

**TITLE OF REPORT: LETCHWORTH GATE AND JUNCTION 9 OF A1(M)**

REPORT OF THE TECHNICAL STANDARDS & PROGRAMMES MANAGER,  
HERTFORDSHIRE HIGHWAYS

**1. PURPOSE OF REPORT**

- 1.1 To advise the Panel on the performance of the improvement to junction 9 of the A1(M) (Letchworth Gate interchange), part of the Baldock bypass project, and to advise on current initiatives on its operation. To advise the Panel on the operation of Letchworth Gate, its influence on routing of traffic through Baldock town centre and on possibilities for improvement.

**2. BACKGROUND**

- 2.1 At the public inquiry into the bypass in 1995 a scheme was agreed between the Highways Agency (HA) and the County Council to ensure that the queues on the slip roads of junction 9 were no greater after the opening of the bypass than were experienced before. It was also anticipated that some traffic might transfer from the B197 through Graveley to the A1(M). The scheme involved the construction of dedicated south facing slip roads to and from the A1(M) within the existing highway/motorway boundary.
- 2.2 Development of the scheme started in late 2002 and continued until September 2005 when the HA gave approval to the scheme. Detail of the development of the scheme is given in Appendix 1.
- 2.3 The southbound slip was constructed over the period Dec 2005 to Apr 2006 as part of the main works. The works on the northbound off slip road started in June 2006 and in order to give safety benefits to the motorway and reduce traffic delays the dedicated slip road was opened as soon as it could be. This was in advance of the traffic signals controlling the vehicles on the circulatory carriageway causing some uncertainty. The signals became operational in December 2006 and with the westbound traffic on the roundabout stopped at the signals, this provided the opportunity for the traffic exiting the dedicated lane to enter Letchworth Gate more easily. In Oct 2007 work was completed on the traffic calming measures through Graveley and in Nov 2007 alterations to the signals at Coreys Mill were undertaken to help reduce queuing particularly on the s/b off slip to the A1(M).
- 2.4 A number of representations were received in the first few months of operation of the dedicated lane regarding the difficulty of seeing rear and side view oncoming traffic when moving towards and onto Letchworth Gate, along with the almost immediate transition into a single carriageway. These comments were considered by the safety

auditors when they carried out the stage 3 (post completion) safety audit in December 2006 and January 2007. The report acknowledged the problem of the difficulty of seeing rear and side view oncoming traffic when moving towards and onto Letchworth Gate even though the design complied with HA standards. It was also noted that there were significant numbers of vehicles using the right turning lanes to enter the roundabout and turn left. These vehicles are difficult to see for drivers in the dedicated lane and impeded the exit for vehicles in that lane. Trial alterations to the layout to improve visibility were recommended.

### **3. REVIEW AND ALTERATIONS**

- 3.1 Following the Stage 3 safety audit report a meeting was held in March 2007 between the designers and safety auditors to discuss the recommendation and review options. Arrangements to install a trial alteration were put in place as well as a video survey to assess driver behaviour before and during the trial. Further evaluation of signal/junction layouts was commissioned.
- 3.2 The trial was undertaken over a two week period in April 2007 using traffic cones to realign the route of drivers using the dedicated lane. Following an evaluation of the trial and a review of other options and consulting with the Hertfordshire police and the HA it was decided to carry out relatively minor alterations. The give way marking would be amended and red anti-skid surfacing placed at the end of the lane on the nearside kerb. The aim was to enable and encourage drivers to approach at a greater angle but allow those who were confident of merging to over-run the red surfacing. The alteration was implemented in the first week of August 2007. A complete report of the trial and options considered is included in Appendix 2.

### **4. STUDY FINDINGS**

#### ***Northbound Off –slip Road***

- 4.1 In October 2002 queues on the northbound off slip road extended back 250 metres in the am peak and as far as the main carriageway (500m) in the pm peak. In 2004 these had extended to 750 metres and in 2006 following the opening of the bypass the queues extended back some 1000 metres. During traffic counts in March 2008 it was observed that the two lanes at the signal onto the roundabout generally cleared on each green phase whilst on the dedicated lane queues extended at times to 12 vehicles but averaged around 6 vehicles .
- 4.2 From the Before and After traffic report on the bypass flows northbound on the B197 through Graveley in the pm peak have reduced by around 200 vehicles. There are also reductions in the southbound direction. These vehicles have transferred to the A1(M) and this can be attributed to the reduction in delay at junction 9. Following the Graveley traffic calming and the retiming of the traffic signals at Coreys Mill Stevenage, traffic counts show further reduction of flow on the B197 through Graveley with vehicles again transferring to the A1(M).
- 4.3 In Oct 2002 the number of vehicles accessing Letchworth Gate from the A1(M) northbound off slip road during the am and pm peak hour was 700 and 770 respectively and similar figures were observed at the start of 2007. In March 2008 the

number of vehicles was recorded as 950 and 940 respectively. It is estimated that some 55% of traffic on the northbound off slip turns left into Letchworth Gate. During the am peak 314 vehicles are turning left from the right turn lanes with 93 vehicles in the pm peak. It was noted that with the short queues it is sometimes quicker to turn left from here than use the dedicated left turn lane.

- 4.4 A Stage 4 Road Safety Audit shows that in the 3 years prior to the improvement there were 24 accidents on the northbound off slip road at or near its junction with the A505(A6141) Letchworth Gate roundabout. In the 12 months after 3 accidents occurred. One of the 3 accidents could be directly attributable to the new segregated slip lane. The audit recommends that a 36 month Stage 4 Road Safety Audit should be completed at this site to assess if the A1(M) northbound off slip road is in need of any further remedial measures to enable drivers to safely negotiate the measures already implemented.

#### ***Southbound On-slip Road***

- 4.5 Prior to the bypass construction queues on the A6141 approach from Baldock to junction 9 of the A1(M) extended back some 200m during the am and pm peaks. During the construction of the bypass queue lengths varied considerably as work interfered with traffic flow sometimes reducing the available carriageway to one lane. The southbound dedicated slip road has reduced the queue approaching the circulatory carriageway of the roundabout to 10 vehicles with free flow on the dedicated lane. A Stage 4 Road Safety Audit shows that a total of 4 accidents occurred in the 3 year before period and no accidents in the 12 months after study period.

#### ***General Appraisal***

- 4.6 The primary objectives of the scheme have been met and it has in many respects proved successful. The queues on the northbound off slip road from the A1(M) which at peak hours extended back for some 500m onto the motorway and created very dangerous conditions with vehicles travelling at high speed have been eradicated. Delays of 10-15 minutes were commonplace and are now only 1-2 minutes at most. Traffic on the A505 from Baldock now flows more freely reducing queues approaching junction 9 and access to the A1(M) southbound via the southbound dedicated slip lane has been improved. Traffic flows through Graveley have reduced in both directions throughout the day.
- 4.7 The minor alterations to the exit of the dedicated lane on the northbound off slip road have improved the situation overall with most drivers approaching the give way at a greater angle but allowing those confident of merging to over-run the red surfacing. However some drivers are continuing to experience problems exiting the dedicated lane and the situation is not helped by those drivers who choose to turn left from the signalled right turn lanes, either to avoid the give way or to jump any queue that develops on the dedicated lane. This action not only brings uncertainty and hesitation by drivers exiting the dedicated lane but also leads to the development of queues in the dedicated slip lane. From the options given in Appendix 2 the imposition of a left turn ban from the right turning lanes is being pursued. This measure has been requested by both members and the public, and the necessary statutory orders were being prepared. However the regulations require that the measure has the support of the Highways

Agency and to date this has not been forthcoming. Options involving further signalisation are not recommended both on operational and safety grounds and that queuing back down the slip road will increase. It is likely that on this latter ground that the HA would object to any alteration to the signal arrangement.

## **5. LETCHWORTH GATE IMPROVEMENT**

### ***General***

- 5.1 Congestion along Letchworth Gate during the peak hours has been put forward as a reason for increased traffic through parts of Baldock town centre following the opening of the bypass. Alterations to improve capacity ranging from widening junctions to full dualling could help relieve any problem. A solution to the layout of the dedicated lane at Junction 9 would be to dual Letchworth Gate and bring the slip lane in on a long merge, or directly onto one of 2 lanes westbound.
- 5.2 A brief study of traffic patterns and conditions occurring along Letchworth Gate and a range of improvements together with the possible effects of such improvements has been undertaken and is summarised below.

### **Traffic conditions**

- 5.3 Letchworth Gate is a single carriageway 9 metres wide but narrowed to 7.3 metres by centre hatching and a centre island. Counts in October 2007 show the road carrying over 26,000 vehicles/day, around 2300 vehicles in the peak hours. If considered a rural road the recommended upper level of traffic for a road of this standard is between 13,000 and 21,000 vehicles/day. If treated as an urban road the maximum peak hour flow is recommended as 2600 vehicles /hour. The actual situation lies somewhere between and it is considered that the road is operating around its maximum capacity.
- 5.4 The Baldock bypass Before and After traffic report found that post bypass opening, traffic levels decreased on Letchworth gate by an average 3%, with a greater reduction being measured at peak times. This was attributed to traffic previously seeking other routes between Letchworth and Baldock to avoid congestion on the old A505 may now find it easier to travel on the B656 between the towns. The October 2007 counts show a return to pre bypass levels.
- 5.5 Journey times taken between the St Paul's roundabout in Letchworth and the Firs interchange east of Baldock show that in the pm peak it is on average around 2 minutes slower to travel by the B656 than the new A505. Journey times taken between St Paul's roundabout and junction 10 of the A1(M) show that it is on average around 1.5 minutes slower via the B656 and A507 than the A505 Letchworth Gate and A1(M). Time taken on a journey will be only one factor in choosing a route and where the time savings are not significant, other factors may determine the choice. Queue lengths approaching junction 9 along Letchworth Gate in the pm peak average 58 vehicles but very slow moving queues are observed extending to 95 vehicles. Turning counts taken at the St Paul's roundabout indicate that traffic travelling north on Letchworth Gate in the am peak splits 13% to Hitchin 39% to Letchworth and 48% to Baldock whilst in the pm peak splits 12% to Hitchin 49% to Letchworth and 39% to Baldock. In the am peak traffic travelling east on A505 Baldock Road splits 33% to A505 Letchworth Gate 2% to

Letchworth and 65% to Baldock whilst in the pm peak splits 30% to A505 Letchworth Gate 1% to Letchworth and 69% to Baldock.

- 5.6 On the evidence of the journey times it there does not appear to be any incentive to use Baldock town centre when travelling between St Paul's roundabout and the Firs interchange or between St Paul's and Junction 10 of the A1(M), the optimum route for both journeys would be made via junction 9 of the A1(M). However the increase in traffic on Hitchin Street post bypass indicates the drivers are finding the route through Baldock more attractive. The turning count information indicates that during the peak hours the predominant traffic movement at St Paul's roundabout is to and from Baldock the strategic route, the A505, taking a secondary role. The forthcoming traffic signal scheme at the junction of the B656 and Weston Way Baldock and the Baldock Town centre works should have the effect of making the route through Baldock less attractive than at present. Improvements to Letchworth Gate in particular on the approach to Junction 9 could increase the usage on this route. Only an origin and destination survey of those using the Baldock Town centre may reveal the reasons behind the increases on Hitchin Street. It would be prudent to await the implementation of the Weston Way, Baldock Town Centre Scheme and associated traffic management before considering whether further investigations is required.

### Improvements

- 5.7 Minor improvements to Letchworth Gate have been considered as follows:
- Installation of additional signals at the dedicated lane. This is covered in paragraph 4.7 and Appendix 2 where a number of alterations were investigated but not recommended either on the grounds that queue lengths increased or additional safety risks were created, in some cases a combination of these problems.
  - *Widening the exit to Letchworth Gate from the dedicated lane.* Extending the merge of the dedicated slip has been put forward by a number of people/organisations. The problem remains that two lanes have to merge into one and there is the possibility of the vehicle in lane two being forced into the oncoming eastbound traffic. There is also the issue of the proximity of Willian Way with vehicles trying to turn left in to Willian Way conflicting with vehicles joining from the dedicated lane. Some 400 vehicles in the am peak and 200 vehicles in the pm peak make this left turn.
  - *Widening the approach to Junction 9 from Letchworth Gate.* There is a 2 lane approach existing albeit short, little would be gained by extending this.
  - *Dedicated (3<sup>rd</sup>) lane from Letchworth Gate to A1(M) north.* This would improve capacity but to be effective would need to be accompanied by the widening the approach to two lanes over some 100-150m. The volume of traffic making the turn from Letchworth Gate to the A1(M) northbound has reduced over the years possibly as a result of congestion. A dedicated lane could improve the attraction of this route. The improvement would require land purchase and the agreement of the HA. It would also require alterations to Baldock Lane.

5.8 Major improvements to Letchworth Gate have been considered as follows:

- *Dualling of Letchworth Gate between Junction 9 and the gyratory.* Providing 2 lanes in each direction over the section of Letchworth Gate between Junction 9 and the gyratory could improve conditions and reduce eastbound journey times. It would allow the widening of the exit of the dedicated slip into lane one as mentioned in para 5.7., although again the close proximity of Willian Way to the exit would make it difficult for traffic to turn left into Willian Way and closure of this road could be necessary. Dualling would also allow increased capacity on the approach to Junction 9 eastbound with the possibility of a dedicated slip lane onto the A1(M) northbound although this would involve additional land and awkward earthworks. Otherwise the dualling would not require land outside the existing highway boundary but the Letchworth Garden City Heritage Foundation may have an element of control over the roadside verge effects.
- *Dualling of Letchworth Gate between the gyratory and St Paul's roundabout.* There is little evidence of congestion causing delays along this stretch of road. However if the adjacent section is dualled the release from constraint of traffic travelling from Junction 9 through towards Letchworth may lead to queuing at St Paul's. There is also the issue of two lanes of traffic on the gyratory trying to access to a single lane towards St Paul's roundabout.

### **Route Hierarchy**

5.9 There are implications for the road network should an improvement to Letchworth Gate be implemented as this could induce further traffic onto the A505 Hitchin to Letchworth corridor. The A505 from Royston to the A1(M) is classified as a County Primary route. The A505 to the west of the A1(M) is an "A" road whilst the A602 from junction 8 to the west (Hitchin) is a County Primary route and the strategic east west route would be A505/A1(M)/A602. Should the A505 Letchworth Gate be improved to dual carriageway the case could be made to improve the remainder of the A505 to Hitchin and upgrade this to County Primary route status.. Thus the strategic implications would need to be considered alongside a review of the relative hierarchy of the routes between the Baldock Bypass and A505 west of Hitchin. The Hertfordshire Infrastructure Implementation Strategy Study is the appropriate vehicle to consider this.

## **6. LEGAL IMPLICATIONS**

6.1 The implementation of a left turn ban at the top of the northbound off slip road would require a Traffic Regulation Order.

6.2 Any dualling or substantial improvement at Letchworth Gate could require planning permission and /or compulsory purchase orders together with side road and traffic regulation orders.

## **7. FINANCIAL AND HUMAN RESOURCE IMPLICATIONS**

- 7.1 Any minor works in the short term can be funded from the bypass budget.
- 7.2 Any long term major improvement would need to be prioritised for funding against other major schemes within the county and then accepted by the Eastern Region for funding within the Regional Funding Allocation.

## **8. CONSULTATION WITH EXTERNAL ORGANISATIONS AND WARD MEMBERS**

- 8.1 Details of the design alterations will be provided to the North Hertfordshire District Council and Letchworth Garden City Heritage Foundation.

## **9. RECOMMENDATIONS**

- 9.1 That the Panel notes the update information.

## **10. REASONS FOR RECOMMENDATIONS**

- 10.1 To assist the District Manager in providing information.

## **11. CONTACT OFFICERS**

- 11.1 Barry Anderson, Team Leader, Hertfordshire Highways.

## **12. BACKGROUND PAPERS**

- 12.1 Minutes of meeting dated March 07.
- 12.2 Baldock bypass Before and After Study
- 12.3 Letchworth Gate Interchange Capacity report 1994 HCC
- 12.4 Letchworth Gate Junction 9 Review 2003 URS/Carillion for HA
- 12.5 Letchworth Gate Junction 9 Assessment 2005 MP for HCC
- 12.6 Highways Agency DRMB Advice junction design
- 12.7 Stage 4 Safety Audit
- 12.8 Letchworth Gate Improvement Traffic and Technical Detail

### **13. APPENDICES**

Appendix 1 Background to Design Development

Appendix 2 Review, Trial, and Alterations

Appendix 3 Scheme Plan

## APPENDIX 1

### A1(M) JUNCTION 9 LETCHWORTH GATE IMPROVEMENT BACKGROUND TO DESIGN DEVELOPMENT

- 1.1 The requirement of the Highways Agency (HA) for the Letchworth Gate improvements, made at the 1995 public inquiry, was to ensure that queuing on the northbound off slip road of the A1(M) did not increase as a result of the extra bypass traffic. A layout for the interchange agreed by the two highway authorities was put forward and recommended by the inspector. The principle of further grade separation was ruled out.
- 11.2 Following the approval given in 2002 to construct the Baldock bypass, the HA's consultants reviewed the original design in light of current highway design standards and traffic conditions. Traffic flows had increased in the years since the inquiry and peak hour queues stretched some 500 metres back onto the motorway resulting in delays of up to 15 minutes and creating injury accidents. Of the 54 injury accidents in 5 years at the whole Letchworth Gate junction and its approaches, 19 were at the top of the northbound off slip road. The reviews considered various layouts including partial and full signalisation and the conclusions were:
- The 1995 design would not meet current design standards.
  - Alterations to improve congestion could not be carried out within the existing boundaries.
  - A solution could not be found to meet all capacity, operational and safety objectives without the dualling of Letchworth Gate or further grade separation at the interchange – for which there were no statutory powers or funding.

As there could not be an ideal solution, primary objectives were set to improve the layout to cure the pre-existing slip road safety and queuing problems and to accommodate the extra bypass traffic. In 2004 the scheme was passed over to HCC to investigate further.

- 1.3 HCC's consultant, Mouchel, recommended an option using dedicated lanes to new standards published in late 2003 set out by the Highways Agency (HA) but with signals controlling the northbound off slip road. It concluded that this was the only layout that would reduce significantly the queues occurring and those predicted following the opening of the bypass, as required by the HA, without major alterations to the interchange and Letchworth Gate. The design was based on traffic using the dedicated lane having free access to Letchworth Gate except during the green signal phase on the westbound arm of the roundabout. Safety audits were carried out in conjunction with representatives of the HA and the police and the recommendations implemented. It should be noted that the design originally had a taper merge into Letchworth Gate and this was changed to the

current give way layout as a result of safety audit recommendations. The scheme was finally given approval by the HA in September 2005.

## APPENDIX 2

### A1(M) JUNCTION 9 LETCHWORTH GATE IMPROVEMENT REVIEW, TRIAL LAYOUT, AND ALTERATIONS TO NORTHBOUND DEDICATED LANE

- 2.1 The trial alterations to the layout to improve visibility were undertaken over a two week period in April 2007 using traffic management to realign the route of drivers using the dedicated lane. Video recording of the operation of the junction before and during the trial was taken (and this was augmented by observations by safety engineers.
- 2.2 The video survey revealed that before the temporary layout was in place there was very little queuing even in the peak hour on the dedicated lane, as drivers were able to merge relatively freely into the traffic flow although some uncertainty remained. This was considered an improvement on the situation observed during the safety audit 12 weeks earlier when greater uncertainty on the part of some drivers caused more disruption to flow. Visual monitoring of the trial was carried out by a safety engineer over several days, and his findings indicated that there was substantial queuing at various times of the day on the slip road, sometimes stretching back beyond the first ADS sign (in excess of 250 metres). Prior to the trial, 2 seconds were added to the red light time at the traffic signals for lanes 2 & 3, to deter vehicles turning left from lane 2. However it was observed that there was an increase in vehicles turning left from lane two during the trial period. This was assumed to have been due to the length of queues on the dedicated lane. Using the video recording it was evident that with the temporary layout the majority of drivers paused at the 'give way' line as the temporary layout positioned their vehicles more at a right angle to the traffic flow. Some drivers tried to negotiate the give way without pausing but were inhibited by the deflection imposed by the cones. A number of comments from drivers were made to the effect that they were changing from using their wing mirrors to looking to the right. The substantial queuing observed at various times of the day was considered mostly due to drivers pausing at the give way although the presence of the signs and traffic cones will have contributed and there was concern that the queuing could lead to rear end shunts on the dedicated lane.
- 2.3 The response from drivers using the junction during the trial was mixed. Those that found the slip road difficult to use responded positively to the alteration of the approach angle saying that they were better able to see traffic on the circulatory traffic. Others preferred the unaltered layout saying they were able to better judge the gaps using wing mirrors without having to pause or stop at the give way. It should be noted that there have been no reportable accidents on the slip road since it opened in November 2006 and none occurred during the trial. Several damage only accidents have been logged during November 2006 to March 2007.
- 2.4 As response to the trial had been mixed and from observation concerns regarding queuing and safety had been raised, a review of all options was carried out.
- 1) Investigate a traffic signal layout for signal control of the dedicated slip lane, with secondary signals on the exit from that lane into Letchworth Gate. This would prevent left turns from the right turning lane. Also investigate closing the

dedicated lane leaving a 2 lane or a 3 lane signalised approach to the roundabout.

- 2) Extend the left turning lane towards Letchworth.
- 3) Dual Letchworth Gate. This option was looked at several years ago and discounted on the grounds of possible objections from Letchworth Heritage, and costs of approximately £4million.
- 4) Provision of a second grade separation, taking right turners direct to the Baldock Bypass (similar to Stansted Airport) this was ruled out at the 1995 Public Inquiry.
- 5) Provide a left turn ban - 'No left turn' at the traffic signals for lane 2 (difficult to enforce).
- 6) Apply red anti-skid material to an area at the end of the current layout, which would tend to deflect vehicles towards a 90° angle at the 'Give Way' line.
- 7) Carry out permanent alterations to the line and angle of approach as per the 'trial layout', altering existing hatching, lining and anti-skid material
- 8) Do nothing.

- 2.5 Option 1 was evaluated using traffic data from the trial. The modelling showed that any variations to the current signal layout would increase queue lengths on the circulatory carriageway of the roundabout blocking the exit to the A1(M) south. Queues for left turning traffic into Letchworth Gate extended back down towards the motorway to varying degrees with the possibility of rear end shunts. Adjusting the green times to avoid the circulatory queues blocking the southbound on slip road would further increase queues on the northbound off slip road and with anticipated growth the situation would continue to deteriorate. Having a signalised three lane approach at the roundabout would again produce queues back on the slip road but would allow drivers to turn left from the centre lane. With only the circulatory and right turning traffic controlled by signals under the current layout there is reserve capacity allowing for further growth on these movements although some queuing might develop on the left turn dedicated lane. Closing the dedicated lane would result in queues back onto the motorway. It should be noted that around 55% of the traffic leaving the A1(M) northbound turns left into Letchworth Gate.
- 2.6 Option 2 was again ruled out on safety grounds due to the possibility of head on collisions as vehicles merge to one lane.
- 2.7 Options 3 & 4 were ruled out on cost and time basis, although with Letchworth Gate considered to be operating at capacity an additional lane into Letchworth may need to be considered in the mid term.
- 2.8 Option 5 was considered as a possibility and can be implemented independently from the other options. It may deter some drivers and indicate to the drivers the problems they cause by turning left across the exit of the dedicated lane. The Hertfordshire police have indicated they would not object to the implementation of the ban but would not support it due to the difficulty of tracking and prosecuting drivers. Without enforcement the ban will only have a limited effect

- 2.9 Option 6 was put forward as a low cost minimal alteration solution. The give way marking would be amended and red anti-skid surfacing placed at the end of the lane on the nearside kerb. The aim would be to enable and encourage drivers to approach at a greater angle but allow those who are confident of merging to over-run the red surfacing. The cost is estimated at £6,000 and would involve disruption over 3-4 days.
- 2.10 Option 7 would implement the layout used in the trial but is almost certain to result in much longer queues. The work required would involve laying new antiskid material over half the length of the dedicated lane together with new lane and give way markings. This is estimated to cost £30,000 and would involve some disruption over 10-15 days.
- 2.11 The consensus from the reviewing group including safety engineers responsible for the audits was that minimal alterations should be undertaken bearing in mind the improvement in operation of the junction since its implementation and in the knowledge that no injury accidents had been reported in that time. Option 6 was considered the most appropriate alteration to try to assist all users of the junction.

**APPENDIX 3**  
**A1(M) JUNCTION LAYOUT**