San Juan County Four Corners Freight Rail Project

Subtask 4.6 Operations and Maintenance Cost Estimate Memorandum

Feasibility Study

San Juan County, New Mexico
November 22, 2024

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I. SUBTASK 4.6: Operations & Maintenance (O&M) Cost Estimation

OVERVIEW

Subtask 4.6 includes conceptual estimates ("cost estimates" or "costs") of the operating, maintenance, and capital renewal (O&M) costs over a 40-year period for the projected railway operation for one single design option. The "Defiance Via Highway 371" route was selected as the design option to be analyzed for this subtask. The Defiance via Highway 371 route is approximately the same length, traverses similar terrain, has similar track alignment characteristics, and has similar railroad operating characteristics as the other four route options under consideration; thus, the O&M costs for the Defiance via Highway 371 route would be representative of the O&M costs for the other options.

This O&M cost analysis relies on the forecasted freight volumes identified in Subtask 2.3 – Freight Demand Forecast and the railroad operating and staffing patterns identified in Subtask 4.2 – Operations Analysis.

Outputs from the conceptual O&M Cost Estimation will be utilized in the Project's financial model to reflect different anticipated commercial scenarios.

APPROACH

The proposed railroad is proposed to be a relatively low-speed, low-density freight railway, compared to most of the principal main lines of the U.S. railway system. Accordingly, this section contemplates that the proposed railroad, as a new railroad, will have many components that are at the beginning of their lifespan and will require inspection and maintenance requirements that are less intense than other existing railways of similar tonnage, speed, and frequency of trains. It is proposed to be a heavy haul railroad with car weights up to 286,000 lbs., the common maximum car weight hauled on most of the U.S. railway system. As a common-carrier railway, the proposed railroad would be subject to Federal Railroad Administration (FRA) safety regulation, and its maintenance would comply with applicable FRA regulations.

The major components driving the proposed railroad's Operating and Maintenance Program consist of workforce labor for train operation, inspection, and maintenance, locomotive operation and maintenance, locomotive fuel, maintenance-of-way (MOW) equipment and vehicles, and maintenance of railroad assets. These components are described in the following sections.

The Freight Demand Forecast identifies 2 scenarios for freight volumes, a low-volume forecast, and a high-volume forecast. Equipment and staffing plans have been developed for both scenarios. The freight demand for both the low-volume forecast and the high-volume forecast are presented in the tables below.

Table 1: Freight Forecast Summary – All Commodities (Including Coal)

Metric	2030	2040	2050	2060	2070
Total Volume – Low Forecast (Net Tons)	830,000	719,000	684,000	698,000	748,000
Compound Annual Growth Rate	-	-1.42%	-0.49%	0.20%	0.69%
Total Volume - High Forecast (Net Tons)	9,966,000	7,816,000	6,745,000	6,390,000	6,550,000
Compound Annual Growth Rate	-	-2.40%	-1.46%	-0.54%	0.25%

Table 2: Freight Forecast Summary – All Commodities (Excluding Coal)

Metric	2030	2040	2050	2060	2070
Total Volume – Low Forecast (Net Tons)	372,000	324,000	320,000	344,000	387,000
Compound Annual Growth Rate	-	-1.38%	-0.12%	0.72%	1.18%
Total Volume - High Forecast (Net Tons)	1,720,000	1,970,000	2,419,000	3,038,000	3,872,000
Compound Annual Growth Rate	-	1.36%	2.08%	2.31%	2.45%

Adjustments for Traffic Levels

With these two volume scenarios come two different operating plans, shown below:

Table 3: Train Volumes per Scenario

Scenario / Year	2030	2040	2050	2060	2070
Low Volume: Manifest Trains per Week	1.4	1.3	1.3	1.4	1.5
Low Volume: Bulk Trains per Week	0.6	0.5	0.5	0.5	0.5
Low Volume Total Trains per Week	**2**	**1.8**	**1.8**	**1.9**	**2**
High Volume: Manifest Trains per Day	1	1	1	1	2
High Volume: Bulk Trains per Day	2	2	1	1	1
High Volume Total Trains per Day	**3**	**3**	**2**	**2**	**3**

The low-volume scenario assumes manifest trains would be approximately 43 car long trains with 3 locomotives and 1 spare locomotive (for a total of 4 locomotives). The high-volume scenario assumes manifest trains would be 85 cars long with 5 locomotives per train and 2 spare locomotives (for a total of 7 locomotives).

Two O&M plans have been developed, one for the low-volume scenario, and one for the high-volume scenario. These different plans account for the different train frequencies, with adjustments made to staffing levels and maintenance intervals based on amount of gross tonnage over the railroad.

The major elements driving the proposed railroad's Maintenance Program are described in the following sections. The O&M cost model is predicated on two broad cost categories: labor costs (for staff employed by the railroad) and purchased goods, such as materials and services (for example, replacement parts and contract services).

Railroad Labor

Railroad labor constitutes one of the major cost drivers for the project. Hourly rates for labor were derived from advertised railroad labor rates for comparable positions from Class I railroad "careers" web pages. The hourly rates for the proposed railroad have been set approximately 10 percent below the rates for comparable positions found on Class I railroad "careers" web pages, reflecting the generally lower pay common to short line railroads which do not require extensive travel. It is assumed that the rigid work rule restrictions on Class I railroads would not apply, and that, for example, conductors and locomotive engineers would be cross-trained and that M/W staff could also occasionally assist with basic mechanical repairs to work equipment. Flexible work rules are typical of short line railroads, including those where collective bargaining units represent employees. Labor quantities (number of people per position) and associated costs for the respective service scenarios are indicated in the tables below. These include direct hourly rates for straight time (S.T.) hours, assumed amounts of overtime (O.T.) at 1.5 times the direct hourly rate, and a "Burden Rate" multiplier, applied to straight time hours only.

The burden rate accounts for the full cost of employment, and includes the cost of payroll taxes, benefits, such as healthcare, vacations, and per-employee insurance. For this conceptual estimate, the burden rate has been assumed to be 2.0 x direct hourly rate. For example, a person earning a straight time rate of $30/hour ($62,400 per year) would have a burdened cost of $60/hour ($124,800 per year).

Maintenance of Way, Mechanical, and Supervisory Staffing Plans and Costs

These employees maintain track, signals, bridges, rolling stock (locomotives and cars) and work equipment and provide supervision for the railroad. The number of staff for the high-volume scenario is based upon the staffing plan developed in Subtask 4.2, while the staffing plan for the low-volume scenario is a refinement of the Subtask 4.2 staffing plan, accounting for the generally lower number of trains and thus reduced wear-and-tear on the infrastructure and equipment, as well as reduced supervisory burden. Headcounts and costs for staff for both scenarios are shown in **Table 4** and **Table 5.**

Table 4: Low-Volume Scenario: M/W, Mechanical, & Supervisory Staffing Plan (rounded)

Position	Qty	S.T. Hourly Rate	S.T. Hours/ Year	Additional O.T. %	Grand Total Direct Labor
MOW (laborers, equip. operators, foremen, utility worker) Composite Rate	7	$30.00	2080	10%	$502,000
Mechanical (diesel mechanic/electrician/utility worker)	1	$32.00	2080	10%	$77,000
Supervisory (General Manager)	1	$60.00	2080	0%	$125,000
Supervisory (Engineering/Mechanical, Operations)	2	$40.00	2080	10%	$191,000
Supervisory - Administrative/Clerk	1	$25.00	2080	10%	$60,000
					$950,000
Burden Rate (Assumed) Applies to Straight Time Labor Only:	2.00				

Position	Qty	S.T. Hourly Rate	S.T. Hours/ Year	Additional O.T. %	Grand Total Direct Labor
Total Annual Labor Cost (rounded)		$1,800,000			

Table 5: High-Volume Scenario: M/W, Mechanical, & Supervisory Staffing Plan (rounded)

Position	Qty	S.T. Hourly Rate	S.T. Hours/ Year	Additional O.T. %	Grand Total Direct Labor
MOW (laborers, equip. operators, foremen, utility worker) Composite Rate	10	$30.00	2080	10%	$718,000
Mechanical (diesel mechanic/electrician/utility worker)	5	$32.00	2080	10%	$383,000
Supervisory (General Manager)	1	$60.00	2080	0%	$125,000
Supervisory (Engineering/Mechanical, Operations)	3	$40.00	2080	10%	$287,000
Supervisory - Administrative/Clerk	1	$25.00	2080	10%	$60,000
					$1,570,000
Burden Rate (Assumed) Applies to Straight Time Labor Only:	2.00				
Total Annual Labor Cost (rounded)		$2,960,000			

Maintenance of Way, Mechanical, and Supervisory Staffing Plan Assumptions:

As noted, the staffing plan for the high-volume scenario is based on that identified in Subtask 4.2. The low-volume scenario operates fewer trains on a daily basis, but nonetheless has the same amount of infrastructure to maintain (in terms of miles of track, numbers of grade crossings and detectors, numbers of bridges, etc.), and thus the staff numbers are not proportionately smaller.

The one notable exception is the mechanical staff, where it has been assumed that there would be only one full-time mechanical staff member to inspect and service locomotives and perform light repairs, this person would be assisted by a utility worker from the M/W group. The reduced staffing level for mechanical staff is justified by the fact that a maximum of 4 trains per week would operate, one each direction four days/week, meaning that all 4 locomotives would be available in the NAPI shop for maintenance for at least one full weekday and also over each weekend. By comparison, the high-volume scenario assumes manifest train operations 7 days per week, with 5 locomotives on each manifest train and 2 spares, meaning that the mechanical staff would need to be available 7 days per week.

Note that the operating plans identified in Subtask 4.2 assume that unit train operations would be conducted with locomotives from BNSF Railway, a common practice designed to keep unit trains intact and reduce the overall cost of transportation for customers. These BNSF locomotives would not require maintenance or fueling by the staff of the proposed railroad, with these costs accounted for the handling carrier agreement with BNSF.

Train Operations Staffing Plan and Costs

Total train operations labor is dependent on train volumes relative to each scenario (i.e., low- and high-volume).

High-Volume Scenario

For the high-volume scenario, with typically 3 round trips operating between NAPI and the BNSF connection each day, and trains requiring switching at NAPI each day, it has been assumed that 9 train crews (2 people on each crew) would be required, as shown in **Table 6.**

Table 6: Train Crew Rotations, High-Volume Scenario

Crew / Day (High-Volume)	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
Crew 1 (bulk trains)	X	X	X	X			
Crew 2 (bulk or manifest trains)	X	X	X	X			
Crew 3 (manifest trains)	X	X	X	X			
Crew 4 (bulk trains)					X	X	X
Crew 5 (bulk or manifest trains)					X	X	X
Crew 6 (manifest trains)					X	X	X
Crew 7 (yard or relief crew)	X	X	X	X			
Crew 8 (yard or relief crew)					X	X	X
Crew 9 (relief crew as needed)							

Because each round trip between NAPI and the BNSF interchange would require approximately 10-11 hours (allowing time for some enroute delays and minor switching at the BNSF interchange), each crew posted for 4 days per week would accumulate an average of 2 hours overtime per week. The crews posted for 3 days per week would work approximately 32 hours per week, with no overtime.

Due to the number of trains operating, as well as occasional work in the yard at NAPI, the schedule assumes up to 3 relief crews would be needed to cover vacancies and relieve crews on any trains that are unable to complete their journeys in the legal maximum of 12 hours of service. With a minimum of 6 crews needed to operate the regular schedule, relief crews would be used frequently – on nearly a daily basis – to cover vacations, yard switching, or re-crewing trains approaching their maximum hours of service. Thus, the 3 relief crews are assumed to be paid a minimum of 32 hours per week to be available on standby.

Low-Volume Scenario

Train operations for the low-volume scenario are significantly simpler. The low volume scenario assumes 2 round trips per week, divided into an out-and-back operation, with a crew operating one direction each day and making the return trip via taxi. This plan makes it very unlikely that any train crew would ever exceed their legal maximum of hours of service. This results in a 2-crew rotation (with 2 people on each crew), shown in **Table 7**.

Table 7: Train Crew Rotations, Low-Volume Scenario

Crew / Day (Low-Volume)	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
Crew 1 (one direction each day)		X	X	Misc.	X	X	
Crew 2 (relief crew as needed)							

On Wednesdays, the train crew would be available for yard switching or other duties as assigned. While one crew would be sufficient for train operations, a second crew would be needed “in reserve” for eventualities and to cover

vacations. It has been assumed that the second crew would be compensated 3 hours each day, 5 days per week, to be available on-call.

Motive Power and Rolling Stock Maintenance – Parts and Services

Maintenance of locomotives and rolling stock would occur at the proposed maintenance facility at the northern terminal near NAPI. The nature of these maintenance activities was described in Subtask 4.2. the cost of labor associated with motive power and rolling stock maintenance is identified above. This section identifies the cost of parts and materials to support the maintenance activities.

May short line railroads have found it more cost effective to purchase locomotives rather than to lease them. It has been assumed that, if grant funding is available for all or part of the capital cost, locomotives would be purchased new, with relatively low maintenance costs (compared to purchasing second-hand locomotives). It is also assumed at this time that the operator would be a government entity, and thus there would be no tax benefits to leasing locomotives.

Locomotive Fuel

Fuel requirements for locomotives were based on the outputs of the Rail Traffic Controller software for one route option, which was developed in Subtask 3.3. As options evolved between Subtask 3.3 and Task 4, fuel requirements were scaled proportionately by the revisions in mileage and number of locomotives to represent the fuel requirements for other options in Task 4, as shown in **Table 8.**

Table 8: Locomotive Fuel Consumption

Defiance via Highway 371 Route				
Train Type	**Subtask 3.3 Fuel Use**	**Subtask 3.3 Mileage**	**Subtask 4.4 Mileage**	**Fuel Use Assumed for Subtask 4.6 (scaled by proportionate mileage)**
Manifest – Empty, 85 rail cars (High-Volume Scenario)	500 gallons	117 miles	116 miles	500 gallons
Manifest – Empty, 43 rail cars (Low-Volume Scenario)				300 gallons
Manifest – Loaded, 85 rail cars (High-Volume Scenario)	2,000 gallons	117 miles	116 miles	2,000 gallons
Manifest – Loaded, 43 rail cars (Low-Volume Scenario)				1,200 gallons
Unit – Empty, 125 rail cars	600 gallons	117 miles	122 miles	640 gallons
Unit – Loaded, 125 rail cars	3,600 gallons	117 miles	122 miles	3,800 gallons

The information in Subtask 4.2 was developed based on the design options established in Subtask 3.3. Since the development of Subtask 3.3, designs have been refined and mileages have changed slightly. The new mileages were identified in Subtask 4.4; these mileages reflect the updated distances from the BNSF interchange to NAPI for manifest trains and from the BNSF interchange to the Navajo Mine for unit bulk trains.

The fuel consumption determined as part of Subtask 4.2 has been scaled proportionately by the mileage and number of locomotives. The number of locomotives remains the same in both scenarios for bulk trains interchanged with the BNSF Railway. The train length and number of locomotives for manifest trains has been

reduced for the low-volume scenario. Because designs will be refined again in the event this project moves to another stage of analysis, and because fuel prices are variable, this approach to calculating fuel consumption is reasonable for this stage of study.

Diesel fuel has been assumed at $3.50 per gallon for bulk delivery to locomotives at NAPI. This cost was based on the current average cost of highway diesel fuel in Farmington, NM, which is approximately $3.52/gallon (based on current reporting from the American Automobile Association, AAA). While it is anticipated that bulk delivery of fuel may achieve some economies of scale (for example, there is a refinery in the Gallup Area that could deliver fuel to NAPI by truck or railcar), the $3.50/gallon highway price is assumed.

Locomotive Maintenance

Each locomotive is assumed to require $50 of supplies, such as locomotive sand or lubricating oil, per trip.

Locomotive maintenance expenses, exclusive of labor, are estimated at an average of $50,000 per unit per year, to cover larger items, like air compressor maintenance. It is anticipated that, with new locomotives, not every locomotive would need major maintenance each year, and so the $50,000 per year cost would, in total, presumably cover these expenses for all locomotives.

It has been assumed that locomotives would require intermediate overhauls on 10-year intervals (at years 10 and 30) at a cost of $750,000 per locomotive, and a more significant mid-life overhaul at year 20 at a cost of $1.5 million per locomotive.

Rolling Stock

It is expected that minor repairs to railcars would be billed to the rail car owners, based on typical railroad interchange rules. However, there may be some railcar maintenance items for which the proposed railroad is responsible; exclusive of mechanical labor time, an allowance of $10,000 per year for such repairs has been included for the low-volume scenario and $50,000 for the high-volume scenario.

The proposed railroad will own four non-revenue ballast and flat cars to assist with maintenance activities. It is assumed that maintenance costs for the non-revenue cars would amount to $2,000 per year.

Infrastructure Maintenance Activities

Track Maintenance

Track maintenance activities will generally consist of track inspection, track maintenance, turnout maintenance, track surfacing, track undercutting, routine rail replacement, routine tie replacement, maintenance of grade crossings, and maintenance of active and passive grade crossing warning systems. These activities were outlined in Subtask 4.2.

Most track maintenance activities, such as inspections, replacement of damaged signage at grade crossings, and replacement of damaged right-of-way fencing, would have a constant cost from one year to the next. The one major exception to this would be rail maintenance, chiefly consisting of preventative grinding of the rail surface.

Preventative rail grinding reduces the effects of curve wear, removes fatigued metal from the rail head, improves wheel and rail interaction, and extends the life of the rail asset. Preventative grinding intervals depend on curvature, truck type, and tonnage. Grinding intervals correspond with the accumulated gross tonnage, expressed as millions of gross tons (MGT) of traffic over a section of track.

An example grinding schedule is provided in **Table 9** as a basis for this cost estimate. It is assumed that contract rail grinding greater than 5 miles in length is costed at $8.00 per track foot while contract rail grinding for areas less than 5 miles in length is costed as a lump sum amount of $90,000 (to account for the disproportionately high mobilization and de-mobilization costs when grinding short sections of rail). The total length of track in each category (tangent and curves less than 2 degrees, curves between 2 degree and 4 degrees, etc.) has been tabulated, and the total, cumulative amount of grinding in each interval has also been tabulated (for example, at the 75 MGT interval for tangents and curves less than 2 degrees, not only would rail in the 75 MGT interval/category be ground, but also rail in the 45, 30, and 15 MGT intervals would also be ground at the same time, meaning effectively the entire railroad. Similarly, when the 4–6-degree category (1.7 miles of rail) is ground, it would also include grinding the 6–8-degree category (for an additional 0.3 miles). Note that the totals vary slightly (in the 0.1-mile place) due to rounding.

Table 9: Example Grinding Schedule for the Proposed Railroad

Track/Curve Categories for Grinding Intervals	**Grinding Interval (per Million Gross Tons of Traffic)**	**Length of Track/Curve in Each Category for Defiance via 371 Route (miles)**	**Cumulative Length of Grinding per Interval (miles)** *- May not sum due to rounding*
Tangent Track and Curves < 2 degrees	75	123.1	145.3
Curves 2-4 degrees	45	20.3	22.2
Curves 4-6 degree	30	1.7	1.9
Curves 6-8 degrees	15	0.3	0.3
Total:		**145.3**	

Note: There is a 15 MGT grinding interval between all Grinding Interval groupings except the "2-4 degree" and "Tangent and <2 degree" groupings (where there is a 30 MGT gap).

The high-volume scenario accumulates a total of approximately 500 MGT on the rail over the 40-year analysis period. With preventative grinding, nearly all rail should last the full 40-year analysis period, with the exception of rail in the one 7.5-degree curve, which is assumed to be replaced shortly after accumulating 400 MGT in the high-volume scenario. Rail replacement costs are estimated to be $150 per track foot, with in-house maintenance forces performing the work on the one relatively short (0.3 mile long) 7.5-degree curve.

In the low-volume scenario, which accumulates less than 60 MGT over the 40-year analysis period, no rail would require replacement.

Other track maintenance activities include:

- Rail lubricators refills to reduce top-of-rail and flange friction and extend the life of the rail. Annual cost of $5,000 (low-volume scenario) to $10,000 (high-volume scenario) for the lubrication grease, with labor being provided by the proposed railroad's maintenance staff.
- Highway-rail grade crossings, including asphalt approaches, crossing panels, gates, and signage and marking will be regular maintenance items, estimated at $20,000 per year, with labor provided by the

proposed railroad's maintenance staff. Annual maintenance is assumed for each roadway crossing by type and may be offset by crossing agreement fees; however, that is unknown at this phase of the project.

- Trackside ditching will need to be a periodic maintenance item to maintain and promote positive drainage away from the ballast section and embankment. It is assumed 5 miles of ditching is needed per year at a cost of $1 per linear foot.
- Other annual track maintenance items include the maintenance of turnouts, such as switch points and stock rails, estimated at $20,000 per year, with labor provided by the proposed railroad's maintenance staff. Turnout replacement is also required on the proposed railroad, with an estimated one turnout being replaced per year (for the high-volume scenario) at an estimated cost of $100,000, with labor provided by the proposed railroad's maintenance staff. One turnout would need to be replaced every 2 years for the low-volume scenario.
- There will often be consumables that will be required to support track maintenance, including but not limited to OTM, specialty tools, drill bits, saw blades, fuel, etc. Estimated at $75,000 (low-volume scenario) to $100,000 (high-volume scenario) per year, with labor provided by the proposed railroad's maintenance staff.
- Access roads are anticipated at key locations, like structures and the interchange with BNSF. These roads will need occasional maintenance, which is anticipated to be performed by the railroad's maintenance forces with equipment like end loaders or backhoes.

While not directly related to track maintenance, the railroad maintenance department will be expected to maintain right-of-way (ROW) fence for properties adjacent to the railroad. In New Mexico, railroads are statutorily required to construct and maintain ROW fence that are sufficient to prevent livestock from getting onto the railroad, except at highway-rail grade crossings of public roads and highways, and the limits of towns, cities, and villages. It is assumed that 1 percent of the corridor length may need fence improvements per year.

Structures Maintenance

Bridges and culverts will need to be inspected annually, which is assumed to be performed with in-house staff. It is assumed that some routine maintenance is required by contractors; this has been assumed at $25,000 per year.

Signal and Communications Maintenance

The only signals on the proposed railroad are expected to be highway-rail grade crossing signals and wayside detectors (such as hot bearing detectors, highwater, and dragging equipment detectors). Renewal of standby batteries and replacement of gate arms at signalize highway-rail grade crossings is estimated to cost $75,000 per year, with labor provided by (and accounted for in) the proposed railroad's maintenance forces.

Railroad radio systems will also need to be maintained, likely by third parties, and annual licensing fees paid. This is estimated to cost $50,000 per year.

Railroad Facilities

There will also be general maintenance requirements for proposed railroad facilities as identified in Subtask 4.3, Support Facilities and Access Analysis. These facilities will themselves require some level of maintenance (e.g., regular cleaning, replacement of consumables such as locomotive sand, etc.).

Several railroad support facilities are likely required to support the operation of the proposed railroad and its maintenance practices. Some of these facilities include:

1. Locomotive and rail car maintenance facility.
2. Transload facilities.
3. Unit train loop track.
4. Maintenance-of-Way (MoW) facility.

Locomotive and Rail Car Maintenance Facility

Annual O&M costs for the facility can range from $2 square foot for the low-volume scenario, amounting to approximately $40,000 per year, to $3 per square foot for the high-volume scenario.

Locomotive Servicing Area

Annual O&M costs for the locomotive servicing area, including drip pans, industrial wastewater treatment facility, connection to a leach field, and sanitary waste removal facility, are estimated to cost $50,000 per year.

General NAPI Site Maintenance

The NAPI Site includes several smaller facilities that would require some maintenance, such as trash disposal, fence repairs, lighting, etc. It is estimated that this site would require $50,000 annually to maintain. Utility expenses is estimated to add $4,000 per month (or $48,000 per year).

Work Equipment and Vehicle Fleet

The work equipment and the vehicle fleet are indicated below:

- Four (4) – Utility pickup trucks (hi-rail): one each for the foreman, track inspector, roadway mechanic, and signal maintainer.
- One (1) – Boom truck/gang truck: three-axle, hi-rail, boom truck with crew cab to accommodate five people.
- One (1) – Trailer for boom truck.
- Five (5) – Pickup trucks (i.e., F-250 or similar): one each for the general manager, mechanical manager, train master, engineering supervisor, and train operations supervisor.
    - For the low-volume scenario, only three pickups are needed, one each for the general manager, train supervisor, and engineering/mechanical supervisor.

Operating and maintenance costs are based on the number of vehicles, cost of diesel or gasoline, fuel economy (i.e., 15 miles per gallon for the pickup trucks and 5 miles per gallon for the boom truck), assumed average mileage of 150 miles/day, and equipment maintenance cost assumed to be $2.00 per gallon of fuel used (since maintenance is related to the amount of time on the engine). This cost accounts for registration/licensing, insurance, tires, oil changes, and regular maintenance of these vehicles.

Equipment needed for track maintenance:

- One (1) – Ballast tamper.
- One (1) – Ballast regulator.
- One (1) – Backhoe (e.g., Cat 416).

Operating and maintenance costs are based on daily fuel use and equipment maintenance cost per day. For the high-volume scenario, it is assumed that an average of 20 gallons of diesel fuel are used per day for the tamper

and regulator while the backhoe is assumed to use an average of 10 gallons of diesel fuel per day. For the low-volume scenario, it is assumed that the tamper and regulator would each use 10 gallons per day and 5 gallons per day for the backhoe. Equipment maintenance cost is assumed to be $2.00 per gallon of fuel used. Note that this equipment would not be used each day, but an average daily fuel consumption is used for simplicity of calculations. For example, if the backhoe were used 2 days per week, the daily fuel consumption would be 35 gallons (based on an average of 10 gallons per day for a 7-day week). These fuel consumptions are within the reasonable range for typical heavy equipment based on fuel tank sizes and fuel consumption.

The equipment fleet needed for mechanical activities includes:

- Three (3) – side-by-side or "Gator" small all-terrain vehicles for inspecting trains – two (2) to remain at NAPI and one (1) to remain at the BNSF interchange area.
    - For the low-volume scenario, only one "gator" is required for the intended operations.
- One (1) – Off-road forklift for use at car maintenance facility and for general use.
- One (1) – Battery-powered forklift for use inside shop.
    - Operating costs of per year and minimal maintenance costs per year; electricity costs are accounted for in monthly utilities.

Operating and maintenance costs are based on daily fuel use and equipment maintenance cost per day. Assumed fuel usage would be an average of 2 gallons of gasoline per day for the gators and 1 gallon of diesel fuel each day for off-road forklift. Both equipment types are assumed to have a daily maintenance cost of $2.00 per gallon of fuel used.

Some cost savings is expected as the roadway mechanic could handle maintenance of the off-road equipment fleet and minor maintenance of vehicles. This would include changing fluids, replacing worn parts (such as backhoe bucket teeth), replacing hydraulic hoses, preventative maintenance, etc. Heavy maintenance of off-road vehicles (e.g., engine overhauls) would be performed by outside vendors; due to industrial activity in the area, these vendors are locally available or, at the very least, available in Albuquerque, New Mexico. On-road vehicles (i.e., pickup trucks, boom truck) would be maintained at local dealerships and vendors.

Contracted Services

The proposed railroad will likely contract out other services to reduce overhead costs. The unit costs identified below are based on published information and bid prices from other recent projects.

- **Ultrasonic rail inspection** to detect internal flaws within the rail itself, conducted in compliance with 49 CFR Part 213.113 and/or CFR Part 213.240. It is assumed that an annual ultrasonic rail inspection will be conducted annually and is estimated to cost $60,000.

- **Weed/vegetation control** will need to be conducted programmatically and is estimated to cost $100,000 per year.

- **Dispatching:** Several companies provide dispatching services for short line railroads on a contract basis. This provides 24-hour coverage for the client railroads, with no need for a separate staffing plan, hour of service recordkeeping and restrictions, etc. It is assumed the proposed railroad will contract for dispatching and is estimated to cost $80,000 (low-volume scenario) to $120,000 (high-volume) scenario per year.
- **Crew transport services:** When needed, it is assumed a crew van (e.g., to transport a crew to a train whose crew is about to exceed hours of service limitations) would be contracted. The BNSF main line

regularly requires crew van services, and it is assumed that the same companies can provide service to the proposed railroad on an as-needed basis, rather than the proposed railroad staffing a full-time crew van. It is assumed that the proposed railroad could also piggyback onto BNSF crew vans, as well. This contracted cost is assumed to be $56,000 per year (high-volume scenario) and $40,000 per year (low-volume scenario).

- **Accounting and bookkeeping:** Contracted accounting and bookkeeping services for recordkeeping, invoicing customers, etc. Part-time support could range from approximately 2 to 3 days per week depending on scenario. Annual cost is estimated to range from $77,000 (low-volume scenario) to $115,000 (high-volume) per year.
- **Information Technology (IT):** IT support would be from one of many contract vendors catering to small businesses. Part-time support could range from approximately one-half day to one day per week depending on scenario. is estimated to cost $21,000 (low-volume scenario) to $42,000 (high-volume scenario) per year.
- **Heavy equipment rental:** Specialized equipment, such as dump trucks, end-loaders, etc., would be rented from equipment rental operators, such as Hertz Equipment Rental, Sunstate, or others – cost on demand. This assumes 10 rental-days per year (e.g., end loader, dump truck, lowbed) and is estimated to cost $10,000.
- **Extra track, signal, and structures maintenance and major repairs**: since it would not be financially viable to have spare personnel for every eventuality, it is assumed that local track, structures, and signal contractors would be on-call to supplement the railroad's own staff. This service is estimated at $25,000 per year.
- **Mobile Radio and Repeater Maintenance and License Fees** is estimated to cost $50,000 per year.

Railroad Liability Insurance

Railroads should consider liability protections in the event of accidents or incidents resulting in damages to the freight, injuries, or death of employees or public, and other property damage. Railroads are not required to purchase insurance, but often times, most do. Typical coverages are for:

- **Bodily injury and property damage liability** – covering injuries and damage in the event of a derailment.
- **Bill of lading (cargo) coverage** – covering reimbursements to shippers for a set amount regarding lost or damaged cargo.
- **Foreign rolling stock coverage** – covering losses to the rail cars not owned by the proposed railroad.
- **Evacuation expense coverage** – covering cleanup costs caused by hazardous materials releases.
- **Federal Employees Liability Act** coverage – providing protections and compensation to railroad employees on the job.

A railroad's level of risk aversion is tied to how much coverage it typically purchases. Regional and short line railroads are believed to typically purchase liability limits of $5 million to $100 million, with a retention between $50,000 and $500,000 annually. The assumed premium for the proposed railroad would be $150,000 (for the low-volume scenario) or $200,000 (for the high-volume scenario).

The proposed railroad would need to allocate approximately $100,000 per year for an Emergency Repair fund. This would help to offset the typical self-insurance limit for incidents like derailments, washouts, etc.

Contingency, Inflation, and Discounting

A 25 percent contingency factor has been included to costs, which may be revisited as part of Task 6.

A 2.20 percent long-term inflation rate has been assumed, based on the Federal Reserve's 2 percent target. This inflation rate may be revised as part of Task 6.

A 3.1 percent discount rate has been assumed, based on USDOT Benefit Cost Analysis guidance. This discount rate may be revised as part of Task 6.

II. Results

The conceptual O&M cost results for 2030 (Year 1) are provided in **Table 10**.

The overall conceptual O&M costs have been expressed in several ways in the table below: as the average of total of discounted annual costs, an average operating cost per track-mile (annualized), and an average operating cost per revenue ton-mile (annualized). They include a 25 percent contingency for unknowns present at the current level of evaluation.

Table 10: Annual Conceptual O&M Cost (rounded)

Conceptual Cost Item: **Scenario:**	**Low Volume**	**High Volume**
Average Annual Discounted Operating Cost per Year Over 40-Year Period	$4,400,000	$11,800,00
Average Annual Discounted Cost per Track-Mile	$30,000	$81,000
Average Annual Discounted Cost per Revenue Ton-Mile	$0.051	$0.014

**All costs rounded.*