BETTER VALUE RAIL OPERATING COSTS

This guidance document forms part of the Better Value Rail toolkit designed to shape good proposals for railway transport projects. This tool should be used alongside those for understanding potential benefits, and for estimating potential capital costs.

1. WHAT DOES THIS TOOL COVER?

The focus of the tool is understanding the possible range of OPEX (Operating Expenditure) costs for schemes, at an early stage. This guidance is intended to provide promoters with an understanding of the key components of operating cost and how they should be treated in appraisals at an early stage. It is best suited for promoters considering producing a strategic outline business case for a typical local/regional new line/s, new services, and new stations.

This section will present a series of graphs and tables to enable promoters to read off the forecast total OPEX cost which matches their schemes characteristics, with advice on how to use these graphs and some of the assumptions behind them. These costs can help provide order of magnitude operating costs so promoters can have an idea of the likely scale of costs their scheme may incur. The costs documented in this report are for guidance and reference only at the early stage of scheme development; more detailed analysis will be required if projects progress further.

Promoters are encouraged to use the cost tool in this document to build a range of options, scenarios, and sensitivity tests, as well as identify possible risks/opportunities their proposal may have which could result in actual costs being higher or lower than the costs outlined in this tool, which could consequently affect the viability of the scheme. The tool only provides an indication of variable operational costs; some proposals may incur additional costs (e.g. additional resource requirements, training or maintenance costs) which can be identified through engagement with industry. One such area is the whole life costs, which can vary depending on the specific proposal. For example, a scheme may initially use cascaded rolling stock which needs to be retired after 5 years, requiring a switch to a alternative rolling stock vehicle (depending on what is available). The business case should factor in two different sets of operating costs during the appraisal period. Please consultant your

DfT/NR representative and the Transport Appraisal Guidance (TAG) to review how this can be applicable to your scheme.

1.1 WHAT ARE OPERATING COSTS?

There are several types of costs incurred in the operation of a train service, and these fall into two categories, variable and fixed costs. These include:

- Track access charges i.e. VTAC (Variable Track Access Charge). This the payment train operators pay to Network Rail for upkeep and maintenance of the railway system. The charge is rolling stock type specific, taking into consideration things such as axle load and mass to account for the wear and tear each type of rolling stock will place on the track.
- Vehicle Maintenance Costs (these include wear and tear costs train operators incur to maintain the vehicles)
- Energy costs, diesel fuel or electric power (including both the resource cost and the fuel duty)
- Vehicle leasing costs (Capital Lease and Non-Capital Lease, these are the annual payments train operators pay to rolling stock operating companies for the lease of rolling stock vehicles and heavy maintenance of the rolling stock fleet)
- Train staff costs for drivers and guards
- Station staff costs for the cleaning and maintenance of new stations

In this tool, only the total OPEX cost is displayed because a more detailed operating cost breakdown including individual cost rates by rolling stock model cannot be shared publicly due to confidentiality reasons (costs are held by the TOC - Train Operating Company and are therefore commercially sensitive).

The relative size of each cost component will vary scheme to scheme, but generally the train staff cost is the largest cost component, followed by train leasing costs, incurred when operating a new line & service.

1.2 OPERATING COST RANGES

The graphs below help show the anticipated operating costs for new services based on the type of rolling stock and the end-to-end journey time of the proposed service.

Operating costs are displayed for four rolling stock types (Diesel/Electric and Short/Medium distance) to match the rolling stock configurations and the line characteristics of different schemes.

A general rule of thumb to identify whether to use the short or medium distance cost is the likely top speed of the proposed rolling stock in question. Rolling stock classes under 75mph typically fall under the short distance category, while rolling stock classes 75-100mph fall under the medium distance category.

The graphs below represent a likely range of cost that could be incurred via a central, upper and lower cost range based on the standard deviation of cost data for each rolling stock type. Costs presented below are in 2021 factor prices. Using the upper and lower figures in the cost range will enable a proposer to check the sensitivity of the business case to variations in OPEX cost. This in turn will allow identified risks to be highlighted for early resolution in the development process.

Note: Additional guidance is provided in Appendix A detailing the recommended methodology to calculate end to end journey time for early-stage promoters who have yet to work this out for their scheme. Appendix B details some of the OPEX cost assumptions behind the Operating Cost Ranges graphs which promoters should be aware of when using this cost information.

Figure 1 – Short Distance Diesel Rolling Stock Operating Costs

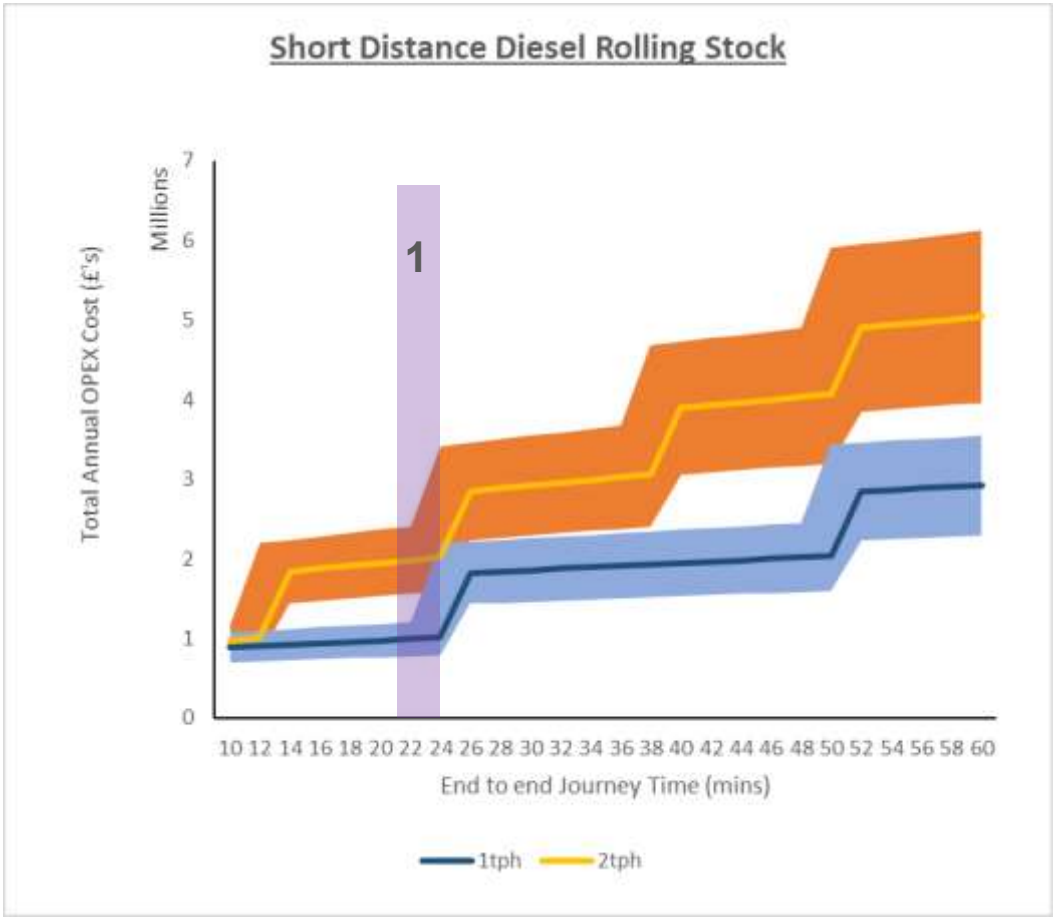


Figure 2 – Medium Distance Diesel Rolling Stock Operating Costs

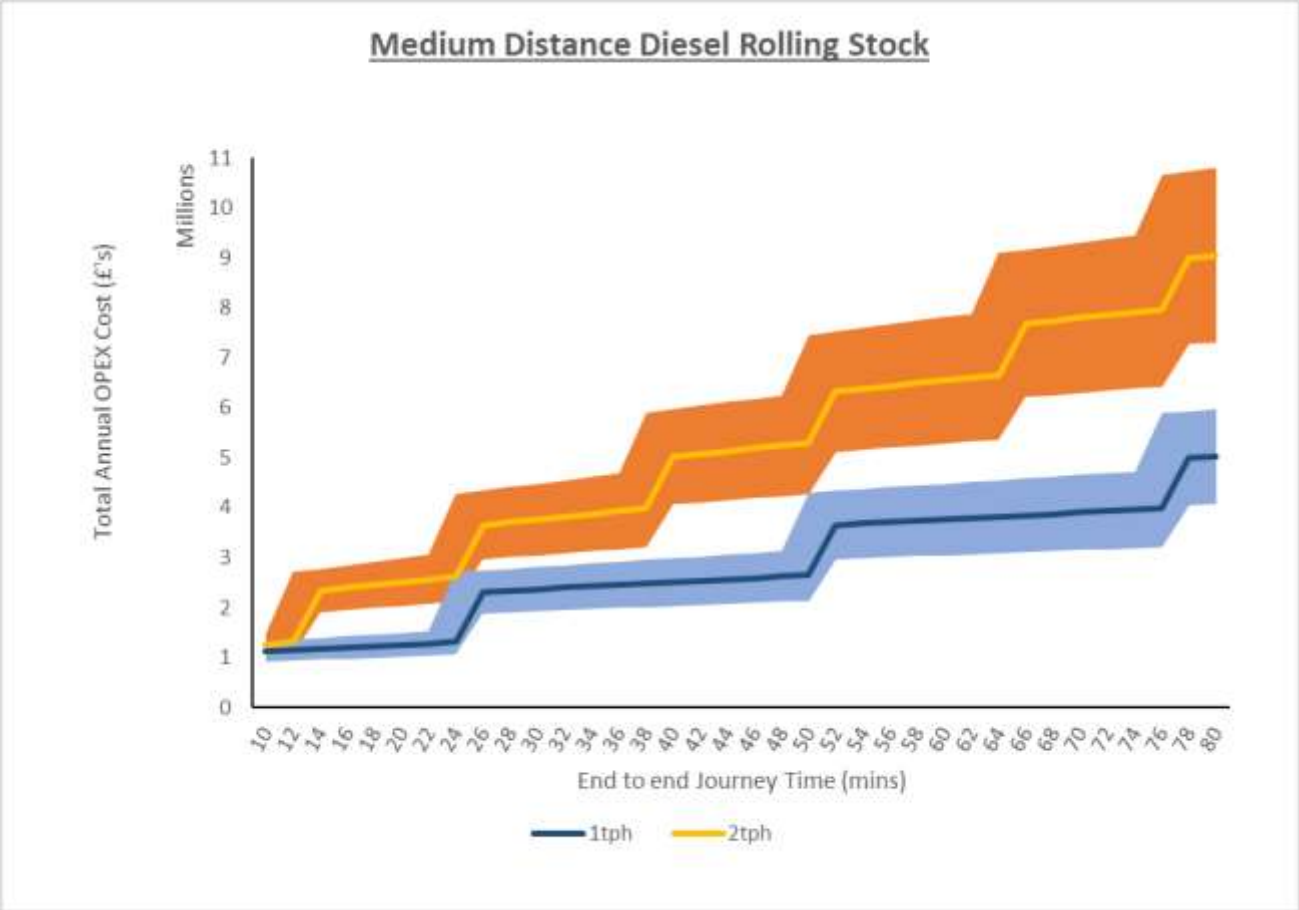


Figure 3 – Short Distance Electric Rolling Stock Operating Costs

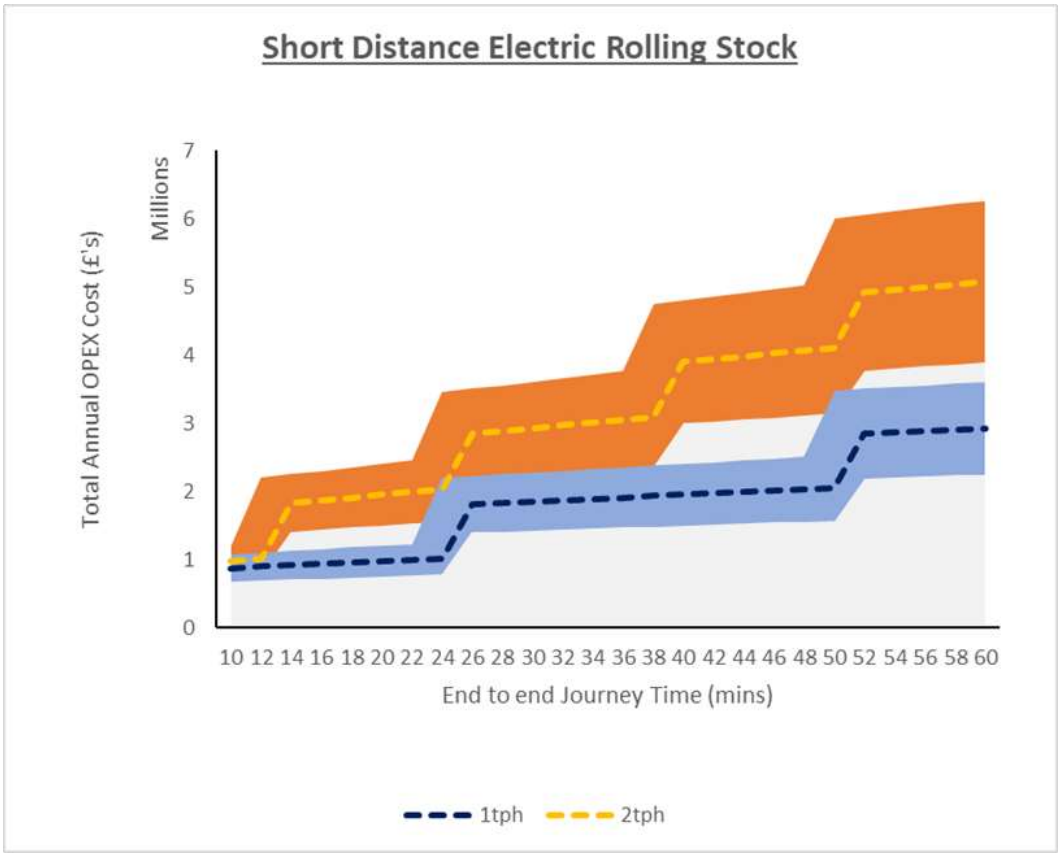
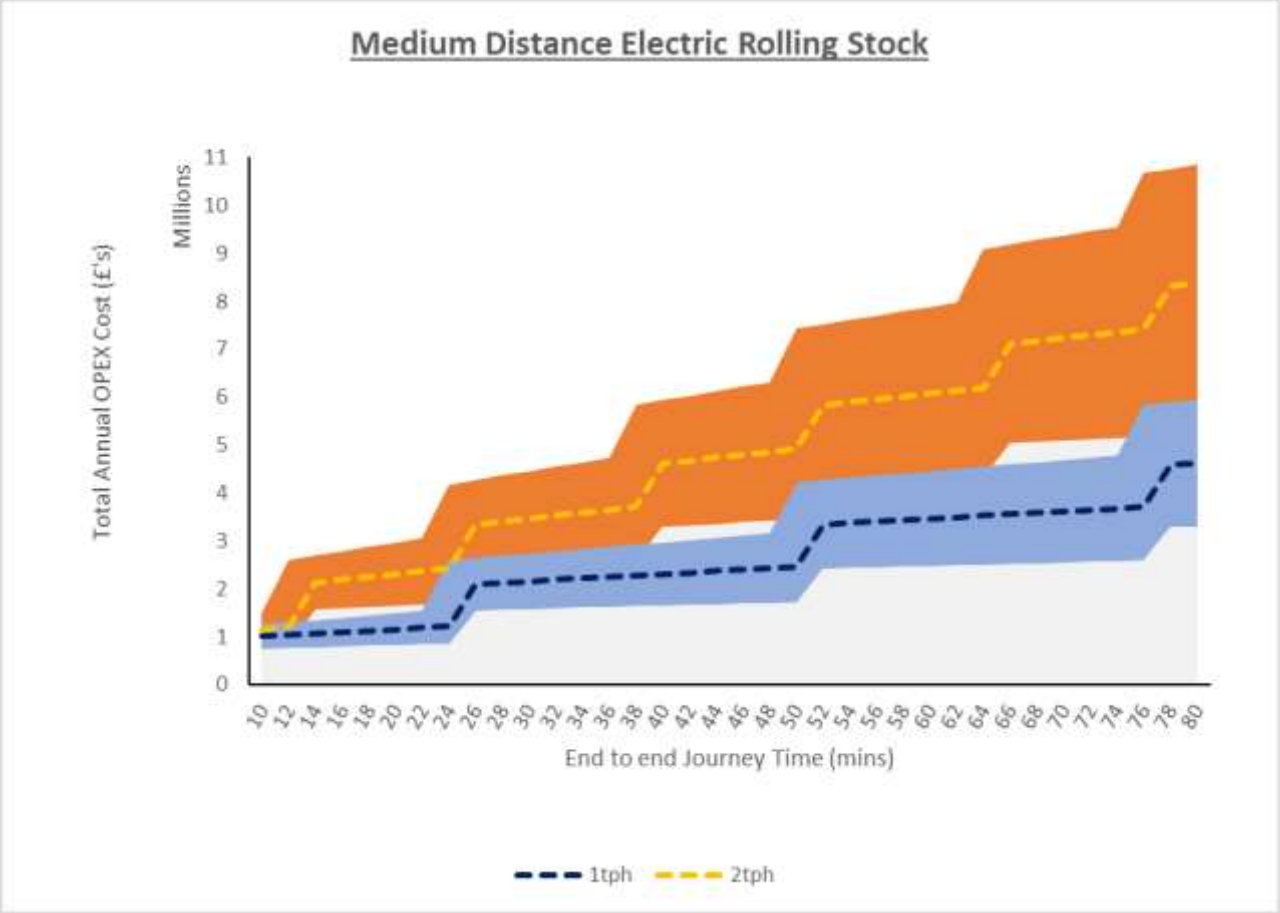


Figure 4 – Medium Distance Electric Rolling Stock Operating Costs



Area **1** on Figure shows where the OPEX cost increases sharply as the end-to-end journey time increases over 24 minutes. This represents the approximate point at which an additional train (plus drivers and guards) could be required to help deliver a consistent service in the timetable. Before this journey time point a single train (on a 1tph frequency) was able to make one journey, turn around at the terminus station and then travel back to the starting station. At the area marked as Area 1 the train is no longer able to make this train movement, meaning an additional train is needed to deliver the train service.

The exact number of minutes which triggers the requirement for an extra train is dependent on the characteristics of the rail line (specifically the train speeds achieved between stations and the number of stations calls). Promoters at this stage are not expected to know this is detail but should be aware of the possible financial impact on the operational costs of the scheme (represented by a higher upper range in the OPEX graphs above).

Note 1: If your project exceeds a 80-minute end to end journey time or proposes to use a different type of rolling stock (i.e. light rail / long distance stock) speak to your NR/DfT representative.

Note 2: Electric medium distance stock sees the largest cost variability.

1.3 STATION OPERATING COSTS

If the scheme delivers new stations, a new cost item is incurred to maintain, operate and potentially staff the station. A sample average cost for two types of station is displayed below:

	Small new single platform station (£s per annum)	Two platform parkway type station (£s per annum)
Staffed	£138,000	£196,000
Unstaffed	£58,000	£77,000

Source: DfT sample figures converted to 2020 prices, assuming no parking maintenance costs (which cost approximately +£10,000-£15,000)

1.4 COST APPRAISAL

The DfT's TAG (Transport Appraisal Guidance)[1] demonstrates how to treat operating costs in a socio-economic appraisal. This guidance includes how to treat cost inflation, optimism bias and whole life costs.

A typical appraisal period for a new line is 60 years, making it important to understand the likely future costs throughout the appraisal period. Promoters should grow the total operating cost by a suitable growth rate using TAG to represent future costs. See the DfT's TAG databook (Table A5.3.1.)

The costs in this document exclude Optimism bias. Promoters should refer to TAG unit A1-2 scheme costs[2], and apply an appropriate optimism bias in their economic cases reflecting the stage of development of their proposal.

Promoters should seek to undertake a whole life cost appraisal to represent the total cost of ownership, i.e. the total cost of delivering, operating and maintaining a project. The total

[1] https://www.gov.uk/transport/transport-modelling-and-appraisal
[2] https://www.gov.uk/government/publications/webtag-tag-unit-a1-2-scheme-costs-july-2017

cost of ownership will depend on various factors such as the life of assets. TAG Unit A1.1 provides guidance on how to assess the residual values of these types of assets.

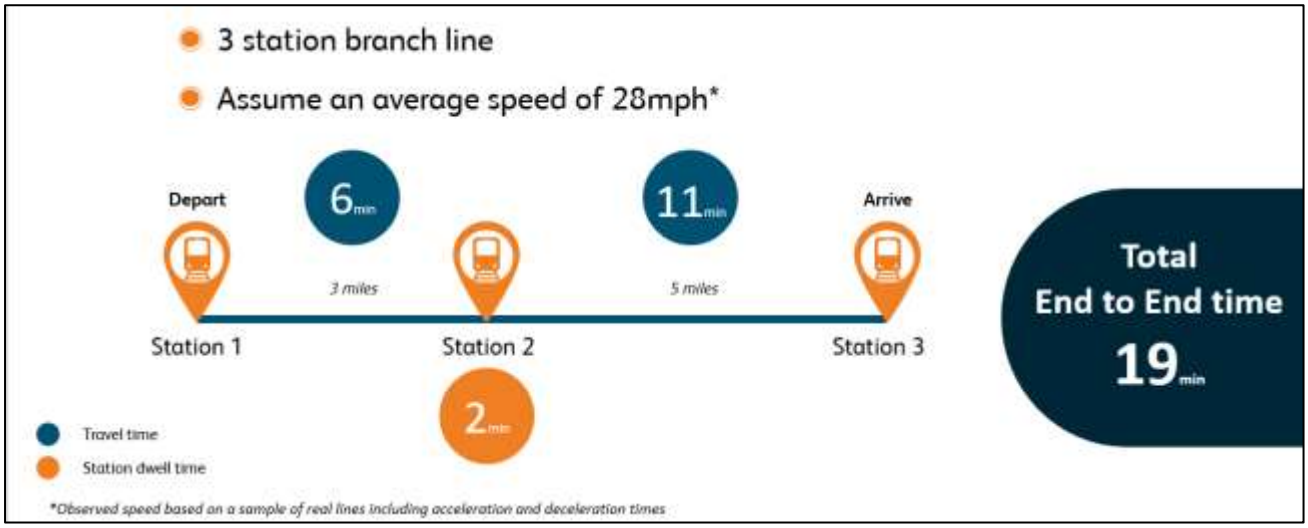
2. APPENDICES

Appendix A: How to calculate end to end journey time

The graphs above assume users have some idea of the end-to-end journey times of their projects. If you are unsure about how to calculate this, this section will provide some examples of how it can be calculated.

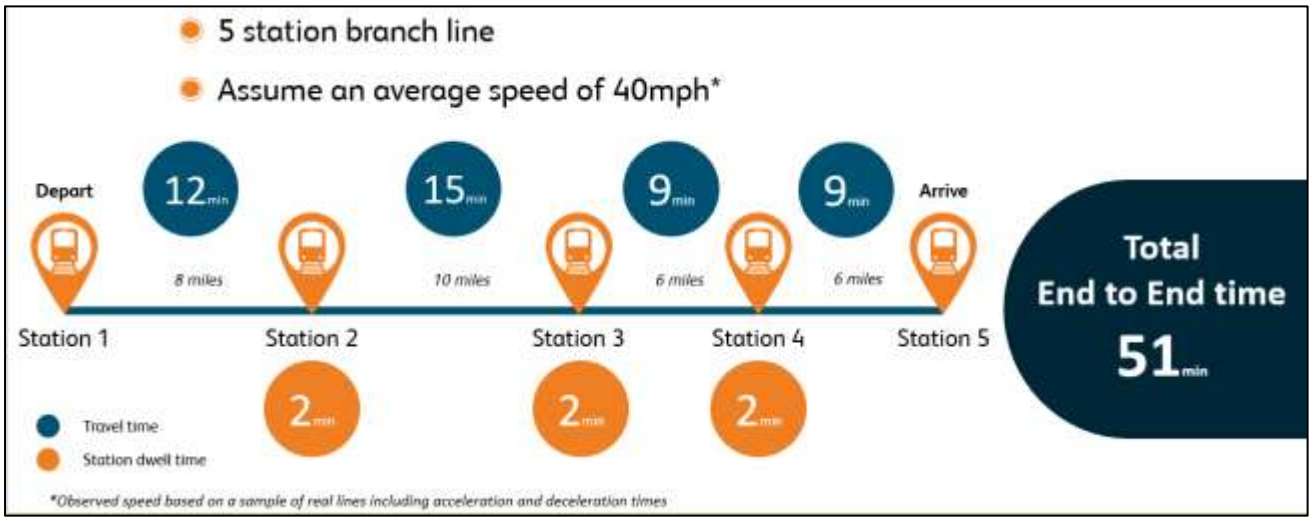
End to end journey time is the total number of minutes a train takes from the first stop to the last stop on the line. It includes the total travel time between all stations along the line, performance allowances to permit recovery in the timetable, plus dwell times at stations to enable passengers to board and alight. Two examples are laid out below for reference:

Figure 1 – Example 1 – Short distance branch line



First, determine the rail distance (length of rail track) between station 1 and station 2. In this example the distance is 3 miles. Assuming an average speed of 28mph for a short distance rolling stock, it would take 6 minutes to travel between station 1 and 2 (3 miles ÷ 28mph x 60 minutes in an hour = 6.4 minutes). A station dwell time of 2 minutes is also added to account for the time a train waits at a station to board and alight passengers with some performance allowance). Finally, the last track section is calculated; with a 5-mile distance the journey time is expected to be 11 minutes. Adding all these times together, the total end to end time is calculated at 19 minutes.

Figure 2 – Example 2 – Medium distance branch line



The methodology for a medium distance branch line is very similar to example 1 above, except a higher speed of 40mph is used as the line characteristics (spacing between stations) of a medium distance line permit trains to reach higher top speeds[3] for longer durations. This higher speed feeds through to the travel time calculation between stations.

[3] Medium distance lines also tend to have rolling stock capable of reaching higher top speeds

Appendix B: OPEX Cost Assumptions

Several key operating assumptions and simplifications have been made in producing the operating cost ranges above, which are:

- 16-hour operation, 7 days a week, no bank holiday services
- Average speed of 28mph for short distance and 40mph for medium distance (based on a handful of observed services across the UK)
- Trains assumed to be 2-vehicles long (noting some rolling stock is longer, but an equalising assumption has been made to aid comparisons i.e. a 2-car short vs 2-car medium distance stock) and it is also assumed that cascaded rolling stock will be available (new rolling stock could be built to a higher specification and could therefore be more costly).
- No DOO (Driver Only Operation) with each train travelling back and forth throughout the day requiring 4 drivers and 4 guards to operate across the year
- No additional station operating costs assumed (see Station Operating Costs section)
- Another exclusion made to these costs is that they do not include any additional depot and stabling arising from operating the new service. Speak to your NR/DfT representative to review whether the service can be operated using existing assets or if there might be additional depot and stabling costs to consider.

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