Estimates of the Overall Time Value of Eliminating Railroad Crossings: Rio Grande Plan

One benefit of the Rio Grande Plan is the elimination of congestion due to road crossing where train tracks intersect surface streets. The plan would remove eight such crossings with approximately 60 closures per day due to both passenger and freight trains. The estimates of the real amortized dollar value of removing these delays range from 18 to 44 million dollars. These estimates include ONLY the time cost to drivers and do not include other benefits such as decreased fatalities and more rapid emergency service response times.

The plan would close eight crossings with about 500 total closure events per day. Traffic over these eight crossings is around 35 thousand cars per day on average, or just under 4500 cars per crossing. Closure times for passenger trains (Frontrunner and Amtrak) run around 3 minutes, while freight closures run from 5 to 30 minutes (we will use an average of 15 minutes in our estimates). If we assume that 75% of closures are due to passenger trains, then over a 24-hour period the crossing will be blocked just under 10% of the time due to passenger trains and just over 16% of the time due to freight trains. Assuming that cars arrive at crossing in a steady stream the average wait per car will be half the time the crossing is closed. This gives 570 car-minutes of delay per crossing per day.

Estimates of the value of time vary depending on what the opportunity cost of that time is. The study with the closest parallel to waiting for train crossing that we could find is a 2020 study by Goldszmidt, et al that uses data from natural field experiments in 2015/16 and 2017 performed by the ride-sharing service Lyft. In these experiments, Lyft offered rides which randomly varied the price and the waiting times. These experiments generated 14.8 million customer service observations. Statistical analysis of these events produced an estimate for the time value of waiting of $19.38 per hour measured in 2015 dollars, or about 75% of the average hourly wage. Adjusted for inflation, this number is $25.73 as of September 2024. In contrast, federal government estimates for time costs lie somewhere between one-third to one-half of the hourly wage.

We use four values for the hourly cost of waiting: 1) Goldszmidt, et al’s inflation adjusted estimate of $25.73, 2) 75% of the average hourly wage in the Salt Lake metropolitan area, $24.32, 3) 50% of this wage, $16.21, and 4) 33% of this wage, $10.70. If we multiply these values times 569.66 minutes of delay over all eight crossings and assume 1.5 passengers per car, we get the daily cost of delays reported in Table 1. Multiplying again by 365.24 days per year gives the annual cost. If we take the present-value of these annual costs amortized at a real discount rate of 2.5% we get the overall time cost estimates for these delays in the last column.

Table 1

|  |  |  |  |
| --- | --- | --- | --- |
| Time cost | per day | per year | amortized |
| Goldszmidt, et al | $2,932 | $1,070,790 | $43.9 million |
| 75% of hourly wage | $2,771 | $1,011,943 | $41.5 million |
| Government 50% | $1,847 | $674,629 | $27.7 million |
| Government 33% | $1,219 | $445,255 | $18.3 million |

These estimates hinge critically on assumptions for the number of closure events per day. The numbers in Table 1 assume that these stay fixed at 500 per day. A more realistic assumption would be that these crossing will grow over time. For the sake of simplicity, we assume that the number of closures grows at 1% or 2% per year. These are likely a conservative estimates. Table 2 shows the closure costs for these assumptions. As can be seen, the costs rise rapidly with the increase in closures per day. Similar results would apply if we assumed that real wages grow over time. The numbers in Tables 1 and 2 assume real wages are constant over time.

Table 2

|  |  |  |  |
| --- | --- | --- | --- |
| Time cost | 0% growth | 1% growth | 2% growth |
| Goldszmidt, et al | $43.9 million | $73.2 million | $219.5 million |
| 75% of hourly wage | $41.5 million | $69.1 million | $207.4 million |
| Government 50% | $27.7 million | $46.1 million | $138.3 million |
| Government 33% | $18.3 million | $30.4 million | $91.3 million |

A spreadsheet is included with this report that allows us to examine the effects of changing various assumptions such as the ratio of passenger to freight trains, the wait times, the volume of traffic, the number of passengers per car, etc.

The numbers reported here seem small relative to other potential benefits. But they are not zero. An additional benefit that is likely to be larger is the value of decreased fatalities due to train-car and train-pedestrian accidents and due to quicker response times for emergency vehicles. The value of a single life saved is estimated to be between one and ten million dollars, depending on the context.

References

Goldszmidt, Ariel, et al (2020) “The Value of Time in the United States: Estimates from Nationwide Natural Field Experiments,” NBER Working Paper 28208 (http://www.nber.org/papers/w28208)