# CD86

# Road Safety Audits

## Public Inquiry in respect of the Lincoln Eastern Bypass and the following Orders and Application

**1. The Lincolnshire County Council (A15 Lincoln Eastern Bypass) (Classified Road) (Side Roads) Order 2014.**

**2. The Lincolnshire County Council (A15 Lincoln Eastern Bypass) Compulsory Purchase Order 2014.**

**3. Application In Relation To Proposed Compulsory Purchase Of Land Held By The Canal & River Trust.**

Department for Transport Reference: NATTRAN/EM/LAO/0084

July 2015

# Contents

# 1 Stage I RSA - LEB Single Carriageway Scheme

The Lincolnshire Road Safety Partnership
Witham House
The Pelham Centre
Canwick Road
Lincoln
LN5 8HE
Tel 01522 805800
Fax 01522 805803

Beacon Authority 2006-2007 Road Safety

Staying Alive !

Lincolnshire Road Safety Partnership

"Working Together to Make the Roads of Lincolnshire Safer for All"

## SAFETY AUDIT REPORT GRADE A

## STAGE 1 – PRELIMINARY DESIGN

## LINCOLN EASTERN BYPASS-SINGLE CARRIAGEWAY

**SAFETY AUDIT REPORT**

Date: - 27th November 2012
Scheme Code: - HR/ADB/5001
Scheme Name: - Lincoln Eastern Bypass Single Carriageway
Audit Brief Submitted: - By Lee Rowley
Safety Audit Team Leader: - Mel Hewson
Safety Audit Team Member: - Paul Stewart
Safety Audit Adviser: - PC Paul Whetstone

**Departure from Standards**

Wragby Road to Greetwell Road:

No departures or relaxations in geometrical standards have been identified on the main carriageway. However the left turn in/out at the Hawthorn Road junction vertical alignment is 3 design steps below the desirable minimum for a design speed of 100kph. Also the crest curve from chainage 740m to 990m is just above the desirable minimum k value for a design speed of 120kph. This means that it is between full overtaking values for the single carriageway. This is a value that is not recommended in TD9/93 as it does not restrict forward visibility to a level that is clearly less than half the full overtaking site distance. The horizontal curvature over this section is to be designed to make it clear to drivers that overtaking is not appropriate. The use of hazard ladder markings on the curve will further reinforce this. The cross-falls of the straight sections of carriageway have been designed for the future dual carriageway rather than having a crown on the centre line with falls to either channel.

Greetwell to Washingborough Road:

No geometric departure from standards or relaxations have been identified. However the vertical alignment has been designed with desirable minimum crest curves and these are not recommended for single carriageway layouts. This has been done to minimise the adverse effect on a future dual carriageway that would otherwise occur should the advice in TD9/93 to use less than desirable minimum curves be followed.

## 1 INTRODUCTION.

The audit was carried out on the 19th November 2012 at 14:00pm.
The weather was overcast and the carriageway was dry.
As the bypass is to be built over fields there was no traffic to observe, there is only the traffic data detail supplied by the project manager.
No night time audits have been carried out.

The scheme comprises of the proposal to build a 7.5km long bypass along the eastern side of Lincoln City. This will link the north of Lincoln A158 at Wragby Road to the south of Lincoln at A15 Sleaford Road. The new road will have a design speed of 100kph and a separate 3m wide combined cycle and pedestrian right of way (located on the western side of the carriageway) provided along the full length of the scheme to link up with existing public rights of way.

The scheme will comprise of the following elements (north to south starting from Wragby Road Roundabout)

1.1 Wragby Road Roundabout to Greetwell Road (0-1,500m, Drawing Ref B/1030171/100/023)

a) Wragby Road Roundabout: From the A158 Wragby Road the single carriageway layout follows the horizontal alignment of the northbound side of the A158 which allows the Lincoln Eastern Bypass (LEB) to tie into the existing roundabout as a fourth arm. The diameter of the existing roundabout remains unaltered.
b) Hawthorn Road junction: The western side (residential side) of Hawthorn Road will be stopped up and a turning head provided. A left in left out only priority junction on the eastern side with the LEB will be added and a segregation island included to block right turns.
c) The existing footpath located to the north of Hawthorn Road will be stopped up and access provided to the LEB NMU route in the western side of the LEB.
d) Greetwell Road footbridge: A footbridge on the north side of the Greetwell Road roundabout over the LEB will provide access to the LEB Non-Motorised User (NMU) route and maintain the current NMU provision along Greetwell Road.

1.2 Greetwell Road Roundabout to Washingborough Road Roundabout (1,500m – 3,000m, Drawing Ref B/1030171/100/024)

a) Greetwell Road Roundabout: A new four arm roundabout will provide a link from the LEB to Greetwell Road.
b) Lincoln to Market Rasen Railway Underbridge: The structure will carry the LEB over the Lincoln to Market Rasen railway line and the Viking Way. A link will be provided to the Viking Way from the LEB NMU route.
c) Northbound overtaking lane provided between the River Witham Bridge and Greetwell Road Roundabout.
d) River Witham Underbridge: The River Witham Underbridge is the largest structure on the scheme and will cross the River Witham floodplain on an embankment, with a bridge travelling over the North Delph , River Witham and South Delph.
e) Lincoln to Spalding Railway Overbridge: To the south of the river the bypass will cross under the Lincoln to Spalding railway line.
f) South Delph Footbridge: The footbridge will cross the South Delph watercourse away from the northbound carriageway and provide access to the existing Sustrans cycleway/footway facility that runs parallel to the rover Witham.

1.3 Washingborough Road Roundabout to 1500m south of Heighington Overbridge (3000m-4500m, Drawing Ref B/1030171/100/025)

a) Washingborough Road Roundabout: The LEB joins the B1190 Washingborough Road at a new four arm roundabout.
b) A climbing lane has been provided on the southbound exit from Washingborough Road roundabout with an 8% gradient.
c) Heighington Road Overbridge: The LEB will pass under the Heighington Road through a new overbridge, with only NMU access to Heighington Road.

1.4 4500m-6000m (Drawing Ref B1030171/100/026)

a) Lincoln Road Roundabout: A new four arm roundabout will be constructed where the LEB crosses the B1188 Lincoln Road.
b) Lincoln Road Subway: An underpass is proposed for NMU to cross the LEB at Lincoln Road.

1.5 6000m-7500m (Drawing Ref B/1030171/100/027)

a) Bloxholm Lane Footbridge: A new footbridge will be provided over the LEB at Bloxholm Lane.
b) Sleaford Road Roundabout: A new four arm roundabout will be constructed to join the LEB with the A15 Sleaford Road and the realigned Bloxholm Lane.

## 2 ADDITIONAL INFORMATION AND SCHEME BACKGROUND

The Lincoln Eastern Bypass design has been developed in some detail and a previous Road Safety Audits have been carried out on a dual carriageway design :-

4th December 2003 – Feasibility.
9th February 2005 – Feasibility – alternative vertical alignment details.
15th February 2005 – Feasibility – revisions to drainage, ecology, cycleway/footways and lay-by provision.
22nd April 2009 – Stage 1 Preliminary Design.

Due to funding issues the new proposal is for a single carriageway road, but the road is to be built to allow for it to be upgraded if the funds become available. The future proofing design elements are as follows:

a) Greetwell Road Roundabout, Washingborough Road Roundabout, Lincoln Road Roundabout and Sleaford Road Roundabout are all larger than required for a standard single carriageway design to allow for the carriageway to be widened with minimum disruption if required in the future.
b) The western leg of Greetwell Road Roundabout will have provision for the future dualling of Greetwell Road to accommodate development in the area.
c) Greetwell Road Footbridge: It is proposed to build the footbridge as a dual carriageway width structure to allow for any future widening of the LEB to be accommodated without having to rebuild the footbridge.
d) Lincoln to Market Rasen Railway Underbridge: The underbridge design contains a wider northbound verge that will allow for the longer sightline for future widening of the LEB albeit with a departure from current standards.
e) Heighington Road Overbridge: The bridge has been designed to accommodate a widened LEB carriageway.
f) Lincoln to Spalding Railway Overbridge: The overbridge design contains a two span box structure to allow for any future widening of the LEB.
g) Bloxholm Lane Footbridge: It is proposed to build the footbridge as a dual carriageway width structure to allow for future widening of the LEB.

h) The Lincoln Road Subway: It is proposed to build the subway as a dual carriageway width structure to accommodate any future widening of the carriageway.
i) The drainage (including catchment ponds) have been designed to allow for future widening of the carriageway.
j) The carriageway cross-falls are traditionally designed to have a 'crown' in the middle i.e. each lane falls away from the centre line. In this case the carriageway is designed to fall to the outside edge of the road.
k) The large cutting south of Washingborough Road Roundabout has been designed so that future widening can be completed within the proposed land take.

## 3 MATTERS OUTSTANDING FROM PREVIOUS SAFETY AUDITS

As mentioned in Item 2 there have been previous audits but these were all for a dual carriageway design. Therefore as this is a completely new design the previous audits will not be part of this audit process.

## 4 MATTERS ARISING FROM THIS STAGE 1 (PRELIMINARY DESIGN) ROAD SAFETY AUDIT

### 4.1 PROBLEM

**Location**

All roundabouts along the proposed Lincoln Eastern Bypass.

**Summary of safety problem**

Conflicts between pedestrians/cyclists and vehicles within the live carriageway.

**Specific problem identified**

The plans do not show if there are any refuge islands at the roundabouts for pedestrians/cyclists to use when crossing the main and side roads. As the main road of the bypass will be heavily trafficked, there needs to be a safe harbour half way across the roads to allow NMU's to cross in two stages. If they do not have this facility they may have to hurry across the road when there is an insufficient gap both ways. This may lead to conflicts between them and vehicles within the live carriageway.

**Recommendation**

Ensure there are refuges in place large enough for pedestrians and cyclists to harbour in when crossing at the roundabouts.

### 4.2 PROBLEM

**Location**

North bound approach lane to Washingborough Road Roundabout.

**Summary of safety problem**

Risk of late braking and shunt type accidents.

**Specific problem identified**

The northbound approach to Washingborough Road Roundabout is on a steep downhill gradient, this means the approach speeds will be much higher than if the road was on a level surface. There is history of problems with shunt type accidents on the approaches to the existing western bypass roundabouts, and the carriageway is on a level surface. Therefore the problem may only be exacerbated and increase in the severity of accidents on the new bypass due to the downhill approach and the higher speeds.

**Recommendation**

Ensure the surfacing on the approach to the roundabout is of the highest PSV value and highest skid resistance available, and the roundabout is signed well in advance.

**4.3 PROBLEM**

**Location**

Hawthorn Road entry/exit onto the new bypass.

**Summary of safety problem**

Risk of shunt type and side shunt collisions.

**Specific problem identified**

Hawthorn Road has a relatively high traffic flow rate due to a School being located along it and villages to the east of Lincoln. There will be an increase in traffic using this road especially during school starting and leaving times. Due to the proposed location of Hawthorn Road to enter and exit the bypass, the audit team are concerned that vehicles exiting the A158 roundabout onto the new bypass will be accelerating towards this junction, if a vehicle in front was slowing to turn left onto Hawthorn Road the vehicle behind may not be able to slow in time and shunt type collisions may occur. The audit request states that the junction at this location is 3 design steps below the desirable minimum for this type of road. As the junction is not designed to the requirements there is a risk of conflicts between these vehicles and those having to slow down to exit onto Hawthorn Road. Vehicles may also be queuing along the exit of Hawthorn Road during peak times waiting to enter onto the bypass, this may lead to drivers becoming impatient and pulling out when it is not safe to do so. This may also lead to late braking and side shunt type collisions.

**Recommendation**

Because Hawthorn Road is a local tributary road that has a relatively high traffic flow for this type of road and also links the villages to the east of Lincoln to the city. The audit team feel it would be safer to have its own arm on the A158 roundabout.

**4.4 PROBLEM**

**Location**

Whole length of the proposed Lincoln Eastern Bypass.

**Summary of safety problem**

Risk of collisions between opposing flows of traffic.

**Specific problem identified**

To allow for possible future developments the bypass has been designed with a cross fall and not a crown. The audit team are concerned that if a driver was to suffer fatigue, illness or lose their attention, there is a risk of their vehicle being pulled to the offside and crossing into the opposing lane towards oncoming traffic. This may lead to head on collisions and a much higher severity of injury, than if they veered towards the nearside. Also if the cross fall carriageway profile was to be used there is an increase in standing water and ponding occurring on the main carriageway due to all the carriageways water draining to one side. If the drainage becomes blocked in cold weather conditions any standing water may freeze and become a skidding hazard.

**Recommendation**

The audit team recommend the crowned road profile carriageway design be used instead.

**4.5 PROBLEM**

**Location**

Whole length of the cycleway/footway along the proposed Lincoln Eastern Bypass.

**Summary of problem**

Risk of pedestrians/cyclists feeling unsafe and may walk/cycle along the bypass instead.

**Specific problem identified**

The location of the new cycleway/footway at the bottom of the embankment out the way of view of the traffic may make its users feel vulnerable. This may lead to them walking/cycling along the edge of the carriageway where they may perceive it to be safer and make them feel less vulnerable. This may lead to them being at risk of conflicts with vehicles using the bypass that may not see them, especially during the hours of darkness.

**Recommendation**

Look at relocating the cycleway/footway alongside the bypass at the top of the embankment where its users will be visible to vehicles using the bypass. This will make them less vulnerable, feel safer and less likely to walk/cycle along the bypass itself.

**4.6 PROBLEM**

**Location**

Whole length of the proposed Lincoln Eastern Bypass.

**Summary of safety problem**

Risk of shunt type collisions.

**Specific problem identified**

The new bypass has not been designed with any lay-bys along its length. There may be a risk of drivers who wish to stop for a rest, check their vehicle if there is a problem, or use their mobile phones stopping on the main carriageway. This may lead to vehicles following who will not be expecting them to stop having to brake suddenly. This in turn may lead to shunt type accidents.

**Recommendation**

Consideration should be given to providing lay-bys at least in accordance with the recommended frequency specified within design standards for the improved length of road and its adjoining sections.

**4.7 PROBLEM**

**Location**

All new roundabouts along the proposed Lincoln Eastern Bypass.

**Summary of safety problem**

Risk of loss of control type accidents and conflicts on the roundabouts.

**Specific problem identified**

The new roundabouts are to be built as though they are on a dual carriageway, much larger than needed. There may be a risk of vehicles approaching the roundabouts having too much forward visibility, and not slowing down sufficiently to safely negotiate the roundabout. This may lead to them losing control on the circulatory of the roundabout and causing a collision. Also if vehicles can see a long distance back to the right when approaching the roundabout, they may perceive it still to be clear to the right when reaching the roundabout, this may lead to late braking if vehicles suddenly realise when they are at the roundabout there is a vehicle approaching from the right. This may lead to shunt type accidents.

**Recommendation**

Ensure the visibility on the approaches to/and at the roundabout are such that vehicles have to sufficiently slow down as they approach them to safely negotiate the roundabout or give way to vehicles to their right travelling around the roundabout.

**4.8 PROBLEM**

**Location**

Minor roads linking the A15 to the A46 especially the B1178 and C103.

**Summary of safety problem**

Increase in traffic along existing more minor roads leading to increase in conflicts between local and through traffic.

**Specific problem identified**

As the proposed bypass will not fully encircle the city of Lincoln a high percentage of vehicles travelling from the south west along the A46 wishing to get to the east side of Lincoln may cut across to the A15. This means that lower class and minor roads such as the B1178 and C103 may be more frequently used. As these roads go through small villages the increase in traffic at these locations may increase the number of conflicts, and in turn increase the risk of collisions.

**Recommendation**

Although nothing can be done to prevent road users from using this route, improvement in the signing directing vehicles to more appropriate routes at the southern end of the bypass. Also look at road improvements along the minor routes to cater for these extra vehicles.

## 5 AUDIT TEAM STATEMENT

I certify that this audit has been carried out in accordance with HD 19/03. Examined the drawings and documents listed in Appendix A of this report. The examination has been carried out with the sole purpose of identifying any features that could be removed or modified in order to improve the safety of the scheme. The problems identified have been noted in this report together with associated safety improvement recommendations. No member on the Audit Team has been involved with the scheme design.

**AUDIT TEAM LEADER:**

Name: Melanie Hewson AMIHIE EngTech
Position: Senior Engineer (Accident Investigation and Prevention)
Organisation: Lincolnshire Road Safety Partnership
Address: Witham House
The Pelham Centre
Canwick Road
Lincoln
LN5 8HE

Signed: Date:

**AUDIT TEAM MEMBER:**

Name: Paul Stewart EngTech TMICE
Position: Engineer (Accident Investigation and Prevention)
Organisation: Lincolnshire Road Safety Partnership
Address: As above

**AUDIT OBSERVERS / SPECIALISTS:**

PC661 Paul Whetstone BSc (Hons) (Traffic Management) Forensic Collision Investigator

**Appendix A**

List of the drawings and other information submitted with the Audit Brief and considered by the Audit Team

1030171-100-023A Plan and Profile Sheet 1 – Main carriageway
1030171-100-024A Plan and Profile Sheet 2 – "As above "
1030171-100-025A Plan and Profile Sheet 3 – "As above "
1030171-100-026A Plan and Profile Sheet 4 – "As above "
1030171-100-027A Plan and Profile Sheet 5 – "As above "

Appendix C
**Audit Response Form**

**From** LEB ROWLEY **PM/DPHO** **To** ALAN AISTROP **Head of Service/ADHT**

**Scheme Name**.....**Lincoln Eastern Bypass**..... **Safety Audit Stage** 1 ~~2~~ ~~3~~

**Date Audit Completed**.....**27 November 2012**.....**Audit Team Leader**.....**Mel Hewson**.....

*where problem or recommendation are not accepted, the Exception Report should be completed and the Head of Service/ADHT will adjudicate

| | | | | Exception Report | |
|---|---|---|---|---|---|
| Audit ref. no. | Description of problem and recommendation | Problem Accepted Yes/No* | Recommendation Accepted Yes/No* | Project Managers/DPHO reason for rejecting Audit problem/recommendation | Head of Service/ADHT decision and required action |
| **4.1** | The plans do not show if there are any refuge islands at the roundabouts for pedestrians/cyclists to use when crossing the main and side roads. As the main road of the bypass will be heavily trafficked, there needs to be a safe harbour half way across the roads to allow NMU's to cross in two stages. If they do not have this facility they may have to hurry across the road when there is an insufficient gap both ways. This may lead to conflicts between them and vehicles within the live carriageway. **Recommendation** - Ensure there are refuges in place large enough for pedestrians and cyclists to harbour in when crossing at the roundabouts | **Yes** | **Yes** | Refuge islands are intended | ✓ Agreed AJA |
| **4.2** | The northbound approach to Washingborough Road Roundabout is on a steep downhill gradient, this means the approach speeds will be much higher than if the road was on a level surface. There is history of problems with shunt type accidents on the approaches to the existing western bypass roundabouts, and the | **Yes** | **Yes** | The design has been further developed and the approach gradient reduced from 8% to 5% slackening to 2% over the last 75m to the roundabout. Surfacing with aggregate of at least 65psv will be specified on the approaches to the roundabout as will signing in accordance with the Traffic Signs Manual. | ✓ Agreed AJA |

| | | | | Exception Report | |
|---|---|---|---|---|---|
| Audit ref. no. | Description of problem and recommendation | Problem Accepted Yes/No* | Recommendation Accepted Yes/No* | Project Managers/DPHO reason for rejecting Audit problem/recommendation | Head of Service/ADHT decision and required action |
| | carriageway is on a level surface. Therefore the problem may only be exacerbated and increase in the severity of accidents on the new bypass due to the downhill approach and the higher speeds.<br>**Recommendation** - Ensure the surfacing on the approach to the roundabout is of the highest PSV value and highest skid resistance available, and the roundabout is signed well in advance | | | | |
| **4.3** | Hawthorn Road has a relatively high traffic flow rate due to a School being located along it and villages to the east of Lincoln. There will be an increase in traffic using this road especially during school starting and leaving times. Due to the proposed location of Hawthorn Road to enter and exit the bypass, the audit team are concerned that vehicles exiting the A158 roundabout onto the new bypass will be accelerating towards this junction, if a vehicle in front was slowing to turn left onto Hawthorn Road the vehicle behind may not be able to slow in time and shunt type collisions may occur. The audit request states that the junction at this location is 3 design steps below the desirable minimum for this type of road. As the junction is not designed to the requirements there is a risk of conflicts between these vehicles and those having to slow down to exit onto Hawthorn Road. Vehicles may also be queuing along the exit of Hawthorn Road during peak times waiting to enter onto the bypass, this may lead to drivers becoming impatient and pulling out when it is not safe to do so. This | **Yes** | **No** | Following the recommendation would require significant improvement to the Wragby Road Roundabout. The heightened risk has been recognised and the junction redesigned to include an auxiliary diverge lane and a merge taper in order to ease traffic movements and reduce the risk of collisions. With respect to vehicles exiting the junction onto the bypass, junction capacity testing has shown that the maximum queue length in peak times is likely to be a maximum of 3 vehicles. The risk of drivers becoming impatient and attempting unsafe merge manoeuvres is therefore considered to be very low. | ✓ Agreed |

| | | | | Exception Report | |
|---|---|---|---|---|---|
| Audit ref. no. | Description of problem and recommendation | Problem Accepted Yes/No* | Recommendation Accepted Yes/No* | Project Managers/DPHO reason for rejecting Audit problem/recommendation | Head of Service/ADHT decision and required action |
| | may also lead to late braking and side shunt type collisions.<br>**Recommendation** - Because Hawthorn Road is a local tributary road that has a relatively high traffic flow for this type of road and also links the villages to the east of Lincoln to the city. The audit team feel it would be safer to have its own arm on the A158 roundabout | | | | |
| **4.4** | To allow for possible future developments the bypass has been designed with a cross fall and not a crown. The audit team are concerned that if a driver was to suffer fatigue, illness or lose their attention, there is a risk of their vehicle being pulled to the offside and crossing into the opposing lane towards oncoming traffic. This may lead to head on collisions and a much higher severity of injury, than if they veered towards the nearside. Also if the cross fall carriageway profile was to be used there is an increase in standing water and ponding occurring on the main carriageway due to all the carriageways water draining to one side. If the drainage becomes blocked in cold weather conditions any standing water may freeze and become a skidding hazard.<br>**Recommendation -** The audit team recommend the crowned road profile carriageway design be used instead. | **No** | **No** | For around 50% of the bypass the curvature is such that the carriageway needs to be superelevated and the introduction of a crowned profile will be inappropriate. There is no inherent problem with draining water to one side of a 9.3m wide pavement, this would be the case for a dual carriageway and the drainage will be designed to cope with the resultant volume of run off. The recommendation will result in considerable additional cost as water collection and formation drainage will be required on both sides of the carriageway. This will not only increase the capital cost but the additional drainage runs will mean:<br>• Addition maintenance cost year on year,<br>• Operatives carrying out maintenance being exposed to risk of injury for longer periods<br>• Longer maintenance periods leading to greater traffic disruption<br>The straight sections of bypass are relatively short and the scheme as a whole is split up by at grade junctions therefore we consider that there is a low likelihood of drivers loosing attention on the straight sections of carriageway. | ✓ Agreed AJA |
| **4.5** | The location of the new cycleway/footway at the bottom of the embankment out the way of view of the traffic may make its users feel vulnerable. This may lead to them walking/cycling along the edge of the carriageway where they may perceive it to | **No** | **No** | The NMU Provision Technical Note dated March 2009 stated *"Where possible, the principle of the north/south footway/cycleway is to provide a rural, countryside type facility that is segregated from the carriageway edge, where reasonably feasible."* The design presented for audit has around 3200m (44% of the total length of the bypass) of the | ✓ Agreed AJA |

| | | | | Exception Report | |
|---|---|---|---|---|---|
| Audit ref. no. | Description of problem and recommendation | Problem Accepted Yes/No* | Recommendation Accepted Yes/No* | Project Managers/DPHO reason for rejecting Audit problem/recommendation | Head of Service/ADHT decision and required action |
| | be safer and make them feel less vulnerable. This may lead to them being at risk of conflicts with vehicles using the bypass that may not see them, especially during the hours of darkness.<br>**Recommendation -** Look at relocating the cycleway/footway alongside the bypass at the top of the embankment where its users will be visible to vehicles using the bypass. This will make them less vulnerable, feel safer and less likely to walk/cycle along the bypass itself. | | | footway/cycleway adjacent to and at the same level as the main carriageway. Of the 4100m that is separated from the carriageway for around 1550m this separation is merely a shallow embankment allowing NMUs to be clearly visible from the main carriageway. The remainder will provide segregation in accordance with the original stated principle. | |
| **4.6** | The new bypass has not been designed with any lay-bys along its length. There may be a risk of drivers who wish to stop for a rest, check their vehicle if there is a problem, or use their mobile phones stopping on the main carriageway. This may lead to vehicles following who will not be expecting them to stop having to brake suddenly. This in turn may lead to shunt type accidents<br>**Recommendation -** Consideration should be given to providing lay-bys at least in accordance with the recommended frequency specified within design standards for the improved length of road and its adjoining sections. | **No** | **No** | Provision of lay-bys has been considered. On a single carriageway road with traffic flows in excess of 8000 vehicles per day (AADT) TD 69/07 *THE LOCATION AND LAYOUT OF LAY-BYS AND REST AREAS* recommends that lay-bys be provided at intervals between 2.5km and 5km. Travelling south on the existing bypass there is a lay-by approximately 250m north of the Wragby Road. (Incidentally this position does not comply with TD 69/07 as it is within 3.75xdesign speed from the Wragby Road roundabout.) Working on the recommended interval the first lay-by on the LEB should be located between chainage 2250 to 4750. However there are a number of factors that preclude the provision of a lay-by:<br>• Inside of a curve<br>• River Witham Viaduct<br>• Lincoln to Spalding Rail Bridge<br>• Washingborough Road Roundabout<br>• Deep cutting south of Washingborough Road<br>• Climbing lane<br>• Proximity of Lincoln Road Roundabout<br><br>The first suitable location for a southbound lay-by would be between the Lincoln Road and Sleaford Road roundabouts (remote from junctions and on lengths of carriageway benefiting from at least desirable minimum stopping sight | ✓ Agreed |

| | | | | Exception Report | |
|---|---|---|---|---|---|
| Audit ref. no. | Description of problem and recommendation | Problem Accepted Yes/No* | Recommendation Accepted Yes/No* | Project Managers/DPHO reason for rejecting Audit problem/recommendation | Head of Service/ADHT decision and required action |
| | | | | distance). Similarly on the northbound the only suitable location would be between Sleaford Road and Lincoln Road. However. such locations would reduce the length of carriageway suitable for overtaking and thereby increasing the risk of serious collisions resulting from conflict between vehicles making inappropriate overtaking manoeuvres and those using the lay-bys. | |
| **4.7** | The new roundabouts are to be built as though they are on a dual carriageway, much larger than needed. There may be a risk of vehicles approaching the roundabouts having too much forward visibility, and not slowing down sufficiently to safely negotiate the roundabout. This may lead to them losing control on the circulatory of the roundabout and causing a collision. Also if vehicles can see a long distance back to the right when approaching the roundabout, they may perceive it still to be clear to the right when reaching the roundabout, this may lead to late braking if vehicles suddenly realise when they are at the roundabout there is a vehicle approaching from the right. This may lead to shunt type accidents.<br>**Recommendation**<br>Ensure the visibility on the approaches to/and at the roundabout are such that vehicles have to sufficiently slow down as they approach them to safely negotiate the roundabout or give way to vehicles to their right travelling around the roundabout. | **No** | **No** | The size of the roundabouts will have no influence on the level of visibility on the approaches to them. With any roundabout there is an inherent risk that drivers will not slow their vehicles sufficiently for them to maintain control on the circulatory carriageway, reducing the size of the roundabout will not reduce this risk. | ✓ Agreed |
| **4.8** | As the proposed bypass will not fully encircle the city of Lincoln a high percentage of vehicles travelling from the south west along the A46 wishing to get to | **In part** | **In part** | A review of signing on the wider network will be undertaken as part of the detail design with the aim of providing a strategy that will encourage use of appropriate routes. Improvements to minor roads outside the scheme may lead | |

| | | | | Exception Report | |
|---|---|---|---|---|---|
| Audit ref. no. | Description of problem and recommendation | Problem Accepted Yes/No* | Recommendation Accepted Yes/No* | Project Managers/DPHO reason for rejecting Audit problem/recommendation | Head of Service/ADHT decision and required action |
| | the east side of Lincoln may cut across to the A15. This means that lower class and minor roads such as the B1178 and C103 may be more frequently used. As these roads go through small villages the increase in traffic at these locations may increase the number of conflicts, and in turn increase the risk of collisions.<br>**Recommendation**<br>Although nothing can be done to prevent road users from using this route, improvement in the signing directing vehicles to more appropriate routes at the southern end of the bypass. Also look at road improvements along the minor routes to cater for these extra vehicles. | | | to increased use of those routes therefore this latter recommendation is not accepted. | |
| Authorised by Project Manager/DPHO<br><br>Signed .....<br>Date 19 Feb 2014 | | | | For development led schemes, signed for the developer in advance of submission to Head of Service/ADHT<br><br>Title.....<br>Signed.....<br>Date..... | Approved / ~~is noted as being required for the scheme to comply with approved planning requirements~~ (delete as appropriate)<br><br>Head of Service/ADHT<br>A.J. AISTROP<br>Signed.....<br>Date 10th Jan 2014 |

# 3 Stage II RSA - LEB Single Carriageway Scheme

The Lincolnshire Road Safety Partnership
Witham House
The Pelham Centre
Canwick Road
Lincoln
LN5 8HE
Tel 01522 805800
Fax 01522 805803

Beacon Authority 2006-2007 Road Safety

Staying Alive!

Lincolnshire Road Safety Partnership

"Working Together to Make the Roads of Lincolnshire Safer for All"

## SAFETY AUDIT REPORT GRADE A
## STAGE 2 – DETAILED DESIGN
## LINCOLN EASTERN BYPASS - SINGLE CARRIAGEWAY

**SAFETY AUDIT REPORT**

Date: - 31st January 2014
Scheme Code: - HCMSA0021
Scheme Name: - Lincoln Eastern Bypass Single Carriageway
Audit Brief Submitted By: - Sam Edwards, Technical Services Partnership
Safety Audit Team Leader: - Derek Johnstone
Safety Audit Team Members: - Melanie Hewson, Tristan Alwyn-Clark
Safety Audit Adviser: - PC Stewart Cooke

**1 INTRODUCTION.**

The audit was carried out on the 24th January 2014 at 14:00pm.
The weather was overcast and the carriageway was dry.
Only the bypass interfaces with the existing network were observed due to this being predominantly a green field site. Two separate site visits were carried out on the afternoon of Tuesday 28th January 2014 and the morning of Wednesday 29th January 2014. The weather was cold and wet, with a wet road surface, during both these visits.
No night time audits have been carried out.

A check of the Personal Injury Accidents (PIA) on the County's accident database for the 3 years prior to 31/10/2013 shows there to have been 3 serious and 26 slight Personal Injury Accidents within the scope of the proposals. These are summarised in Appendix A.

The audited scheme is the proposal to build a 7.5km bypass to the east of Lincoln City. This will link the north of Lincoln at A158 Wragby Road to the south of Lincoln at A15 Sleaford Road. The new road will have a design speed of 100kph with a separate 3m wide combined cycle and pedestrian right of way (located on the western side of the carriageway) provided along the full length of the scheme to link up with existing public rights of way. The aim of the scheme is to reduce the severe traffic congestion and delays caused by the passage of the A15 through Lincoln city centre and the additional pressures of locally generated and attracted traffic.

The scheme contains the following elements in a southerly direction from the A158 Wragby Road roundabout to the A15 Sleaford Road:

- Wragby Road Roundabout: From the A158 Wragby Road the single carriageway layout follows the horizontal alignment of the northbound side of the A158 which allows the Lincoln Eastern Bypass (LEB) to tie into the existing roundabout as a fourth arm. The diameter of the existing roundabout remains unaltered.

- Hawthorn Road junction: The western side (residential side) of Hawthorn Road will be stopped up and a turning head provided. A left in/left out priority junction with the LEB is provided on the eastern side with a central physical island to restrict right turn manoeuvres.
- Hawthorn Road junction: A 3m wide Non-Motorised User (NMU) footbridge will be provided over the LEB that also provides access to the LEB NMU route.
- Greetwell Fields is to be stopped up with a turning head provided to the northern side of the LEB. The southern section of Greetwell fields is to be replaced with a new bridleway.
- Greetwell Road footbridge: A footbridge on the north side of the Greetwell Road roundabout over the LEB will provide access to the LEB NMU route and maintain the current NMU provision along Greetwell Road.
- Greetwell Road Roundabout: A new four arm roundabout will provide a link from the LEB to Greetwell Road.
- Lincoln to Market Rasen Railway Underbridge: The structure will carry the LEB over the Lincoln to Market Rasen railway line and the Viking Way. A link will be provided to the Viking Way from the LEB NMU route.
- A northbound climbing lane has been provided from the River Witham Viaduct approaching Greetwell Road Roundabout.
- River Witham Viaduct: The River Witham Viaduct is the largest structure on the scheme and will cross the River Witham floodplain on an embankment, with a bridge travelling over the North Delph , River Witham and South Delph.
- Lincoln to Spalding Railway Overbridge: To the south of the river the bypass will pass under the Lincoln to Spalding railway line.
- South Delph Footbridge: The footbridge will cross the South Delph watercourse away from the northbound carriageway and provide access to the existing Sustrans cycleway/footway facility that runs parallel to the River Witham.
- Washingborough Road Roundabout: The LEB joins the B1190 Washingborough Road at a new four arm roundabout.
- A climbing lane has been provided on the southbound exit from Washingborough Road roundabout.
- Heighington Road Overbridge: The LEB will pass under Heighington Road through a new overbridge. Access to Heighington Road is provided for NMUs only.
- Lincoln Road Roundabout: The LEB joins the B1188 Lincoln Road at a new four arm roundabout.
- Lincoln Road Subway: An NMU underpass is proposed to cross the LEB at the B1188 Lincoln Road.
- Bloxholm Lane Footbridge: A new footbridge will be provided over the LEB at Bloxholm Lane.
- Sleaford Road Roundabout: The LEB joins the A15 Sleaford Road at a new four arm roundabout which includes for access to the realigned Bloxholm Lane.

The NMU footbridges for Hawthorn Road, Greetwell Road and Bloxholm Lane are to be designed by the nominated contractor and therefore cannot be fully assessed. However, certain details have been specified; for example that appropriate parapet heights are to be used for the expected type of user.

A consequential signing scheme is to be undertaken separate to these works to include for alterations to the City's signing due to route alterations and reclassification from both the LEB and proposed Lincoln East/West link road.

Two Departures/Relaxations from Standards were provided with the Safety Audit request and are detailed in Appendix C.

## 2 ADDITIONAL INFORMATION AND SCHEME BACKGROUND

The Lincoln Eastern Bypass design has been developed in some detail and a previous Road Safety Audit process has been carried out for a dual carriageway design comprising the following:

- 4th December 2003 – Feasibility.
- 9th February 2005 – Feasibility for alternative vertical alignment details.
- 15th February 2005 – Feasibility for revisions to drainage, ecology, cycleway/footways and lay-by provision.
- 22nd April 2009 – Stage 1 Preliminary Design.

Due to funding issues the new proposal is for a single carriageway road with design elements to cater for future upgrade to duals should funding become available. The future proofing design elements are as follows:

- Greetwell Road Roundabout, Washingborough Road Roundabout, Lincoln Road Roundabout and Sleaford Road Roundabout are all larger than required for a standard single carriageway design to allow for the carriageway to be widened with minimum disruption if required in the future.
- The western leg of Greetwell Road Roundabout will have provision for the future dualling of Greetwell Road to accommodate development in the area.
- Greetwell Road Footbridge: It is proposed to build the footbridge as a dual carriageway width structure to allow for any future widening of the LEB to be accommodated without having to rebuild the footbridge.
- Lincoln to Market Rasen Railway Underbridge: The underbridge design contains a wider northbound verge that will allow for the longer sightline for future widening of the LEB albeit with a departure from current standards.
- Heighington Road Overbridge: The bridge has been designed to accommodate a widened LEB carriageway.
- Lincoln to Spalding Railway Overbridge: The overbridge design contains a two span box structure to allow for any future widening of the LEB.
- Bloxholm Lane Footbridge: It is proposed to build the footbridge as a dual carriageway width structure to allow for future widening of the LEB.
- The Lincoln Road Subway: It is proposed to build the subway as a dual carriageway width structure to accommodate any future widening of the carriageway.
- The drainage (including catchment ponds) has been designed to allow for future widening of the carriageway.
- The carriageway cross-falls are traditionally designed to have a 'crown' in the middle i.e. each lane falls away from the centre line. In this case the carriageway is designed to fall to the outside edge of the road.
- The large cutting south of Washingborough Road Roundabout has been designed so that future widening can be completed within the proposed land take.

## 3 TERMS OF REFERENCE

The terms of reference of the audit are as described in Lincolnshire County Council Safety Audit Policy and Guidelines 2010. The auditors have examined only the accident prevention implications of the scheme as presented and have not considered or verified the compliance of the design to any other criteria.

## 4 MATTERS OUTSTANDING FROM PREVIOUS SAFETY AUDITS

A Stage 1 Safety Audit was undertaken for these proposals by members of LRSP during November 2012 and a Safety Audit Response has been received. There are no outstanding issues from this audit.

## 5 MATTERS ARISING FROM THIS STAGE 2 (DETAILED DESIGN) ROAD SAFETY AUDIT

### 5.1 PROBLEM

**Location**

LEB A158 Roundabout Northbound Lane Dropped Kerb Crossing Point.

**Summary of safety problem**

Conflicts between pedestrians/cyclists and vehicles within the live carriageway.

**Specific problem identified**

There is a possibility that visibility for pedestrians could be restricted by the acoustic fencing when crossing from the dropped kerb of the southwest quadrant footway to the central splitter island. This could lead to injudicious crossing manoeuvre conflicts between NMU's and motorised traffic resulting in NMU injuries or shunt type collisions.

**Recommendation**

Careful positioning of the dropped kerb crossing point is required to ensure maximum visibility of oncoming traffic for pedestrians waiting to cross to the central splitter island.

### 5.2 PROBLEM

**Location**

LEB between A158 Roundabout and Hawthorn Road.

**Summary of safety problem**

Risk of loss of control/head on collisions.

**Specific problem identified**

The short section between the A158 Roundabout and Hawthorn Road could be prone to inappropriate overtaking manoeuvres as people exit the roundabout and could become trapped on the wrong side of the island or lose control in a late attempt at returning to their designated lane.

**Recommendation**

To further dissuade overtaking extend the central hatch ladder marking so that it includes the short section between the roundabout and the island for Hawthorn Road.

### 5.3 PROBLEM

**Location**

LEB Hawthorn Road Island.

**Summary of safety problem**

Risk of injudicious U-turns at island.

**Specific problem identified**

The right turn manoeuvres to and from Hawthorn Road are restricted by a physical island in the centre of the LEB main carriageway. The audit team are concerned that vehicles may undertake injudicious "U-turn" manoeuvres due to impatience or a lack of directional knowledge. Injudicious U-turn manoeuvres could lead to shunt or side impact collisions.

**Recommendation**

Extending the island would further dissuade possible injudicious "U-turn" manoeuvres and/or "no U-turn" signing could be provided. Further to this the directional signing could be amended to inform traffic of the diversionary route taken to access Hawthorn Road and vice-versa.

**5.4 PROBLEM**

**Location**

Hawthorn Road where it ties in with the LEB.

**Summary of safety problem**

Risk of opposing traffic flow conflicts.

**Specific problem identified**

The junction where Hawthorn Road ties in with the LEB is located just after a bend on Hawthorn Road. There is a risk that vehicles leaving the LEB could lose control where the alignment flicks back to the right or straight-line through the curve possibly leading to conflicts with oncoming traffic.

**Recommendation**

Extending the central hatch marking around the bend on to the straight section of Hawthorn Road would better direct traffic and introduce a greater gap between opposing flows.

**5.5 PROBLEM**

**Location**

LEB south of Hawthorn Road.

**Summary of safety problem**

Possible loss of control/head on collisions.

**Specific problem identified**

There is a long section of central hatching approaching the central island for the Hawthorn Road junction and "get-in arrows" are only provided at the start of this hatching, approximately 600m from the island. There is a risk that vehicles will overtake through this section of hatching and could get trapped on the wrong side of the island or lose control in a late attempt at returning to their designated lane.

**Recommendation**

Provide additional "get-in arrows" in the southbound lane for northbound traffic closer to the central island.

**5.6 PROBLEM**

**Location**

Greetwell Fields western side of LEB.

**Summary of safety problem**

Risk of vehicles colliding with the proposed anti-ram bollard due to insufficient warning of the abrupt termination of stopped up side road.

**Specific problem identified**

Greetwell Fields is stopped up where it is intersected by the LEB with only a single anti-ram bollard provided at the termination point. There is a risk of drivers not realising their road is about to end abruptly and colliding with the anti-ram bollard.

**Recommendation**

A more visible feature should be installed across the ends of the stopped up side road. In addition advance warning signage, such as "no-through road", would give notice of the termination of the road ahead.

**5.7 PROBLEM**

**Location**

Greetwell Road between Outer Circle Road and LEB.

**Summary of safety problem**

Risk of increase in injury accident occurrences.

**Specific problem identified**

The Audit Team are concerned that the section of Greetwell Road between Outer Circle Road and the proposed LEB is not suitable for an increase in usage, due in part to the horizontal and vertical alignments. There are, at the time of writing, 5 slight injury accidents (of which 4 occurred in a wet/damp road surface) in a 3 year period along this short stretch that, if not addressed, have a high possibility of increasing.

**Recommendation**

Greetwell Road should be subject to improvement works to reduce the likelihood of increased occurrences of injury accidents.

**5.8 PROBLEM**

**Location**

Witham Viaduct.

**Summary of safety problem**

Possible injudicious overtaking manoeuvres.

**Specific problem identified**

Full overtaking sight distance is not achieved across the Witham Viaduct and warning line is proposed. The audit team feel however that this section could still be prone to overtaking manoeuvres and the possible reduced visibility caused by the curved alignment and raised parapet of the viaduct could lead to injudicious overtaking manoeuvres, resulting in head on collisions.

**Recommendation**

To further dissuade overtaking manoeuvres replace the central warning line with a hatched ladder marking.

**5.9 PROBLEM**

**Location**

B1188 south-eastbound approach to LEB.

**Summary of safety problem**

Possible shunt type collisions on the south-eastbound approach to the roundabout.

**Specific problem identified**

The roundabout of the B1188 and LEB is to be positioned approximately 300m after a series of bends with the associated signing also on the roundabout side of the bends. Approaching traffic could be unaware of the roundabout and/or queuing traffic resulting in the risk of shunt type accidents.

**Recommendation**

Additional signing for the roundabout ought to be provided in advance of the bends.

**5.10 PROBLEM**

**Location**

NMU Route at the termination with the A15 Sleaford Road.

**Summary of safety problem**

NMU Conflicts with A15 Sleaford Road traffic.

**Specific problem identified**

Although the NMU route deviates to the north of the roundabout on to the intersected Bloxholm Lane, this is not signed and therefore not obvious that access to Bracebridge Heath for NMU's is provided away from the busy main road. The NMU route then terminates north of the A15 Sleaford Road roundabout; NMU users could continue to the termination of the NMU route and be forced on to the unrestricted carriageway between the LEB roundabout and Bracebridge Heath in conflict with vehicular traffic on this section instead of using the much less trafficked stopped up section of Bloxholm Lane.

**Recommendation**

If the short section of NMU route was omitted between the A15 Sleaford Road roundabout and Bloxholm Lane, with appropriate signing, NMU's could access Bracebridge Heath using Bloxholm Lane. Directional signing for NMU's would need to be provided when travelling south out of Bracebridge Heath to direct them away from Sleaford Road and down Bloxholm Lane. Provision for access on to the NMU route would be required for those NMU's approaching from the A15 northbound direction, such as an on-slip from the new LEB carriageway.

**5.11 PROBLEM**

**Location**

A15 Sleaford Road northbound approach to LEB roundabout.

**Summary of safety problem**

Possible shunt type accidents.

**Specific problem identified**

The northbound approach to the A15 Sleaford Road LEB roundabout has a brow in the vertical alignment that could mask slow moving/queuing traffic leading to possible shunt type conflicts should the queue extend back to this point.

**Recommendation**

Provide additional signing prior to this brow to warn approaching traffic of the likelihood of queuing/slow moving traffic.

**5.12 PROBLEM**

**Location**

Bloxholm Lane approach to LEB A15 roundabout.

**Summary of safety problem**

Possible shunt/overshoot type accidents due to insufficient warning.

**Specific problem identified**

The roundabout warning sign is positioned on the exit of a hedge lined left hand bend which could reduce the forward visibility of said sign. This could therefore easily be missed by approaching traffic that could then be unaware of the roundabout resulting in possible shunt/overshoot type accidents.

**Recommendation**

Position the warning sign to ensure adequate forward visibility.

**5.13 PROBLEM**

**Location**

All new roundabouts.

**Summary of safety problem**

Possible overshoot type accidents.

**Specific problem identified**

The positioning of some chevron units on the roundabouts do not give optimum forward visibility on the approaches to the roundabouts but rather for vehicles waiting at the roundabout give way markings. This could lead to approaching traffic misjudging the proximity of the roundabout and entering at inappropriate speeds likely resulting in overshoot accidents.

**Recommendation**

Position the chevron units on the roundabouts to give optimum warning for approaching traffic.

**5.14 PROBLEM**

**Location**

South Delph Footbridge tie-in with Sustrans Route.

**Summary of safety problem**

Cyclists losing control/overshooting at cycle path intersection.

**Specific problem identified**

The intersection of the proposed cycle path with the Sustrans Route at the South Delph footbridge could be less visible during the hours of darkness and could be prone to cyclists overshooting.

**Recommendation**

The installation of an amenity lighting column would improve the conspicuousness of this intersection reducing the likelihood of cyclists overshooting the junction.

5.15 **PROBLEM**

**Location**

NMU route slopes.

**Summary of safety problem**

Loss of control during inclement weather.

**Specific problem identified**

There are numerous locations along the NMU routes where slopes are provided to access the existing network or cross the LEB. During times of inclement weather these could become a slip hazard resulting in pedestrian/cycle injuries.

**Recommendation**

Provided grit bins on the NMU routes where level changes occur.

6 **AUDIT TEAM STATEMENT**

I certify that we have examined the drawings and documents listed Appendix B of this report. The examination has been carried out with the sole purpose of identifying any features that could be removed or modified in order to improve the safety of the scheme. The problems identified have been noted in this report together with associated safety improvement recommendations. No member on the Audit Team has been involved with the scheme design.

**AUDIT TEAM LEADER:**

Name: Derek Johnstone EngTech TMICE
Position: Engineer (Accident Investigation and Prevention)
Organisation: Lincolnshire Road Safety Partnership
Address: Witham House
The Pelham Centre
Canwick Road
Lincoln
LN5 8HE

Signed: Date: 31st January 2014

**AUDIT TEAM MEMBERS:**

Name: Melanie Hewson MIHE EngTech
Position: Engineer (Accident Investigation and Prevention)
Organisation: Lincolnshire Road Safety Partnership

Name: Tristan Alwyn-Clark MIHE EngTech
Position: Senior Technician (Accident Investigation and Prevention)
Organisation: Lincolnshire Road Safety Partnership

**AUDIT OBSERVERS/SPECIALISTS:**
Name: PC30 Stewart Cooke
Position: Forensic Collision Investigator
Organisation: Lincolnshire Road Safety Partnership

**Appendix A - Personal Injury Accidents Information for 3 year period to 31/10/13**

A158 Wragby Road Roundabout and Approaches:

- 2 serious and 16 slight injury accidents
- All accidents on the A158 between the roundabout and North Greetwell
- 11 westbound shunts into either slow moving or stationary queuing traffic
- 2 westbound loss of control under braking for stationary queuing traffic
- 1 glancing head on collision between opposing flows
- 2 driveway turning manoeuvres
  - 1 from a drive across the path of a westbound vehicle
  - 1 overtaking manoeuvre as a vehicle turned right from the carriageway
- 1 cycle in collision with an overtaking vehicle as they crossed between queuing traffic
- 1 deliberate act pedestrian collision
- 4 occurred on a wet/damp road surface

C258 Hawthorn Road:

- 1 slight injury accident
- Eastbound shunt on Hawthorn Road (west of LEB) where the lead vehicle injudiciously stopped and reversed without looking appropriately

U/C Greetwell Fields:

- No injury accidents

C004 Greetwell Road:

- No injury accidents

C004 Greetwell Road between the city and LEB:

- 5 slight injury accidents
- 4 single vehicle loss of control
- 1 involved a car passing too close to a cyclist
- 4 occurred on a wet/damp road surface

B1190 Washingborough Road:

- No injury accidents

C113 Heighington Road:

- No injury accidents

B1188 Lincoln Road:

- 1 serious injury accident
- Westbound 3 vehicle shunt

C002 Bloxholm Lane:

- 1 slight injury accident
- A northbound car lost control due to a tyre blow out and left road

A15 Sleaford Road:

- 1 slight injury accident
- A southbound car lost control after dropping off edge of carriageway, overcorrected and left road

**Appendix B – List of the drawings and other information submitted with the Audit Brief and considered by the Audit Team**

Series 000 - General Arrangements
Series 300 - Fencing
Series 400 - Vehicle Restrain System
Series 500 - Drainage
Series 700 - Pavements
Series 1100 - Kerbs, Footways and Paved Areas
Series 1200 - Traffic Signs
Series 1250 - Carriageway Markings
Series 1300 - Street Lighting Equipment
Series 1700 - Structures
Series 3000 - Landscaping
Series 6000 - Typical Sections
Series 8000 - Traffic Signs Design

LEB Combined Specification Document

**Appendix C – Supplied Departures/Relaxations from Standards**

- Due to restriction in available clearance behind Vehicle Restrain System (VRS) there are several locations where signs and lighting columns are being positioned within the VRS working width which conflicts with TD19/06 Part 8 3.14. In response, both the signs and lighting columns have been designed as a passively safe system and have been set back a minimum of 600mm from the back of the VRS as per TD19/06 Part 8 3.101. This is deemed an acceptable solution as per TD19/06 Part 8 3.67 (iii) if a relaxation is agreed.
  This relaxation is one which has been agreed on Lincolnshire highways several times and most notably on the Teal Park Project, which was also agreed by the Highways Agency on their trunk road network. The street lighting team have expressed their acceptance of this proposal from both a safety and maintenance view.

- TD34/07 recommends lighting extents in relation to Stopping Sight Distances. Using this standard would mean that the lighting extents from the roundabouts would be a minimum of 332 metres on the major road. Providing lighting 322 metres into the major road would leave a short unlit distance between the Washingborough Road and Greetwell roundabouts and in order to satisfy the requirements of TD34/07 would require lighting as "infill".
  Institute of Lighting Professionals (ILP) Technical Report PLG02 recommends lighting extents in relation to road speed limits. Using this report would mean that the lighting extents from the roundabouts would be a minimum of 133 metres on the major road – depending on individual risk assessments. This would negate the requirement to provide infill lighting on the section between the Washingborough Road and Greetwell roundabouts.

Appendix C
**Audit Response Form**

**From David Chetwynd PM/DPHO** **To Paul Little Head of Service/ADHT**

**Scheme Name...Lincoln Eastern Bypass.....** **Safety Audit Stage Two**

**Date Audit Completed.....31st January 2014 .....** **Audit Team Leader.....Derek Johnstone.....**

*where problem or recommendation are not accepted, the Exception Report should be completed and the Head of Service/ADHT will adjudicate

| Audit ref. no. | Description of problem and recommendation | Problem Accepted Yes/No* | Recommendation Accepted Yes/No* | Exception Report | |
|---|---|---|---|---|---|
| | | | | Project Managers/DPHO reason for rejecting Audit problem/recommendation | Head of Service/ADHT decision and required action |
| 5.1 | **Existing Roundabout A158**<br>**Proposed LEB Approach**<br>There is a possibility that visibility for pedestrians could be restricted by the acoustic fencing when crossing from the dropped kerb on the southwest quadrant footway to the central splitter island. This could lead to injudicious crossing manoeuvre conflicts between NMU's and motorised traffic resulting in NMU injuries or shunt type collisions.<br>**Recommendation:** Careful positioning of the dropped kerb crossing point is required to ensure maximum visibility of oncoming traffic for pedestrians waiting to cross to the central splitter island. | **Yes** | **Yes** | The NMU crossing point on the west side has been moved approximately 2m further south on the radius to provide a visibility distance of 230m of on-coming vehicles. | No |

| Audit ref. no. | Description of problem and recommendation | Problem Accepted Yes/No* | Recommendation Accepted Yes/No* | Exception Report | |
|---|---|---|---|---|---|
| | | | | Project Managers/DPHO reason for rejecting Audit problem/recommendation | Head of Service/ADHT decision and required action |
| 5.2 | **LEB Between A158 Roundabout And Hawthorn Road**<br>The short section between the A158 Roundabout and Hawthorn Road could be prone to inappropriate overtaking manoeuvres as people exit the roundabout and could be trapped on the wrong side of the island or lose control in a late attempt at returning to their designated lane.<br>**Recommendation:** To further dissuade overtaking extend the central hatch ladder marking so that it includes the short section between the roundabout and the island for Hawthorn Road. | **Yes** | **Yes** | | N/A |
| 5.3 | **LEB Hawthorn Road Island**<br>The right turn manoeuvres to and from Hawthorn Road are restricted by a physical island in the centre of the LEB main carriageway. The audit team are concerned that vehicles may undertake injudicious "U-turn" manoeuvres due to impatience or lack of directional knowledge. Injudicious U-turn manoeuvres could lead to shunt or side impact collisions.<br>**Recommendation:** Extending the island would further dissuade possible injudicious "U-turn" manoeuvres and/or "no U-turn" signing could be provided. Further to this the directional signing could be amended to inform traffic of the diversionary route taken to access Hawthorn Road and vice-versa. | **Yes** | **Yes** | It is the designer's view that the current layout physically discourages 'U' turns. The manoeuvre has been modelled and proven only to be capable of being executed by cars. Extension of the island further North would not reduce the likelihood of occurrence as the slip lane would also have to be extended.<br><br>The scheme signage has therefore been revised to include 'No U-turn' signs on the northbound LEB approach to the junction. | N/A. |

| Audit ref. no. | Description of problem and recommendation | Problem Accepted Yes/No* | Recommendation Accepted Yes/No* | Exception Report | |
|---|---|---|---|---|---|
| | | | | Project Managers/DPHO reason for rejecting Audit problem/recommendation | Head of Service/ADHT decision and required action |
| 5.4 | The junction where Hawthorn Road ties into the LEB is located just after a bend on Hawthorn Road. There is a risk that vehicles leaving the LEB could lose control where the alignment flicks back to the right or straight-line through the curve possibly leading to conflict with oncoming traffic. **Recommendation:** Extending the central hatch marking around the bend onto the straight section of Hawthorn Road would better direct traffic and introduce a greater gap between opposing flows. | **Yes** | **Yes** | The junction between Hawthorn Road and the LEB has been re-designed to reduce the 'flick back' scenario, increase the size of the splitter island and extend the hatch marking along the straight section connecting into Hawthorn Road. | N/A |
| 5.5 | There is a long section of central hatching approaching the central island for the Hawthorn Road junction an "get in arrows" are only provided at the start of this hatching, approximately 600m from the island. There is a risk that vehicles will overtake through this section of hatching and could get trapped on the wrong side of the island or lose control in a late attempt at returning their designated. **Recommendation:** Provide additional "get in arrows" in the southbound lane for northbound traffic closer to the central island. | **Yes** | **Yes** | | N/A. |

| Audit ref. no. | Description of problem and recommendation | Problem Accepted Yes/No* | Recommendation Accepted Yes/No* | Exception Report | |
|---|---|---|---|---|---|
| | | | | Project Managers/DPHO reason for rejecting Audit problem/recommendation | Head of Service/ADHT decision and required action |
| 5.6 | Greetwell Fields is stopped up where it is intersected by the LEB with only a single anti-ram bollard provided at the termination point. There is a risk of drivers not realising their road is about to end abruptly and colliding with the anti-ram bollard.<br>**Recommendation:** A more visible feature should be installed across the ends of the stopped up side road. In addition advance warning signage, such as "no-through road", would give notice of the termination of the road ahead. | **Yes** | **Yes** | Marker posts are to be added in addition to the bollard at the termination point of Greetwell Fields making the termination point more visible.<br><br>No through road signs will be erected as part of the consequential signing of the scheme. | N/A. |

| Audit ref. no. | Description of problem and recommendation | Problem Accepted Yes/No* | Recommendation Accepted Yes/No* | Exception Report | |
|---|---|---|---|---|---|
| | | | | Project Managers/DPHO reason for rejecting Audit problem/recommendation | Head of Service/ADHT decision and required action |
| 5.7 | The audit team are concerned that the section of Greetwell Road between Outer Circle Road and the proposed LEB is not suitable for an increase in usage, due in part to the horizontal and vertical alignments. There are, at the time of writing, 5 slight injury accidents (of which 4 occurred in a wet/damp road surface) in a 3 year period along this short stretch that, if not addressed, have a high possibility of increasing. **Recommendation:** Greetwell Road should be subject to improvement works to reduce the likelihood of increased occurrences of injury accidents. | **Yes** | **Yes** | The Divisional Highways team had previously identified that there was an ongoing issue with a third party drainage culvert under Greetwell Road at Greetwell Hollow which was prone to flooding, this has now been resolved.<br>The following have been identified as being likely to be contributory to issues on Greetwell Road:<br>a. forward visibility through the bends which would be improved through verge trimming and scrub clearance; and<br>b. the skidding resistance of the carriageway through the bends which would be enhanced by resurfacing with a higher PSV material in order to improve braking efficiency.<br><br>The above works are to be carried out as an undertaking by the Highway Authority under its current powers.<br><br>It is also expected that the proposed NEQ development of the former quarry will require an improvement of Greetwell Road before development can take place which will eliminate the alignment issues that currently exist. | N/A |

| Audit ref. no. | Description of problem and recommendation | Problem Accepted Yes/No* | Recommendation Accepted Yes/No* | Exception Report | |
|---|---|---|---|---|---|
| | | | | Project Managers/DPHO reason for rejecting Audit problem/recommendation | Head of Service/ADHT decision and required action |
| 5.8 | Full overtaking sight distance is not achieved across the Witham Viaduct and warning line is proposed. The audit team feel however that this section could still be prone to overtaking manoeuvres and the possible reduced visibility caused by the curved alignment and raised parapet of the viaduct could lead to injudicious overtaking manoeuvres, resulting in head on collisions.<br>**Recommendation**: To further dissuade overtaking manoeuvres replace the central warning line with a hatched ladder marking. | **No** | **No** | The forward visibility through this section meets the desirable minimum criteria for Stopping Sight Distance for the route. It will be unambiguous to drivers that this is the case and it is therefore felt that such manoeuvres are not being encouraged.<br><br>The inclusion of central ladder markings is therefore not deemed to be necessary at this time but should be subject to review post completion. | Visibility acceptable.<br><br>*Note Review*. |
| 5.9 | The roundabout of the B1188 and LEB is to be positioned approximately 300m after a series of bends with the associated signing also on the roundabout side of the bends. Approaching traffic could be unaware of the roundabout and/or queuing traffic resulting in the risk of shunt type accidents.<br>**Recommendation:** Additional signing for the roundabout ought to be provided in advance of the bends. | **No** | **No** | An ADS sign is sited 250 metres in advance of the junction which will be clearly visible on the approach. The junction will also be street lit. Temporary 'NEW ROAD LAYOUT AHEAD' signs will be in place for 6 months post completion.<br><br>The predicted queue length on the approach to the roundabout is modelled to be typically 3 vehicles in the worst case scenario of the PM peak in 2033 (the design year) | No Sign Required. |

| Audit ref. no. | Description of problem and recommendation | Problem Accepted Yes/No* | Recommendation Accepted Yes/No* | Exception Report | |
|---|---|---|---|---|---|
| | | | | Project Managers/DPHO reason for rejecting Audit problem/recommendation | Head of Service/ADHT decision and required action |
| 5.10 | Although the NMU route deviates to the north of the roundabout on to the intersected Bloxholm Lane, this is not signed and therefore not obvious that access to Bracebridge Heath for NMU's is provided away from the busy main road. The NMU route then terminates north of the A15 Sleaford Road roundabout; NMU users could continue to the termination of the NMU route and be forced on to the unrestricted carriageway between the LEB roundabout and Bracebridge Heath in conflict with vehicular traffic on this section instead of using the much less trafficked stopped up section of Bloxholm Lane.<br>**Recommendation:** If the short section of NMU route was omitted between the A15 Sleaford Road roundabout and Bloxholm Lane, with appropriate signing, NMU's could access Bracebridge Heath using Bloxholm Lane. Directional signing for NMU's would need to be provided when travelling south out of Bracebridge Heath to direct them away from Sleaford Road and down Bloxholm Lane. Provision for access on to the NMU route would be required for those NMU's approaching from the A15 northbound direction, such as an on-slip from the new LEB carriageway. | **Yes** | **No** | It would be detrimental to remove provision for cyclists that would in the future provide connectivity to possible new routes along the A15 and the proposed Lincoln Southern Bypass as well as reducing access to cyclists currently using the A15.<br><br>The route has therefore been realigned to primarily connect with Bloxholm Lane with a secondary connection to the A15 that would maintain access for cyclists approaching from the South.<br><br>The scheme signing and marking will be amended to reflect this change. → O.K. | |

| Audit ref. no. | Description of problem and recommendation | Problem Accepted Yes/No* | Recommendation Accepted Yes/No* | Exception Report | |
|---|---|---|---|---|---|
| | | | | Project Managers/DPHO reason for rejecting Audit problem/recommendation | Head of Service/ADHT decision and required action |
| 5.11 | The northbound approach to the A15 Sleaford Road LEB roundabout has a brow in the vertical alignment that could mask slow moving/queuing traffic leading to possible shunt type conflicts should the queue extend back to this point. **Recommendation:** Provide additional signing prior to this brow to warn approaching traffic of the likelihood of queuing/slow moving traffic. | **No** | **No** | Visibility on the northern approach to Sleaford Road Roundabout is in accordance with the DMRB The proposed roundabout will be constructed above the exiting road level with mandatory advance signing and will be street lit. Temporary 'NEW ROAD LAYOUT AHEAD' signs will be in place for 6 months post completion.<br><br>The predicted queue length on the approach to the roundabout is modelled to be typically 3 vehicles in the worst case scenario of the PM peak in 2033 (the design year). | Visibility Acceptable. |
| 5.12 | **Location:** Bloxholm Lane Approach to LEB A15 roundabout.<br>The roundabout warning sign is positioned on the exit of a hedge lined left hand bend which could reduce the forward visibility of said sign. This could therefore easily be missed by approaching traffic that could then be unaware of the roundabout resulting in possible shunt/overshoot type accidents.<br>**Recommendation:** Position the warning sign to ensure adequate forward visibility. | **Yes** | **Yes** | Issue to be flagged on construction drawings as requiring attention to this matter when setting out. | N/A. |

| Audit ref. no. | Description of problem and recommendation | Problem Accepted Yes/No* | Recommendation Accepted Yes/No* | Exception Report | |
|---|---|---|---|---|---|
| | | | | Project Managers/DPHO reason for rejecting Audit problem/recommendation | Head of Service/ADHT decision and required action |
| 5.13 | The positioning of some chevron units on the roundabouts do not give optimum forward visibility on the approaches to the roundabouts but rather for vehicles waiting at the roundabout give way markings. This could lead to approaching traffic misjudging the proximity of the roundabout and entering at inappropriate speeds likely resulting in overshoot accidents. (all roundabouts) **Recommendation:** Position the chevron units on the roundabouts to give optimum warning for approaching traffic. | **Yes** | **Yes** | Issue to be flagged on construction drawings as requiring attention to this matter when setting out. | |
| 5.14 | The intersection of the proposed cycle path with the Sustrans Route at the South Delph footbridge could be less visible during the hours of darkness and could be prone to cyclists overshooting. **Recommendation:** The installation of an amenity lighting column would improve the conspicuousness of this intersection reducing the likelihood of cyclists overshooting the junction. | **Yes** | **No** | The frequency of use of this route at night time would not normally justify the costs associated with providing street lighting at this location. A post and four rail timber fence will be erected adjacent to the Sustrans Route with reflective markers applied that would raise the conspicuity of the change in direction of the route. | |
| 5.15 | There are numerous locations along the NMU routes where slopes are provided to access the existing network or cross the LEB. During times of inclement weather these could become a slip hazard resulting in pedestrian/cycle injuries. **Recommendation:** Provide grit bins on the NMU routes where level changes occur. | **No** | **No** | There is no evidence to suggest that this a problem on similar routes around the County. Furthermore there are likely to be few instances where members of the public are likely to participate in gritting activities due to the remoteness of the majority of the route. | |

| Authorised by Project Manager/DPHO | For development led schemes, signed for the developer in advance of submission to Head of Service/ADHT | Approved / is noted as being required for the scheme to comply with approved planning requirements (delete as appropriate) |
|---|---|---|
| Signed.. .....<br>Date.....8/8/2015..... | Title.....<br>Signed.....<br>Date..... | Head of Service/ADHT<br>.....<br>Signed.....<br>Date.....07/07/15..... |

## 5 Stage II RSA - Revised Hawthorn Road junction

The Lincolnshire Road Safety Partnership
Witham House
The Pelham Centre
Canwick Road
Lincoln
LN5 8HE
Tel 01522 805800
Fax 01522 805803

Beacon Authority 2006-2007 Road Safety

Staying Alive!

Lincolnshire Road Safety Partnership

"Working Together to Make the Roads of Lincolnshire Safer for All"

# SAFETY AUDIT REPORT GRADE A
# STAGE 2 – DETAILED DESIGN (SUPPLEMENTARY)
# LINCOLN EASTERN BYPASS - SINGLE CARRIAGEWAY
# HAWTHORN ROAD JUNCTION

**SAFETY AUDIT REPORT**

Date: - 3rd July 2014
Scheme Code: - HCMSA0021
Scheme Name: - Lincoln Eastern Bypass Single Carriageway
Audit Brief Submitted By: - Amy Clay, Technical Services Partnership
Safety Audit Team Leader: - Derek Johnstone
Safety Audit Team Members: - Melanie Beadle-Hewson
Safety Audit Adviser: - PC Stewart Cooke

**1 INTRODUCTION.**

The audit was carried out on the Tuesday 1st July 2014 at 09:30.
The weather was sunny and the carriageway was dry.
The traffic at the time of the audit was moderate for the type of road.
No night time audits have been carried out.

A check of the Personal Injury Accidents (PIA) on the County's accident database for the 3 years prior to 31/3/2014 shows there to have been 1 slight Personal Injury Accident within the scope of the proposals.

The audited scheme is the amended layout to the Hawthorn Road junction with the new single carriageway Lincoln Eastern Bypass. The junction has altered from the original design by removing the merge taper changing it to a simple 'T' junction. The left diverge lane remains the same.
The splitter island has been extended to allow for a pedestrian refuge at the crossing point of where the non-motorised user (NMU) route emerges from the NMU bridge to allow safer crossing to the existing footway/cycleway on the south side of Hawthorn Road.
The vertical alignment of Hawthorn Road has slackened as a result of the redesign process and now complies with the DMRB.
To the west side of Hawthorn Road the vehicle turning head has been removed as a result of redesigning the St. Augustine's junction.

No Departure From Standards were provided for this supplementary Road Safety Audit.

**2 TERMS OF REFERENCE**

The terms of reference of the audit are as described in Lincolnshire County Council Safety Audit Policy and Guidelines 2010. The auditors have examined only the accident prevention implications of

the scheme as presented and have not considered or verified the compliance of the design to any other criteria.

## 3 MATTERS OUTSTANDING FROM PREVIOUS SAFETY AUDITS

A Stage 1 Safety Audit was undertaken for these proposals by members of LRSP during November 2012 and a Safety Audit Response has been received.

A Stage 2 Safety Audit was undertaken for these proposals by members of LRSP during January 2014 and a Safety Audit Response has not been received at the time of this audit. The following matters are outstanding and are applicable to this audit:

### 5.2 PROBLEM

**Location**

LEB between A158 Roundabout and Hawthorn Road.

**Summary of safety problem**

Risk of loss of control/head on collisions.

**Specific problem identified**

The short section between the A158 Roundabout and Hawthorn Road could be prone to inappropriate overtaking manoeuvres as people exit the roundabout and could become trapped on the wrong side of the island or lose control in a late attempt at returning to their designated lane.

### 5.3 PROBLEM

**Location**

LEB Hawthorn Road Island.

**Summary of safety problem**

Risk of injudicious U-turns at island.

**Specific problem identified**

The right turn manoeuvres to and from Hawthorn Road are restricted by a physical island in the centre of the LEB main carriageway. The audit team are concerned that vehicles may undertake injudicious "U-turn" manoeuvres due to impatience or a lack of directional knowledge. Injudicious U-turn manoeuvres could lead to shunt or side impact collisions.

### 5.5 PROBLEM

**Location**

LEB south of Hawthorn Road.

**Summary of safety problem**

Possible loss of control/head on collisions.

**Specific problem identified**

There is a long section of central hatching approaching the central island for the Hawthorn Road junction and "get-in arrows" are only provided at the start of this hatching, approximately 600m from the island. There is a risk that vehicles will overtake through this section of hatching and could get trapped on the wrong side of the island or lose control in a late attempt at returning to their designated lane.

## 4 MATTERS ARISING FROM THIS STAGE 2 (DETAILED DESIGN) ROAD SAFETY AUDIT

### 4.1 PROBLEM

**Location**

Hawthorn Road East Splitter Island.

**Summary of safety problem**

Conflicts between pedestrians/cyclists when crossing.

**Specific problem identified**

The extension of the splitter island at the Hawthorn Road East junction is to be used as a pedestrian refuge for NMU's crossing from the bypass overbridge to the existing shared facility currently on the south side of the existing Hawthorn Road. The drawings do not specify the width of this island and if this is not sufficient cyclists could be prone to overhanging in to the carriageway at risk of being hit by vehicular traffic.

**Recommendation**

Ensure the island is of an appropriate width to cater for crossing cyclists.

### 4.2 PROBLEM

**Location**

Hawthorn Road East Splitter Island.

**Summary of safety problem**

Conflicts between pedestrians/cyclists when crossing.

**Specific problem identified**

The extension of the splitter island at the Hawthorn Road East junction is to be used as a pedestrian refuge for NMU's crossing from the bypass overbridge to the existing shared facility currently on the south side of the existing Hawthorn Road. The drawings do not show provision of textured paving within this island which does not therefore properly indicate that this is a safe place for NMU's to separate their crossing manoeuvre, possibly leading to conflict with motorised users in the carriageway.

**Recommendation**

Provide textured paving as appropriate.

**4.3 PROBLEM**

**Location**

Hawthorn Road East Splitter Island.

**Summary of safety problem**

Conflicts between pedestrians/cyclists when crossing.

**Specific problem identified**

50RS is to be located close to the dropped kerb crossing point on the splitter island of Hawthorn Road East. There is a possibility that this sign could mask the view of NMU's within the island leading to possible conflicts during a crossing manoeuvre due to reduced visibilities.

**Recommendation**

Ensure positioning and mounting height of 50RS does not obscure visibilities.

**4.4 PROBLEM**

**Location**

Hawthorn Road East junction with LEB.

**Summary of safety problem**

Conflicts between vehicles entering the LEB and those travelling southbound on LEB.

**Specific problem identified**

The changes to the Hawthorn Road East junction with the LEB from on-slip to Give Way control alters the manner in which vehicles enter the LEB. The Give Way means vehicles may have to stop at the junction and look to their right across the splitter island. 42RS, located on the splitter island could restrict the view of oncoming vehicles for traffic exiting Hawthorn Road East resulting in turning manoeuvre conflicts.

**Recommendation**

Ensure positioning of 42RS does not obscure junction visibilities.

**5 AUDIT TEAM STATEMENT**

I certify that we have examined the drawings and documents listed Appendix B of this report. The examination has been carried out with the sole purpose of identifying any features that could be removed or modified in order to improve the safety of the scheme. The problems identified have been noted in this report together with associated safety improvement recommendations. No member on the Audit Team has been involved with the scheme design.

**AUDIT TEAM LEADER:**

Name: Derek Johnstone EngTech TMICE
Position: Engineer (Accident Investigation and Prevention)
Organisation: Lincolnshire Road Safety Partnership

Address: Witham House
The Pelham Centre
Canwick Road
Lincoln
LN5 8HE

Signed: Date: 3rd July 2014

**AUDIT TEAM MEMBERS:**

Name: Melanie Beadle-Hewson MIHE EngTech
Position: Engineer (Accident Investigation and Prevention)
Organisation: Lincolnshire Road Safety Partnership

**AUDIT OBSERVERS/SPECIALISTS:**
Name: PC30 Stewart Cooke
Position: Forensic Collision Investigator
Organisation: Lincolnshire Road Safety Partnership

**Appendix A - List of the drawings and other information submitted with the Audit Brief and considered by the Audit Team**

| | |
|---|---|
| HCMSA0021/LEB/000/001 Rev A1 | General Arrangement – Sheet 1 of 27 |
| HCMSA0021/LEB/000/002 Rev A1 | General Arrangement – Sheet 2 of 27 |
| HCMSA0021/LEB/1100/002 Rev A1 | Kerbs and Footways – Sheet 2 of 27 |
| HCMSA0021/LEB/1200/002 Rev A1 | Traffic Signs – Sheet 3 of 28 |

## 6 Stage I RSA – Revised Locations of NMU Uncontrolled Crossing Points On Hawthorn Road

The Lincolnshire Road Safety Partnership
Witham House
The Pelham Centre
Canwick Road
Lincoln
LN5 8HE
Tel 01522 805800
Fax 01522 805803

Beacon Authority 2006-2007 Road Safety

Staying Alive!

Lincolnshire Road Safety Partnership

"Working Together to Make the Roads of Lincolnshire Safer for All"

# SAFETY AUDIT REPORT GRADE A
# STAGE 1 – PRELIMINARY DESIGN
# HAWTHORN ROAD JUNCTION NMU CROSSING FACILITY

**SAFETY AUDIT REPORT**

Date: - 11th July 2014
Scheme Code: - HCMSA0021
Scheme Name: - HAWTHORN Road NMU crossing facility
Audit Brief Submitted By: - Sam Edwards, Technical Services Partnership
Safety Audit Team Leader: - Melanie Beadle-Hewson
Safety Audit Team Members: - Derek Johnstone
Safety Audit Adviser: - PC Stewart Cooke

**1 INTRODUCTION.**

The audit was carried out on 10th July 2014 at 13:00pm.
The weather was overcast and the carriageway was dry.
The traffic at the time of the audit was moderate for the type of road.
No night time audits have been carried out.
There are no departures from standard.

A check of the Personal Injury Accidents (PIA) on the County's accident database for the 3 years prior to 31/3/2014 shows there to have been 1 slight Personal Injury Accident within the scope of the proposals.

The audited scheme is the provision of a 2.5m wide bituminous NMU route on the north side of Hawthorn Road connecting to the proposed LEB NMU route. In addition the establishment of an uncontrolled crossing (tactiles and dropped kerbs) is proposed approximately 175m east of the proposed LEB Hawthorn Road splitter island, this crossing facility will be signed as the primary route for those crossing Hawthorn Road. There is also a provision of a secondary crossing facility nearer to the bridleway to provide a desire line for those travelling in a north south direction.

These proposals are being audited separately as part of the Lincoln Eastern Bypass works. The LEB itself has been audited.

**2 TERMS OF REFERENCE**

The terms of reference of the audit are as described in Lincolnshire County Council Safety Audit Policy and Guidelines 2010. The auditors have examined only the accident prevention implications of the scheme as presented and have not considered or verified the compliance of the design to any other criteria.

## 3 MATTERS OUTSTANDING FROM PREVIOUS SAFETY AUDITS

No previous safety audits have been carried out for this proposal. Therefore there are no outstanding matters.

## 4 MATTERS ARISING FROM THIS STAGE 1 (PRELIMINARY DESIGN) ROAD SAFETY AUDIT

No safety audit concerns.

**AUDIT TEAM LEADER:**

Name: Melanie Beadle-Hewson MIHE EngTech
Position: Engineer (Accident Investigation and Prevention)
Organisation: Lincolnshire Road Safety Partnership
Address: Witham House
The Pelham Centre
Canwick Road
Lincoln
LN5 8HE

Signed:  Date: 11th July 2014

**AUDIT TEAM MEMBERS:**

Name: Derek Johnstone EngTech TMICE
Position: Engineer (Accident Investigation and Prevention)
Organisation: Lincolnshire Road Safety Partnership
Address: Witham House
The Pelham Centre
Canwick Road
Lincoln
LN5 8HE

**AUDIT OBSERVERS/SPECIALISTS:**
Name: PC30 Stewart Cooke
Position: Forensic Collision Investigator
Organisation: Lincolnshire Road Safety Partnership

**Appendix A - List of the drawings and other information submitted with the Audit Brief and considered by the Audit Team**

HCMSA0021/HW/AIP001- Hawthorn Road NMU Crossing Facility

## 7 Stage I RSA – Revised Location of NMU Uncontrolled Crossing Point Over Hawthorn Road

The Lincolnshire Road Safety Partnership
Witham House
The Pelham Centre
Canwick Road
Lincoln
LN5 8HE
Tel 01522 805800
Fax 01522 805803

Lincolnshire Road Safety Partnership

"Working Together to Make the Roads of Lincolnshire Safer for All"

# SAFETY AUDIT REPORT GRADE A
# STAGE 1 – PRELIMINARY DESIGN
# HAWTHORN ROAD JUNCTION NMU CROSSING FACILITY

**SAFETY AUDIT REPORT**

Date: - 23rd July 2014
Scheme Code: - HCMSA0021
Scheme Name: - Hawthorn Road NMU crossing facility
Audit Brief Submitted By: - Amy Clay, Technical Services Partnership
Safety Audit Team Leader: - Derek Johnstone
Safety Audit Team Members: - Alan Ball
Safety Audit Adviser: - PC Stewart Cooke

**1 INTRODUCTION.**

The audit was carried out on 23rd July 2014 at 10:30pm.
The weather was sunny and the carriageway was dry.
The traffic at the time of the audit was moderate for the type of road.
No night time audits have been carried out.
There are no departures from standard.

A check of the Personal Injury Accidents (PIA) on the County's accident database for the 3 years prior to 31/5/2014 shows there to have been 1 slight Personal Injury Accident within the scope of the proposals; this PIA did not involve an NMU.

The audited scheme is the provision of a 2.5m wide bituminous NMU route on the north side of Hawthorn Road connecting to the proposed LEB NMU route. In addition the establishment of an uncontrolled crossing (tactiles and dropped kerbs) is proposed approximately 120m east of the proposed LEB Hawthorn Road splitter island, this crossing facility will be signed as the primary route for those crossing Hawthorn Road.

These proposals are being audited separately as part of the Lincoln Eastern Bypass works. The LEB itself has been audited.

**2 TERMS OF REFERENCE**

The terms of reference of the audit are as described in Lincolnshire County Council Safety Audit Policy and Guidelines 2010. The auditors have examined only the accident prevention implications of the scheme as presented and have not considered or verified the compliance of the design to any other criteria.

## 3 MATTERS OUTSTANDING FROM PREVIOUS SAFETY AUDITS

A previous Stage 1 Safety Audit was carried out for amendments to the NMU provision at Hawthorn Road on 11/7/14 with no outstanding issues. This audit relates to similar measures; with a single crossing point in a differing location.

## 4 MATTERS ARISING FROM THIS STAGE 1 (PRELIMINARY DESIGN) ROAD SAFETY AUDIT

There are no safety audit concerns.

## 5 AUDIT TEAM STATEMENT

I certify that we have examined the drawings and documents listed In Appendix A of this report. The examination has been carried out with the sole purpose of identifying any features that could be removed or modified in order to improve the safety of the scheme. The problems identified have been noted in this report, together with associated safety improvement suggestions. No member on the Audit Team has been involved with the scheme design.

**AUDIT TEAM LEADER:**

Name: Derek Johnstone EngTech TMICE
Position: Engineer (Accident Investigation and Prevention)
Organisation: Lincolnshire Road Safety Partnership
Address: Witham House
The Pelham Centre
Canwick Road
Lincoln
LN5 8HE

Signed:  Date: 23rd July 2014

**AUDIT TEAM MEMBERS:**

Name: Alan Ball IEng AMICE
Position: Road Safety AI Manager
Organisation: Lincolnshire Road Safety Partnership
Address: Witham House
The Pelham Centre
Canwick Road
Lincoln
LN5 8HE

**AUDIT OBSERVERS/SPECIALISTS:**
Name: PC30 Stewart Cooke
Position: Forensic Collision Investigator
Organisation: Lincolnshire Road Safety Partnership

**Appendix A - List of the drawings and other information submitted with the Audit Brief and considered by the Audit Team**

Hawthorn Road Alteration S73

## 8 Stage I RSA - Revised Hawthorn Road Junction Including Revised Bridge Location

The Lincolnshire Road Safety Partnership
Witham House
The Pelham Centre
Canwick Road
Lincoln
LN5 8HE
Tel 01522 805800
Fax 01522 805803

Lincolnshire Road Safety Partnership

"Working Together to Make the Roads of Lincolnshire Safer for All"

# SAFETY AUDIT REPORT GRADE A
# STAGE 1 – PRELIMINARY DESIGN
# HAWTHORN ROAD JUNCTION NMU CROSSING FACILITY
# (REPOSITIONED BRIDGE)

**SAFETY AUDIT REPORT**

Date: - 18th September 2014
Scheme Code: - HCMSA0021
Scheme Name: - Hawthorn Road NMU crossing facility
Audit Brief Submitted By: - Sam Edwards, Technical Services Partnership
Safety Audit Team Leader: - Derek Johnstone
Safety Audit Team Members: - Mel Beadle-Hewson
Safety Audit Adviser: - PC Stewart Cooke

**1 INTRODUCTION.**

The audit was carried out on 17th September 2014 at 12:15pm.
The weather was overcast and the carriageway was damp.
The traffic at the time of the audit was moderate for the type of road.
No night time audits have been carried out.
There are no departure from standards.

A check of the Personal Injury Accidents (PIA) on the County's accident database for the 3 years prior to 30/06/2014 shows there to have been 1 slight Personal Injury Accident within the scope of the proposals; this PIA did not involve an NMU.

The audited scheme is the provision of a 3.5m wide bituminous NMU route comprising a bridge over the LEB to the south side of Hawthorn Road connecting the proposed LEB NMU route with the existing facilities on Hawthorn Road.

These proposals are being audited separately as part of the Lincoln Eastern Bypass works. The LEB itself has been audited.

**2 TERMS OF REFERENCE**

The terms of reference of the audit are as described in Lincolnshire County Council Safety Audit Policy and Guidelines 2010. The auditors have examined only the accident prevention implications of the scheme as presented and have not considered or verified the compliance of the design to any other criteria.

## 3 MATTERS OUTSTANDING FROM PREVIOUS SAFETY AUDITS

A previous Stage 1 Safety Audit was carried out for amendments to the NMU provision at Hawthorn Road on 11/7/14 and 23/7/14 with no outstanding issues. This audit relates to the relocation of the NMU bridge from the north to south side of Hawthorn Road.

## 4 MATTERS ARISING FROM THIS STAGE 1 (PRELIMINARY DESIGN) ROAD SAFETY AUDIT

There are no safety audit concerns.

## 5 AUDIT TEAM STATEMENT

I certify that we have examined the drawings and documents listed In Appendix A of this report. The examination has been carried out with the sole purpose of identifying any features that could be removed or modified in order to improve the safety of the scheme. The problems identified have been noted in this report, together with associated safety improvement suggestions. No member on the Audit Team has been involved with the scheme design.

**AUDIT TEAM LEADER:**

Name: Derek Johnstone EngTech TMICE
Position: Engineer (Accident Investigation and Prevention)
Organisation: Lincolnshire Road Safety Partnership
Address: Witham House
The Pelham Centre
Canwick Road
Lincoln
LN5 8HE

Signed:  Date: 18th September 2014

**AUDIT TEAM MEMBERS:**

Name: Mel Beadle-Hewson AMIHE
Position: Engineer (Accident Investigation and Prevention)
Organisation: Lincolnshire Road Safety Partnership
Address: Witham House
The Pelham Centre
Canwick Road
Lincoln
LN5 8HE

**AUDIT OBSERVERS/SPECIALISTS:**
Name: PC30 Stewart Cooke
Position: Forensic Collision Investigator
Organisation: Lincolnshire Road Safety Partnership

**Appendix A - List of the drawings and other information submitted with the Audit Brief and considered by the Audit Team**

| | |
|---|---|
| HCMSA0021/LEB/100/106 Rev 2A | S73 Planning Application |
| F/1054738-HRD-100 Rev 0.0 | Site Plan |
| B/1054738/1700/HF/101 Rev 0.0 | Hawthorn Road Southern NMU Bridge GA |

## 9 Stage II RSA - Revised Hawthorn Road Junction Including Revised Bridge Location

The Lincolnshire Road Safety Partnership
Witham House
The Pelham Centre
Canwick Road
Lincoln
LN5 8HE
Tel 01522 805800
Fax 01522 805803

Beacon Authority 2006-2007 Road Safety

Staying Alive!

Lincolnshire Road Safety Partnership

"Working Together to Make the Roads of Lincolnshire Safer for All"

### SAFETY AUDIT REPORT GRADE A
### STAGE 2 - DETAILED DESIGN (SUPPLEMENTARY)
### LINCOLN EASTERN BYPASS - SINGLE CARRIAGEWAY
### HAWTHORN ROAD JUNCTION - AMENDED LAYOUT 2015

**SAFETY AUDIT REPORT**

Date: - 9th July 2015
Scheme Code: - HCMSA0021
Scheme Name: - Lincoln Eastern Bypass Single Carriageway, Hawthorn Road Junction
Audit Brief Submitted By: - Amy Clay, Technical Services Partnership
Safety Audit Team Leader: - Derek Johnstone
Safety Audit Team Members: - Mel Beadle-Hewson

**1 INTRODUCTION.**

The audit was carried out on the Wednesday 8th July 2015.
The weather was sunny and the carriageway was dry.
The traffic at the time of the audit was moderate for the type of road.
No night time audits have been carried out.

A check of the Personal Injury Accidents (PIA) on the County's accident database for the 3 years prior to 31/3/2015 shows there to have been 1 slight Personal Injury Accident within the scope of the proposals.

The audited scheme is an amended layout to the Hawthorn Road junction with the new single carriageway Lincoln Eastern Bypass. The junction has altered from the original design by removing the merge taper changing it to a simple 'T' junction in accordance with DMRB. The left diverge lane remains the same.
The 3.5m wide None Motorised User (NMU) bridge has been moved to the southern side of Hawthorn Road to allow tie in to the existing footway/cycleway that runs along Hawthorn Road.
In addition, the establishment of an uncontrolled crossing (dropped kerb and textured paving) is proposed approximately 150m east of the proposed LEB Hawthorn Road splitter island.
To the west side of Hawthorn Road the vehicle turning head has been removed as a result of redesigning the St. Augustine's junction.

No Departure From Standards were provided for this supplementary Road Safety Audit.

**2 TERMS OF REFERENCE**

The terms of reference of the audit are as described in Lincolnshire County Council Safety Audit Policy and Guidelines 2010. The auditors have examined only the accident prevention implications of

the scheme as presented and have not considered or verified the compliance of the design to any other criteria.

## 3 MATTERS OUTSTANDING FROM PREVIOUS SAFETY AUDITS

A Stage 1 Safety Audit was undertaken for the full bypass proposals by members of LRSP during November 2012 and a Safety Audit Response has been received.

A Stage 2 Safety Audit was undertaken for the full bypass proposals by members of LRSP during January 2014 and a Safety Audit Response has been received.

A Supplementary Stage 2 Safety Audit was undertaken for the amended Hawthorn Road layout area only by members of LRSP during July 2014. A Safety Audit Response has not been received for this audit; however the layout has been amended as such that this Stage 2 Safety Audit report dated 8th July 2015 supersedes the July 2014 audit and will be undertaken as new proposals.

## 4 MATTERS ARISING FROM THIS STAGE 2 (DETAILED DESIGN) ROAD SAFETY AUDIT

### 4.1 PROBLEM

**Location**

Hawthorn Road East junction with LEB.

**Summary of safety problem**

Conflicts between vehicles entering the LEB and those travelling southbound on LEB.

**Specific problem identified**

The changes to the Hawthorn Road East junction with the LEB from on-slip to Give Way control alters the manner in which vehicles enter the LEB. The Give Way means vehicles may have to stop at the junction and look to their right across the splitter island. 42RS that is located on the north of the splitter island could restrict the view of oncoming vehicles for traffic exiting Hawthorn Road East resulting in turning manoeuvre conflicts.

**Recommendation**

Ensure positioning of 42RS does not obscure junction visibilities.

## 5 AUDIT TEAM STATEMENT

I certify that we have examined the drawings and documents listed Appendix B of this report. The examination has been carried out with the sole purpose of identifying any features that could be removed or modified in order to improve the safety of the scheme. The problems identified have been noted in this report together with associated safety improvement recommendations. No member on the Audit Team has been involved with the scheme design.

**AUDIT TEAM LEADER:**

Name: Derek Johnstone EngTech TMICE
Position: Engineer (Accident Investigation and Prevention)
Organisation: Lincolnshire Road Safety Partnership
Address: Witham House
The Pelham Centre
Canwick Road
Lincoln
LN5 8HE

Signed: Date: 9th July 2015

**AUDIT TEAM MEMBERS:**

Name: Melanie Beadle-Hewson MIHE EngTech
Position: Engineer (Accident Investigation and Prevention)
Organisation: Lincolnshire Road Safety Partnership

**Appendix A - List of the drawings and other information submitted with the Audit Brief and considered by the Audit Team**

| | |
|---|---|
| HCMSA0021/LEB/000/002 Rev A2 | General Arrangement – Sheet 2 of 27 |
| HCMSA0021/LEB/1100/002 Rev A2 | Kerbs and Footways – Sheet 2 of 27 |
| HCMSA0021/LEB/1200/002 Rev A2 | Traffic Signs – Sheet 3 of 28 |
| HCMSA0021/LEB/1250/002 Rev A2 | Carriageway Markings – Sheet 3 of 28 |