South Central
COUNCIL OF GOVERNMENTS

RAIL FEASIBILITY STUDY
DRAFT

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PREPARED BY: CONNETICS TRANSPORTATION GROUP

South Central Council of Governments

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SECTION 1
INTRODUCTION

This report supports the Southern Central Council of Government's (SCCOG) efforts to develop a Service and Financial Plan for the South Central Regional Transit District (SCRTD). One of the objectives of this effort is to conduct a feasibility study of passenger rail connecting the El Paso metro area and southern Dona Ana County to the Spaceport in Sierra County, and ultimately north to meet Rail Runner.

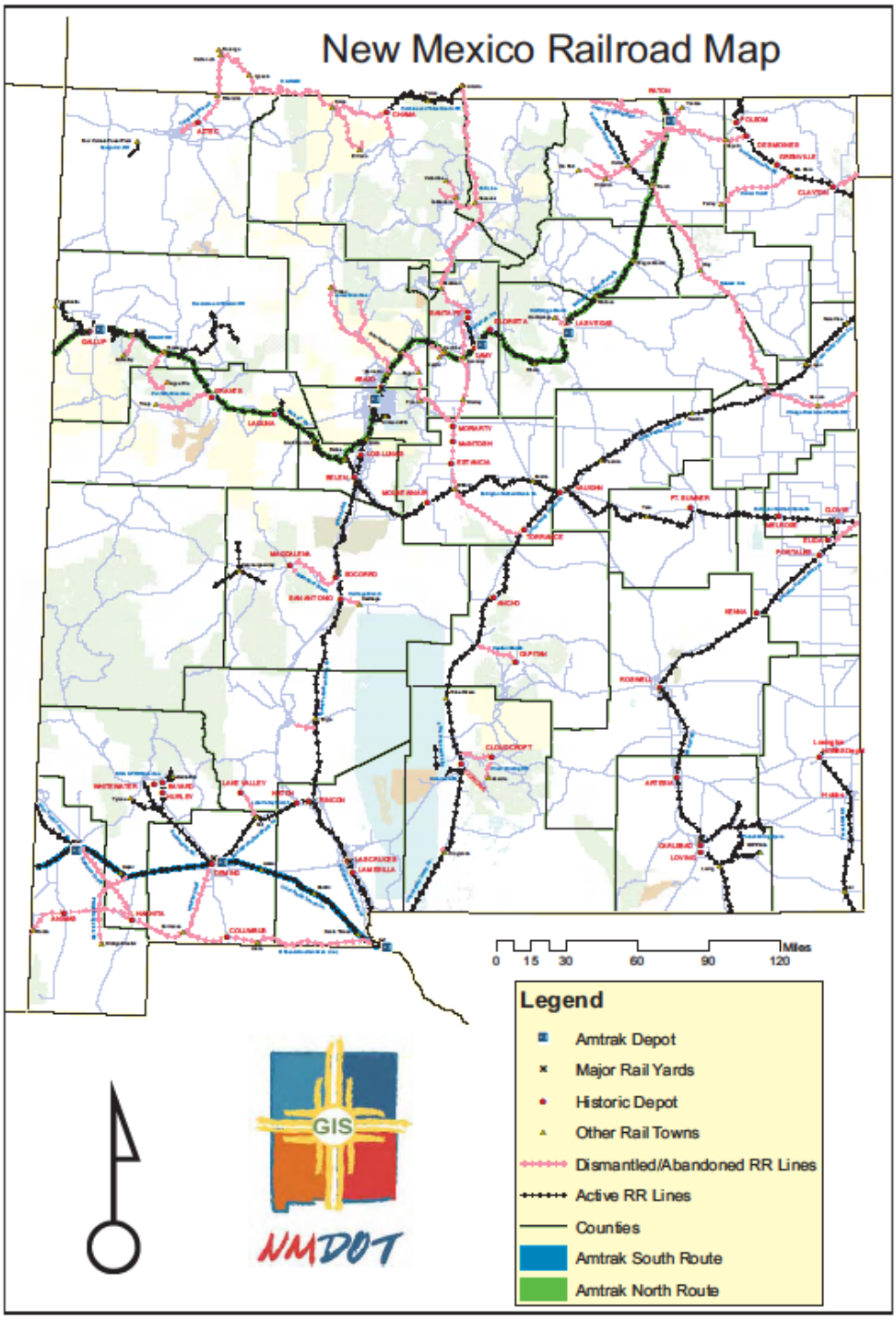
This rail feasibility report provides the following analysis:

- Describes the rail corridor
- Provides rail service options
- Identifies potential stations
- Estimates a range of capital costs
- Estimates a range of annual operating costs
- Estimates potential ridership
- Identifies next steps for pursuing rail service along this corridor.

Two rail corridors relate to the Southcentral RTD area. The Burlington Northern Santa Fe (BNSF) El Paso Subdivision passes from El Paso through Las Cruces to Belen, joining the BNSF Glorieta Subdivision into Albuquerque and beyond. The Union Pacific (UP) Carrizozo Subdivision proceeds from El Paso through Alamogordo, Vaughn and Tucumcari into Texas. These corridors can be seen in **Figure 1-1** showing rail lines in New Mexico.

This feasibility study focuses on the El Paso Subdivision, since it is best able to serve the existing major density in Las Cruces County as well as the future Spaceport site.

Figure 1-1
RAIL LINES IN NEW MEXICO



Source: New Mexico 2025 Statewide Multimodal Transportation Plan, NMDOT

Passenger rail refers to the carrying of passengers on vehicles running along railways or railroads. **Intercity rail** refers to express train passenger services that cover long distances, such as what Amtrak operates. Intercity rail usually involves a locomotive hauling passenger vehicles. **Commuter rail** usually is oriented to work trips between a central city and adjacent suburbs. The common practice in the western United States is to use passenger cars drawn by locomotives. The following description of commuter rail is provided by the American Public Transit Association:[1]

> "**Commuter rail** (also called **metropolitan rail**, **regional rail**, or **suburban rail**) is an electric or diesel propelled railway for urban passenger train service consisting of local short distance travel operating between a central city and adjacent suburbs. Service must be operated on a regular basis by or under contract with a transit operator for the purpose of transporting passengers within urbanized areas, or between urbanized areas and outlying areas. Such rail service, using either locomotive hauled or self propelled railroad passenger cars, is generally characterized by multi-trip tickets, specific station to station fares, railroad employment practices and usually only one or two stations in the central business district. Intercity rail service is excluded, except for that portion of such service that is operated by or under contract with a public transit agency for predominantly commuter services, which means that for any given trip segment (i.e., distance between any two stations), more than 50% of the average daily ridership travels on the train at least three times a week."

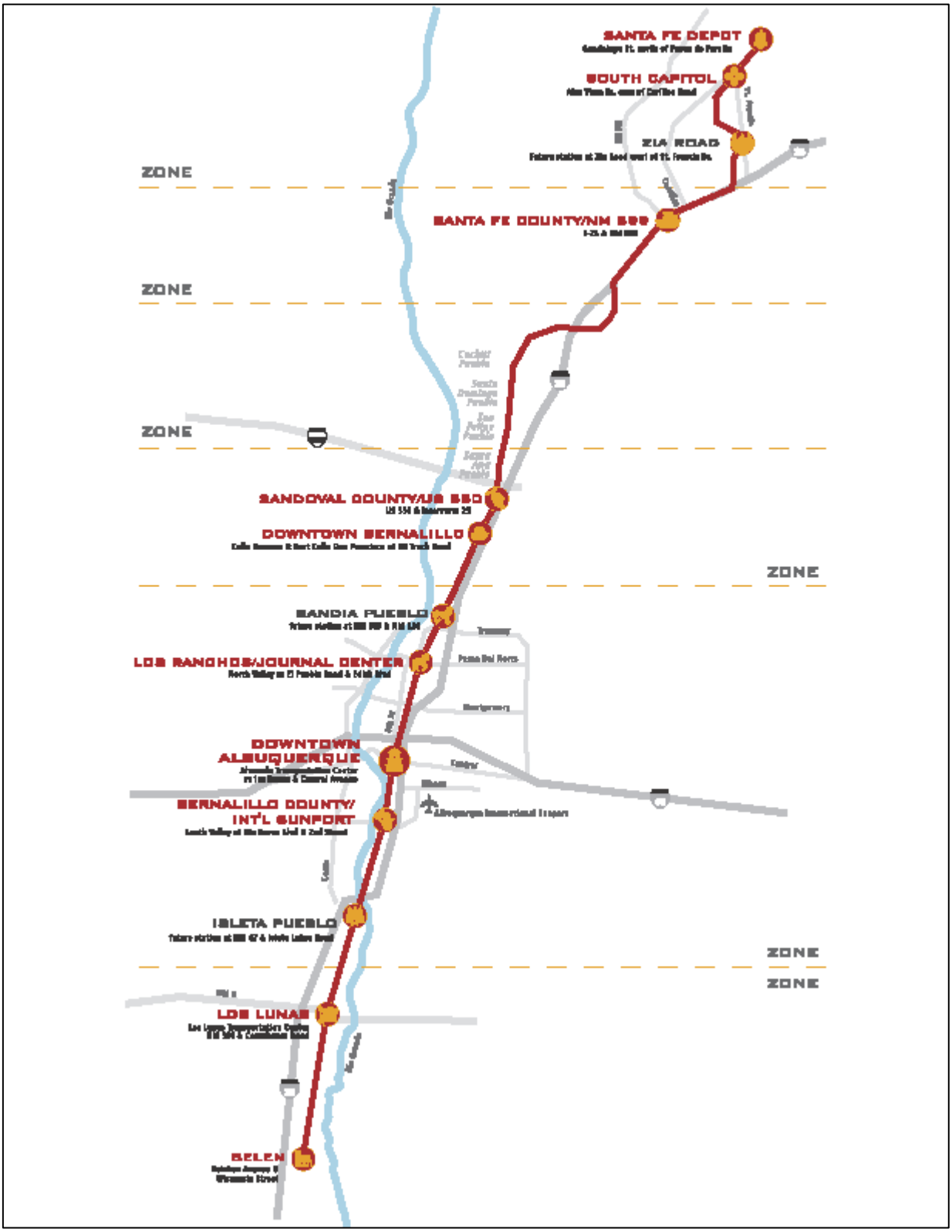
Commuter rail routes are typically from 20 to 50 miles in length. Railway track is often shared with freight trains or intercity trains. Station spacing is typically anywhere from 3 to 8 miles apart, depending on the environment. Longer distances between stations allow more competitive travel times, whereas shorter distances between stations provide better local access.

Long-established commuter rail systems are common in large metropolitan areas in the east coast, such as New York, Chicago, Boston and Philadelphia. Newer commuter rail operations (since the 1990s) have been established in Southern California, Dallas, San Diego, and Miami. New Mexico's Rail Runner commuter rail service opened in 2006 linking Albuquerque with adjacent commuter communities, and the segment to Santa Fe recently opened for service at the end of 2008. **Figure 1-2** provides the route map of Rail Runner service.

Other types of rail transit, including **heavy rail** (**metro**, **subway**, **rapid transit**, or **rapid rail**) and **light rail** (streetcar, tramway or trolley) are used within urbanized settings. These types of transit are not applicable to the corridor under study.

[1] http://www.apta.com/research/stats/rail/definitions.cfm

Figure 1-2
RAIL RUNNER MAP



Source: nmrailrunner.com

New Mexico Rail Runner express train at downtown Albuquerque station
Source: trainweb.org

Rail Runner Belen station
Source: nmrvpark.com

SECTION 2
STUDY CORRIDOR CHARACTERISTICS

The BNSF El Paso Subdivision extends 241 miles from El Paso to Isleta (north of Belen), where it joins the Glorieta Subdivision to proceed another 10 miles or so to Albuquerque. The rail right-of-way begins in the railyard area south of Union Station in El Paso. It proceeds northward through an industrial area and gravel pit, parallel to West Paisano Drive. In the vicinity of Race Track Drive, the rail line begins to parallel Doniphan Drive which becomes Main Street/Highway 478 as it continues northwesterly to Las Cruces County. South of Idaho Avenue in Las Cruces, Main Street diverges as the right-of-way continues to the west in between Compress Road and Melendres Street. North of downtown Las Cruces the right-of-way roughly parallels Dona Ana Road and Route 185 – I-25 to Rincon.

The BNSF rail line passes a number of communities and cities ranging from fairly minimal populations to significant-sized cities. The first significant community north of El Paso is Sunland Park, a relatively dense area with regional attractions such as the Sunland Park Mall (on the east side of I-10 rather than the west side containing the rail right-of-way) and the Sunland Park Race Track and Casino. North of Sunland Park are communities such as Canutillo, Vinton, Anthony and Berino which have community-level development oriented toward Doniphan Drive (Highway 20). The right-of-way then runs adjacent to largely agricultural uses from Vado to Mesquite, approaching Mesilla Park which is adjacent to New Mexico State University. North of Mesilla Park is downtown Las Cruces, with Las Cruces being by far the largest city between El Paso and Albuquerque. North of downtown Las Cruces is Dona Ana, which begins to make the transition back to agricultural uses which are then dominant through to Rincon.

North of Rincon the the right-of-way passes through mostly desert for the next 90 miles or so, passing the Spaceport site north of Upham (near Cutter). Agricultural uses pick up at San Antonio, northward to Socorro, San Acacia, La Joya, Sabinal and Belen.

Belen serves as the southern terminus of Rail Runner. From Belen to downtown Albuquerque is another 30 miles, using the remaining segment of the El Paso Subdivision which merges onto the Glorieta Subdivision at Isleta.

Table 2-1 provides the population of incorporated cities along the alignment, south to north, as reported in the 2000 Census. The anchoring cities of El Paso and Albuquerque have the greatest populations by far with around 500,000 residents, with El Paso exceeding Albuquerque. Las Cruces is the largest city between these two anchors with a population of over 74,000. Other notable concentrations of at least 5,000 occur at Sunland Park, Canutillo, Anthony, Socorro and Belen.

Table 2-1
POPULATION IN CITIES ALONG RAIL CORRIDOR

CITY	POPULATION 2000 Census
El Paso	563,700
Sunland Park	13,300
Canutillo	5,100
Vinton	1,900
Anthony	7.900
Vado	3,000
Mesquite	1,000
Mesilla Park	2,200
Las Cruces	74,300
Dona Ana	1,400
Rincon	200
Socorro	8,900
Belen	6,900
Albuquerque	449,000

Note: Reporting limited to census cities, ordered south-to-north along route.

The track along the El Paso Subdivision is in generally good condition. Most of the right-of-way is single track, with double track in only a couple of stretches and sidings in about a dozen locations.

There is no signal system along this right-of-way so operations are controlled by a track warrant system. This is a method where train crews are given permission by a dispatcher in order to proceed along two fixed points as a procedure for avoiding conflicts between opposing trains. The lack of a signal system mandates a maximum speed of 49 mph. There is the potential for crews having to wait long periods for opposing trains before they are given permission to proceed. Trains pulling out of sidings can be a time-consuming process as a crew member must hop off the train to manually line the switch back.

These limitations would be difficult to work around if there was a high volume of trains using the route. However, train traffic is limited to several daily trains along with some local activity. There is occasional service that heads into and out of Mexico.

BNSF right-of-way near Rincon
Photo by Wes Carr

Spaceport site – grading activities
http://www.space.com/images/060323_spaceport_bdoze_02.jpg

SECTION 3
RAIL SERVICE OPTIONS AND STATIONS

Overview

Rail service along the 250-mile right-of-way from El Paso to Albuquerque can be structured in a number of ways. This section explores service options in terms of length, frequency, and communities served.

The full distance from El Paso to Albuquerque exceeds what would be considered a typical commute served by a commuter rail line. Census journey-to-work data suggests that very little commute demand between El Paso and Albuquerque exists (to be described in a later section on potential ridership). The substantial segment of the right-of-way traveling through undeveloped land would provide little opportunity for travel to interim points unless a large-scale development (such as Spaceport) comes into fruition.

Passenger travel along the full length of this distance can be seen more as an intercity rail service if operated by a carrier such as Amtrak, since it would provide links to their overall system. Since this corridor is being explored outside of this context, the corridor is distinguished as regional rail to suggest that instead of focusing strictly on commute trips, this route serves the purpose of providing connections to greater regions within New Mexico. To serve such a long corridor, the focus would be to target only key populations and/or significant interceptors along the length of the route. Serving the many interim communities along such a long corridor would overly burden the travel time while offering minimal additional ridership.

However, a more manageable rail corridor with a shorter distance could offer improved access to communities along the route. A logical corridor for such service would be from El Paso to Las Cruces, a 43-mile route. This route follows the more typical commuter rail definition in terms of its length and is anchored by two significant populations.

The following discussion will explore the potential service patterns listed below:

- El Paso to Downtown Las Cruces or Dona Ana
- El Paso to Spaceport
- El Paso to Albuquerque

El Paso to Downtown Las Cruces or Dona Ana

The most significant ridership along the full BNSF corridor would occur between El Paso and Las Cruces, based on demographics and journey-to-work information (see section regarding potential ridership). This route would cover a distance of about 43 miles (El Paso to Las Cruces) to 48 miles (El Paso to Dona Ana). For this distance, station spacing averaging 5 to 8 miles would be appropriate to offer a balance of community access while still providing competitive travel times to the automobile.

El Paso Union Depot
Source: http://farm1.static.flickr.com/110/311677540_23e4c7a771.jpg?v=0

A total of eight to nine stations along the entire route is envisioned. The following station locations have been assumed for purposes of planning, based on serving the most populated communities along the route:

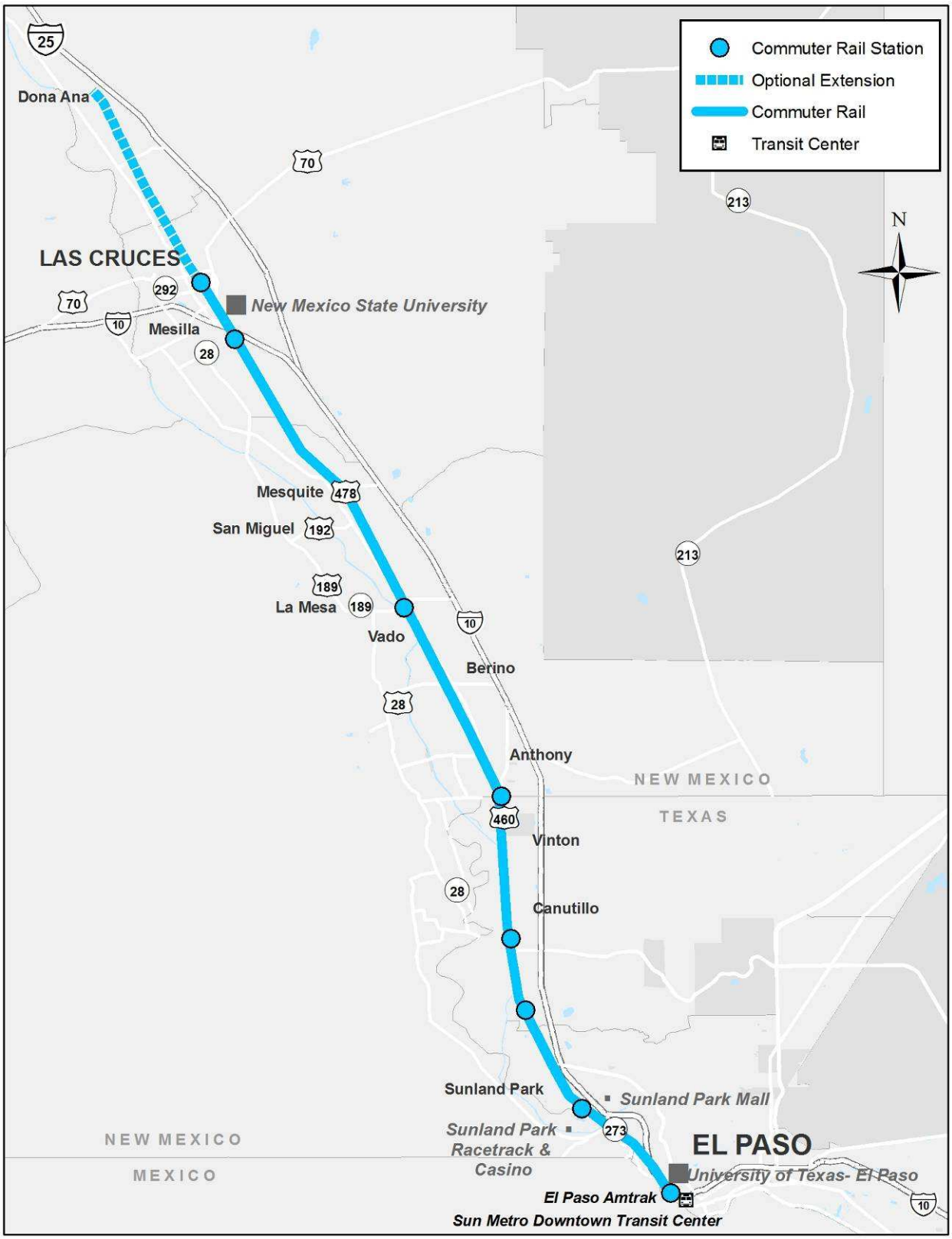
- El Paso Union Depot
- Sunland (vicinity of Sunland Park Drive/Doniphan)
- Montoya (vicinity of Montoya or Aircraft)
- Canutillo (south of La Mesa Ave)
- Anthony (vicinity of Washington Street)
- Berino/Vado/Mesquite (represented at Vado)
- Mesilla Park (at old depot site)
- Las Cruces (at downtown depot, Las Cruces Avenue/Mesilla Street)
- Dona Ana (optional extension)

While representative station locations are noted, these should be considered for planning purposes only, to be refined in subsequent planning efforts.

Service is envisioned to initiate from the Union Depot in downtown El Paso. Some track arrangement to switch onto Union Pacific tracks would be likely to provide the most convenient access for the approach to the station.

Figure 3-1 illustrates the route and representative stations for this alternative.

Figure 3-1
El Paso-Las Cruces or Dona Ana Alternative



Old depot at Mesilla Park
Source: http://flickr.com/photos/99491151@N00/2894197926/

Depot at Las Cruces (Railroad Museum)
Source: http://flickr.com/photos/slongtoo/321920628/

For purposes of planning, daily service levels are assumed to be patterned after Rail Runner service in Northcentral New Mexico. A representative schedule assumes eight trains in each direction throughout the day. This translates to bi-directional service mostly focused on the morning and evening peak period commutes. For this analysis, only weekday service is assumed.

El Paso to Spaceport

The development of the Spaceport site would trigger consideration of train service as a convenient way to get workers to the site, since the rail right-of-way is adjacent to the site. The most manageable way to offer at least minimal service to the Spaceport is to serve it from the south. The corridor from El Paso to Spaceport is nearly 104 miles. Given this long distance, the service best operates with very selective stops focused at high-volume locations.

Under this scenario, stations are limited to the following locations:

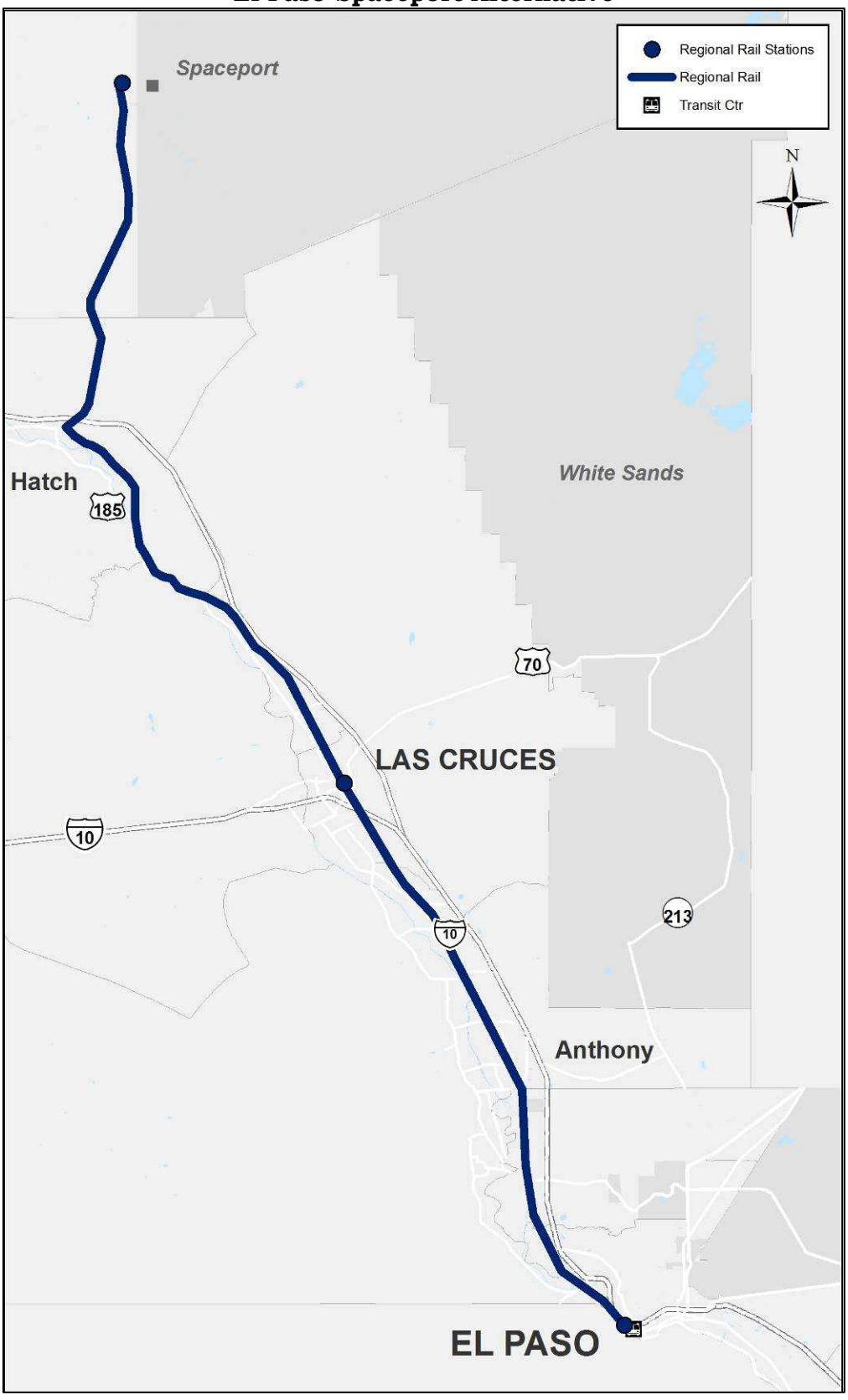
- Downtown El Paso (Union Depot)
- Downtown Las Cruces (Las Cruces Depot)
- Spaceport (near Cutter)

For purposes of planning, a single directional train is assumed to provide service to Spaceport on weekdays: one northbound trip in the morning, and one southbound return trip in the evening. For this analysis, only weekday service is assumed.

This type of service could operate as an overlay of the El Paso-Las Cruces service, whereby the El Paso to Las Cruces line operates with frequent stops while the El Paso to Spaceport line skips community stops to provide more of an express ride.

Figure 3-2 illustrates the route and representative stations for this alternative.

Figure 3-2
El Paso-Spaceport Alternative



El Paso to Albuquerque

A final scenario provides service along the full length of the El Paso Subdivision from El Paso to Belen, then continues onto the Glorieta Subdivision to travel the final leg to Albuquerque. The full distance is about 253 miles. Again, due to the long length of the corridor, a minimal number of stops are assumed.

For this scenario, stations are limited to the following locations:

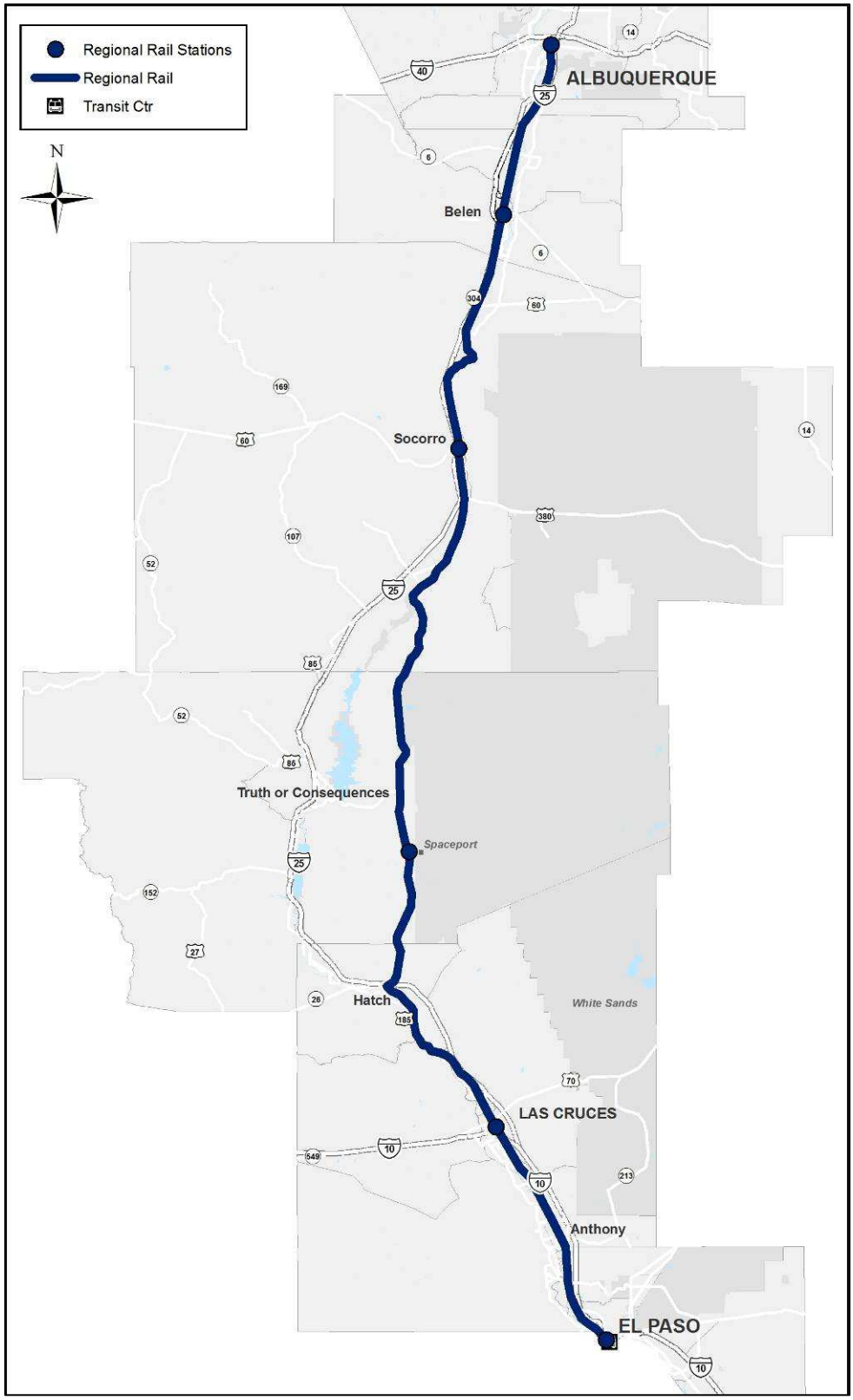
- Downtown El Paso (Union Depot)
- Downtown Las Cruces (Las Cruces Depot)
- Spaceport (near Cutter)
- Belen (at Rail Runner station)
- Downtown Albuquerque (at Rail Runner station)

Again, for purposes of planning, a single directional train is assumed to provide service to Albuquerque on weekdays: one northbound trip in the morning, and one southbound return trip in the evening. For this analysis, only weekday service is assumed.

This type of service could operate as an overlay of the El Paso-Las Cruces service, whereby the El Paso to Las Cruces line operates with frequent stops while the El Paso to Albuquerque line skips community stops to provide more of an express ride.

Figure 3-3 illustrates the route and representative stations for this alternative.

Figure 3-3
El Paso-Albuquerque Alternative



SECTION 4
OPERATING STATISTICS

Based on the service assumptions defined in Section 3, a series of operating statistics can be developed. First, rail travel times are generated based on acceleration and deceleration rates of a commuter rail vehicle, distances between stations, and maximum allowable speeds. These estimated travel times are summarized in **Table 4-1.**

Table 4-1
ESTIMATED ONE-WAY TRAVEL TIMES

SERVICE OPTION	DISTANCE (IN MILES)	NUMBER OF ASSUMED STATIONS	ESTIMATED ONE-WAY TRAVEL TIME
El Paso – Downtown Las Cruces	42.6	8	58 minutes
El Paso – Dona Ana	48.2	9	66 minutes
El Paso – Spaceport	222.7	3	2 hours, 16 minutes
El Paso – Albuquerque	252.7	6	5 hours, 26 minutes

Station-to-station travel times can be found in the appendix.

Vehicle requirements are determined as a function of how many trainsets are needed to provide the specified level of service. The number of daily trains takes into account the ability of a train to be "recycled" once it has completed its trip. Once daily trains are established, this determines the number of locomotives. The number of passenger cars is based on an expected maximum load of passengers. At this stage of analysis, it is assumed that demand can be handled with two passenger cars for all scenarios. A spare ratio of 20% (rounded to a whole vehicle) is applied. **Table 4-2** summarizes resulting vehicle requirements for each alternative.

Table 4-2
VEHICLE REQUIREMENTS

SERVICE OPTION	DAILY TRAINS	LOCOMOTIVES	PASSENGER CARS
El Paso – Downtown Las Cruces	4	4 + 1 spare = 5	8 + 2 spares = 10
El Paso – Dona Ana	4	4 + 1 spare = 5	8 + 2 spares = 10
El Paso – Spaceport	1	1 + 1 spare = 2	2 + 1 spare = 3
El Paso – Albuquerque	1	1 + 1 spare = 2	2 + 1 spare = 3

Daily revenue car-miles sums the revenue miles of each passenger car on a daily basis. Daily revenue train-hours calculate the hours of revenue service of each train on a daily basis. **Table 4-3** summarizes daily revenue car-miles and daily revenue train-hours.

Table 4-3
DAILY SERVICE STATISTICS

SERVICE OPTION	DAILY REVENUE CAR-MILES	DAILY REVENUE TRAIN-HOURS
El Paso – Downtown Las Cruces	1,360	19
El Paso – Dona Ana	1,540	20
El Paso – Spaceport	415	4
El Paso – Albuquerque	1,500	8

Daily service statistics are factored to produce annual service statistics, which are the basis for calculating operating costs. For this analysis, 254 annual weekdays are assumed, leading to the annual service statistics listed in **Table 4-4**:

Table 4-4
ANNUAL SERVICE STATISTICS

SERVICE OPTION	ANNUAL REVENUE CAR-MILES	ANNUAL REVENUE TRAIN-HOURS
El Paso – Downtown Las Cruces	346,300	4, 700
El Paso – Dona Ana	391,800	5,100
El Paso – Spaceport	105,400	1,000
El Paso – Albuquerque	385,100	2,100

SECTION 5
CAPITAL COSTS

Capital costs refer to the elements related to purchasing land, construction, facilities and equipment in order to produce the project. In this case, development of rail service along the El Paso Subdivision requires the following major capital cost elements:

- Right-of-way acquisition and/or trackage rights
- Trackwork and signaling
- Stations
- Maintenance facilities
- Vehicles

Right-of-way/Property Acquisition

Perhaps the largest unknown is the cost of either acquiring the entire El Paso Subdivision, or obtaining trackage rights to operate along all or a portion of the route. In the case of Rail Runner, the agreement with BNSF led to the purchase of the rail line and associated right-of-way from Belen, New Mexico to the Colorado state line (270 miles of track, rights-of-way,etc.) for $75 million.

The cost of purchasing right-of-way may not be meaningful being expressed on a per-mile basis, because the railroads may require the purchase of more than what is strictly required for immediate project use. For example, even if the defined project is a commuter rail service from El Paso to Las Cruces, BNSF may want to negotiate the purchase of the entire El Paso subdivision as the price of entry.

Outside of Rail Runner, other commuter rail properties have paid significantly higher costs to acquire right-of-way. The Utah Transit Authority (UTA) purchased about 175 miles of right-of-way (some portions without track) for $185 million in 2002; the Southern California Regional Rail Authority (SCRRA) purchased about 340 miles of track and rights-of-way for a total of $705 million between 1991 and 2000.[2]

The length of track from El Paso to Belen is about 223 miles, compared to the 270 miles purchased under the Rail Runner transactions. For purposes of this analysis, two estimates are provided: a low estimate (based on similar conditions to Rail Runner) and a high estimate (based on conditions more similar to other commuter rail properties). For the low estimate, a placeholder of $75 million will be applied to all scenarios for right-of-way, based on the theory that BNSF will want to sell the entire subdivision rather than a portion of it. For the high estimate, a placeholder of $250 million will be applied to all scenarios, which represents more similarity to the UTA transaction which averaged a little more than $1 million per mile.

[2] *Belen to Santa Fe Commuter Rail Project Overview and Status of Project Elements*, New Mexico Department of Transportation/MRCOG, October 8, 2008.

Trackwork and Signaling

It is clear that modifications would need to be made in order to make the El Paso Subdivision suitable for passenger service. At a minimum, a block signal system would need to be installed to ensure a safe and effective method for minimizing train conflicts in opposite directions. It is anticipated that certain sections of the route would require a second track to allow opposing trains to pass. The extent of double-tracking depends on the service plan.

A segment of the Rail Runner service from Isleta to Belen uses the El Paso Subdivision. Much of the signal and trackwork that was needed to initiate Rail Runner service was focused on that section. While a precise breakdown is not available, the total budget for all improvements from Belen to Bernalilo was $30 million. It can be assumed that perhaps 60 percent of this budget was for the portion of the route using the El Paso Subdivision, which is about an 18-mile segment. This would translate to about $1 million per mile.

In other commuter rail systems, this cost is on the low side. For commuter rail systems such as Metrolink (Southern California area) and Sounder (Seattle region), such costs were more in the order of $10 to $12 million per mile.

For purposes of this analysis, the low estimate will be based on $1 million per mile similar to Rail Runner's experience, and the high estimate will be based on $10 million per mile, similar to Metrolink or Sounder.

Stations

Rail Runner spent about $2 million per station. Stations can be as simple as providing a platform and canopy, to a more elaborate facility involving a building and bathroom facilities. For this alignment, the El Paso Depot is an active train station for Amtrak service. The downtown Las Cruces Depot already is restored, currently housing the Railroad Museum, and can readily accommodate passenger service. At Mesilla Park, an old depot exists and can potentially be restored. On the northern end, Belen and Albuquerque stations are already in place. For all other stations, simple platforms would be adequate. A reasonable assumption to use for purposes of this study is $2 million per station.

Maintenance Yard

Rail Runner was able to obtain an eight-to-nine acre site in downtown Albuquerque as part of the right-of-way acquisition package. Rail Runner budgeted about $5 million for the actual construction of the maintenance facility with offices, a covered area, service pit and track. A reasonable assumption to use for purposes of this study is a slightly higher cost of $6 million.

Vehicles

Rail Runner spent $2 million per locomotive, and about $2.3 million per bi-level passenger car. This analysis uses slightly higher costs to account for inflation, $2.2 million per locomotive and $2.5 million per passenger car.

Table 5-1 summarizes the assumptions used for creating a low estimate and high estimate for capital costs. The only two categories where a range is explored is for right-of-way and trackwork/signals. The remaining cost items (locomotives, passenger cars, stations and maintenance facility) have less potential for wide variation so are kept constant.

Table 5-1
CAPITAL COST BASIS FOR LOW AND HIGH ESTIMATES

COST ITEM	LOW ESTIMATE	HIGH ESTIMATE
Right-of-Way	$75 million fixed cost	$250 million fixed cost
Trackwork, Signals	$1 million/mile	$10 million/mile
Locomotives	$2.2 million/vehicle	$2.2 million/vehicle
Passenger Cars	$2.5 million/vehicle	$2.5 million/vehicle
Stations	$2 million/station	$2 million/station
Maintenance Facility	$6 million	$6 million

Table 5-2 provides quantities by alternative. *Note that quantities for the regional routes from El Paso to Spaceport or Albuquerque assume that a base project from El Paso to Las Cruces already exists.*

Table 5-2
QUANTITIES BY ALTERNATIVE

COST ITEM	El Paso – Las Cruces (base project)	El Paso – Dona Ana	El Paso – Spaceport	El Paso – Albuquerque
Right-of-Way	fixed	fixed	0 (assumes base)	0 (assumes base)
Trackwork, Signals	42.6 miles	48.2 miles	61.1 miles (assumes base)	180.1 miles (assumes base)
Locomotives	5	5	2	2
Passenger Cars	10	10	3	3
Stations	8	9	1 (assumes base)	2 (assumes base)
Maintenance Facility	1	1	0 (assumes base)	0 (assumes base)

Table 5-3 provides the resulting order-of-magnitude capital costs. *Again, it is important to note that quantities for the regional routes from El Paso to Spaceport or Albuquerque assume that a base project from El Paso to Las Cruces already exists.*

Table 5-3
ORDER-OF-MAGNITUDE CAPITAL COST SUMMARY

SERVICE OPTION	LOW ESTIMATE (IN MILLIONS)	HIGH ESTIMATE (IN MILLIONS)
El Paso – Downtown Las Cruces (base project)	$175	$735
El Paso – Dona Ana	$185	$790
El Paso – Spaceport (assumes base project)	$75	$625
El Paso – Albuquerque (assumes base project)	$200	$1,800

The resulting range in costs is so marked as to provide little guidance. The wide variation is due to the following unknowns:

- The terms of using the right-of-way are a large unknown. BNSF may allow trackage rights for all or a segment of the right-of-way, or it may end up being more beneficial to purchase the right-of-way outright. The deal negotiated for Rail Runner service suggests that a similar arrangement can be possible, but experience from other agencies suggests the potential for costs to be far higher.
- Trackwork and signal costs for Phase 1 of the Rail Runner project (which included a portion of the El Paso Subdivision right-of-way) were fairly minimal, compared to experience from other agencies. Because of the mileages involved in the alternatives, differences in resulting capital cost become aggravated.
- Both of these high-variance cost items can best be resolved once actual negotiations with BNSF occur.

The capital cost analysis confirms that if similar terms can be reached as was available for the Rail Runner, passenger rail service along this corridor can be achieved at a very affordable capital cost. To the extent that terms approach other agencies' experiences, the capital cost along this corridor has the potential to balloon.

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SECTION 6
OPERATING COSTS

Operating Cost Methodology

A commuter/regional rail operating and maintenance (O&M) cost model was developed to estimate costs for various commuter and regional rail routes under study in Southcentral New Mexico. The unit-cost based O&M model is calibrated to the start-up operating statistics and system characteristics, and costs for New Mexico Rail Runner Express service. Calibration data were derived from many sources, including the agency's website, reports, and telephone interviews with key staff.

The O&M cost model's calibration operating statistics and service characteristics are listed in **Table 6-1**. Revenue train-hours and passenger car-miles were not provided by Rail Runner Express staff, so these statistics were estimated using published schedules and other sources. The operating statistics were adjusted with more recent data based on actual Rail Runner revenue service, which commenced in July 2006.

Table 6-1
2006 Rail Runner Operating Statistics/System Characteristics

Operating Statistic/System Characteristic	Rail Runner 2006
Annual Revenue Train-Hours	2,379
Annual Revenue Passenger Car-Miles	211,166
Peak Trains	3
Route Miles	51.0
Stations	9
Maintenance Facilities/Yards	1
Peak Passenger Vehicles	6

SOURCE: FY 06/07 New Mexico Rail Runner Express Operating Budget Summary Phase I Belen to Bernalillo, and February 2009 telephone interview with Rail Runner staff.

Rail Runner's start-up budget was adjusted slightly to reflect more current, actual cost data, which was integrated into the O&M cost model and represent 2008 dollars. Cost drivers, represented by operating statistics and system characteristics, were assigned to each cost item based on industry guidelines and standards. Unit costs were derived by dividing budgeted costs by the value of the cost driver for each cost item. Unit costs based on Rail Runner's 2006 operating statistics and system characteristics, and adjusted budget are presented in **Table 6-2**.

Rail Runner contracts train operation, vehicle maintenance, and right-of-way maintenance. These expenses are shown in Table 2 as "Purchased Transportation". The contractor also charges a fee for its services, and the New Mexico Gross Receipts Tax applies to all contract services.

The Agency's direct costs include the administration of services associated with customer service, planning, contract maintenance, and station maintenance, marketing (advertising media and printed materials), and insurance claims administration.

Table 6-2
O&M Cost Model Unit Costs

Cost Item	Type	Cost Driver	Unit Cost
VEHICLE OPERATIONS & MAINTENANCE			
Dispatch by Host Railroad	SERV	Peak Trains	$20,000
- Fuel & Lubricants	FUEL	Car-Miles	$2
Purchased Transportation	PURCH	Train-Hours	$165
Purchased Transportation	PURCH	Car-Miles	$12
Special Event Trains, Misc. Crews	PURCH	Fixed	
NON-VEHICLE MAINTENANCE			
Purchased Transportation	PURCH	Route Miles	$31,000
(Unit cost of $31K per mile if less than 70, otherwise $10K per mile)			
GENERAL ADMINISTRATION			
Salaries, Wages & Benefits	LABOR	Peak Veh.	$166,667
Marketing	SERV	Fixed	$250,000
Web Ticket Vending/Fare Inspect.	SERV	Peak Veh.	$8,333
Risk/Claims Administration	SERV	Fixed	$100,000
Utilities	UTIL	Yard	$80,000
Utilities	UTIL	Stations	$2,222
Casualty & Liability	INS	Fixed	$1,700,000
Purchased Transportation (Fee)	PURCH	Peak Veh.	$83,333
Purchased Transportation (GRT)	PURCH	Contractor Services	6.75%
Miscellaneous Expenses	MISC	Peak Veh.	$6,325

The description of most line items is self-explanatory. Detailed descriptions and explanations for some specific line items are as follows:

Vehicle Operations & Maintenance:

- Dispatch by Host Railroad represents Rail Runner's initial arrangement for Burlington Northern Santa Fe (BNSF) to dispatch their trains for the incremental cost of the service to the railroad, above and beyond the other trains BNSF dispatched every day. This arrangement no longer applies because Rail Runner now owns the track and has taken over the entire dispatch function. The O&M cost model, however, assumes that the initial arrangement would be more likely to apply to the alignments in the Southcentral New Mexico rail study.

- Fuel represents the cost of diesel fuel for locomotives. The costs estimated by the O&M cost model could vary significantly if rolling stock operated in Southcentral New Mexico is different from Rail Runner's equipment. This expense also can fluctuate widely with market conditions and negotiated purchase agreements. Assumptions regarding fuel costs will be refined in subsequent studies.

Non-Vehicle Maintenance:

- Right-of-way Maintenance represents the cost of maintaining track and signals. The $31,000 per route mile unit cost is less than the approximately $40,000 per mile that Rail Runner currently pays, but that agency owns its mainline track and is also responsible for maintaining spur tracks as well. The adjusted unit cost is intended to represent a placeholder payment for using non-owned track. This amount would be higher or lower depending on the language in an actual contract with the railroad owners.

General Administration:

- Web Ticket Vending/Fare Inspection represents Rail Runner's current practice of selling tickets on-line instead of using ticket vending machines. Their on-board fare inspectors are provided with hand-held devices to use. The O&M cost model assumes a similar strategy would be applied to the study alignments.

- Utilities primarily applies to Road Runner's maintenance facility. The model assumes 80% of utility costs are yard-related and the remainder is for stations.

- Casualty and Liability is modeled as a fixed annual cost of $1.7 million. According to Rail Runner staff, that is the premium for $200 million of general liability coverage, and it will not vary whether the system operates one train or sixty trains a day.

Rail Runner's cost of $75,000 a year for Property Management was not included in the cost model because it is associated with track ownership, which is not assumed for the Southcentral commuter rail alignments.

Operating Statistics and System Characteristics for Southcentral New Mexico Alignments

In order to estimate O&M costs, it was first necessary to develop operating plans and requirements for each project alignment. Operating Plans were prepared for four Southcentral New Mexico scenarios:

1. El Paso – Downtown Las Cruces
2. El Paso – Las Cruces – Dona Ana
3. El Paso – Spaceport
4. El Paso – Albuquerque

Operating plans defined peak and base period headways, route lengths and route travel times for each project alignment. The operating plans were entered into an operating statistics (operstat) worksheet. The operstat worksheet provides for each rail line the peak and total fleet size, annual revenue car-miles, and annual revenue train-hours based on headways, travel times and distances, and analysis of peak hour passenger loads to size train consists. Travel times are calculated using an algorithm that accounts for maximum speed, geometry, distance between stops,

acceleration/deceleration near stops, dwell times at stops, and average delay expected at intersections.

Operating & Maintenance Cost Estimates for Southcentral New Mexico Alignments

The total annual operating costs range from $5.6 million (2008$) for the El Paso - Spaceport alignment to $13.3 million for the El Paso – Dona Ana alignment. While the Spaceport and Albuquerque options operate far longer distances than the options to Las Cruces and Dona Ana, the longer services are based on one round trip daily whereas the Las Cruces and Dona Ana services are based on a far richer level of service at eight round trips daily. O&M cost estimates for each alignment are presented in **Table 6-3**.

Table 6-3
O&M Cost Estimates for Southcentral New Mexico Alignments

Alignment	Annual O&M Cost (millions)
El Paso – Downtown Las Cruces	$12.4
El Paso – Las Cruces – Dona Ana	$13.3
El Paso – Spaceport	$5.6
El Paso – Albuquerque	$9.6

Costs in 2008 dollars.

SECTION 7
POTENTIAL RIDERSHIP

Ridership Forecasting Methodology

Ridership forecasts were prepared for commuter rail options between El Paso and Las Cruces and for a regional rail route connecting El Paso, Las Cruces, Spaceport, and optionally reaching Albuquerque. Forecasts were developed for a base year of 2007 as well as a target year of 2020. Data sources included: the 2000 US Census, 2004-2006 Longitudinal Employment and Household Dynamics (LEHD), the El Paso MPO regional travel demand model, and population and employment projections from various New Mexico and Texas authorities.

First, base year 2007 work trip tables were developed from the 2000 Census Journey-to-Work data (CTPP Part 3 – Worker Flows). For the commuter rail corridor, trips were collected at the census tract level and organized into rail station districts. Since the regional rail route has only one station per county, journey-to-work trips at the county level were used to represent station districts. These year 2000 trip tables were factored up to 2007 using population and employment estimates from the Bureau of Business and Economic Research at the University of New Mexico (BBER), the New Mexico Economic Development Department (NMEDD), and the Texas State Data Center and Office of the State Demographer (TxSDC).

To account for deficiencies in the reporting of interstate work trips in the Census data, as well as to improve the overall accuracy of the trip tables, the Census tables were modified by estimates of worker flows as reported in El Paso MPO's 2007 trip tables and 2004-2006 LEHD data (which is compiled from the US Census, American Community Survey, and federal and state labor departments records). To acknowledge the variability between these data sources, both low range and high range trip tables were estimated for total work trips in each rail corridor.

The greatest uncertainty in this analysis comes in determining how many of the work trips between two given station districts could be expected to use the proposed transit investment. Currently, no intercity public transit options exist in this corridor, although city transit agencies such as Sun Metro in El Paso and RoadRUNNER in Las Cruces provide local service in the vicinity of some stations. Private transit options include over-the-road coaches with stops in El Paso, Las Cruces, Truth or Consequences, and Albuquerque, and direct flights between El Paso and Albuquerque.

Without comparable existing services in place, rail trip shares were based on factoring means of transportation data available in the Journey-to-Work files. National averages for a rail investment's ability to capture total work trips were variably applied to the trip tables. Highest rail trip shares were applied to the few existing transit trips in the Census data, moderate rail trip shares were applied to existing HOV trips, and lowest rail trip shares were applied to existing drive alone trips. Likewise, longer-haul trips or trip destinations with a strong feeder transit system – which research shows to increase the attractiveness of commuter and regional rail – were allotted higher rail shares than short-haul trips or trip destinations with limited feeder service.

Applying these rail shares stratified by trip interchange to the 2007 commuter rail work trip tables produced an overall commuter rail work trip share within the corridor ranging from 2.9% to 3.3%. This share level is commensurate with current experience in other commuter rail corridors.

Since the Census Journey-to-Work data only captures the home-to-workplace part of the trip, commuter and regional rail work trips were factored to account for the reverse workplace-to-home trip. To capture the non-work trips that would likely be made on the services, the rail work trip estimate was divided by 75% to arrive at a typical base weekday ridership estimate. This factor was based on existing commuter rail system estimates for work vs. non-work travel, as well as analysis of the work vs. non-work destinations available on each rail route. Finally, the base weekday ridership estimate was tested using industry-standard demand elasticities for service frequency, travel time, average fare, along with other factors to understand riders' responses to service variation.

This methodology produced an average weekday ridership range for commuter rail between El Paso and Las Cruces in base year 2007 of 4,700 to 8,000. Adding an optional end-of-line station in Doña Ana increases these forecasts by 100 daily riders. **Table 1** details these results.

Table 7-1
2007 Commuter Rail Weekday Ridership Forecasts

Endpoints	Stations	Daily One-Way Trips	Weekday Riders
El Paso - Las Cruces	8	16	4,700 – 8,000
El Paso - Dona Ana	9	16	4,800 – 8,100

As mentioned above, differences in the lower and upper bounds of the range are primarily due to the uncertainty present in total trip data sources. Additionally, all high range forecasts assume additional investment beyond the norm in supporting feeder services and station amenities (i.e., parking, transit-oriented development, security, branding, etc.). Identical operating plan characteristics (headways, travel times, etc.) were used for the lower and upper estimates.

Average weekday ridership in 2007 for regional rail operating between El Paso and Spaceport was estimated at 90 to 100. Note that this total does not account for any demand to Spaceport itself, as it is not existent in 2007. Extending the regional rail service all the way up to Albuquerque roughly doubles these estimates. These results are presented in **Table 2**.

Table 7-2
2007 Regional Rail Weekday Ridership Forecasts

Endpoints	Stations	Daily One-Way Trips	Weekday Riders
El Paso - Spaceport	3	2	90 – 100
El Paso – Albuquerque	6	2	170 – 200

Target year 2020 forecasts started with the overall work trip tables developed for base year 2007 and factored them up by BBER and TxSDC population forecasts and El Paso MPO model data for years 2015 and 2025. For the regional rail analysis, employment estimates for 2020 as reported in the Futron Corporation report, "New Mexico Commercial Spaceport Economic Impact Study" (2005), were included in the trip totals. From here, the same methodology as described above was used to account for reverse workplace-to-home trip ends, non-work trips, operating plans, and station amenities and feeder services.

In 2020, average weekday ridership for commuter rail between El Paso and Las Cruces is predicted to be 5,800 to 11,700. Adding an optional end-of-line station in Doña Ana increases these forecasts by 200 daily riders (**Table 3**).

Table 7-3
2020 Commuter Rail Weekday Ridership Forecasts

Endpoints	Stations	Daily One-Way Trips	Weekday Riders
El Paso - Las Cruces	8	16	5,800 – 11,700
El Paso - Dona Ana	9	16	6,000 – 11,900

For 2020 regional rail, service from El Paso to Spaceport is estimated at 460 to 660, and service from El Paso to Albuquerque is predicted to be between 550 and 790 (**Table 4**).

Table 7-4
2020 Regional Rail Weekday Ridership Forecasts

Endpoints	Stations	Daily One-Way Trips	Weekday Riders
El Paso - Spaceport	3	2	460 – 660
El Paso - Albuquerque	6	2	550 – 790

It is important to emphasize that these estimates should be considered preliminary values that will fluctuate up or down as more analysis is devoted to these corridors. Next steps could include revising estimates based on updated data that would come available following the 2010 Census, or doing detail analysis of the population, employment, and land use surrounding each station area. Ideally, a calibrated and validated regional travel model that includes both Las Cruces and El Paso could be used to more precisely forecast demand in this promising corridor. Finally, it would be prudent to test a pilot program of express bus service between Las Cruces, El Paso, and points in between to get a better feel for the potential ridership that could come from a significant rail investment in this corridor.

SECTION 8
FUTURE STEPS

This report has attempted to identify the potential service levels, capital and operating costs, and ridership associated with various options for initiating passenger rail service on the BNSF right-of-way. This final section discusses future steps, should the SCRTD choose to pursue passenger rail service. The identified steps are largely based on the experience in initiating Rail Runner passenger service. Many of these steps can be pursued concurrently.

Coordination with BNSF

The immediate next step would be to begin discussions with BNSF Railroad. In the case of Rail Runner, the Mid-Region Council of Governments (MRCOG) and New Mexico Department of Transportation (NMDOT) procured a consultant with expertise in negotiating with the railroads. BNSF asked to be provided with service plan details to allow them to identify what improvements would be made in order to accommodate passenger service. In this case, it is clear that at a minimum some type of track-based signal system would need to be installed since the current right-of-way has no signaling whatsoever, relying on track warrant control (dispatching approval between two identified points) which limits maximum speeds to 49 mph. Other improvements such as extending siding/double-tracking certain segments or improving road crossings might also be identified.

Alternate arrangements such as purchasing the right-of-way outright versus obtaining trackage rights for all or a portion of the route would need to be explored.

Coordination with BNSF would be an iterative process. As each party is willing to proceed, more details regarding needed improvements would be refined, and specific rights regarding joint use, dispatching, etc. would need to be clarified and agreed upon. Responsibilities for such elements as maintenance of track, signals and right-of-way would need to be defined.

Refinement of Project Elements

This study provides general locations for potential stations, but future work would include a more precise definition of station locations, including associated parking needs. The location of an appropriate site for a maintenance yard would need to be determined. An understanding of where sidings should be extended or added would also need to occur.

Environmental Assessment

Once the basic project is outlined, a determination should be made regarding the appropriate level of environmental analysis. Increasing the amount of rail service on an existing rail corridor typically does not trigger the need to do environmental

clearance, but project elements such as stations with significant parking or locating the maintenance facility may require environmental clearance.

Rolling Stock Acquisition

Procurement of rolling stock can involve years of lead time to allow for production, so this is often an early effort once the funding and commitment to the project is secure. Some options exist that can reduce the wait for delivery: off-the-shelf vehicles may be available; arrangements can be made with another agency with an existing option with a manufacturer that can be exercised; or vehicles can be leased.

Other Activities

Features such as branding the service and establishing a fare structure would also need to be addressed. Rail Runner performed a market survey to help establish what would be considered a reasonable fare structure, and ended up with a zone-based fare system involving very affordable fares from $1 (for a single trip within one zone) to $7 (for the longest single trip using six zones). Rail Runner also offers discounts for day passes, monthly passes and annual passes, as well as weekend service. Discounts are also offered to the elderly and disabled, and children under 10 years of age are free.

Conclusions

The El Paso Subdivision appears to have readily-usable track for passenger rail operations, though it is clear that some type of track-based signal system would have to be installed. This report outlines potential service plans, capital costs, operating costs, and ridership associated with establishing passenger rail service. The next step would involve discussions with BNSF. If a deal can be structured with similar terms to the Rail Runner experience, then project costs can be kept to a minimum. Otherwise, costs can quickly spiral due to the long lengths of mileage involved.

The strongest potential for rail service along this corridor is the 45-mile route between El Paso and downtown Las Cruces. Piloting a premium bus service on this corridor may allow a better understanding of what the potential market is for this service, and can serve to build ridership.

APPENDICES
STATION-TO-STATION TRAVEL TIMES
RAIL RUNNER EXPRESS ZONE BASED FARES

EL PASO-LAS CRUCES
PASSENGER RAIL SERVICE
based on improving speeds to 60mph

Station	Parking	Max.Speed (mph)	Distance (miles) Increment	Stn-Stn	Cumulative	Run Time (minutes)	Delay Time (minutes)	Dwell Time (minutes)	Time (minutes) Increment	Stn-Stn	Cumulative
El Paso								0.5			0.5
		60	4.00			4.7	0.4				
					4.00				5.1		5.6
improve - assume 60 mph		60	1.20			1.5	0.1				
Sunland				**5.20**	5.20			0.5	2.2	**7.3**	7.8
improve - assume 60 mph		60	4.60			5.6	0.5				
Montoya (optional)				**4.60**	9.80			0.5	6.6	**6.6**	14.4
improve - assume 60 mph		60	2.90			3.9	0.3				
Canutillo				**2.90**	12.70			0.5	4.7	**4.7**	19.1
improve - assume 60 mph		60	2.60			3.3	0.3				
Vinton (no stop)				**2.60**	15.30			0.0	3.6	**3.6**	22.7
improve - assume 60 mph		60	3.40			3.7	0.3				
Anthony				**3.40**	18.70			0.5	4.6	**4.6**	27.3
improve - assume 60 mph		60	5.00			5.7	0.5				
Berino (no stop)				**5.00**	23.70			0.0	6.2	**6.2**	33.5
improve - assume 60 mph		60	3.60			3.9	0.4				
Vado				**3.60**	27.30			0.5	4.8	**4.8**	38.3
improve - assume 60 mph		60	3.90			4.6	0.4				
Mesquite (no stop)				**3.90**	31.20			0.0	5.0	**5.0**	43.3
improve - assume 60 mph		60	8.90			9.2	0.9				
Mesilla Park				**8.90**	40.10			0.5	10.6	**10.6**	53.9
improve - assume 60 mph		60	2.50			3.5	0.3				
Las Cruces				**2.50**	42.60			0.5	4.3	**4.3**	58.2
improve - assume 60 mph		60	5.60			6.6	0.6				
Dona Ana (optional)				**5.60**	48.20			0.5	7.7	**7.7**	65.9
TOTAL ROUTE				*48.20*	**48.20**	*56.58*	*4.82*	*4.50*		*65.4*	**65.9**
			Ave station spacing		6.0			**43.9 mph**			

NOTES:
1. Maximum speeds are based on signal improvements; while improvements allow up to 79mph, functional operating speed for this scenario assumed to be 60mph maximum.
2. Distances and locations based on *BNSF website*.
3. Minimal intersection delay assumed (based on 0.1 minutes per mile).

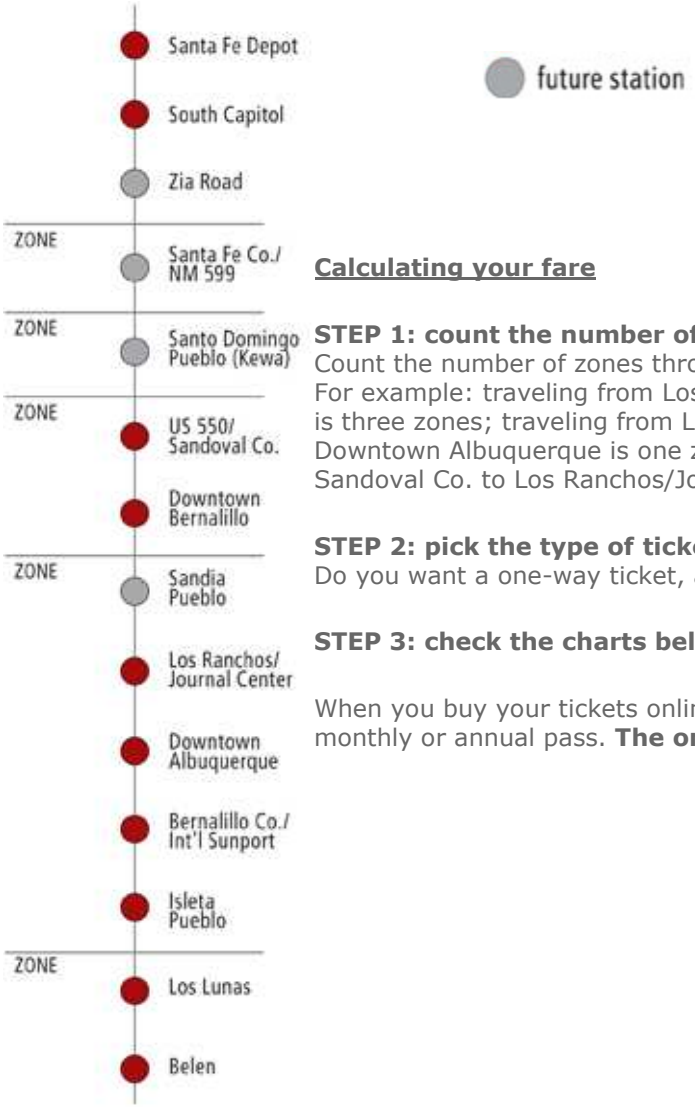
EL PASO-ALBUQUERQUE
PASSENGER RAIL SERVICE
based on improving speeds to operate at 60-79mph

Station	Parking	Max.Speed (mph)	Distance (miles) Increment	Stn-Stn	Cumulative	Run Time (minutes)	Delay Time (minutes)	Dwell Time (minutes)	Time (minutes) Increment	Stn-Stn	Cumulative
El Paso								0.5			0.5
average 60 mph		60	4.00			4.7	0.2				
					4.00				4.9		5.4
average 60 mph		60	38.60			38.9	1.9				
Las Cruces				**42.60**	42.60			0.5	41.4	**46.3**	46.8
average 75 mph		75	61.10			50.3	3.1				
Cutter (Spaceport)				**61.10**	103.70			0.5	53.8	**53.8**	100.6
average 79 mph		80	73.60			56.7	3.7				
Socorro				**73.60**	177.30			0.5	60.8	**60.8**	161.4
average 79 mph		80	45.40			35.5	2.3				
Belen				**45.40**	222.70			0.5	38.3	**38.3**	199.7
average 60 mph		60	30.00			31.0	1.5				
Albuquerque				**30.00**	252.70			0.5	33.0	**33.0**	232.8
TOTAL ROUTE				*252.70*	**252.70**	*217.14*	*12.64*	*3.00*		*232.3*	**232.8**
				Ave station spacing	50.5			**65.1 mph**		**hours = 3.9**	

NOTES:
1. Maximum speeds are based on signal improvements; while improvements allow up to 79mph, slower operating speeds assumed at each end of the route.
2. Distances and locations based on *BNSF website*.
3. Minimal intersection delay assumed (based on 0.1 minutes per mile).

New Mexico Rail Runner Express
Zone Based Fares

The NM Rail Runner Express uses a zone-based fare structure. The amount you pay for your ticket is determined by the distance you travel, so that shorter trips cost less than longer ones. All stations have been subdivided into zones for this purpose.



Calculating your fare

STEP 1: count the number of zones
Count the number of zones through which you will travel.
For example: traveling from Los Lunas to US 550/Sandoval Co. is three zones; traveling from Los Ranchos/ Journal Center to Downtown Albuquerque is one zone; traveling from US 550/ Sandoval Co. to Los Ranchos/Journal Center is two zones.

STEP 2: pick the type of ticket you need (types of tickets)
Do you want a one-way ticket, a day pass, or a monthly or annual pass? Are you eligible for a reduced fare?

STEP 3: check the charts below and see how much your fare is

When you buy your tickets online, you'll receive a discount. Tickets are $1 off of a day pass and $10 off of a monthly or annual pass. **The online discounts do not apply to one way tickets.**

Reduced Fares are available to

- Senior citizens age 65 and over
- Students with a valid student I.D. or proof of enrollment
- People with disabilities

Children under the age of 10 ride free!

FULL FARE

	1 TRIP	Day Pass	Monthly Pass	Annual Pass
1 Zone	$1	$2 **($1 online)**	$35 **($25 online)**	$350 **($340 online)**
2 Zones	$2	$3 **($2 online)**	$50 **($40 online)**	$500 **($490 online)**
3 Zones	$3	$4 **($3 online)**	$65 **($55 online)**	$650 **($640 online)**
4 Zones	$5	$7 **($6 online)**	$95 **($85 online)**	$950 **($940 online)**
5 Zones	$6	$8 **($7 online)**	$100 **($90 online)**	$1,000 **($990 online)**
6 Zones	$7	$9 **($8 online)**	$110 **($100 online)**	$1,100 **($1,090 online)**

REDUCED FARE & SATURDAY FARE

	1 TRIP	Day Pass	Monthly Pass	Annual Pass
1 Zone	$1	$1 **(Free online)**	$17 **($7 online)**	$170 **($160 online)**
2 Zones	$1	$2 **($1 online)**	$25 **($15 online)**	$250 **($240 online)**
3 Zones	$2	$3 **($2 online)**	$32 **($22 online)**	$320 **($310 online)**
4 Zones	$3	$5 **($4 online)**	$47 **($37 online)**	$470 **($460 online)**
5 Zones	$4	$6 **($5 online)**	$50 **($40 online)**	$500 **($490 online)**
6 Zones	$5	$7 **($6 online)**	$55 **($45 online)**	$550 **($540 online)**

Source: nmrailrunner.com, accessed January 2009.