## NETWORK LINKING STRATAGY - HILLSBOROUGH NETWORK, SHEFFIELD

#### **Consisting of:**

1MHC1 – Langsett Road / Holme Lane (Hillsborough Junction)

1MGC1 – Langsett Road / Forbes Road

1MFC1 – Langsett Road / Ripley Street

1VSC1 – Langsett Road – Bamforth Street

The Tram route is along Langsett Rd where it splits at the Hillsborough junction towards Marlin Bridge or Middlewood. There is a tram stop between Holme Lane and Forbes Road. During the peak period's general traffic is not allowed to in the network between Ripley Street and Holme Lane if entering from Middlewood or Langsett Road. Buses and trams are permitted as is traffic turning from Holmes Lane.



# EXISTING SITUATION

In the past the junctions have operated under fixed time control which provided good traffic progression through the network. With the addition of an all round ped at the Ripley junction meant that a common cycle time was hard to implement. The junctions all now operate under local VA control. This gives a benefit to capacity at the Home Lane junction which in the peaks is over capacity, but lose of linking through the network can delay traffic and cause blocking of trams into the tram stops.

Due to the traffic banning during the peaks the dominant traffic movements are different at in the Peaks to the inter-peak (11:00-15:00), in the peaks the traffic from Holmes Lane in the major movement into the network and in the offpeak its traffic from Middlewood and Langsett Road.

Tram priority is provided at most junctions by local LRT priority within the controllers. Currently the LRT priority is effective at minimizing tram delay at Ripley Rd and Forbes Road junctions but there is no priority at the Holmes Lane junction due to the sensitivity of the impact on traffic capacity here.

Inbound traffic failing to clear the Forbes Lane stopline can block a trams entering the stop behind them. Outbound traffic queuing back from the Holmes Lane junction can block trams from entering there stop, this is often an offpeak problem.

In addition traffic on the side road of Ripley Street can suffer delay by consecutive tram priority calls on the main road on the main road.

### AIMS

- To reduce delay to general traffic by providing linking through the network
- To reduce delay to trams through the network
- To stop outbound trams getting blocked from entering their stop.
- To maintain or improve the traffic congestion on the Ripley Street approach

### STRATAGY

There are a number of STM strategies designed to target the issues outlined above.

• Inbound - Linking of junctions

A hard link has been used at Forbe Road to ensure its stage 3 (ped and Forbes Rd) is driven off the Holmes Lane operation. Linking is provided which depending on time of day gives the main inbound movement of traffic a run out through the Forbes Road junction. This reduces delay for traffic and minimizing the risk of traffic from the previous cycle being caught in the tram stop when a tram from Middlewood of Malin Bridge tries to enter the stop.

• Inbound - Additional tram linking

To further reduce the chance of an inbound tram being blocked at the tram stop when an inbound tram is approaching the Holmes Lane junction the Ripley Street junction is linked to the ensure main road progression. The Ripley Street junctions does not naturally link to the others so this is only done when a tram is present, allowing the junction to operate effectively under VA control the rest of the time.

• Outbound – minimizing Tram blocking

There are 2 strategies to help which this, both are aimed at the off peak when the outbound traffic from Langsett Road can block back from Holmes Lane across Forbes road and stopping trams getting into their stop.

One strategy is preventative – when an outbound tram is on the approach to Hillsborough and is detected at the upstream Bamforth Street junction a bonus green is run on stage 3 at Holmes Lane to help clear out any queuing traffic.

The other strategy is reactive – if the outbound Forbes Road tram phase 'T2' is up for more than 12s this usually indicates a tram stuck between the stopline and exit at Forbes Road (trams passing unimpeded through this junction typically have a T2 time of <10s). This strategy calls a longer stage 3 green at Holmes Lane junction to clear out blocking traffic.

• Ripley Road Compensation

STM monitors the Ripley Road junction time between the side road (Ripley Road) greens and if excessive due to tram priority compensates the time back to the Ripley Road approach.

# CONTROL DETAILS

- The STM strategy is timetabled to run daily between 0700 1830.
- The master junction is Holme Lane, although STM does not control this, it only sends a blank plan in order to keep it online and get the reply bits required for the other junctions to sync to.
- The strategy monitors the Tram detector reply watchdog bits (TWF) and if in reply will suspend STM control of the network.

### RESULTS

### TRAM JOURNEY TIMES

The chart below shows tram inbound tram journy times form the Holme Lane juntion through to Ripley Road.

The criteria of reducing delay to trams through the network was measured by comparing journey time data between tram detectors before and after the start date. The data below compares 'before' data taken on the  $5 - 7^{th}$  Jab 2015 with 'after' data taken on the 12-14<sup>th</sup> Jan 2015.

Blue data points are taken over a 2 day period before STM was implemented, the red data is after STM is inplemented. The data clearly shows a reduction in the number of outlying blue before data, with the worst case down from 250s to 160s.



### ANPR JOURNEY TIMES

The Charts below compare **ANPR journey time data** during the time period open to all vehicles (1100 – 1500) for a week before and after the strategy was implemented. The section is inbound between Harris Road to the North of Hillsborough and Penistone Road to the South.

A lowering of the journey times can be seen and a much tighter variability of times in the after data clustering around the 100s time rather than the previous spread from 100 to 150s.

#### 'Before' ANPR Journey Times



Harris Road to Penistone Road - Journey Time Data 05/01/2015 - 11/01/2015

### 'After' ANPR Journey Times



