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Bridge of Dee Short Term Modelling Results

September 2011

1. Introduction

In April 2009 the Nestrans Board determined that a further short term measure identified within the Access to Aberdeen from the South Study would not be progressed due to value for money concerns. A segregated left turn lane had been proposed from Great Southern Road to the A90 Stonehaven Road at the roundabout on the south side of the Bridge of Dee. The preliminary design however highlighted that there were a large number of services on the line of the proposed additional lane that would need to be diverted and land acquisition would be required from properties adjacent to the roundabout, which would impact on their existing off-street parking provision. It was felt that the likely significant costs of the improvement could not be justified when compared with the predicted benefits of the scheme.

Given the success of the left turn slip lane at the King George VI Bridge, the effect of providing a segregated left turn lane from within the existing carriageway, where possible, with only minimal widening to avoid the services as a lower cost improvement is now being looked at as a short term minor improvement in advance of the longer term solution being investigated through the Bridge of Dee Study.

2. Options

2.1. Base Model

The base model used was the Aberdeen Access from the South model that was created by SIAS. This was then modified to create the options tested in this report. It was necessary to remove pedestrian crossings on two legs on approach to the roundabout, due to the effect that these 'hazards' were having on the lane choice of vehicles. These were therefore removed in the base and the option testing to ensure consistency.

2.2. Option 1

2.2.1. Layout

The first option included a slip lane from Great Southern Road to Stonehaven Road. It also looked at reducing the number of lanes entering the roundabout from the Bridge of Dee with only one lane travelling round as far as Stonehaven Road. The drawing of this option is displayed in Figure 1 below.

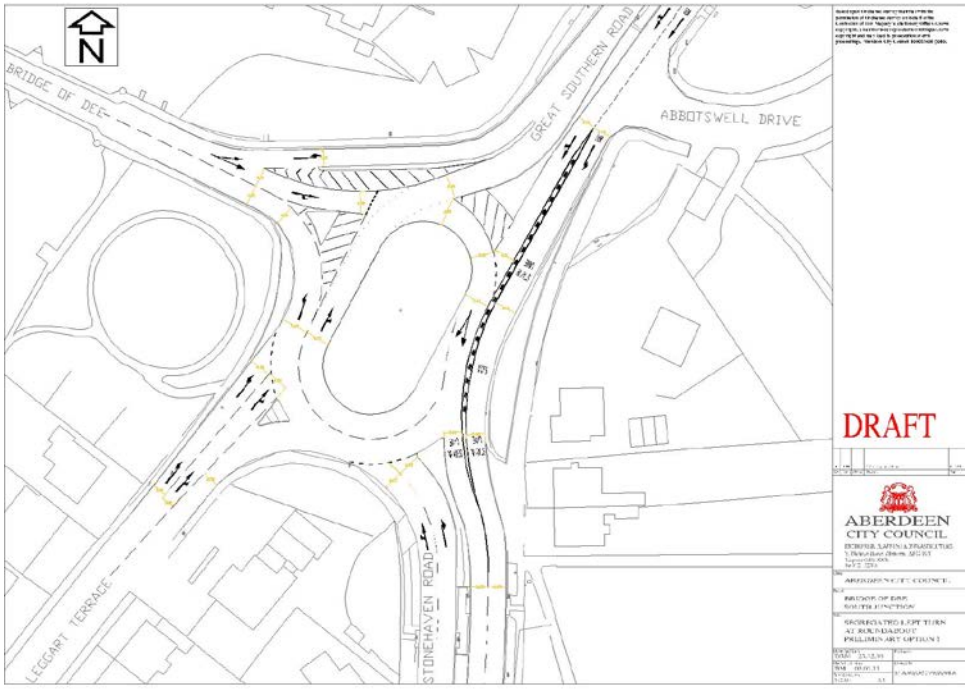

Figure 1: Layout of Option 1

2.2.2. Modelling

The models were edited from the most recent Access from the South Model, which was also used as the base model. To show the model layouts used, a print screen was taken for each of the options. The print screen for Option 1 is displayed in figure 2 below.

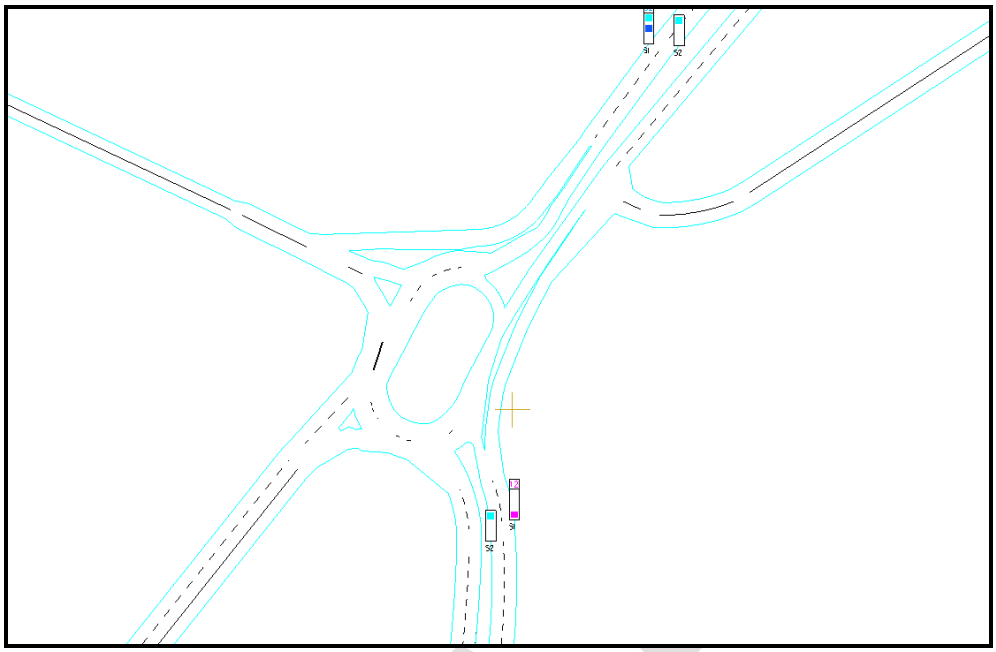

Figure 2: Snapshot of modelling of Option 1

2.3. Option 2

The second option again included a slip lane from Great Southern Road to Stonehaven Road. In contrast to option one, it retained two lanes on the exit from Bridge of Dee, with only one of these continuing to Stonehaven Road. Only one lane continues round from entrance to exit of Stonehaven Road. The diagram in Figure 3 below shows this design.

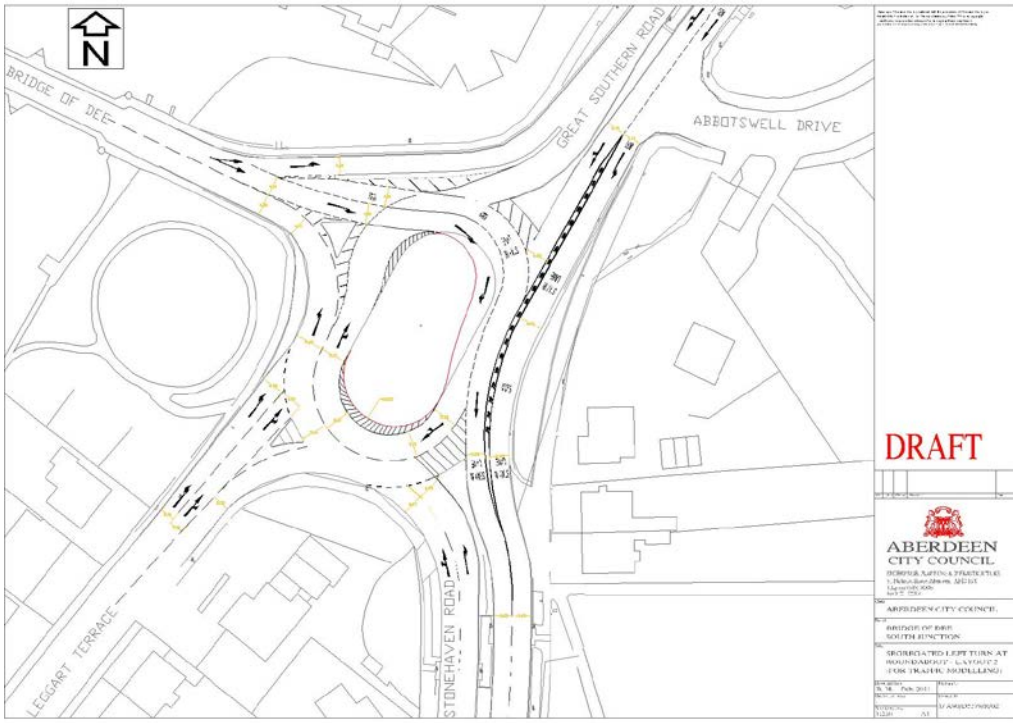

Figure 3: Layout of Option 2

2.3.1. Modelling

The print screen for Option 2 is displayed in figure 4 below.

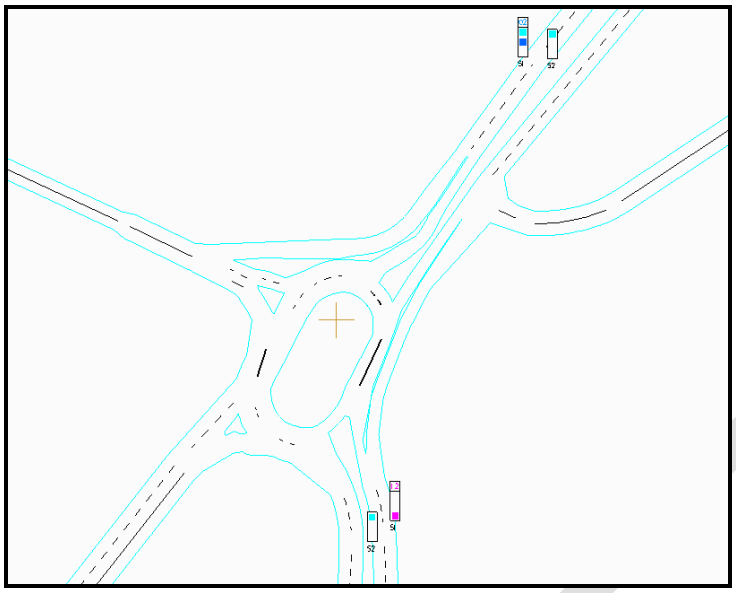

figure **4**: snapshot of model for option 2

2.4. Paths

As part of the modelling, paths were created so that analysis could be done on various journey times throughout the model, not just observations of how it ran. The following paths were created as a way in which to measure the extent to which the new layouts affect the journey times through the junction.

1. Great Southern Road to Leggart Terrace
2. Great Southern Road to Bridge of Dee
3. Great Southern Road to Stonehaven Road
4. Leggart Terrace to Great Southern Road
5. Leggart Terrace to Stonehaven Road
6. Stonehaven Road to Anderson Drive
7. Stonehaven Road to King George VI Bridge
8. Anderson Drive to Stonehaven Road

An example of a path selection within the model, in this instance from Great Southern Road to Leggart Terrace is shown in figure 5 below.

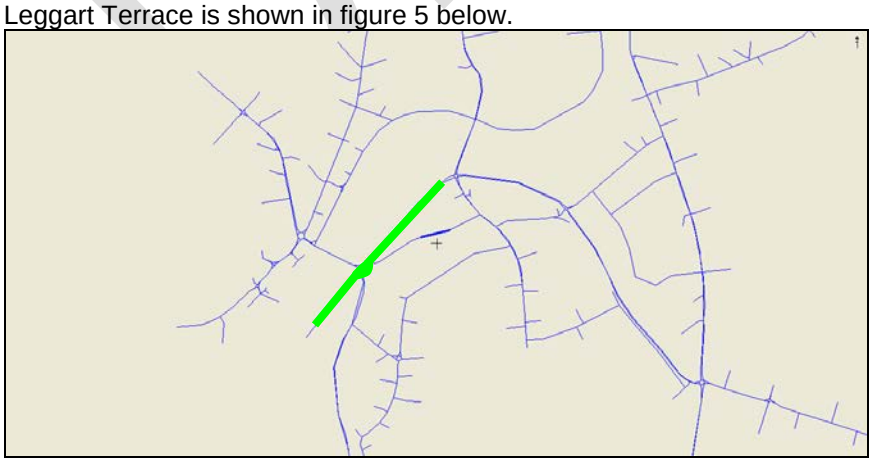

Figure 5: Path from Great Southern Road to Leggart Terrace

Three runs of both the AM and the PM peak were taken for each option along with the base model, and these were combined to produce average journey times for each of the paths. The graphs for both the AM and PM peak for each path are shown in the next section.

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3. Journey times

The graphs below show the average journey time over 5 minute periods for the base model and each of the options on various turning movements at the Bridge of Dee roundabout over the AM and PM Peak periods.

3.1. Great Southern Road to Leggart Terrace

3.1.1. AM Peak

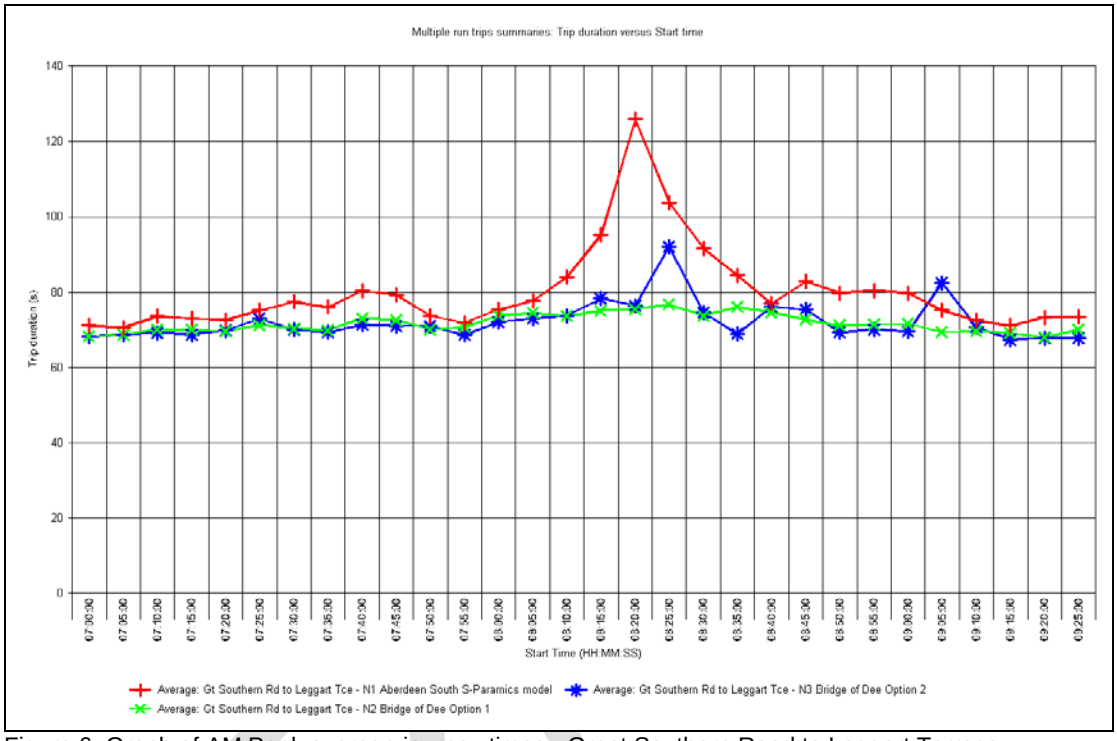

Figure 6: Graph of AM Peak average journey times - Great Southern Road to Leggart Terrace

In the AM Peak, both Option 1 and Option 2 are shown to be a slight improvement on the base journey times from Great Southern Road to Leggart Terrace.

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3.1.2. PM Peak

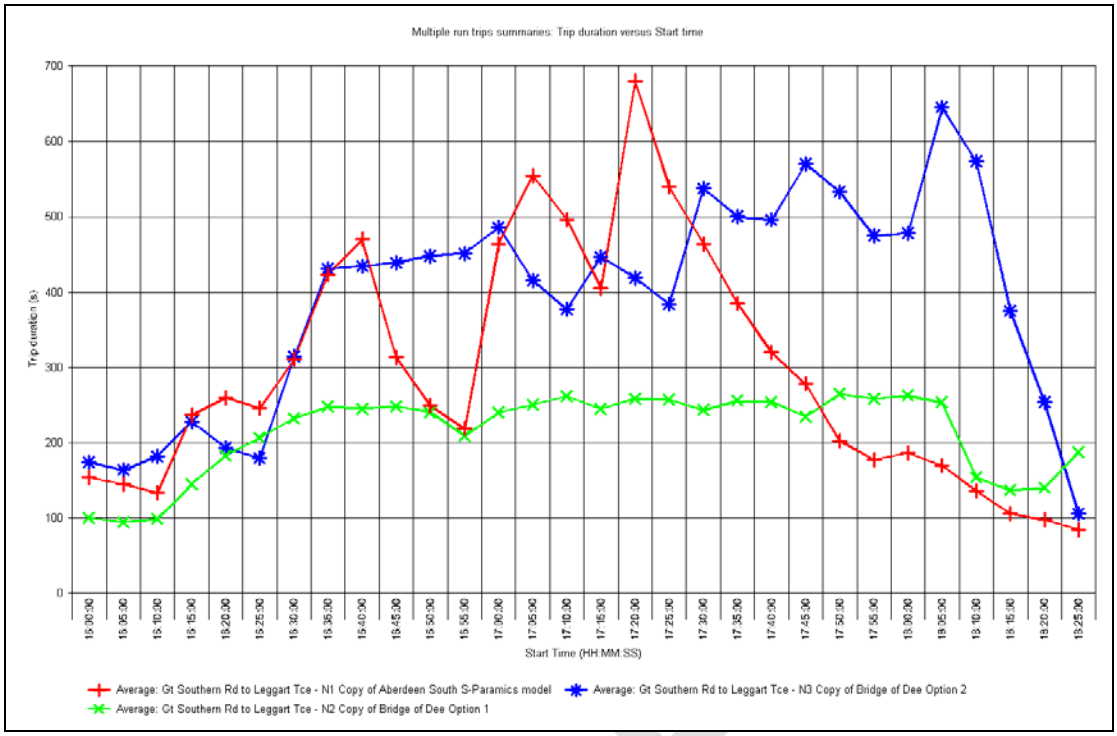

Figure 7: Graph of PM Peak average journey times - Great Southern Road to Leggart Terrace

Option 1 appears to perform better that both Option 2 and the base model in the PM Peak from Great Southern Road to Leggart Terrace.

3.2. Great Southern Road to Bridge of Dee

3.2.1. AM Peak

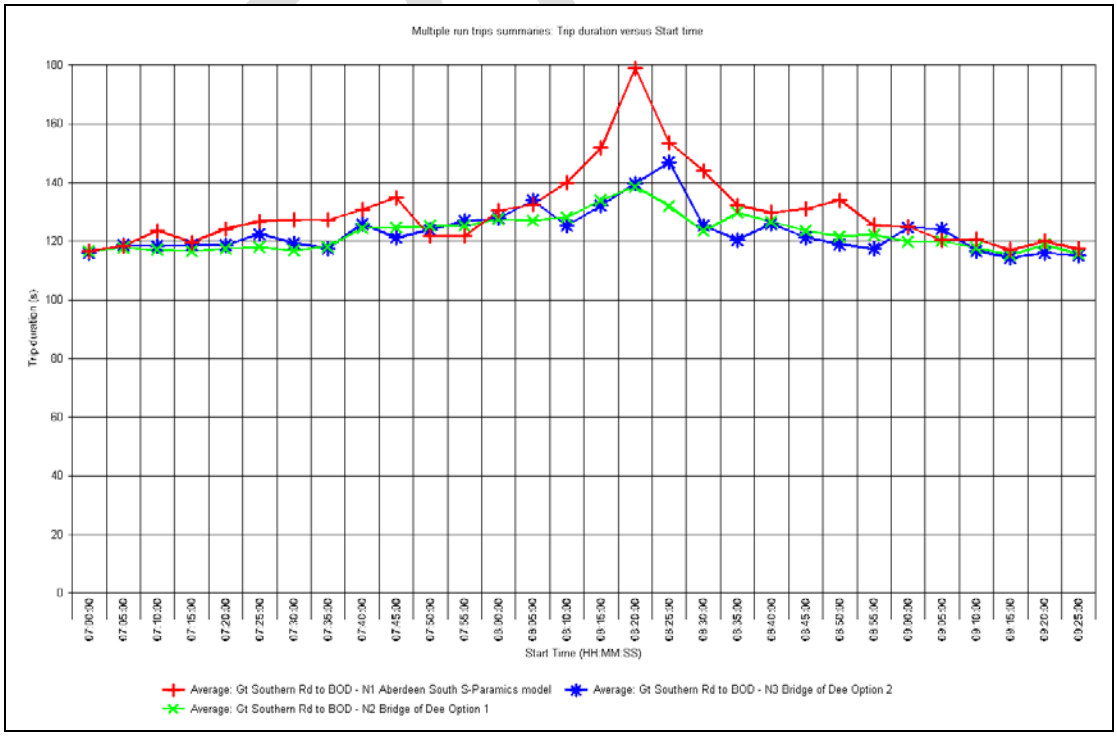

Figure 8: Graph of AM Peak average journey times - Great Southern Road to Bridge of Dee

As can be seen from the graph above, Option 1 and Option 2 are both marginally better than the base model from Great Southern Road to Bridge of Dee in the AM Peak.

3.2.2. PM Peak

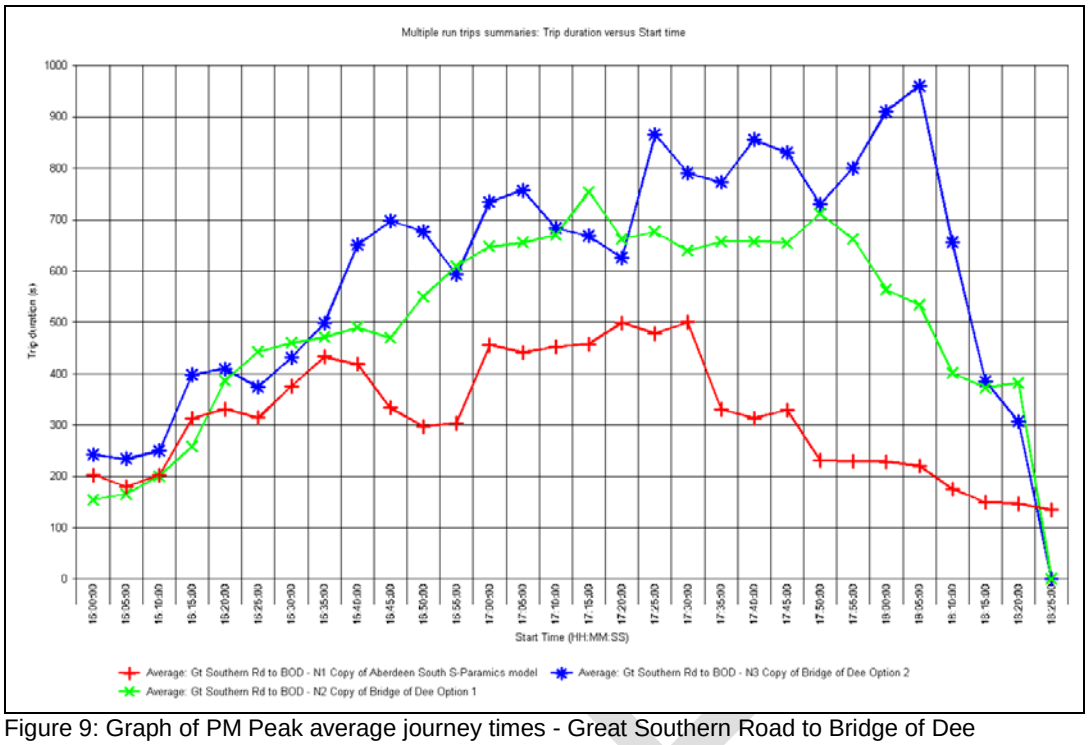

Figure 9: Graph of PM Peak average journey times - Great Southern Road to Bridge of Dee

Both Option 1 and Option 2 are worse than the base in the PM Peak from Great Southern Road to Bridge of Dee, with Option 1 performing marginally better than Option 2.

3.3. Great Southern Road to Stonehaven Road

3.3.1. AM Peak

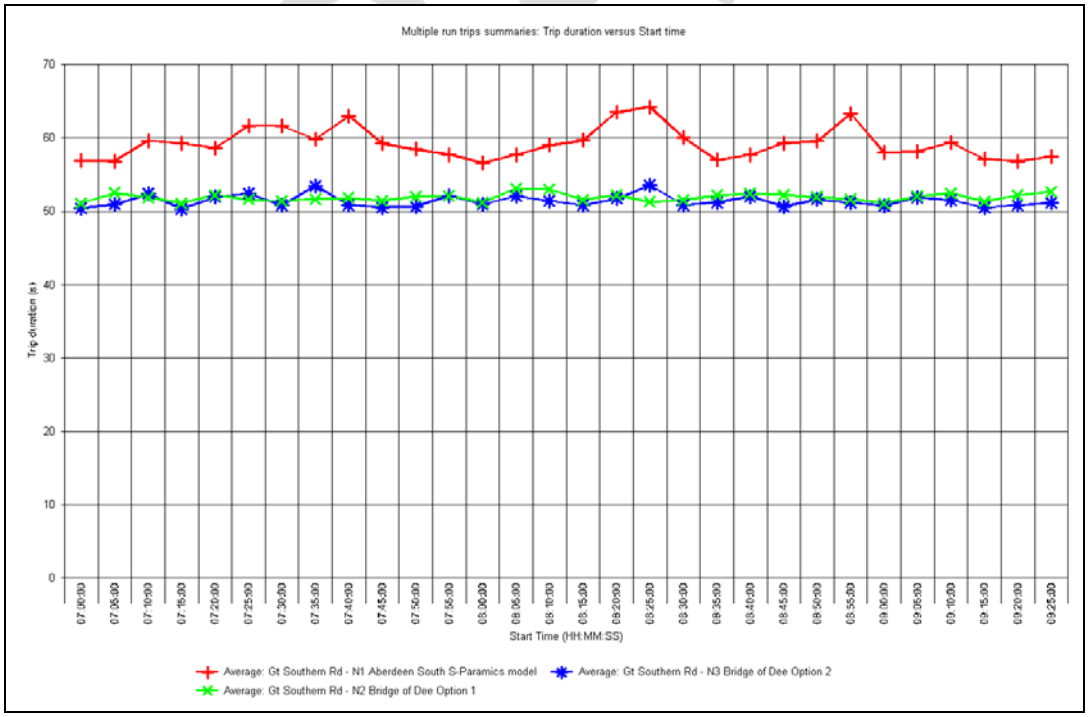

Figure10: Graph of AM peak average journey times – Great Southern Road to Stonehaven Road

In the AM Peak, both Option 1 and Option 2 are shown to be an improvement on the base in journey times from Great Southern Road to Stonehaven Road.

3.3.2. PM Peak

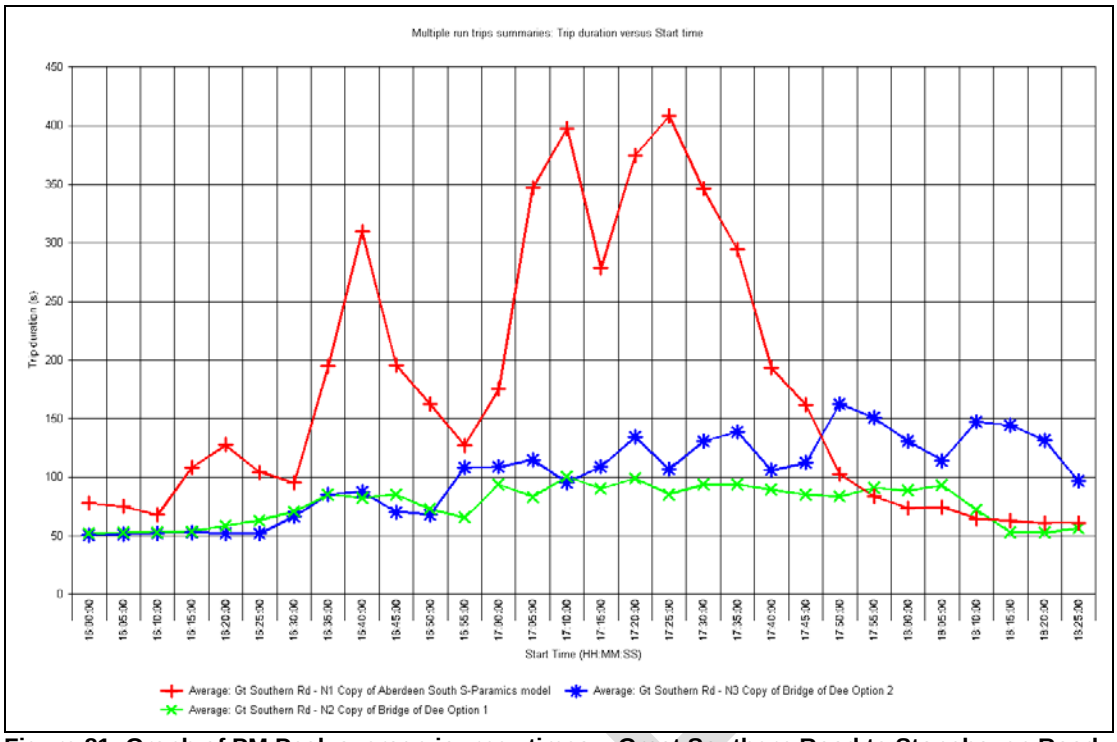

Figure 81: Graph of PM Peak average journey times – Great Southern Road to Stonehaven Road

Both option 1 and option 2 are an improvement on the base in the PM peak from Great Southern Road to Stonehaven Road, with Option 1 performing marginally better.

3.4. Leggart Terrace to Great Southern Road

3.4.1. AM Peak

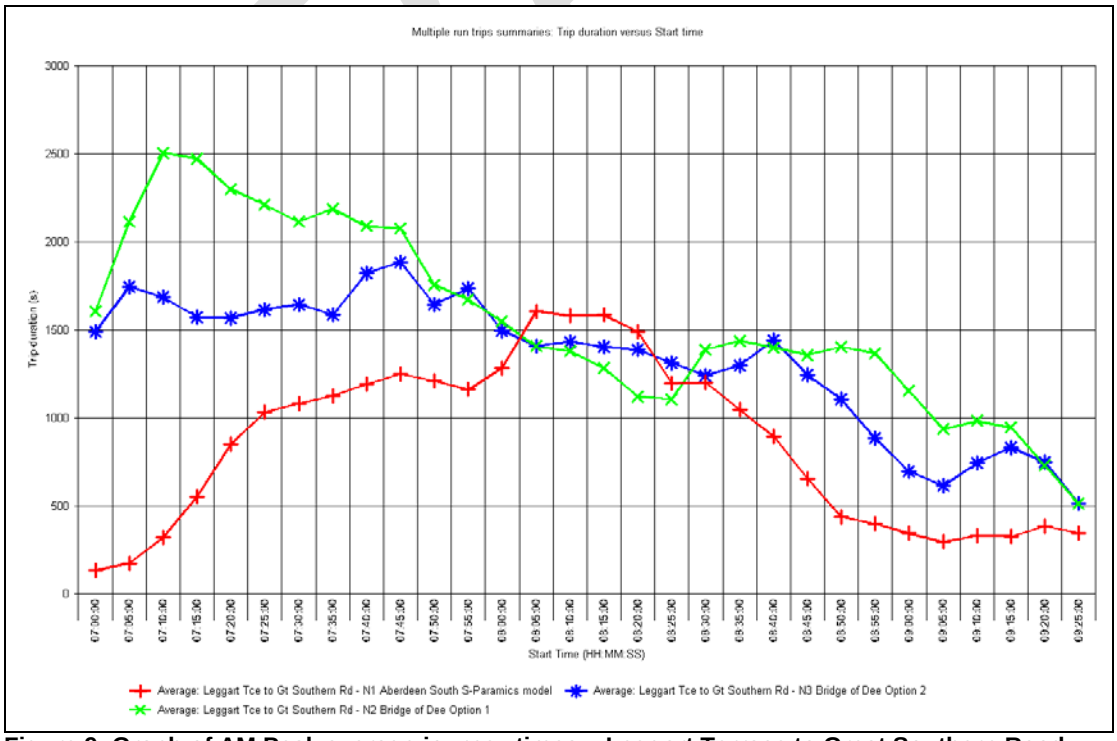

Figure 9: Graph of AM Peak average journey times – Leggart Terrace to Great Southern Road

As can be seen from the graph above, the base model performs considerably better than both Option 1 and Option 2 in the AM Peak from Leggart Terrace to Great Southern Road.

3.4.2. PM Peak

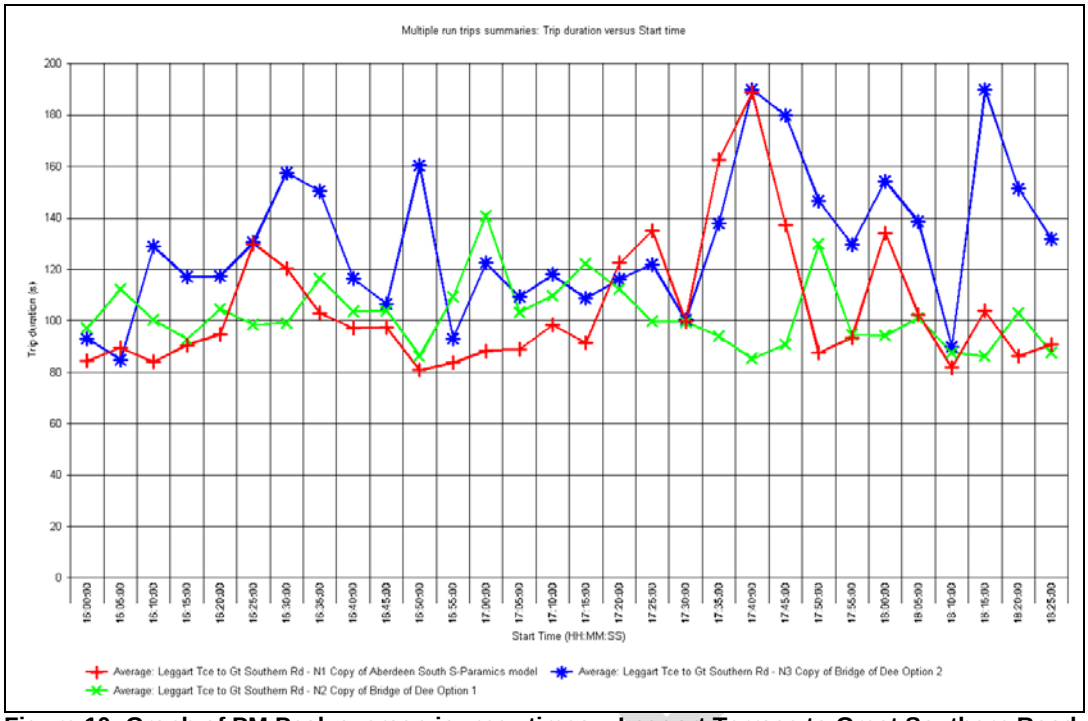

Figure 10: Graph of PM Peak average journey times – Leggart Terrace to Great Southern Road

Option 2 is marginally worse than both Option 1 and the base model from Leggart Terrace to Great Southern Road in the PM Peak.

3.5. Leggart Terrace to Stonehaven Road

3.5.1. AM Peak

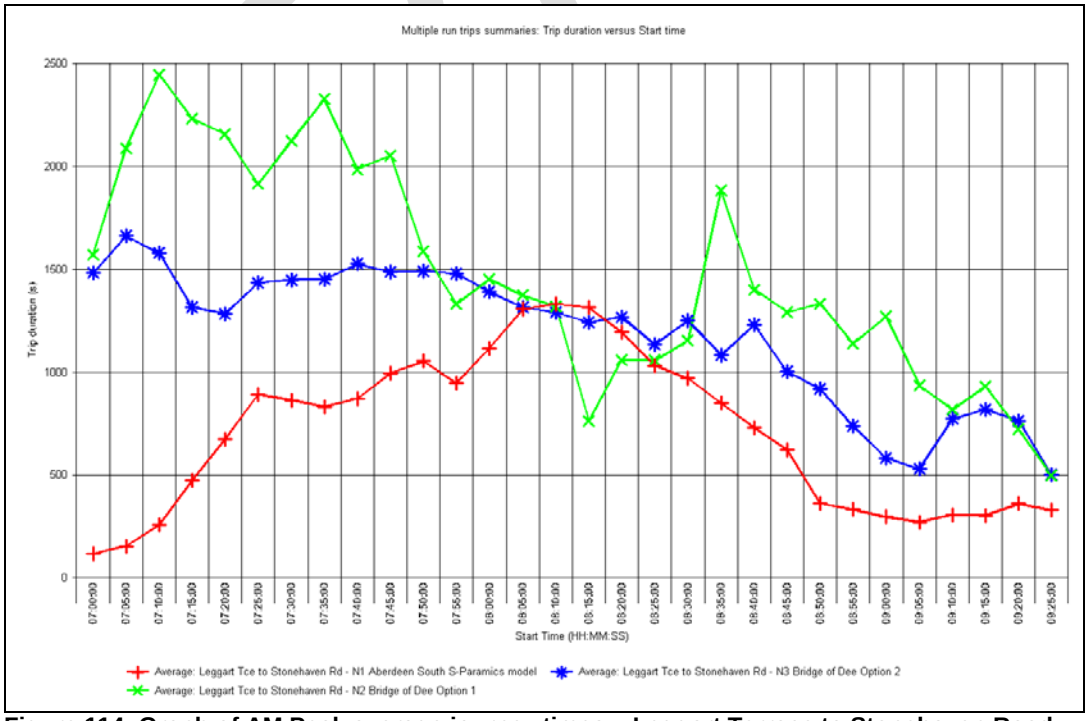

Figure 114: Graph of AM Peak average journey times – Leggart Terrace to Stonehaven Road

As can be seen from the graph above, the base model performs considerably better than both Option 1 and Option 2 in the AM Peak from Leggart Terrace to Stonehaven Road.

3.5.2. PM Peak

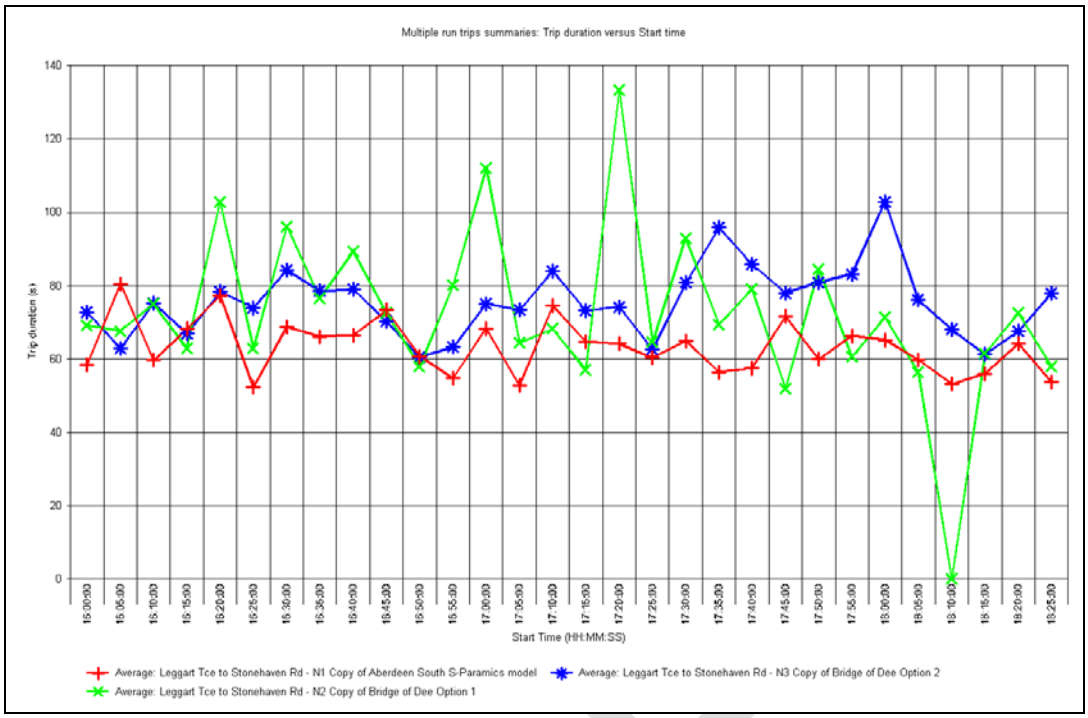

Figure 125: Graph of PM Peak average journey times – Leggart Terrace to Stonehaven Road

Both Option 1 and Option 2 showed worse journey times than the base model from Leggart Terrace to Stonehaven Road in the PM Peak.

3.6. Stonehaven Road to Anderson Drive

3.6.1. AM Peak

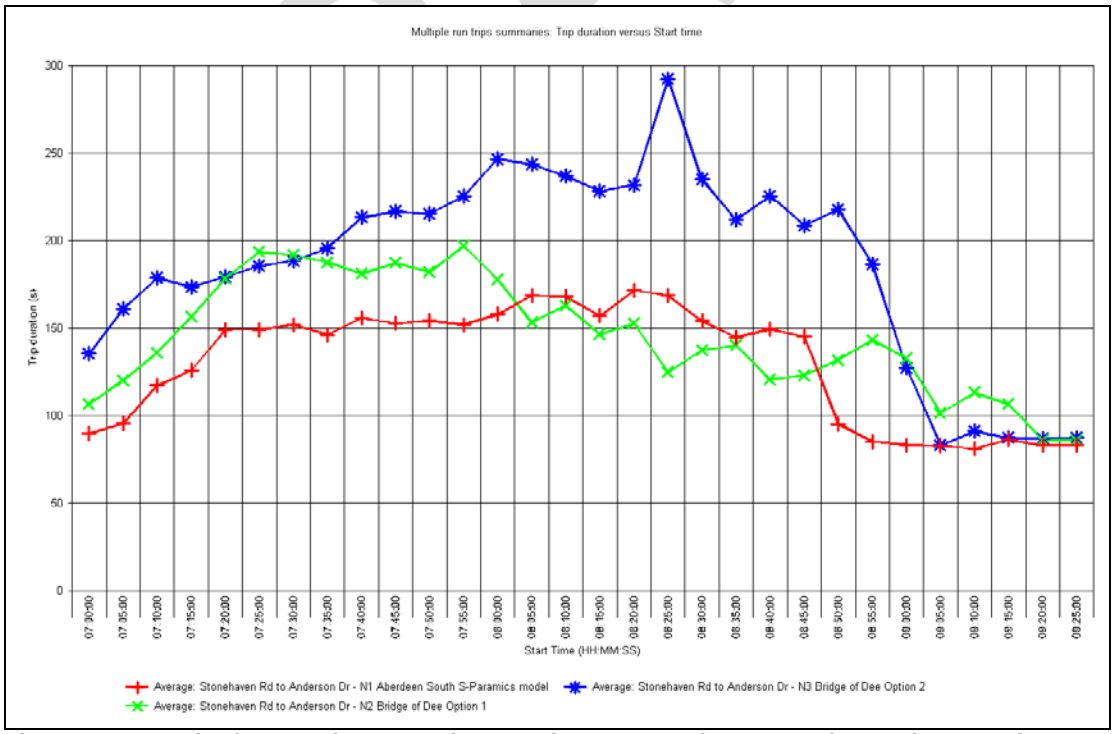

Figure 136: Graph of AM Peak average journey times – Stonehaven Road to Anderson Drive

In the AM Peak, Option 2 is worse than both Option 1 and the base model from Stonehaven Road to Anderson Drive, with the base model performing best.

3.6.2. PM Peak

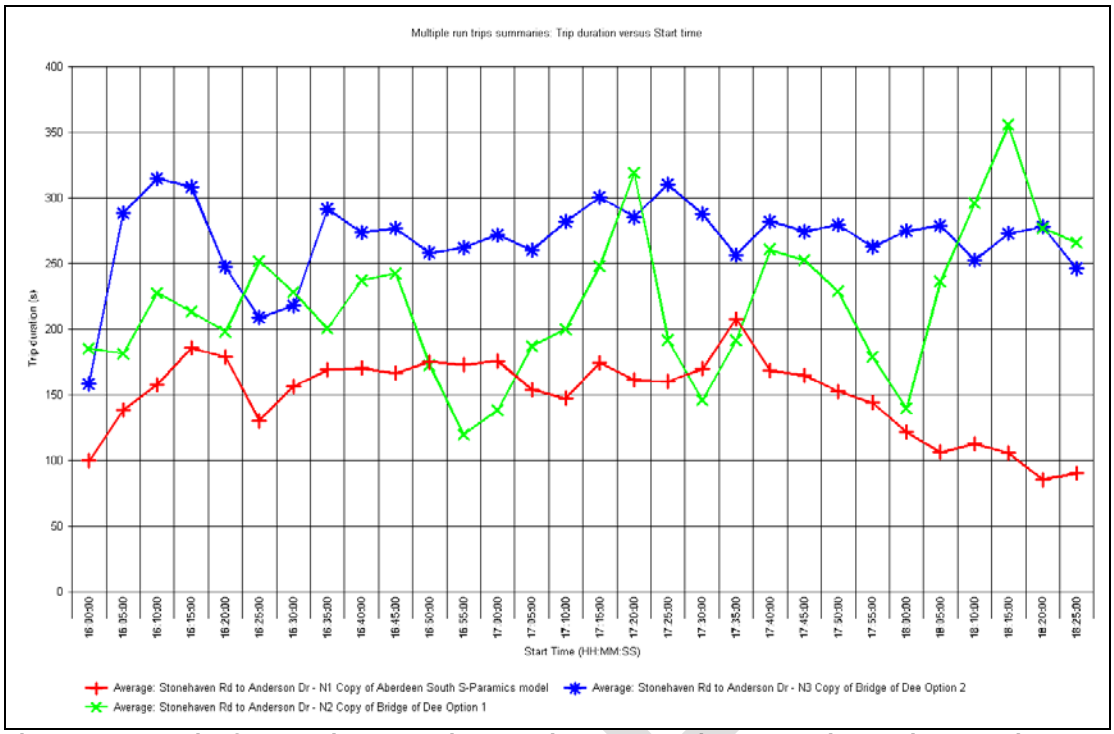

Figure 147: Graph of PM Peak average journey times – Stonehaven Road to Anderson Drive

Both Option 1 and Option 2 are performing worse than the base in the PM Peak from Stonehaven Road to Bridge of Dee, with Option 1 performing slightly better than Option 2.

3.7. Stonehaven Road to KGVI Bridge

3.7.1. AM Peak

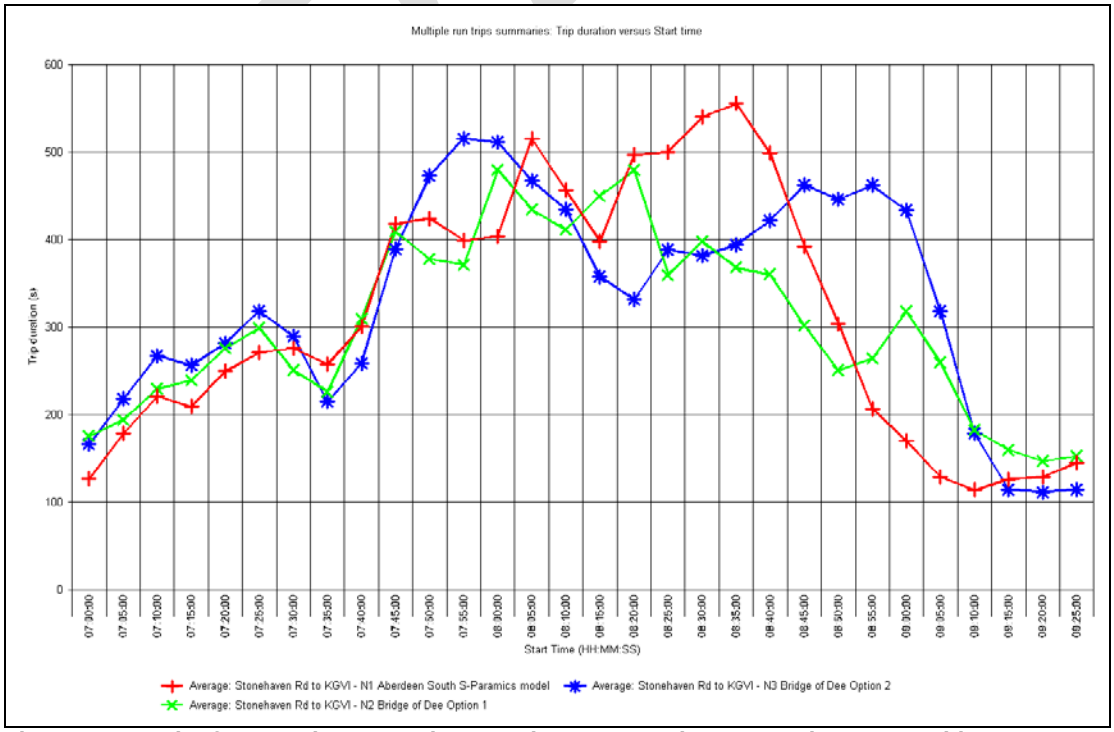

Figure18: Graph of AM Peak average journey times – Stonehaven Road to KGVI Bridge

There is little difference between the options from Stonehaven Road to KGVI Bridge in the AM Peak.

3.7.2. PM Peak

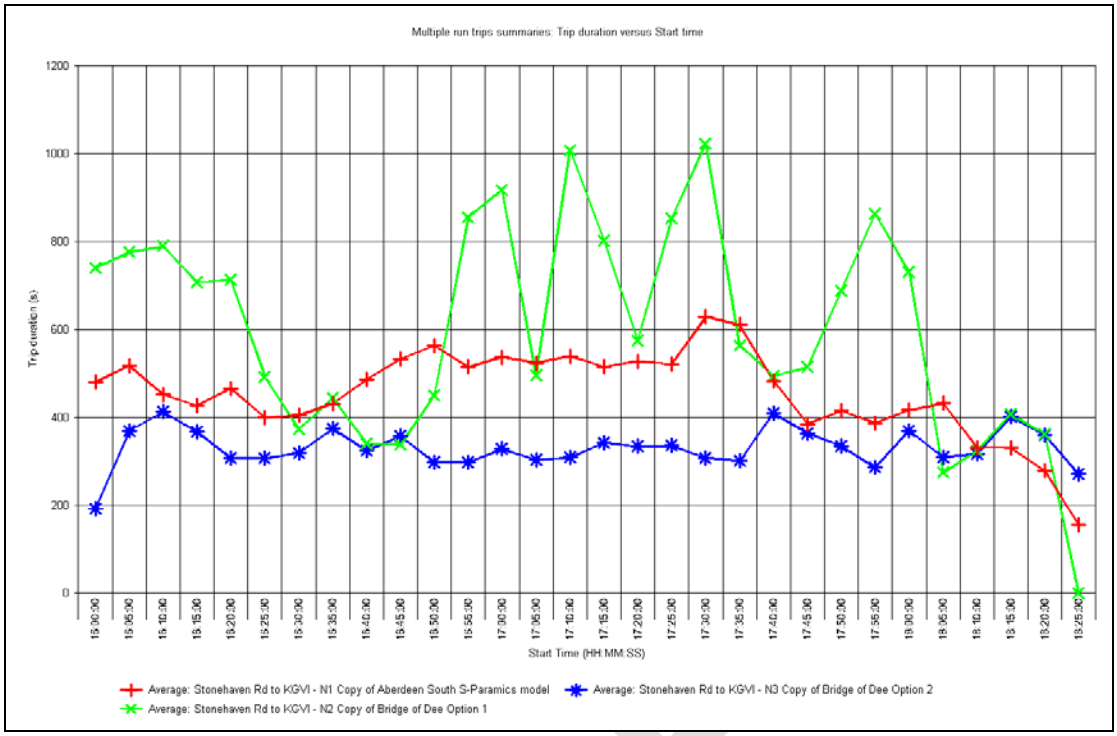

Figure19: Graph of PM Peak average journey times – Stonehaven Road to KGVI Bridge

Option 2 performs better than the base and Option 1 from Stonehaven Road to KGVI Bridge in the PM Peak, with Option 1 performing worst.

3.8. Anderson Drive to Stonehaven Road

3.8.1. AM Peak

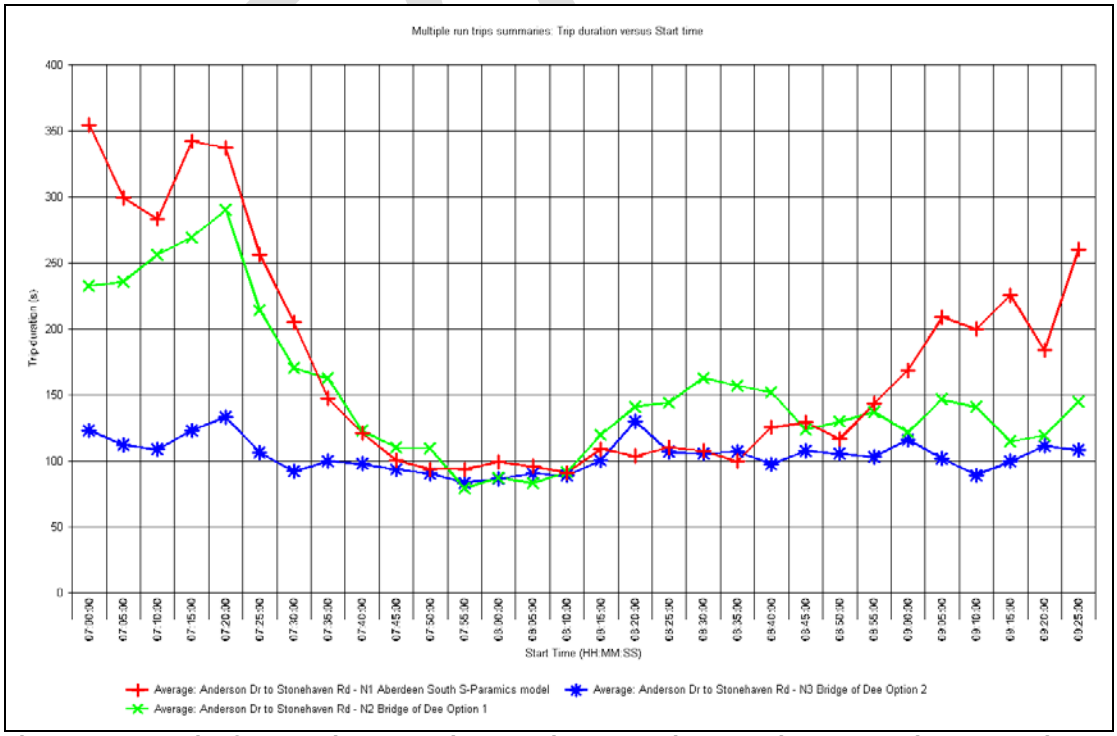

Figure 150: Graph of AM Peak average journey times – Anderson Drive to Stonehaven Road

Option 2 is shown to provide the best journey times in the AM Peak from Anderson Drive to Stonehaven Road.

3.8.2. PM Peak

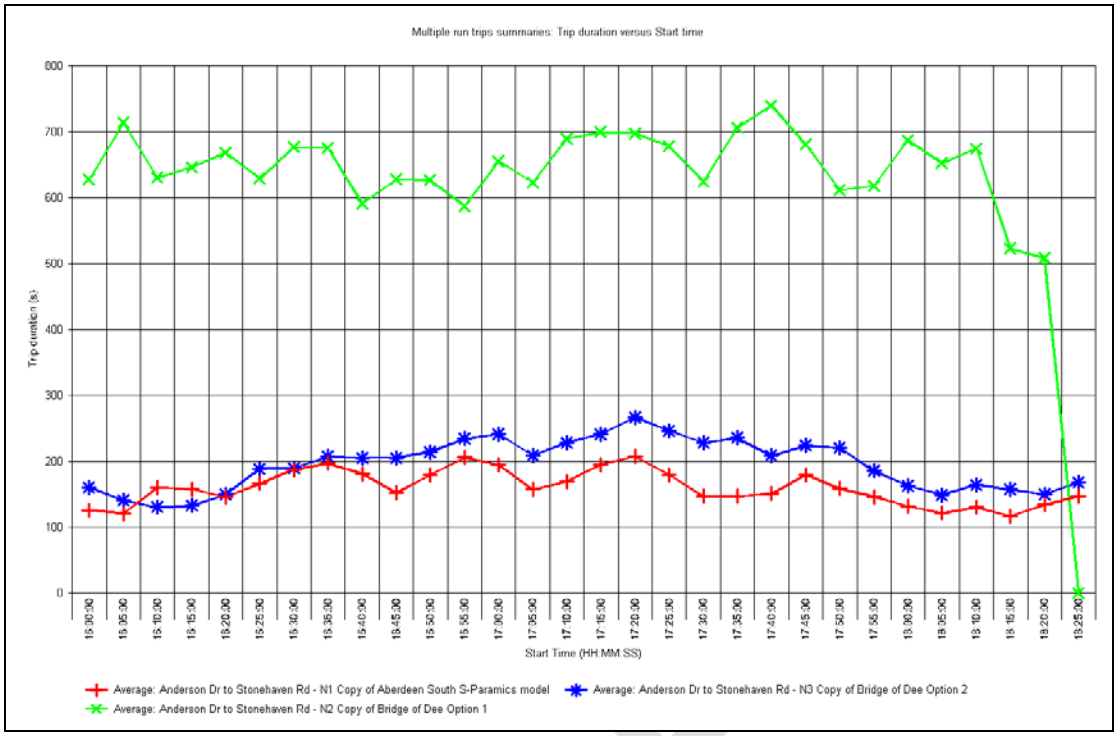

Figure 16: Graph of PM Peak average journey times – Anderson Drive to Stonehaven Road

Option 1 is considerably worse than both Option 2 and the base. Presumably this is due to only one lane on the exit from Bridge of Dee in this scenario.

4. Conclusion

Whilst both options showed an improvement in journey times from Great Southern to Stonehaven Road as a result of the introduction of a segregated left turn slip lane, this has resulted in increased delays on a number of the other approaches to the roundabout. This means that neither Option 1 or Option 2 were effective in improving journey times through the roundabout as a whole and do not therefore provide a viable benefit as a short term measure.

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