MILTON ROAD PROJECT OBJECTIVES

As agreed by the City Deal Executive Board:

— Comprehensive priority for buses in both directions wherever practicable;
— Safer and more convenient routes for cycling and walking, segregated where practical and possible;
— Enhance the environment, streetscape and air quality;
— Additional capacity for sustainable trips to employment/education sites;
— Increased bus patronage and new services; and
— Maintain or reduce general traffic levels.
CITY DEAL BOARD DESIGN REQUIREMENTS

The City Deal Board issued the following design requirements for the Milton Road Design:

— An avenue of mature trees as a core design element along Milton Road, the provision of grass verges and planting and effective wider public realm and landscaping

— Preference for a design that avoids the need for double bus lanes on any stretch of road including the section from Hurst Park Avenue to Oak Tree Avenue so that this stretch would have a maximum of three motorised lanes

— Remove all of the ‘Do Something’ banned turning movements from Gilbert Road, Arbury Road and King’s Hedges Road junctions
LLF ENGAGEMENT

— Over the last year there has been extensive and valuable engagement with the LLF.

— Workshops resulted in the development of a ‘Do Optimum’ scheme by MRRA, HPERA and Cam Cycle.

— The ‘Do Optimum’ scheme contains important design aspirations and principles which strongly influence the design concepts going forward.

— The ‘Do Optimum’ scheme has been used as a new basis for design development of an engineered and modelled Concept Design (detailed design still to be undertaken).

— Assessment of ‘Do Optimum’ has identified the need for some modifications which are outlined and explained within this presentation.
In development of an engineered design concept we have taken the core design principles of ‘Do Optimum’ while also:

— Providing sufficient infrastructure to improve bus journey times and reliability;
— Allocating bus lanes on one side of the road only, at any given section;
— Maintaining options that consider both the retained access or closure of Highworth Ave access at the Elizabeth Way Junction (*further detailed assessment to be undertaken*);
— Retaining a tree planting scheme along the length of Milton Road;
— Providing a junction solution that does not require the closure of Union Lane;
— Achieving optimal junction operation; and
— Fitting within highway boundaries and with consideration of existing drive accesses;
DO OPTIMUM DESIGN DEVELOPMENT - TREES

Key considerations on Trees and landscaping:

— The delivery of any scheme will result in damage to existing trees and their root systems. Therefore it is proposed that the current trees are replaced with a fully considered and developed tree planting design along the length of Milton Road;

— Exact future number of trees is not yet known due to a final design not being finalised, however the aim will be to replace all trees lost;

— Improved planting technology for the trees which means more successful trees in the long term and less disruption to highway structures;

— Officer Landscaping advice is that initial planting of trees no larger than 16-18cm girth which in plant size equates to 3-5m high;

— At that size the tree planting will still have a ‘presence’ along the road but will have a better chance of successfully establishing.
Example of proposed establishing tree planting size, as recently planted along Coldhams Lane
DESIGN CONSIDERATION EXAMPLES

Driveways and current access points (Elizabeth Way)
DESIGN CONSIDERATION EXAMPLES

Driveways and current access points
DO OPTIMUM DESIGN DEVELOPMENT

In taking on all of these considerations we seek to deliver a design concept that:

— Improves on the urban realm

— Provides the transport infrastructure improvements needed to meet the Milton Road project objectives, for all modes.

An idea of what this might look like is provided in the following BEFORE (Current) and AFTER (Proposed) visualisations.
Current - Outbound North of George St
Proposed – Outbound North of George St

DRAFT CONCEPT
Current – Outbound North of Ascham Rd
Proposed – Outbound North of Ascham Rd

DRAFT CONCEPT
Current - Outbound North of Downhams Lane
Proposed – Outbound North of Downhams Lane
Current – Outbound North of Ramsden Square

Google Earth
Proposed – Outbound North of Ramsden Square

DRAFT CONCEPT
ASSESSMENT & MODIFICATION OF ‘DO OPTIMUM’
‘Do Optimum’ – ASSESSMENT OF DESIGN

‘Do Optimum’ – Modelled within 2016 validated PARAMICS model

- Model Validated to 2016 traffic conditions
- Industry standard software for highway modelling
- Model run multiple times and average of results taken
- Ability to calculate interaction and traffic movement through and between junctions
- Results focus on AM Peak (8am-9am) and PM Peak (5pm-6pm) periods
‘Do Optimum’ – ASSESSMENT OF DESIGN

‘Do Optimum’ – Conversion to engineering design to enable assessment
‘Do Optimum’ – TRAFFIC MODELLING UNDERTAKEN

Key outputs from the modelling undertaken, include:

— Journey times for whole route

— Average bus journey times and reliability

— Performance of key junctions, relative to queuing and delay (Gilbert Road, Elizabeth Way, Arbury Road, King’s Hedges Road)

— Comparison with the existing scenario - initially based on 2016 flows (2031 to follow)
‘Do Optimum’ – MILTON RD JOURNEY TIME SUMMARY

**AM Peak**

- The ‘Do Optimum’ proposal is estimated to more than double the current journey times into Cambridge from 7.5 mins to 16.6 mins. Outbound would increase by 1 minute from 5.3 mins to 6.3 mins.

**PM Peak**

- The ‘Do Optimum’ proposal is estimated to increase the current journey times into Cambridge by 1.8 minutes from 5.6 to 7.4 mins. Outbound would increase by 1.6 minute from 5.2 mins to 6.8 mins.
‘Do Optimum’ – MILTON ROAD BUS RELIABILITY

- **AM Outbound** ‘Do Optimum’ bus reliability similar to current but average journey times are 1.4 min longer. Reliability similar due to little difference in bus lane configuration.

- **AM Inbound** ‘Do Optimum’ bus reliability much worse than current with average journey times being 7.6 minutes longer and more variable.
‘Do Optimum’ – TRAFFIC MODELLING UNDERTAKEN

Reviewing of this information has led us to:

— Review and test alternative junction designs to balance vehicle journey times along Milton Road, while maintaining ‘Do Optimum’ ideas for pedestrian and cycle accessibility;

— Identify optimum location of bus priority measures.

— Maximise landscaping and tree planting opportunities
‘Do Optimum’ – JUNCTION MODELLING

1. Gilbert Road
2. Elizabeth Way
3. Arbury Road
4. Kings Hedges
‘Do Optimum’ – GILBERT ROAD JUNCTION

“Do Optimum”

• Tighter Radius on junction can slow traffic movements (however current design too tight for large vehicles to manoeuvre)

• Signal Staging assumed to be very similar in ‘Current’ and ‘Do Optimum’ situation
‘Do Optimum’ – GILBERT ROAD JUNCTION

Milton Road Outbound

Milton Road Inbound

Gilbert Road

Do Optimum  Current Situation

Max No Vehicle Queue in Hour

0.0  5.0  10.0  15.0

AM  PM

Do Optimum  Current Situation

Max No Vehicle Queue in Hour

0.0  5.0  10.0  15.0

AM  PM
• Generous provision for cyclists at the junction despite the tight space constraints as per the do optimum

• No fully dedicated right turn lane to help optimise junction phasing and reduce footprint to enable more space for cycling, walking and potentially planting

• High priority and maximum space for pedestrian movements and crossings
‘Modified Do Optimum’ aims to maintain high priority for cyclists and pedestrians while better enhancing signal optimisation.
• Cars will need to slow speed to view priority of cyclist and then other vehicles on the roundabout

• The reduced roundabout radius slows traffic speed and circulatory capacity
‘Do Optimum’ – ACCIDENT ANALYSIS

Elizabeth Way

Key
Accidents 01/01/11 - 31/12/16
- Fatal
- Serious
- Slight
‘Modified Do Optimum’ – ELIZABETH WAY JUNCTION

- Incorporate off street cycle lanes
- Crossing on each arm
- Aimed to maintain maximum landscaping potential within both alternative designs
‘Modified Do Optimum’ with signalised roundabout, which would include no closure of Highworth Ave, looks to be the most balanced solution tested at this junction.
‘Do Optimum’ – ARBURY ROAD JUNCTION

“Do Optimum”

- Signal Staging suggested within the ‘Do Optimum’ proposal has been used.
- During peak (and during operation of bus lane shown) potential safety and signing issues associated with right turn into Arbury Road in ‘Do Optimum’ proposal
- Staggering of junction would not be possible to achieve to the degree shown in proposal due to safety issues of vehicle manoeuvring.
‘Do Optimum’ – ARBURY ROAD JUNCTION

**Milton Road**

**Milton Road Outbound**
- AM: [Graph showing maximum vehicle queue in hours]
- PM: [Graph showing maximum vehicle queue in hours]

**Milton Road Inbound**
- AM: [Graph showing maximum vehicle queue in hours]
- PM: [Graph showing maximum vehicle queue in hours]

**Union Lane**
- AM: [Graph showing maximum vehicle queue in hours]
- PM: [Graph showing maximum vehicle queue in hours]

Legend:
- **Do Optimum**
- **Current Situation**
‘Modified Do Optimum’ – ARBURY ROAD JUNCTION

“Do Optimum”

• Left turn from Union Lane (for vehicles) is banned to enable pedestrian movements to occur during the Union Lane vehicle stage, to improve optimisation.

• Inbound bus lane has been set back to enable more space for cycle lanes and planting.

• Shared use allocation outbound, plus on carriageway cycle facilities
'Modified Do Optimum’ – ARBURY ROAD JUNCTION

- 'Modified Do Optimum' with no closure of Union Lane, only banning of left turns out of Union Lane, identified as the best solution tested at this junction.
‘Do Optimum’ – KINGS HEDGES JUNCTION

“Do Optimum”

- Cars will need to slow speed to view priority of cyclist and then other vehicles on the Roundabout

- The reduced roundabout radius slows traffic speed and circulatory capacity

- Turning the Junction back into a Roundabout can lead to unbalanced flows and excess queueing on specific arms due to being less balanced
• The signals design has full pedestrian stage, rather than staggered, to assist pedestrians.

• Design aims to increase ability to accommodate off-street cycle lanes and landscaping as per ‘Do Optimum’ while still maintaining vehicle capacity.
• ‘Modified Do Optimum’ strikes a better balance between providing off street cycle movements, improved pedestrian crossing facilities (resulting in slightly higher queues then the current situation due to longer all red stage) but still maintaining sizable vehicle capacity
The ‘Modified Do Optimum’ proposal is estimated to improve journey times for all vehicles in both the AM and PM peaks, improving on both the ‘Do Optimum’ and the existing situation.
‘Modified Do Optimum’ – BUS LANES

— In comparison between the ‘Modified Do Optimum’ scheme and the ‘Current Situation’ the table below shows that bus lanes distance remain at a similar level.

<table>
<thead>
<tr>
<th>BUS LANE DIRECTION</th>
<th>Current Situation</th>
<th>Modified Do Optimum</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>OUTBOUND</td>
<td>110m</td>
<td>430m</td>
<td>+320m</td>
</tr>
<tr>
<td>INBOUND</td>
<td>1015m</td>
<td>935m</td>
<td>-80m</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1125m</td>
<td>1365m</td>
<td>+240m</td>
</tr>
</tbody>
</table>

— Benefits are derived from better location and division between inbound and outbound bus priority needs, rather than extensive new amounts of bus lane.

— As per the City Deal Boards Design Principles, no bus lanes run in parallel inbound and outbound along the same stretch of Milton Road.

— Modelling does not currently include for bus hurry calls at junction so bus journey times should be even better than currently shown in ‘Modified Do Optimum’ but that this will increase non-bus journey times to a degree.
• **AM Outbound** bus reliability is similar to existing but average bus journey times are improved over current 2016 situation by 36 seconds per bus (*likely to be much greater in 2031*)

• **AM Inbound** bus reliability is much improved over ‘Do Optimum’ with average journey times being 103 seconds faster then existing 2016 situation, per bus (*again likely to be much greater in 2031*)
### Modified Do Optimum – Meeting Design Requirements

<table>
<thead>
<tr>
<th>DESIGN CONSIDERATION</th>
<th>Modified Do Optimum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does the design meet to all the project objectives</td>
<td>✓</td>
</tr>
<tr>
<td>Does the design provide sufficient infrastructure to improve bus journey times and reliability?</td>
<td>✓</td>
</tr>
<tr>
<td>Would the design perform safely?</td>
<td>✓</td>
</tr>
<tr>
<td>Is it compatible with design guidance and standards?</td>
<td>✓</td>
</tr>
<tr>
<td>Are the key junction layouts the most suitable to achieve the right balance between traffic delays and improved bus journey times?</td>
<td>✓</td>
</tr>
<tr>
<td>Does the design fit within highway boundaries and with existing drive accesses?</td>
<td>✓</td>
</tr>
</tbody>
</table>
‘MODIFIED DO OPTIMUM’
DRAFT CONCEPT
‘MODIFIED DO OPTIMUM’ – CONCEPT PLANS

The following slides set out concept plans for a ‘Modified Do Optimum’ design, which enables clear comparison with the original ‘Do Optimum’.

Please note the ‘Modified Do Optimum’ plans show a preferred DESIGN CONCEPT only and should not be considered as a detailed or final design.

If agreement of this concept is given by the City Deal Board. Detailed design based around this design concept will be worked up with input from LLF and stakeholders later in the year.

Please note the following areas of design have not been included at this time and will be designed (and located) in consultation with the LLF and key stakeholders:

— Bus stop locations
— Additional pedestrian crossings outside of the junction designs
— Detailed planting schemes
‘Modified Do Optimum’ – Mitchams Corner to Ascham Rd
‘Modified Do Optimum’ – Ascham Rd to Oak Tree Ave
‘Modified Do Optimum’ – Oak Tree Ave to Birch Close
‘Modified Do Optimum’ – Birch Close to Fraser Rd
‘Modified Do Optimum’ – Fraser Rd to Cook Close
‘Modified Do Optimum’ – Cook Close to The Busway
FUTURE PROGRAMME
FUTURE PROGRAMME AND LLF ENGAGEMENT

Future Engagement  June / July 2017

Summer / Autumn 2017

- LLF Design Workshop Trees to inform Detailed Design
- LLF Design Workshop Bus Stops and Crossings to inform Detailed Design
- Further LLF meetings as required to inform/influence emerging detailed design

Early 2018

- Executive Board to consider detailed design
- Full Public Consultation on approved detailed design
Thank you