There are 10 junctions along the AWPR which in order from south to north are:

- Stonehaven (A90)
- Charleston (A90)
- Cleanhill
- Milltimber (A93)
- South Kingswells (A944)
- North Kingswells
- Craibstone (A96)
- South Kirkhill
- Goval (A947)
- Blackdog (A90)

The junctions have been designed based on predicted traffic flows 15 years after opening. Their performance has been analysed using Paramics, a specialist traffic modelling software package. Junctions are assessed during morning and evening peak periods and videos of the junctions for these periods are available for view.

