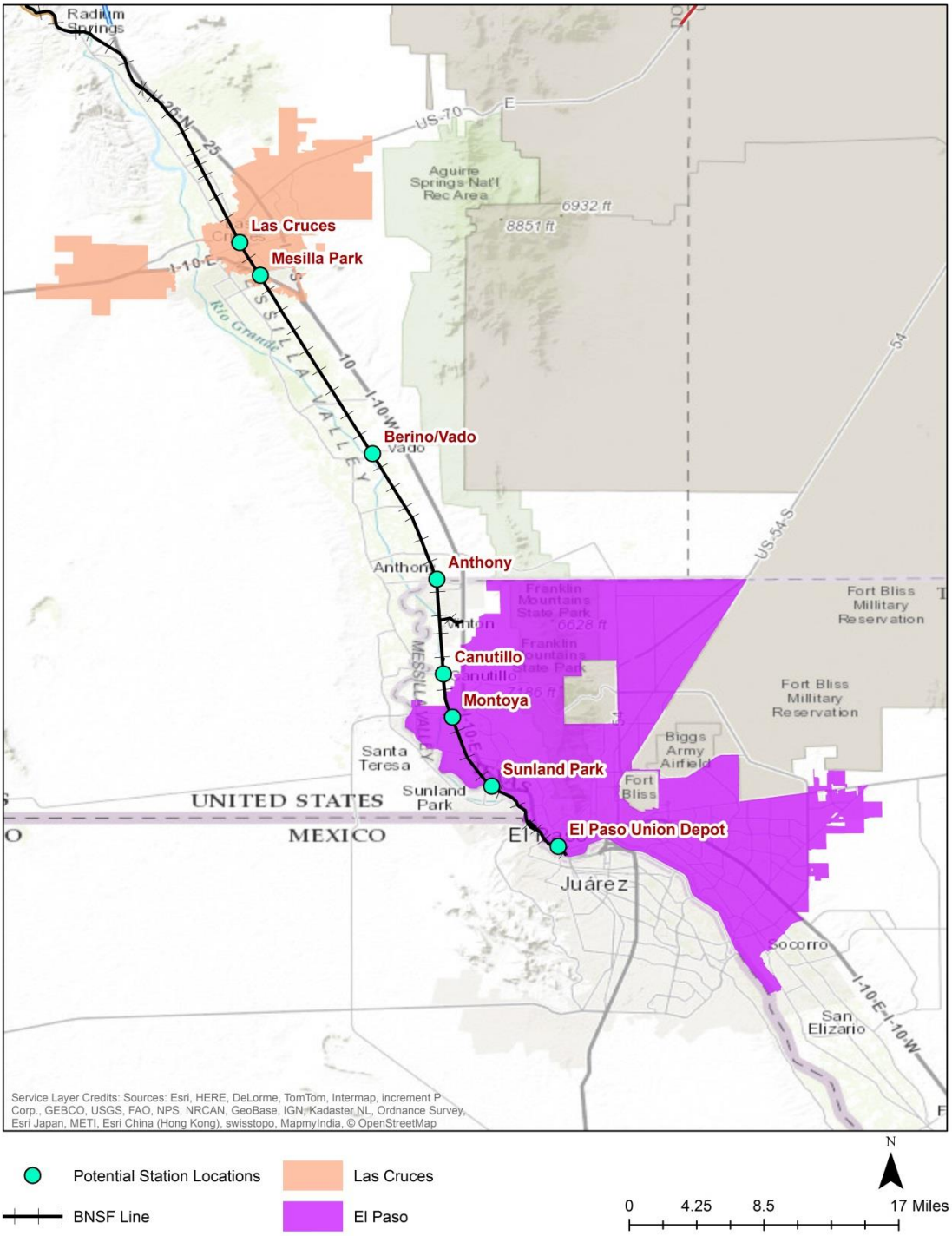
The ridership potential along the proposed commuter line from El Paso to Las Cruces has been adapted from the 2006 TRB report "Sketch Model to Forecast Commuter and Light Rail Ridership: Update to TCRP Report 16"[1]. The model was chosen for two reasons – 1) Large number of inputs used in the estimation, making it more specific to the region. 2) Station level ridership provides an opportunity to validate the results based on local knowledge.

Ngage New Mexico conducted a "Commuter Rail Survey" in March 2016 which was offered online as well as mailed to interested participants. Responses from the 1,000 plus respondents have informed this model and resulted in tweaks to make the model more specific to the Las Cruces-El Paso region. In addition, existing and proposed commuter rail lines in comparable regions have also been studied to verify the estimated ridership.

Sketch Model

The proposed 43-mile commuter line will connect Las Cruces to El Paso with six intermediate stops in the all-station service option. The eight stations are listed - El Paso Union Depot, Sunland Park, Montoya, Canutillo, Anthony, Berino/Vado, Mesilla Park and Las Cruces. The express service will connect El Paso Union Depot, Sunland Park, Anthony and Las Cruces.

[1] Clayton Lane, Mary DiCarlantonio, Len Usvyat. *Sketch Model to Forecast Commuter and Light Rail Ridership: Update to TCRP Report 16.* Transportation Research Record: Journal of the Transportation Research Board, No. 1986, Transportation Research Board of the National Academies Washington, D.C., 2006.



Map 1: Proposed commuter rail stations

The sketch model for estimating commuter rail ridership includes several parameters such as population, employment, presence of parking and characteristics of the station area, distance & speed to downtown, household vehicle ownership, number and proximity of other stations on the line and midday headway. The variables are listed by their decreasing sensitivity on ridership in the model below.

commuter rail station boardings = 13.9031	
× 2.9125	[if parking is present]
× 1.6653	[if transportation center or rail trunk]
× exp	[0.052 × speed to downtown (miles/hour)]
× exp	[–0.015 × time to downtown in minutes]
× exp	[–0.0083 × midday headway in minutes; 0 if none]
× exp	[–.002 × total stations on the entire CR network in the metro area]
× exp	[0.0263 × millions of people in the metro area]
×	(population within 2 miles of the station)$^{0.265}$
× exp	[–1.173 × zero-car households ÷ households with cars, within 2 miles of the station]
× exp	[0.06828 × 1,000s of jobs within 0.5 mile of the station]
× exp	[0.087 × distance to the nearest station]

Availability of parking is critical, followed by the station designation as a "transportation center". A station is a transportation center if it connects to an airport or seaport, connects to 4+ bus routes, serves more than one rail route or is designated a transit center by the local transit agency. The stations in El Paso and Las Cruces do not qualify per this definition as a transportation center. Both stations are in proximity to transit centers (Sun Metro Downtown Transit Center and Mesilla Valley Intermodal Transit Terminal) with significant local bus services but service at the station is less than desirable to support a commuter rail line currently. CNT has estimated ridership for two scenarios – the current scenario in which terminal stations are not transportation centers and the scenario that would see increased bus service to the commuter rail station or the consolidation of the transit center to the terminal station areas qualifying them as transportation centers.

The sketch model does a good job of evaluating the feasibility of the commuter line without requiring complex and expensive travel demand modeling. The simplicity of the model also comes with limitations. The model only looked at commuter lines in big cities, and this model is most applicable in bigger cities.

The model is generalized for application to regions across the county and does not account for special attractors such as universities. CNT in partnership with Ngage New Mexico conducted a ridership survey and found that, other than commuting for work, the leading destinations for likely daily commuters were the colleges in the area (UTEP, NMSU and community colleges). To account for the large student body, each student is considered to be equivalent to half a job. The students at UTEP were assigned to the El Paso station and the NMSU students to Las Cruces.

The average ridership for a commuter rail station for which this model is calibrated is 719, so the model can over predict ridership in some areas where built environment characteristics do not support transit. On examination of the ridership at station level, two station areas were eliminated from the commuter line ridership as they were either yielding very small ridership numbers or were over predicting it. The two stations – Canutillo and Berino/Vado will still be serviced but the overall ridership will account for the few riders from these stations.

The sketch model's relationship of car ownership to ridership is unintuitive for the Las Cruces – El Paso corridor. The car ownership variable considered in the model is the ratio of zero car households/households with cars, and this ratio is inversely proportional to the ridership, i.e. the smaller the ratio the higher is the ridership and vice versa. The model apparently assumes that people will likely drive to the commuter station, and households without cars would not be able to do so. However, in the Las Cruces – El Paso corridor, most of the proposed stations have some public transit connection currently, and transit connections will increase with planned additional bus service. Also the stations in smaller towns are walkable for a majority of the population, and both Las Cruces and El Paso have ambitious plans to increase the density of residential and commercial development in their terminal rail station areas. Consequently, a currently significant and growing population of residents who live or work within walking distance of the proposed rail stations will not own cars and will be likely transit riders. So by counting this population as a negative factor, the model tends to under-estimate potential ridership and is, to this extent, conservative in its ridership projections.

Summary of Potential Ridership

Potential ridership is estimated for the current conditions – 2014 population and employment data and for the years 2020 and 2030 using employment and population projections from the El Paso MPO and Mesilla Valley MPO long range transportation plans. In each scenario, potential ridership is calculated both as if the terminal stations are transportation centers, and separately as if they are not.

Table 1: Average Daily Ridership

Station	Option 1A - Not a Transit Center, 2014	Option 1B - Transit Center, 2014	Option 2A - Not a Transit Center, 2030	Option 2B - Transit Center, 2030	Option 3A - Not a Transit Center, 2040	Option 3B - Transit Center, 2040
El Paso Union Depot	1871	3115	2313	3851	2628	4376
Sunland Park	600	600	647	647	671	671
Montoya	787	787	843	843	869	869
Canutillo	-	-	-	-	-	-
Anthony	911	911	980	980	1007	1007
Berino/Vado	-	-	-	-	-	-
Mesilla Park	457	457	492	492	505	505
Las Cruces	938	1562	1045	1741	1096	1825
Total	**5565**	**7434**	**6320**	**8554**	**6777**	**9254**

Ridership increases by approximately 60% if a station is also a transit center or connects to 4+ bus routes. Future planning in El Paso and Las Cruces should consider the consolidation of transit terminals or making the stations the starting points of bus routes to connect local destinations to the commuter line.

Comparable Commuter Rail Services

CNT looked at ten comparable existing or under construction commuter rail lines and summarized their characteristics in the table below. These examples include some lines with smaller ridership and some with larger ridership than that projected for the El Paso-Las Cruces line. Several factors such as the population size of the connected cities, proximity to downtowns, availability of local public transportation, and transit attractors such as universities or airports influence the higher ridership.

Table 2: Comparable Commuter Rail Lines

Name	Santa Cruz-Watsonville	Boston-Manchester, NH, by Lowell project	Denton County A-Train (Dallas to Trinity Hills by Denton)	FrontRunner (Salt Lake City)	Altamont Corridor Express (ACE) Stockton - San Jose	Denver to Denver Airport A-line commuter rail line	Capital Metro Greater Austin	Coaster NCTD San Diego-Oceanside	Northstar Northwern suburbs to Minneapolis	Music City Star Nashville
Year	Study of 2015 Scenario G	Project, construction in 2017	Opened 2011	Northern Part: 2008 Southern Part: 2012	Opened in 1998	Opened April 22, 2016	Opened 2010	Opened 1995	Opened 2009	Opened 2006
Distance	22 miles 40min	37 miles	28 miles	Northern Part: 50 miles from Ogden to SLC Southern Part: 80 miles from SLC to Provo	86 miles	22 miles 37min other projects in process Gold-line ;11.2 miles, expected summer 2016 Westminster line: 6.2-miles, expected fall 2016	32miles	41 miles	40 miles	32 miles
Population	SC: 270,000 WL 50,000	B:655,000 M: 110,000	Denton: 123,099 Dallas: 1,258,000	SLC: 200,000 Ogden: 83,000 Provo: 112,000	SJ: 1,000,000 Stockton: 300,000	D: 650,000 Airport: 54 million passengers in 2015 (18th busiest airport in the world)	Austin : 850,000 Northern suburbs: fastest growth in the US	San Diego: 1,350, 000 Oceanside: 170,800	Minneapolis : 400,000 Big Lake: 10,000	Nashville: 650,000 Lebanon (Tennessee) 23,000
Ridership	5,500 per weekday	650,000 per year	1,900 per day	16,800 per day (5,000 for the Northern Part in 2012)	3,700 per day	37,900 – estimated average daily ridership	2,900 per day	5,600 per day	3,100 per day	1,225 per day
Frequency	60 weekday trains	16 train per day	26 train per day	30mn (peak)	Every Hour	15minues	30min (peak)	Mostly SB am –	Only:	60min

				60mn (off-peak)	4 round trip per day		60min (off-peak)	approx. 40 min NB pm – approx. 40min	5-7.30am SB- approx. 30min 4-6.30pm NB- approx. 30min	

Rail Service Schedules

Proposed weekday rail service schedules are provided on the following pages, which would serve the estimated levels of ridership with 8, 9, or 10 round trips per day. These schedules consider several factors, namely ideal service frequency, minimizing the number of train sets, allocation of express and all-station trips, and intermodal riders.

Service frequency is designed primarily for commuters, while also providing midday service to meet the needs of other customers, including university students. Accordingly, headway during peak hours ranges from 30 to 60 minutes, while midday headway is 120 minutes. Given this lesser midday headway, it is only peak service that requires more than 2 trains.

The allocation of express and all-station trips has also been considered. Since the rail should serve those wishing to commute from terminal and non-terminal stations, it is important that morning and evening peak service include both express and all-station options. Accordingly, all proposed schedules include at least one of each service type from both terminal stations.

These schedules also recognize that commuters using a subsequent mode of transit need to arrive well in advance of business hours. Accordingly, the schedules provide that peak morning trains arrive in El Paso and Las Cruces before 9:00 a.m. and in most cases before 8:30 a.m.

It is widely recognized that increased service frequency will increase ridership. However, CNT has not found a data-based ratio, applicable to the El Paso – Las Cruces corridor, which would predict the level of ridership increase that could be expected from a given increase in service. So these schedules are designed to serve the levels of ridership projected on demographic and land use bases, with minimum investments in rail equipment. The operating experience of the railroad may demonstrate opportunities to build ridership by increasing service frequency.

Eight Round Trips per day

Northbound							
El Paso Union Depot	Sunland	Montoya	Canutillo	Anthony	Berino/Vado	Mesilla Park	Las Cruces
8:00:00	8:10:36			8:29:06			8:52:54
9:00:00	9:10:36	9:20:24	9:28:06	9:39:06	9:52:42	10:10:30	10:12:54
10:30:00	10:40:36	10:50:24	10:58:06	11:09:06	11:22:42	11:40:30	11:42:54
12:30:00	12:40:36	12:50:24	12:58:06	13:09:06	13:22:42	13:40:30	13:42:54
14:30:00	14:40:36	14:50:24	14:58:06	15:09:06	15:22:42	15:40:30	15:42:54
16:15:00	16:25:36			16:44:06			17:07:54
17:30:00	17:40:36	17:50:24	17:58:06	18:09:06	18:22:42	18:40:30	18:42:54
18:30:00	18:40:36			18:59:06			19:22:54

Southbound							
Las Cruces	Mesilla Park	Berino/Vado	Anthony	Canutillo	Montoya	Sunland	El Paso Union Depot
7:30:00			7:58:48			8:17:18	8:22:54
8:00:00	8:07:24	8:25:12	8:38:48	8:49:48	8:57:30	9:07:18	9:12:54
10:30:00	10:37:24	10:55:12	11:08:48	11:19:48	11:27:30	11:37:18	11:42:54
12:30:00	12:37:24	12:55:12	13:08:48	13:19:48	13:27:30	13:37:18	13:42:54
14:30:00	14:37:24	14:55:12	15:08:48	15:19:48	15:27:30	15:37:18	15:42:54
16:00:00			16:28:48			16:47:18	16:52:54
17:00:00	17:07:24	17:25:12	17:38:48	17:49:48	17:57:30	18:07:18	18:12:54
17:45:00			18:13:48			18:32:18	18:37:54

Nine Round Trips per day

Northbound							
El Paso Union Depot	Sunland	Montoya	Canutillo	Anthony	Berino/Vado	Mesilla Park	Las Cruces
7:00:00	7:10:36	7:20:24	7:28:06	7:39:06	7:52:42	8:10:30	8:12:54
8:45:00	8:55:36			9:14:06			9:37:54
9:30:00	9:40:36	9:50:24	9:58:06	10:09:06	10:22:42	10:40:30	10:42:54
10:30:00	10:40:36	10:50:24	10:58:06	11:09:06	11:22:42	11:40:30	11:42:54
12:30:00	12:40:36	12:50:24	12:58:06	13:09:06	13:22:42	13:40:30	13:42:54
14:30:00	14:40:36	14:50:24	14:58:06	15:09:06	15:22:42	15:40:30	15:42:54
16:15:00	16:25:36			16:44:06			17:07:54
17:30:00	17:40:36	17:50:24	17:58:06	18:09:06	18:22:42	18:40:30	18:42:54
18:00:00	18:10:36			18:29:06			18:52:54

Southbound							
Las Cruces	Mesilla Park	Berino/Vado	Anthony	Canutillo	Montoya	Sunland	El Paso Union Depot
7:00:00	7:07:24	7:25:12	7:38:48	7:49:48	7:57:30	8:07:18	8:12:54
8:00:00			8:28:48			8:47:18	8:52:54
8:45:00	8:52:24	9:10:12	9:23:48	9:34:48	9:42:30	9:52:18	9:57:54
10:30:00	10:37:24	10:55:12	11:08:48	11:19:48	11:27:30	11:37:18	11:42:54
12:30:00	12:37:24	12:55:12	13:08:48	13:19:48	13:27:30	13:37:18	13:42:54
14:30:00	14:37:24	14:55:12	15:08:48	15:19:48	15:27:30	15:37:18	15:42:54
16:00:00			16:28:48			16:47:18	16:52:54
17:15:00	17:22:24	17:40:12	17:53:48	18:04:48	18:12:30	18:22:18	18:27:54
17:45:00			18:13:48			18:32:18	18:37:54

Ten Round Trips per day

Northbound							
El Paso Union Depot	Sunland	Montoya	Canutillo	Anthony	Berino/Vado	Mesilla Park	Las Cruces
7:15:00	7:25:36	7:35:24	7:43:06	7:54:06	8:07:42	8:25:30	8:27:54
8:45:00	8:55:36			9:14:06			9:37:54
9:00:00	9:10:36	9:20:24	9:28:06	9:39:06	9:52:42	10:10:30	10:12:54
9:45:00	9:55:36			10:14:06			10:37:54
11:15:00	11:25:36	11:35:24	11:43:06	11:54:06	12:07:42	12:25:30	12:27:54
13:15:00	13:25:36	13:35:24	13:43:06	13:54:06	14:07:42	14:25:30	14:27:54
15:15:00	15:25:36			15:44:06			16:07:54
17:15:00	17:25:36	17:35:24	17:43:06	17:54:06	18:07:42	18:25:30	18:27:54
18:15:00	18:25:36			18:44:06			19:07:54
18:45:00	18:55:36	19:05:24	19:13:06	19:24:06	19:37:42	19:55:30	19:57:54

Southbound							
Las Cruces	Mesilla Park	Berino/Vado	Anthony	Canutillo	Montoya	Sunland	El Paso Union Depot
7:00:00	7:07:24	7:25:12	7:38:48	7:49:48	7:57:30	8:07:18	8:12:54
7:30:00			7:58:48			8:17:18	8:22:54
8:00:00	8:07:24	8:25:12	8:38:48	8:49:48	8:57:30	9:07:18	9:12:54
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12:30:00			12:58:48			13:17:18	13:22:54
14:30:00	14:37:24	14:55:12	15:08:48	15:19:48	15:27:30	15:37:18	15:42:54
16:30:00	16:37:24	16:55:12	17:08:48	17:19:48	17:27:30	17:37:18	17:42:54
17:30:00			17:58:48			18:17:18	18:22:54
18:30:00	18:37:24	18:55:12	19:08:48	19:19:48	19:27:30	19:37:18	19:42:54