San Juan County Four Corners Freight Rail Project

Subtask 4.1

Detailed Operational Requirements and Data Collection Methodology

Feasibility Study

San Juan County, New Mexico

May 6, 2024

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SUBTASK 4.1: SPECIFICATION OF DETAILED OPERATIONAL REQUIREMENTS AND DATA COLLECTION METHODOLOGY

Overview

The County will engage in further project development and analysis for the alternatives identified through Task 3 for further consideration in Task 4: Project Development. Development work will include data gathering to support functional and operational requirements, identification of operational needs and parameters, including support facilities, and appropriate design and engineering analysis consistent with preliminary Purpose & Need. Task 4 will also be informed by the concurrent Task 3 Alternatives Analysis process, portions of which will occur prior to or concurrently with Task 4.

The purpose of Subtask 4.1 is to provide a high-level overview of the railway operating plan to inform the engineering, environmental process, commercial negotiations with shippers and connecting railroads, and financing for the proposed new rail line. This subtask integrates the Purpose and Need statement and the Freight Demand Forecast deliverables from Task 2, and the Basis of Design requirements detailed in Task 3.

Data from Other Subtasks and Sources

Data collection included information from Task 3 related to possible routes, alignments, profiles, and geometric configurations that would influence the timetable speeds and potentially limit train lengths, as well as gathering data from Task 2 related to the volumes and types of traffic anticipated on the proposed new rail line. This information inform timetable and/or operating window development.

Train volumes and train characteristics were based on a “representative train” and the Freight Demand Forecast from Task 2. As described later in this technical memorandum, the assumption for representative train consists favored unit train or heavy manifest trains, since those are the train types identified in the Task 2 Freight Demand Forecast, while typically “light” trains (such as automobile or intermodal trains) are not anticipated by the Freight Demand Forecast and thus would not operate on the proposed rail line.

1. Project Description Summary

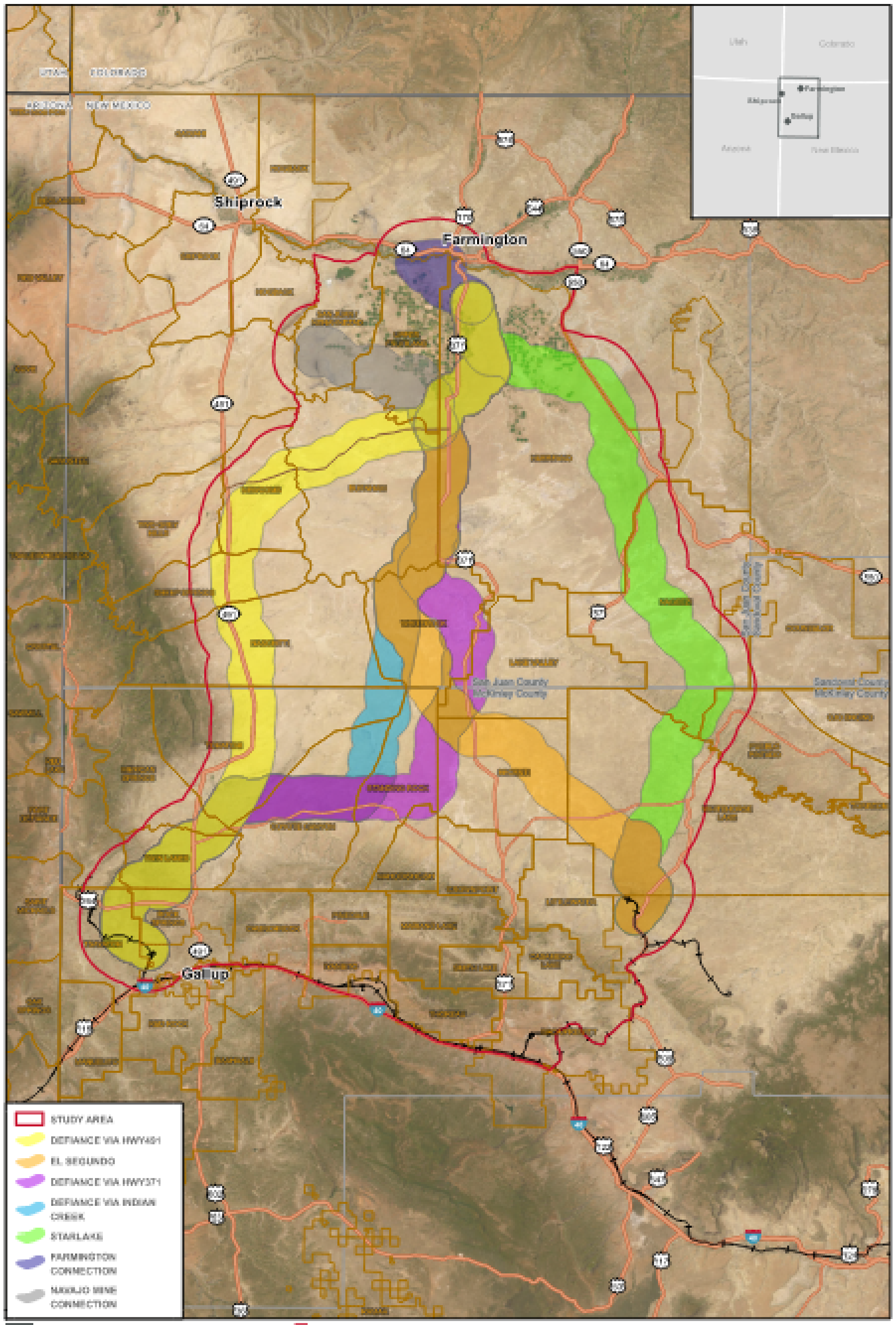
The Project is located within the Four Corners Region, at the convergence of the states of Colorado, New Mexico, Utah, and Arizona. The Study Area for the proposed new rail line, shown in **Figure 1**, is generally located between US Highway 64 to the north, Interstate 40 to the south, State Route 371 to the east, and US Highway 491 to the west, including the towns of Shiprock, Farmington, Thoreau, and Gallup, New Mexico. The proposed new rail line will connect the Farmington, New Mexico Area to the BNSF corridor near Gallup across San Juan and McKinley counties.

The Preliminary Purpose and Need was detailed in the Subtask 2.1 Memo. A brief summary of the Purpose and Need follows:

- ***Purpose*:** The purpose of the Project is to construct a standard gauge freight rail line connecting the historically underserved Four Corners Region, generally located at the convergence of Colorado, New Mexico, Utah, and Arizona (and specifically San Juan County, New Mexico) to the national freight rail network via a connection to the existing BNSF Gallup Subdivision at a location in or near Gallup, New Mexico, through San Juan and McKinley County, New Mexico. The Project is partially located within the Tribal lands of the Navajo Nation. The Project will enhance the economic well-being of the Four Corners Region for future generations by enabling rail-dependent economic development opportunities for the Navajo Nation and surrounding communities, and by providing a viable freight transportation modal alternative to highway trucking for existing and future freight flows. The creation of a viable freight rail connection will also contribute to an anticipated reduction of truck miles on highways in the Four Corners Region, enhancing highway safety for underserved populations and reducing highway maintenance needs due to wear and tear caused by the trucking of heavy freight over regional highways.

- ***Need***: The Four Corners Region is an historically disadvantaged and underserved area of the United States that has not been connected to the national freight railroad network for over fifty years. Freight access to the region exists via the National Highway System (US-550, US-491, and US-64), State highways (SH-371) and via privately-owned pipelines. Previous studies, including the Farmington-Thoreau Railroad Study (2015) have identified access to rail transportation as a significant requirement and a local priority for expanding and diversifying economic development in the region. Access to rail transportation would also simplify the existing multimodal supply chain and reduce highway impacts, providing additional public benefit.

Figure 1: Study Area Map



2. Train Volumes

The Freight Demand Forecast was prepared in Subtask 2.3, which provided both “high” and “Low” forecasts for each forecast year. This Subtask 4.1 uses the average of the “high” and “low” forecasts for the years 2030 and 2070 as the basis for the operating analysis. This Subtask 4.1 assumes that manifest traffic would be mostly inbound to the Four Corners region, while the remaining traffic would be mostly outbound bulk traffic leaving the Four Corners region. The volume assumptions for this Subtask are summarized in **Table 1**, below. Because freight volumes (even the "high" forecast volumes) are relatively low compared with the theoretical capacity of a single-track railroad, such simplifications are reasonable.

Table 1: Freight Forecast Summary, 2030 through 2070

Forecast Year:	2030	2070
All Commodities, Net Tons		
Total Volume "High" Forecast	9,966,000	6,550,000
Manifest Commodities (Assumed Inbound), Net Tons		
Total Volume "High" Forecast	1,720,000	3,872,000
"High" Forecast Number of Manifest Loaded Trains per Day	**0.50**	**1.13**
Rounded "High" Forecast Number of Manifest Loaded Trains per Day	**1**	**2**
Bulk Commodities (Assumed Outbound), Net Tons		
Total Volume "High" Forecast	8,246,000	2,678,000
"High" Forecast Number of Bulk Loaded Trains per Day	**1.64**	**0.53**
Rounded "High" Forecast Number of Bulk Loaded Trains per Day	**2**	**1**
Rounded "High" Forecast Number Outbound Trains per Day	**3**	**3**
Rounded "High" Forecast Number Inbound Trains per Day	**3**	**3**

Note 1: All volumes in net tons
Note 2: Manifest trains per day assumes 85 cars per train, 115 net tons per car
Note 3: Bulk trains per day assumes 125 cars per train, 115 net tons per car

For this analysis, it is assumed that outbound bulk commodities move in unit trains of 125 cars, while inbound manifest trains move in trains of 85 cars. It is assumed that each car has 115 net ton carrying capacity, which is typical for bulk traffic moving in gondola, hopper, or covered hopper cars. It is assumed that trains operate 350 days per year.

It is important to note that car types for inbound and outbound commodities may not match, and thus, to be conservative for the operational analysis, it is assumed that each loaded train is matched by an empty train on the same day. The number of trains per day has been rounded-up to the next whole number. This results in a conservative assumption of three inbound and three outbound trains per day.

3. Train Routings Through the Study Area

In general, train routings will be from the BNSF connection near Gallup or Prewitt, New Mexico (depending upon route option considered) to the Four Corners region. Based on the work of Task 3, possible origins and destinations in the Four Corners region include:

- The Navajo Agricultural Products Industry (NAPI), where the operational headquarters, a yard, bulk loading and unloading facilities for agricultural products and crop inputs, and a transload facility for manifest products would be located,
- The Navajo mine, reached via a spur that leaves the proposed railroad's main line several miles south of NAPI, and
- A potential spur extending from NAPI down into the valley near Farmington to handle manifest traffic from Farmington not transloaded at NAPI.

It is assumed that traffic moving to or from the Navajo Mine would operate directly to or from the BNSF connection, without ever entering the yard at NAPI.

It is assumed that any intermediate freight origins or destinations, such as possible transload facilities at or near towns such as Crown Point or Newcomb, would offer relatively low volumes of freight. As such, these industries would be switched by manifest trains while enroute to the Four Corners region.

Once on the BNSF Railway network, trains may operate intact to their destination or to yards on the national freight rail network, where they would be reclassified for furtherance to their respective final destinations.

Task 3 concluded with five individual routes linking the Four Corners region with the existing BNSF Railway main line. The existing BNSF main line was constructed along the southern edge of a low mountain range that trends east-to-west, and all five individual routes must cross that mountain range over low ridges to link the national freight rail network to the Four Corners Region. The mountain crossings represent the chief operating constraint, insofar as grades up to 2 percent are encountered.

The five route options from Task 3 are:

1. Defiance via Highway 491
2. Defiance via Indian Creek
3. Defiance via Highway 371
4. El Segundo
5. Star Lake

For the purposes of this early operational analysis, each route is effectively the same: they all have similar lengths (plus or minus about 15 miles) and similar grades (all approximately 2 percent maximum), all have the same potential for on-line traffic, all have the same northern endpoints, and all connect with the BNSF Railway (BNSF).

Train Routings Through the Study Area - Originations/Destinations

The northern terminus of the Railway is anticipated to be near the NAPI headquarters on property outside the boundaries of the Navajo Reservation, but on land controlled by the Tribe. Spur connections are anticipated to or near the Farmington Area and for the Navajo Mine Railroad. The Navajo Mine Railroad spur track would branch off the proposed Railway main line at a point several miles south of the northern terminal near NAPI and extends approximately 20 miles to a connection with the Navajo Mine Railroad, an existing, isolated railroad that currently transports coal from the Navajo Mine to the Four Corners Generating Station, approximately 14 miles north of the mine. Other industries or mines are anticipated to connect to the Railway via their own spur connections, too.

Unit trains received from BNSF will be operated intact on the Railway to customer facilities. A loading/unloading terminal is also planned for the NAPI with storage for up to three unit trains, each up to 13,000 feet in length (actual train lengths may be shorter). Unit trains originating on the Railway at customer facilities or NAPI will be handed off intact in return. This is done so that the Railway can accept and deliver trains from and to BNSF without need for aggregation or disaggregation of unit trains at or near the BNSF interchange, which would add considerable operating expense and would require additional yard and siding infrastructure.

Manifest trains received from BNSF will be delivered to a yard lead or staging area at NAPI, where the Railway would sort and classify cars for delivery to customers at the transload facility or on the branch to Farmington. Rail cars originating on the Railway at customer facilities will be brought to the NAPI yard and classified, built into a train, and then handed off to BNSF for interchange.

Commercial discussions with future rail shippers and other stakeholders will likely have effects on the precise locations of spurs and customer transload facilities but are less likely to have major impacts on main track capacity requirements, train speeds, loading gauge, and other basic parameters of the Railway's Conceptual Operating Plan and engineering standards.

4. Conceptual Railway Operating Plan Criteria

The purpose of this Conceptual Operating Plan is to describe how the Project will be operated as a functioning railway and to summarize the anticipated metrics of the railway's operations. Metrics of operations include key information, such as maximum train volumes, characteristics, routings, operating timetables, maintenance requirements, and employee timetable identifying maximum operating speeds, and other basic facts that inform the analysis of the railway's performance and effects.

Principles of the Conceptual Operating Plan

Three principles will used to develop the Conceptual Operating Plan:

1. The Railway will emulate typical practices used by U.S. common-carrier railroads.
2. As informed by work completed in previous Tasks, the Conceptual Operating Plan should be cognizant of the characteristics of the alignment, geography, and traffic potential.
3. The Conceptual Operating Plan should have the flexibility to enable the Railway to adapt to varying traffic levels, traffic types, or traffic requirements that may potentially surface after the Railway is constructed. The Railway is intended as a common-carrier railroad providing transportation service to a large geographic region with many different economic activities that could change over time. The types of traffic may vary in response to broad economic trends, advancing technologies, and changing markets.

Assumptions and Parameters of the Operating Plan

The assumptions and parameters used in this Conceptual Operating Plan are as follows:

- The Railway will be a common-carrier railroad under the authority of U.S. Surface Transportation Board (STB).
- It is anticipated that the proposed common-carrier railway will be a freight-only railway and will not consider passenger rail operations.
- Freight types and volumes are identified in the previous Section of this document.

1. Train Characteristics

Including length, trailing tons, horsepower, and other inputs below.

Maximum loaded gross weight of four-axle rail cars will be 286,00 pounds (lbs.) Note that at this time, 315,000 lbs. rail cars are not in common use and thus are not assumed as typical.

Motive Power:
Motive power is assumed to be high-horsepower diesel-electric locomotives, each developing between 4,300-4,400 horsepower and applying it to six powered axles as is current standard North American railway practice.

Clearances:
Clearances are intended to accommodate Association of American Railroads (AAR) Plates B, C, F, and H recommended clearances. This means that vertical and horizontal clearances will be sufficient to enable operation of double-stack, high-cube intermodal containers in well cars, and intermodal, automotive, and other rail car types, if any, that would be handled in existing manifest trains. No

dedicated intermodal or automotive trains are anticipated in the conceptual planning phase of the project; however, it is a best practice to future-proof the railroad in the event that customers may wish to ship commodities requiring that clearance in the future, or to accommodate future high-and-wide shipments (e.g., transformers, wind turbine propeller blades, etc.).

The U.S. railroads use “plates” established by the AAR to describe the overall maximum dimensions or clearances of rail cars. Current 286,000 pounds (commonly referred to as 286k cars) rail cars used for bulk commodities and goods typically do not exceed the dimensions of Plate F. Rail cars used to haul containerized goods in standard shipping containers stacked two high, or cars used to haul motor vehicles on multilevel racks, typically do not exceed the dimensions of Plate H. Plate F is wider, while Plate H is taller. To be able to accept the same types and sizes of cars that currently are common on the North American rail network, the Railway will have clearances sufficient to accommodate both AAR Plate F and H rail cars.

2. Specific Operating Timetables

For scheduled services or operating windows for unscheduled service

Currently, freight traffic is anticipated to be up to a few trains per day each direction.

Freight service is anticipated to be unscheduled, operating as needed based on freight demand. Train operations are anticipated to be continuous (i.e., 24 hours per day and 7 days per week). Train schedules could target for approximately 350 days of operation per year to allow for holidays, downtime, etc.

It is envisioned that NAPI headquarters, mines, and other industries would work with the railroad develop regular service plans for integration into the Railway’s future transportation plan.

3. Maintenance-of-Way Window Requirements

For maintaining a state of good repair of the Railway.

The proposed Railway is planned as a relatively low-speed, low-density freight railway, compared to most of the principal main lines of the U.S. railway system. The heavy-haul nature of the Railway with 286,000-pound gross weight (also known as 286k) rail cars – the standard that is the common maximum car weight hauled on most of the U.S. railway system – and relatively long trains. As a common-carrier railway, the proposed Railway will be subject to FRA safety regulation, and its maintenance practices must comply with all applicable FRA regulations.

The principal track maintenance activities will be inspection, track surfacing, tamping, and alignment. Other track maintenance will be required as the Railway ages, including tie replacement, rail grinding, rail replacement, turnout maintenance/replacement, and track undercutting.

Other Maintenance-of-Way (MoW) activities may include brush cutting and vegetation control, ditching and ditch cleaning, bridge and culvert maintenance, maintenance of grade crossings, maintenance of switch machines and controls, maintenance of rail lubricators, maintenance of wayside asset devices, and maintenance of active and passive grade crossing warning systems – all of which are necessary to maintaining a state of good repair on the Railway.

Some maintenance activities much be completed on a regular frequency per regulation and/or to reduce risk to the Railway operation. Other maintenance activities are linked to gross tonnage moving over the corridor (i.e., components rated for millions of gross tons, etc.). Some of these maintenance activities will require equipment or laborers to occupy the track or otherwise restrict train movement on a single-track rail corridor, as well.

Assuming that approximately 6 trains per day operate over the rail line, and with infrastructure designed for heavy haul operation, it should be possible to provide adequate windows for maintenance. Since many similar single-track railways in North America operate with as many as 16 trains per day on a regular basis while still providing sufficient time for maintenance, it is assumed that sufficient work windows can be made be available. Larger maintenance windows would have to be planned for through coordination with train management and customer communications. Even at 6 trains per day, with some minor bunching of trains, relatively large work windows, on the order of several hours long, would be available. By comparison, on some higher utilized rail lines where train schedules are somewhat flexible (as with the bulk and manifest traffic anticipated on this Railway), it is possible to assign one maintenance day per week where trains cease operation over the line for a 12-hour period. This would enable MoW crews/contractors to execute larger projects and maximize productivity on a regular basis. Coordination with train operations staff from BNSF, the proposed Railway train management team, and customers may also allow for larger work windows to complete major maintenance or capital work, as well.

4. Timetables

To help identify preliminary operating speeds.

Due to the rugged territory traversed by the Railway, the proposed alignment has a ruling grade of 2.0 percent compensated, and the maximum main track curvature of 7 degrees 30 minutes.

Maximum track speed on the proposed railway will be 45 mph. However, actual operating speeds will vary depending on topography, train makeup, and haulage capability of the locomotives.

Maximum operating speeds on the proposed Railway will be:

- Up to 45 mph in flat terrain
- 30 to 45 mph in undulating terrain except for grades and curves listed below.
- 20 mph or less entering yard limits or other restricted limits.

Grade adjustments to operating speeds are as follows (short grades, less than approximately 1 mile., which equates to about one train length, may be ignored in undulating territory to avoid brake or throttle changes that could cause undesirable slack action):

- 25 to 30 mph descending moderate grades (1.0 to 1.5 percent); applies to both loaded and empty trains.
- 20 to 25 mph descending heavy grades (1.5 to 2.0 percent); applies to both loaded and empty trains.
- 15 to 20 mph ascending moderate grades (1.0 to 1.5 percent); applies to loaded trains *only*, as empties can climb faster.
- 10 to 15 mph ascending heavy grades (1.5 to 2.0 percent); applies to loaded trains *only*, as empties can climb faster.

Below are some equations that were used in helping identify maximum speeds for certain conditions.

$$E_e = E_u + E_a \qquad \text{(Equation 1)}$$

Where:

E_e = Combined (or Equilibrium) Superelevation expressed in inches.

E_u = Unbalanced Superelevation (or Cant Deficiency), which is the difference between the actual superelevation and the superelevation required to create equilibrium conditions for the considered combination of speed and degree of curve. Cant deficiency exists when a rail vehicle travels through a curve at a speed greater than the equilibrium speed of that curve (given the actual superelevation and degree of the curve). Expressed in inches, cant deficiency is also referred to as "underbalance."

E_a = Actual Superelevation (or Cant), which is the actual difference in elevation between the high and low rails on a curved segment of track expressed in inches. This is also the amount of superelevation installed in the track.

$$E_e = 0.0007DV^2 \qquad \text{(Equation 2)}$$

Where:

E_e = Combined (or Equilibrium) Superelevation expressed in inches

D = Degree of curvature expressed in decimal degrees.

V = Train Speed expressed in miles per hour.

Substituting Equation 1 into Equation 2 and solving for V, can lead to determining the maximum train speed for a known curve and combined superelevation condition.

$$V_{Max} = \sqrt{\frac{E_e}{0.0007D}} \qquad \text{(Equation 3)}$$

Curvature adjustments to operating speeds are as follows:

- For this level of design, it is assumed that actual superelevation or underbalance more than about 2 inches as a starting point for a railroad designed for bulk traffic. Curves should not have combined elevation (or E_e) greater than 4 inches (e.g., 2 inches Eu and 2 inches Ea).
- Note that the predominant direction of loads is southbound, and the majority of heavy trains will be going slowly uphill southbound well below maximum operating speeds. Therefore, curves on uphill grades (more than 1 percent) southbound should have no more than 3 inches of combined elevation.

Utilizing the alignment, grade, and curve data from the schematics developed in Task 3.3, along with the grade and curve adjustment listed above, the proposed preliminary timetable speeds for each of the routes are as follows:

1. **Defiance via Highway 491 Route – Preliminary Operating Speeds**

Milepost - Start (MP)	Milepost - End (MP)	Max. Allowable Speed - Freight (MPH)	Distance (mi)
(South) 0.00	9.09	30	9.09
9.09	18.94	25	9.85
18.94	28.41	40	9.47
28.41	41.67	45	13.26
41.67	43.18	35	1.52
43.18	68.75	45	25.57
68.75	69.51	35	0.76
69.51	78.60	45	9.09

Milepost - Start (MP)	Milepost - End (MP)	Max. Allowable Speed - Freight (MPH)	Distance (mi)
78.60	103.22	30	24.62
103.22	106.00	20 (Yard Limits)	2.78
(North) 106.00	End		

2. **Defiance via Indian Creek Route – Preliminary Operating Speeds**

Milepost - Start (MP)	Milepost - End (MP)	Max. Speed - Freight (MPH)	Distance (mi)
(South) 0.00	9.09	30	9.09
9.09	18.94	25	9.85
18.94	27.46	40	8.52
27.46	37.88	45	10.42
37.88	45.45	40	7.58
45.45	47.35	35	1.89
47.35	55.87	40	8.52
55.87	57.77	35	1.89
57.77	75.76	40	17.99
75.76	79.55	35	3.79
79.55	89.96	30	10.42
89.96	95.64	40	5.68
95.64	108.33	30	12.69
108.33	111.36	20 (Yard Limits)	3.03
(North) 111.36	End		

3. **Defiance via Highway 371 Route – Preliminary Operating Speeds**

Milepost - Start (MP)	Milepost - End (MP)	Max. Speed - Freight (MPH)	Distance (mi)
(South) 0.00	9.09	30	9.09
9.09	18.94	25	9.85
18.94	27.46	40	8.52
27.46	37.88	45	10.42
37.88	53.03	40	15.15
53.03	69.13	30	16.10
69.13	82.39	35	13.26
82.39	89.96	25	7.58
89.96	115.91	30	25.95
115.91	118.90	20 (Yard Limits)	2.99
(North) 118.90	End		

4. **El Segundo Route – Preliminary Operating Speeds**

Milepost - Start (MP)	Milepost - End (MP)	Max. Speed - Freight (MPH)	Distance (mi)
(South) 0.00	14.20	30	14.20
14.20	26.52	40	12.31
26.52	42.99	45	16.48

Milepost - Start (MP)	Milepost - End (MP)	Max. Speed - Freight (MPH)	Distance (mi)
42.99	48.30	35	5.30
48.30	55.87	40	7.58
55.87	58.71	35	2.84
58.71	60.61	40	1.89
60.61	68.18	35	7.58
68.18	97.54	30	29.36
97.54	100.00	20 (Yard Limits)	2.46
(North) 100.0	End		

5. **Star Lake Route – Preliminary Operating Speeds**

Milepost - Start (MP)	Milepost - End (MP)	Max. Speed - Freight (MPH)	Distance (mi)
(North) 0.00	22.73	30	22.73
22.73	28.41	20	5.58
28.41	33.52	25	5.11
33.52	48.30	30	14.77
48.30	54.92	25	6.63
54.92	74.81	30	19.89
74.81	92.80	25	17.99
92.80	94.89	20 (Yard Limits)	2.08
(South) 94.89	End		

Turnouts

Turnout speed is important to overall operations. It is anticipated that the turnout enabling movement on and off the BNSF will be a No. 15 to permit at least a 30 mph maximum diverging speeds. Since each route option connects with the BNSF on an existing non-signaled track, no signal system would be required. Turnouts on the proposed Railway for sidings and the spur connection to the Navajo Mine would be No. 15 to allow 30 mph diverging speed. Other main line turnouts will not be sized less than No. 11 to permit at least a 15-mph diverging speed. Turnouts in non-main tracks, like yards, will likely also be sized as No. 11, to reduce the need to maintain multiple turnout items in inventory for repairs, etc.

While yard turnouts would be operated by hand, turnouts on the main line of the proposed Railway, particularly for passing sidings, would be operated by train crews themselves through the implementation of commercially Dual Tone Multi Frequency (DTMF) switches, which have already been widely implemented on short line and low volume railways in North America. DTMF turnouts use a machine to throw the switch, with control via encoded messages transmitted by the train crews' radios – the same radios used for communication between crew members. Using the DTMF system, a train crew that has been directed to leave the main line and enter a particular siding (for example, to allow an oncoming train to pass) would enter a code on their radio corresponding to a nearby turnout. This code would be broadcast to the nearby DTMF-equipped turnout that was programmed to operate on that specific code. This would avoid the need for the train crew to stop the train and have a crewmember manually throw the turnout, thereby increasing operational efficiency. Due to the low volume of trains per day on the proposed Railway, it is likely that a centralized traffic control system would be unnecessary. Instead, all trains would be operated by authorities issued by the dispatcher.

At this stage, passing siding locations have not been identified. However, as a starting point for conceptual siding locations, consider trains operating on any of the route options with an approximate 25 mph average speed. Each route option is approximately 100 miles long. This would result in an approximate four-hour travel time over the proposed Railway. Assuming six trains per day (as noted above in **Section 2. Train Volumes**), if the trains were evenly spaced throughout a 24-hour day, three trains northbound and three trains southbound, a train could start from each endpoint every eight hours and, after traversing the Railway, arrive at the other endpoint four hours later, just as an opposing train was departing. In this *highly* idealized scenario, there would theoretically never be any train meets, and theoretically no need for sidings. This example is offered only to support the assertion that Railway's infrastructure capacity is unlikely to be a constraint, and that even a few sidings could result in sufficient operational flexibility and capacity to address nearly any operational scenario resulting from the freight demand forecast. As noted, the aforementioned example is a *highly* idealized scenario; in actuality, train operations are highly variable, with variations stemming from factors such as variability in inbound train arrival times at the BNSF interchange, crew availability, and customer demand. At this early stage, an approximate 20- to 25-mile interval between sidings would be appropriate as a starting point. Siding locations will be identified in Subtask 4.2, the Operations Analysis.

5. Potential Operators

At this stage, there are several options for the operation of the Railway:

1. The Railway could "lease" to the connecting Class I railroad BNSF for an agreed upon revenue split. While no conversations have been conducted with BNSF to date, it is assumed that BNSF would not be the operator.
2. Another option is to "contract" or hire a single firm to market, operate, maintain, and collect revenue for the Railway operation.
3. A third option is for a government agency (such as the County or the Navajo Nation) to operate and maintain the Railway, possibly in conjunction with specialty contractors.

At this early stage, either the second or third options are most likely.

Wrap-Up

A conceptual operating plan helps tie paint a boundary around project's purpose & need, the potential freight demand and preference for an operating mode, initial route concepts and feasibility, leading to an informed conceptual operations analysis and revised preliminary engineering in order to inform the overall engineering and environmental processes of the study.

This particular operating plan has identified feasible timetables for the anticipated volume of trains. The proposed single-track railway should be capable of accommodating the anticipated train volumes (approximately 6 trains per day), even if there were to be "bunching" of trains such that more trains operate on a given day. This assumption is supported by common railway operating practices across North America, where non-signalized, single-tracked railways, even steeply graded railways, regularly accommodate 16 or more trains per day.