Appendix G. Construction Phasing Report

Essex Highways

Construction Phasing Report

B3553F05-0000-REP-0063 P1

May 2019

RINGWAY JACOBS integrated expertise | Essex County Council

Document Control Sheet

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Report Title	Construction Phasing Report
Project Number	B3553F05
Status	For Information
Revision	P1
Control Date	

Record of Issue

Issue	Status	Author	Date	Check	Date	Review	Date
P0	Issued	JS	Jun16	JC	Oct16	AK	Oct16
P1	Issued	JS	May 19	JC	May 19	AK	May 19

Approved for Issue By	Date
PM	

Distribution

Organisation	Contact	Number of Copies
JACOBS	Jiren Shah / Joydeep Chakravorty	

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Purpose

This report gives an overview of the proposed construction phasing for the scheme. It is to be noted that the proposed phasing outline is based upon the illustrative design developed during PCF Stage 4/5.

Limitation Statement

Whilst undertaking the constructability assessments for the entire scheme in accordance with Stage 4/5 illustrative design, certain proposals were explored in detail in order to optimise the overall duration of the construction programme but the proposals were limited / rejected / discarded due to either engineering or logistical issues. Brief explanation of the 'limitations' are described below.

Limitation on Gilden Way Works

In order to ensure that Gilden Way widening works could be carried out safely and adhere to safety guidelines set up in Chapter 8 of Traffic Management manual, a number of traffic management options were explored to ease the current traffic load on Gilden Way, thus enabling the widening works to be undertaken in a safe and efficient manner. Ultimately, all the proposed options were discarded due to various reasons and changes were incorporated into the design to allow the widening works on Gilden Way to be undertaken without diverting the current traffic.

The traffic management options that were explored and ultimately discarded for Gilden Way works are described below.

Alternative proposed Phasing Options for Gilden Way Works (Discarded Options)

- Full closures of the existing eastbound (E/B) & westbound (W/B) lanes on Gilden Way with a proposed diversion route was explored as the 1st option. This proposal would have diverted the entire volume of traffic from Gilden Way on to a diversion route which would have then helped to minimise the construction phasing and reduce the overall construction durations of Gilden Way widening works. This proposal was not taken forward for several reasons including the significant length of the proposed diversion route that was to allow diverting the traffic currently flowing on the existing Gilden Way. Proposing a complete new diversion

route for Gilden Way traffic was also not deemed viable and consistent with the client's preference due to which this proposal was discarded.

- Single lane closures of the existing E/B or W/B lanes on Gilden Way with proposed diversion route was explored as a 2nd option. Taking either E/B or W/B traffic off Gilden Way and put on the diverted route would have helped to minimise the construction phasing and reduce the overall construction durations of Gilden Way widening works. Due to the current flow rate on Gilden Way, this proposal was also deemed unsuitable due to traffic disruption and safety issues.

- The option of creating a shorter diversion route by temporarily tying in the old Sheering Road and allowing a full closure of Gilden Way was explored as a 3rd option. However, this proposal was also deemed unsuitable due the extra work and time it would require to create the temporary diversion route by tying in with the old Sheering Road. This option also had the potential to cause local resentment and opposition due to noise and other traffic impacts on Sheering Road. Due to these reasons, this proposal was also discarded.

Limitation on the construction of 'Diverge link' and works over existing M11

In order to reduce the overall construction period of the scheme, one of the key drivers is to undertake the construction of the offline link between The Campions roundabout and the M11 grade separated junction early in the programme. The construction of this link requires significant volumes of earthworks and heavy plant movement.

In order to undertake these works early in the programme, it would be required to import the entire volume of earthworks using Gilden Way. Knock-on impacts of routing the construction traffic through Harlow Town via Gilden Way and on the local road network would be significant and considered intolerable.

Installing M11 bridge beams with a rolling roadblock to avoid full closure of the existing M11 northbound (N/B) & southbound (S/B) lanes was also explored, however, due to construction logistics and safety issues, the option of using 'Rolling Blocks' was also deemed unsuitable.

References

- Refer to Phasing Drawings for more details B3553F05-0100-DR-(0801 to 0810) P2.
- Refer to Traffic Management Plan for details of proposed traffic management regime to be put in place to undertake works on the existing M11.
- Refer to Construction Methodology Report for details of proposed construction method for the scheme B3553F05-0000-REP-0076 P1.
- Refer to Construction Programme for dates and durations for given construction activities (B3553F05-0100-PR-0800 P1).

1. Introduction

The M11 Junction 7A scheme involves construction of a new junction over the existing M11, located approximately 6km north of Junction 7. The Junction will be ‘Grade -Separated’ and has both north and south ‘on & off’ slip roads giving full access to the Motorway network. The new proposed junction will comprise of two roundabouts in a dumbbell configuration (referred to as Dumbbell Roundabout) at either end of a new dual two-lane overbridge built over the existing M11 motorway.

The scheme also involves widening of the existing two-lane Gilden Way (B183) to three lanes from London Road roundabout to Mayfield Farm. . At the location of Mayfield Farm on the existing Gilden Way, the widened carriageway will begin to veer off-line to the right where a new carriageway will be built linking the existing Sheering Road with a new roundabout called The Campions roundabout. The existing Sheering Road north of Mayfield Farm will be converted into a local access road for the Campions residents and a new junction will link the Campions residents with the re-aligned Sheering Road.

After the completion of this scheme, two of the lanes on Gilden Way will take traffic in the westerly direction into Harlow Town and the third lane will take the outbound traffic onto the M11.

To assist in understanding the construction of the entire scheme, it has been split into **Section A & B** for the purpose of this report.

Section A comprises the widening works that are required to be carried out on Gilden Way between London Road roundabout and The Campions roundabout (Ch:0 to Ch:2250).

Section B comprises the works that are required to be carried out from the east of The Campions roundabout and includes the new link road, the dumb bell roundabout junction over the existing M11, and construction of the north & south bound merge and diverge slips.

In order to understand the complexity of construction in Section A & B as discussed above, a detailed study has been carried out by Jacobs’ constructability team to establish the sequence of construction within each section. Section A & B have been further split into multiple phases to allow implementation of traffic management in accordance with safety guidelines presented in Chapter 8 of the Traffic Management Manual and allow the widening works to be undertaken in a safe manner.

It is to be noted that the purpose of this report is to present a feasible construction phasing option and does not intend to put any constraint on the principal contractor. It is also to be noted that this report only outlines the proposed construction phasing strategy for the scheme and doesn't capture the construction methodology of each phase within Section A or B. The construction methodology for each phase within Section A & B will be detailed in a separate document titled as the 'Constructability Report' (B3553F05-0000-REP-0076 P1).

2. Proposed Construction Phasing Breakdown

This section details the proposed construction phasing breakdown for the entire scheme. It is proposed to split the construction of the entire scheme in two main construction sections, **Section A** and **Section B**. These sections are further broken down into multiple phases as detailed below in Table 1.

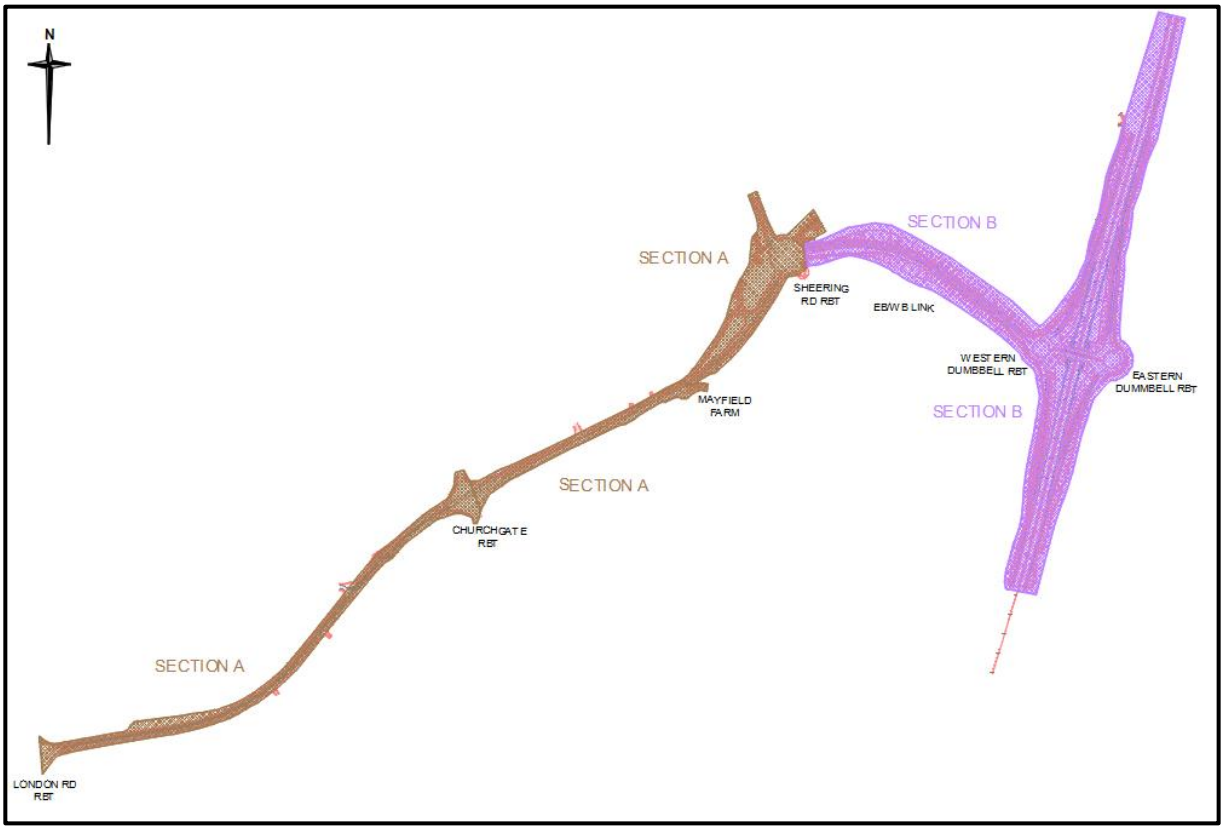
See below table and figure for the proposed construction phasing breakdown for the scheme.

Table 1 – Proposed Construction Phasing Breakdown

Main Phase	Sub-Phase	Sub-Phase Brief Description
Section A (London Roundabout [Ch0] – New The Campions roundabout [Ch2252] Including The Campions roundabout junction)	Gilden Way (Ch0-Ch1900) Phase A	EB widening works up to the top of concrete level only including Churchgate Roundabout works
	Gilden Way (Ch0-Ch1900) Phase B	WB widening works up to the top of concrete level only
	Gilden Way (Ch0-Ch1900) Phase C	New WB lane 1 works up to binder course *(Depending on the nature of widening required, Lane 1 would contain either the new widened area + half of the existing carriageway or only new widened area or only the existing carriageway)*
	Gilden Way (Ch0-Ch1900) Phase D	New WB lane 2 works up to binder course *(Lane 2 would contain the rest of the existing carriageway)*
	Gilden Way (Ch0-Ch1900) Phase E	New EB lane 1 works up to binder course *(Depending on the nature of widening required, Lane 1 would contain either the new widened area + half of the existing carriageway or only new widened area or only the existing carriageway)*

	Gilden Way (Ch0-Ch1900) Phase F	Surfacing works for all three lanes
	New Link (Ch1900-The Campions roundabout) Phase G	Offline section up to and including surfacing works
	New Link (Ch1900 - The Campions roundabout) Phase H	Tie in works
	New Link (Ch1900-The Campions roundabout) Phase I	Minor works on existing Sheering Road
Section B (East of The Campions roundabout up to M11 Dumbbell roundabout junction including N/B & S/B On & Off slips on the existing M11)	Part Slips Phase A	Part construction of new slips from M11 up to existing ground level
	Phase B	New EB/WB link (part construction) and M11 over bridge
	Phase C	New M11 dumbbell roundabout junction, remaining EB/WB link and remaining M11 slips

Figure 1- Illustrative Construction Sections



3. Section A (London Rd roundabout – The Campions roundabout)

This section involves asymmetric widening of the existing Gilden Way between London Road roundabout and The Campions roundabout including the construction of a new offline section between Mayfield Farm (Ch1900) and The Campions roundabout. Gilden Way currently has a single lane arrangement in both directions and is to be widened to a three-lane configuration (one lane E/B towards M11 and two lanes W/B towards Harlow).

The overall strategy is to simultaneously carry out widening works on Gilden Way and offline works between Ch1900 and The Campions roundabout. Once the new offline section is constructed and tied into the existing alignment, minor improvements works can begin on the old Sheering Road between Mayfield Farm (Ch:100) to the south and Ealing Bridge (Ch:0) to the north of the existing Sheering Road.

Due to space constraints within the existing highway boundary, widening works are required to both the existing E/B and W/B lanes on Gilden Way with the widening width varying over the entire stretch.

To undertake widening works to the existing E/B & W/B carriageway on the existing Gilden Way, the proposed construction methodology would require a number of traffic management configurations to be implemented throughout the construction period.

A narrow lane arrangement would be required for several phases with a reduced speed limit during the works. It is to be noted that due to complex and changing traffic management configurations required during Section A works, it is advisable that the principal contractor engages with a specialist traffic management company to minimise disruptions to traffic currently flowing on Gilden Way.

During running narrow lane arrangement on the existing Gilden Way, it is highly advisable to demarcate the opposing lanes using a robust barrier system instead of using traffic cones. This is recommended to improve safety for road users and the workforce (robust barriers would not be susceptible to as much movement as traffic cones) and would also improve work efficiency. Using a robust barrier system would also lower the maintenance of the implemented traffic management regime on a day-to-day basis mainly because they are less susceptible to get moved as compared to the traffic cones. The use of cones

would only be recommended where night work or similar is required to enable speedy installation and removal of TTM to ensure the work required during that shift is not delayed.

The main objectives of the proposed construction phasing are to;

- ensure the design can be constructed in line with standards and guidance (i.e. Traffic Signs Manual Chapter 8).
- ensure the safety of the workforce and road users throughout the construction period.
- minimise disruption by maintaining road capacity when and where possible.
- minimise environmental impact to surrounding area.

As discussed above, there are two main elements to Section A which consist of; Gilden Way widening works (including improvement to the existing carriageway) and the new offline works (from Ch1900 – The Campions roundabout). The sub-phases for these elements are detailed in the sections below.

1.1 Gilden Way Widening

Gilden Way is proposed to be widened from a two-lane carriageway to a three-lane carriageway. To widen and carry out improvements to the existing carriageway on Gilden Way whilst ensuring the aforementioned objectives are met, six phases (A-F) have been proposed for the Gilden Way widening works. It is to be noted that the proposed phasing strategy is indicative and is not proposed to create any constraint on the Principal Contractor.

1.1.1 Section A, Phase A - London Road roundabout to Mayfield Farm (Ch0 – Ch1900)

This phase involves widening the existing carriageway on the north side from the outer edge of the existing E/B lane to the final alignment between CH0-CH1900. This phase includes construction of the ‘hamburger’ alignment at Churchgate Roundabout. To carry out the works safely, traffic management is required by means of narrowing both E/B and W/B lanes to 3m.

An exclusion zone is required from the edge of the live E/B carriageway to ensure minimum 0.5m safe distance is available at all times between the live traffic and the working zone whilst widening works are ongoing to the north side of the existing E/B carriageway. This phase would also include construction of the footpath on the north side.

This stage would involve widening the EB carriageway up to the top of the concrete layer only along with installation of tie bars connecting the new concrete to the concrete pavement of the existing carriageway where required.

In a few instances over relatively short sections on Gilden Way, the existing road width is not sufficient to allow a narrow lane, minimum exclusion zone and varioguard arrangement. These sections would need to be carried out overnight during single lane closures.

It should also be noted that the NMU route would be closed during Phase A construction, therefore NMUs would need to be put on a diversion route prior to commencing any widening works on Gilden Way.

See Figure 2 and Figure 3 for indicative cross sections during Section A, Phase A works.

See drawing B3553F05-0100-DR-0801 P2 & B3553F05-0100-DR-0802 P2 for further details.

Figure 2 – Section A, Phase A Cross Section (Ldn Rbt – Churchgate Rbt)

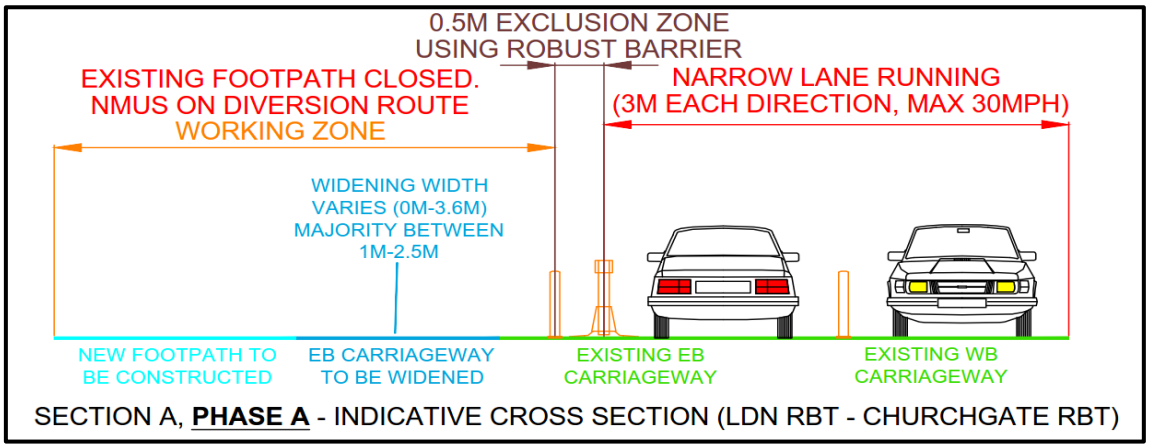
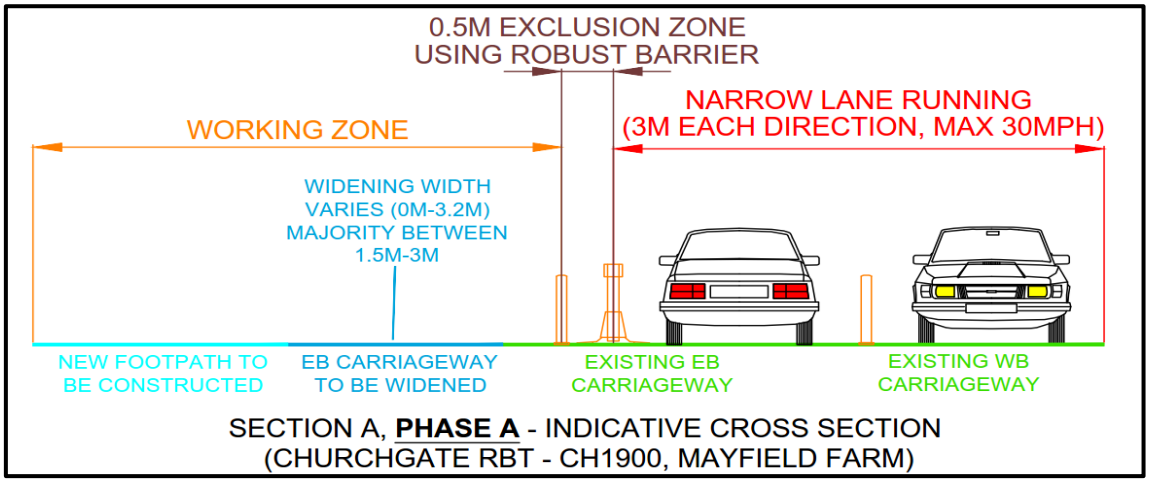


Figure 3 – Section A, Phase A Cross Section (Churchgate Rbt – Ch1900)



1.1.2 Section A, Phase B - London Road roundabout to Mayfield Farm (Ch0 – Ch1900)

This phase would commence following the completion of Phase A. This phase would involve widening the existing carriageway on the south side from the outer edge of the existing W/B lane to the final alignment between Ch0 – Ch1900.

The traffic arrangement would be identical to Phase A however the EB and WB lanes would be moved as far north as possible (utilising the widened concrete area).

Similar to Phase A, Phase B would also involve pouring mass concrete in the area of widening and installing tie bars as required, to stitch the widened pavement with the concrete pavement of the existing carriageway.

See Figure 4 and Figure 5 for indicative cross sections during Section A, Phase B works.

See drawing B3553F05-0100-DR-0801 P2 & B3553F05-0100-DR-0802 P2 for further details.

Figure 4 - Section A, Phase B Cross Section (Ldn Rbt – Churchgate Rbt)

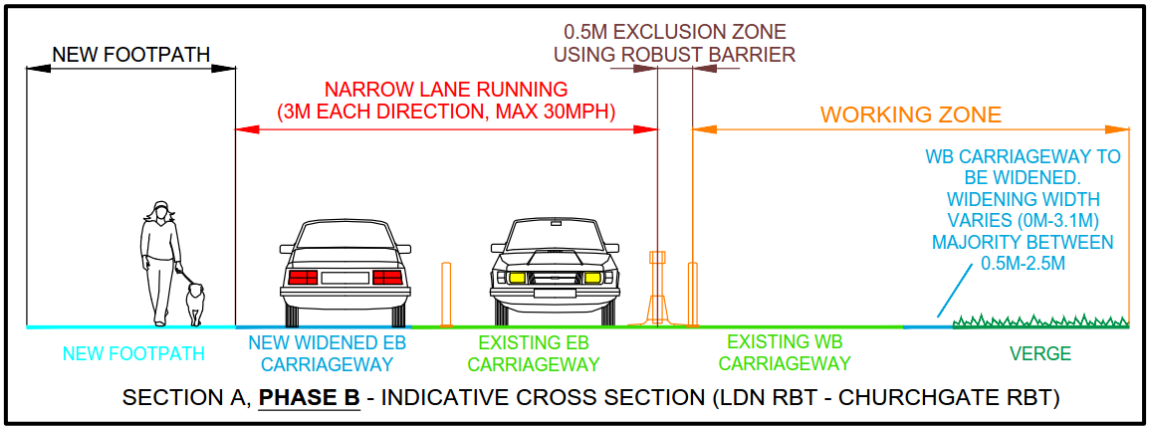
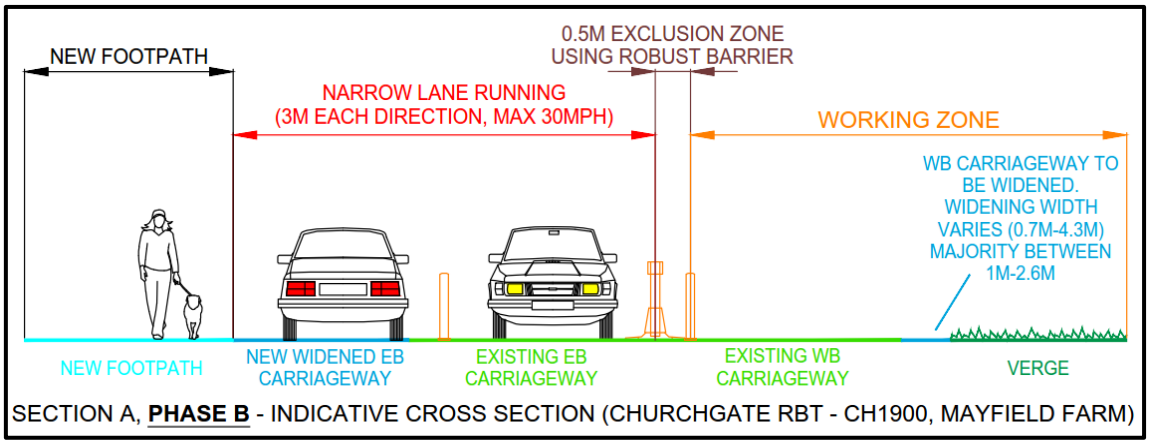


Figure 5 - Section A, Phase B Cross Section (Churchgate Rbt – Ch1900)



1.1.3 Section A, Phase C - London Road roundabout to Mayfield Farm (Ch0 – Ch1900)

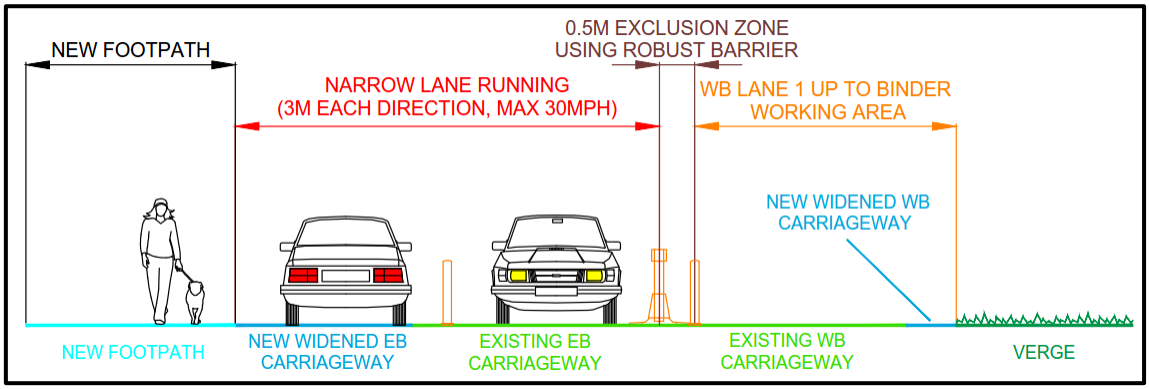
This phase would commence following completion of Phase B. The traffic management arrangement would remain as per Phase B.

This phase involves breaking the existing carriageway down to the existing concrete and repairing any joint issues. This would be carried out for what would become the new WB lane 1 (southern lane). Following this, WB lane 1 can be constructed up to the top of binder course (a sacrificial layer may be laid on the top of the binder course to protect the binder course temporarily if required).

See Figure 6 for indicative cross sections during Section A, Phase C works (Ch0 – Ch1900).

See drawing B3553F05-0100-DR-0803 P2 & B3553F05-0100-DR-0804 P2 for further details.

Figure 6 - Section A, Phase C Cross Section (Ldn Rbt – Ch1900)



1.1.4 Section A, Phase D - London Road roundabout to Mayfield Farm (Ch0 – Ch1900)

This phase would commence following completion of Phase C. The traffic management arrangement would need to be adjusted. The EB lane would remain as per Phase C, the WB lane would be moved onto the newly laid binder course on the top of WB lane 1.

Similarly to Phase C, this phase involves breaking the existing carriageway down to the existing concrete and repairing any joint issues. This would be carried out in the stretch what would become the new WB lane 2 (central lane). Following this, WB lane 2 can be constructed up to the top of the binder course.

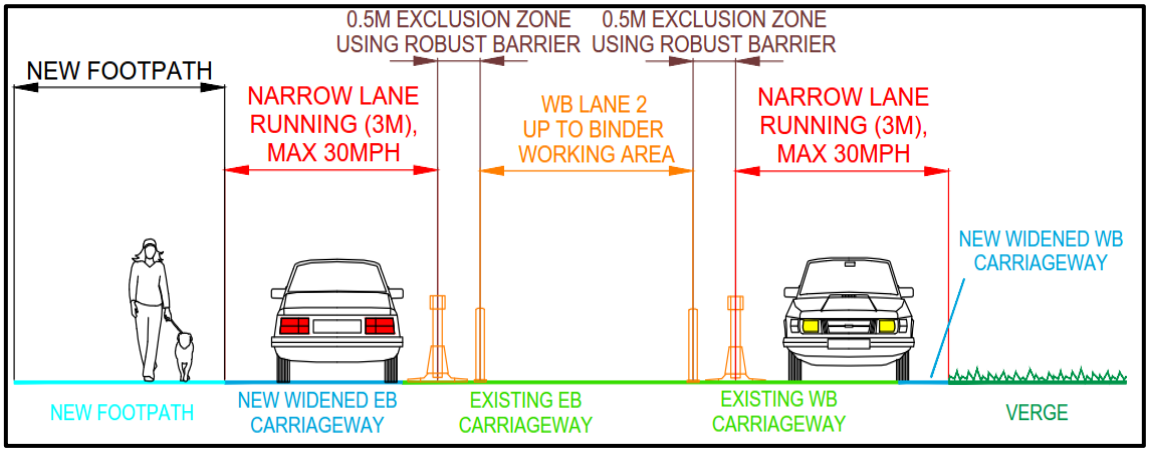
Due to space constraints and considering the working zone is between two live carriageways, whilst not mandatory, it is recommended the speed limit is lowered to 20mph whilst the works associated with WB lane 2 are ongoing.

Another recommendation during this phase and particularly in the stretch between Ch0 and Mulberry Green junction would be to further reduce the lane widths down from 3m to 2.5m-2.75m in order to increase the working room available. This would mean that HGV movements would be prohibited in this stretch and would have to be diverted via Mulberry Green. The section between Ch0 and Mulberry Green is fairly space constrained (the other sections have slightly more space thereby 3m narrow lane arrangement wouldn't be an issue to implement).

See Figure 7 for indicative cross sections during Section A, Phase D works (Ch0 – Ch1900).

See drawing B3553F05-0100-DR-0805 P2 & B3553F05-0100-DR-0806 P2 for further details.

Figure 7 - Section A, Phase D Cross Section (Ldn Rbt – Ch1900)



1.1.5 Section A, Phase E - London Road roundabout to Mayfield Farm (Ch0 – Ch1900)

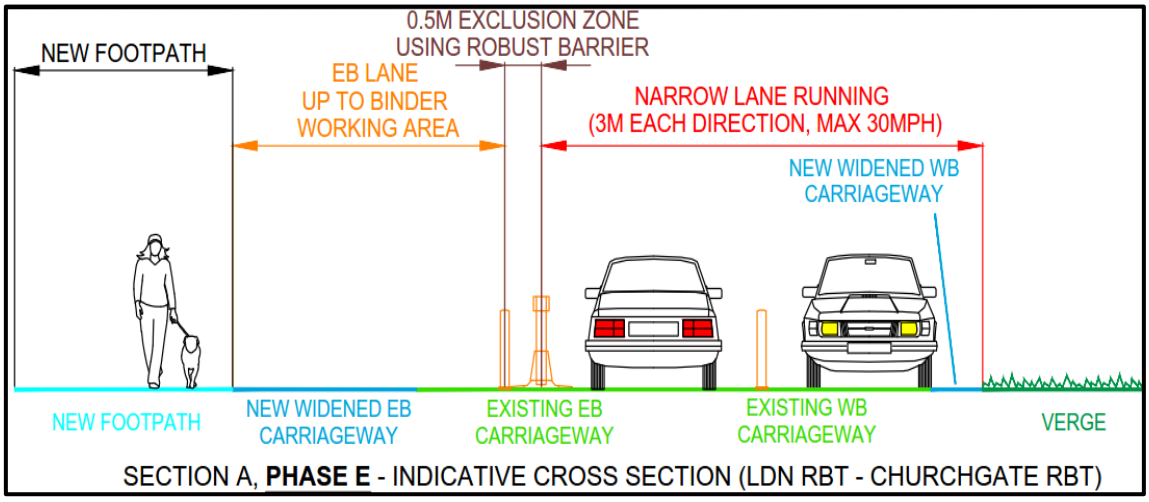
This phase would commence following completion of Phase D. The traffic management arrangement would need to be adjusted. The WB lane would remain as per Phase D, the EB lane would be moved onto what would be the WB lane 2 on the top of the newly laid binder course.

This phase would also involve breaking the existing carriageway down to the existing concrete and repairing any joint issues. This would be carried out in the stretch that would become the new EB lane (northern lane). Following this, EB lane can be constructed up to the top of binder course.

See Figure 8 for indicative cross sections during Section A, Phase E works (Ch0 – Ch1900).

See drawing B3553F05-0100-DR-0807 P2 & B3553F05-0100-DR-0808 P2 for further details.

Figure 8 - Section A, Phase E Cross Section (Ldn Rbt – Ch1900)



1.1.6 Section A, Phase F - London Road roundabout to Mayfield Farm (Ch0 – Ch1900)

Once Phase E is completed, the entire three lane carriageway would be constructed up to the binder course. The binder course joints would be between the lanes.

Phase F would involve surfacing works. It would be ideal to close the road and surface the entire carriageway thereby minimising joints and avoiding installation of traffic management (other than a diversion route).

Due to the volume of traffic on Gilden Way and length of alternative diversion route it is proposed to not completely close the road but to undertake the surfacing works at night under part closure by keeping one lane open. Surfacing works would need to be carried out overnight in manageable stretches over half of the three-lane carriageway.

Traffic management would involve setting up traffic cones for the stretch to be worked on, installing temporary traffic lights to allow two-way flow of traffic over the single lane arrangement. The TTM would then be taken down before the (following) morning peak hours. This would be repeated each night until the entire carriageway is surfaced.

See Figure 9 and Figure 10 for indicative cross sections during Section A, Phase F works (Ch0 - Ch1900).

See drawing B3553F05-0100-DR-0876 P0 for further details.

Figure 9 - Section A, Phase F Cross Section (Ldn Rbt – Ch1900) Southside

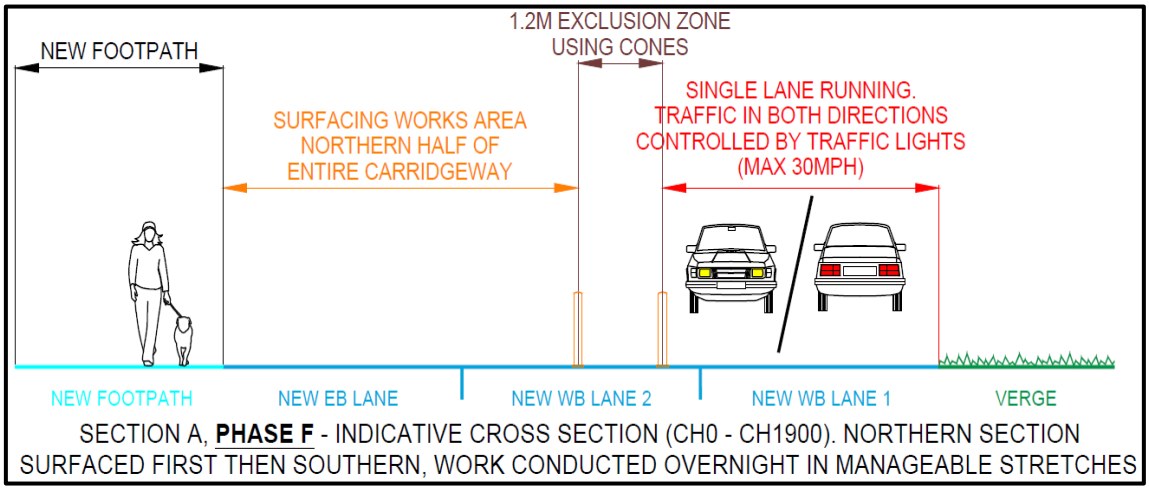
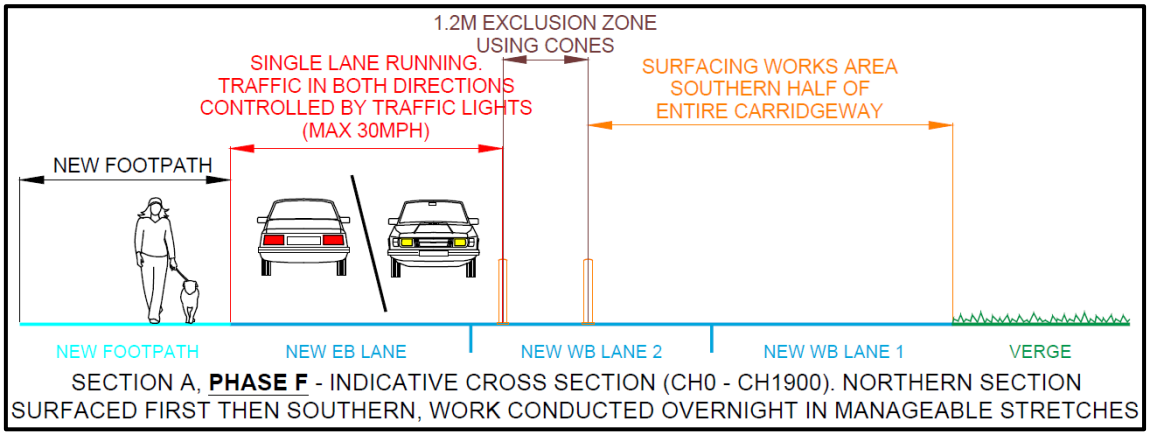


Figure 10 - Section A, Phase F Cross Section (Ldn Rbt – Ch1900) Northside



1.2 Offline Construction (Mayfield Farm @ Ch1900 – The Campions roundabout)

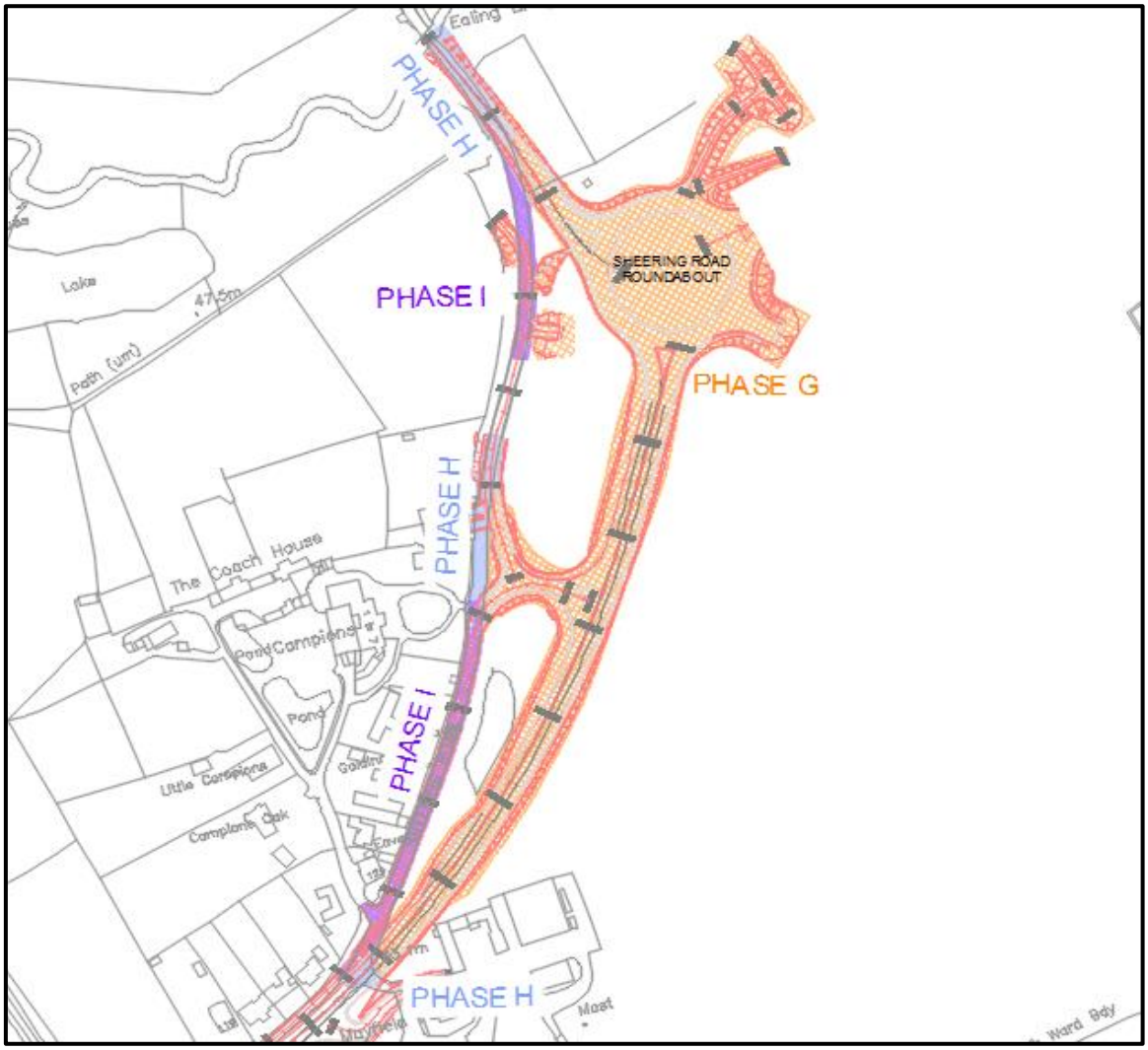
A continuation of the proposed Gilden Way widening is proposed. This new connection would be offline and begins to veer off the existing Gilden Way alignment at the location of Mayfield Farm at approx. Ch1900. The new offline link would be a three-lane carriageway (one towards M11, two towards Harlow) and would extend approx. 350m up to the new proposed Campions roundabout. The Campions roundabout is constructed offline and would have six arms;

- To and from Harlow (south).
- To and from existing Sheering Road (north).
- Connection to the new drainage pond (with possibility to develop into new link as part of future bypass if and when required).
- Land access
- To and from new M11j7a western rbt.
- A stub arm for access to potential future development.

The general construction sequence for this element would be to initially construct the offline sections, tie in the offline section to the existing road network and divert the traffic that is currently flowing on the existing Sheering Road through the newly built offline stretch and finally carry out minor improvement works on the existing Sheering Road. The off-line construction has been proposed in three phases (G – I).

The phasing of Section A offline section (Ch1900 – the Campions roundabout) is illustrated in figure 11.

Figure 11 - Section A, Phase G,H & I (Ch1900 – The Campions roundabout)



1.2.1 Section A, Phase G, (Mayfield Farm @ Ch1900 – The Campions roundabout)

This phase involves offline construction from Mayfield Farm (Ch1900) up to and including The Campions roundabout. As this phase is offline, traffic management would not be required other than a local access of Sheering Rd for construction traffic to enter/exit the site. Construction would be carried out as close as possible to the existing alignment without disrupting the live traffic i.e. this phase would be entirely new construction and won't include tying-in to the existing carriageway.

See drawing B3553F05-0100-DR-0809 P2 for further details.

1.2.2 Section A, Phase H (Tie in Locations)

This phase would commence following completion of Phase G. This phase would involve tying in the newly constructed alignment (carried out in Phase G)

into the existing Sheering Road at three locations; northern roundabout arm, link road (approx. CH2110) and tying in of the southern arm with the existing Sheering road. This phase would require traffic management, temporary access to housing and night time working. The work in this phase would not be significant but would cause disruption to the Campion residents on the existing Sheering Road for a short period of time.

See drawing B3553F05-0100-DR-0809 P2 for further details.

1.2.3 Section A, Phase I (Works on existing Sheering Road)

This phase would commence following completion of Phase H and the traffic currently flowing on Gilden Way has been diverted through the newly built offline stretch between Mayfield farm and new The Campions roundabout.

Access to local property (Campions residents / residents living on the west side of the existing Sheering Road) may be affected temporarily but some form of access would be maintained as far as reasonably practicable.

See drawing B3553F05-0100-DR-0809 P2 for further details.

4. Section B (The Campions roundabout – M11)

Section B would involve construction of the four new slip roads, construction of the two new dumbbell roundabouts (east and west of the existing M11) along with the new bridge spanning over the existing M11 connecting the eastern & western roundabouts. Section B would also involve construction of a new link road connecting The Campions roundabout and the dumbbell to the east.

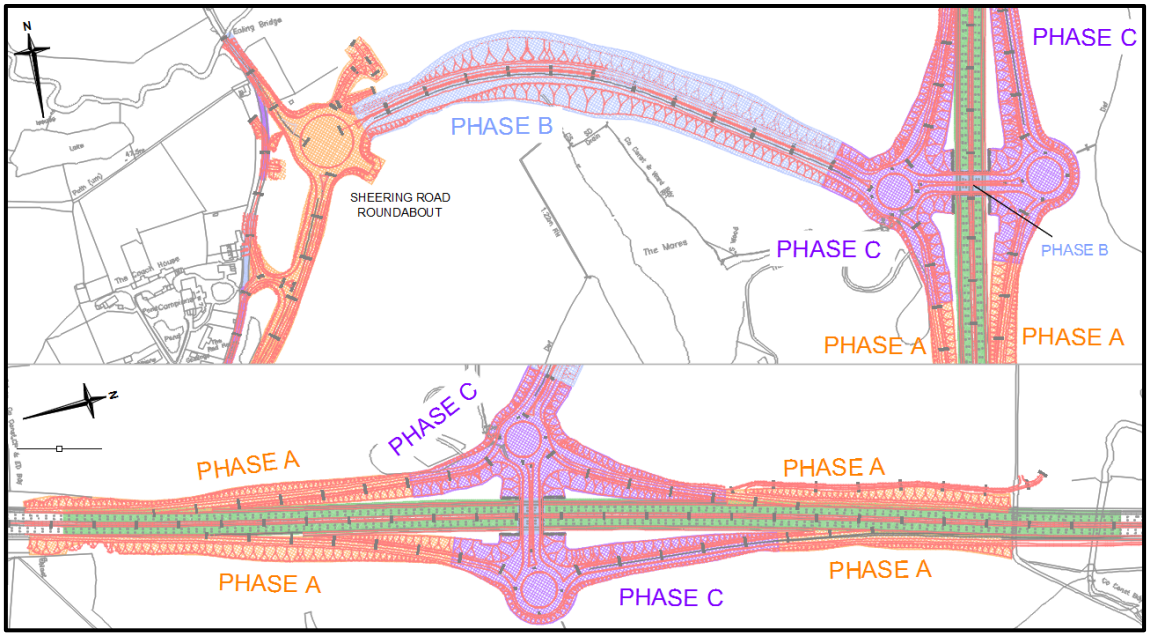
The construction phasing sequence has been designed to;

- ensure the design can be built on the ground.
- minimise disruptions to the local road network where and when possible.
- minimise importation requirements by optimizing earthworks sequence.
- minimise construction traffic movements using the Gilden Way and the surrounding local road network.

The phasing of Section B is illustrated in Figure 12.

As mentioned previously, this report only outlines the proposed phasing. For a detailed description of the works involved in each phase along with the proposed method of construction refer to the Construction Methodology Report (B3553F05-0000-REP-0076 P1).

Figure 12 - Section B, Phase A,B & C



2.1 Section B, Phase A (New M11 Slips – Part Construction)

This phase would involve part construction of all four M11J7A slips; NB merge (Ch0-Ch90), NB diverge (Ch0-Ch310), SB merge (Ch0-Ch290), SB diverge (Ch0-Ch120) as well as drainage works on the existing M11. The four slips would be constructed from the M11 (slip chainage 0) up to designed grade level and act as an access for construction traffic directly of the M11 up until the end of Section B.

Part slips would be constructed as per the permanent designed alignment up to the binder course with a possible sacrificial layer. This would be used only for construction related works. Surfacing works would be conducted shortly before completion of Section B works.

During this phase, traffic management would be required in the form of hard shoulder closure and a narrow lane arrangement would be implemented on the existing M11 for both northbound and southbound running lanes.

A separate Traffic Management Plan - B3553F05-0000-REP-0144 P0 has been prepared capturing the details of proposed Traffic Management regime required to be implemented to allow carrying out works on the M11.

Drawing B3553F05-0100-DR-0810 P2 captures the details of the proposed Traffic Management set-up on the existing M11.

2.2 Section B, Phase B (M11 Bridge & EB/WB Link – Part Construction)

This phase involves construction of much of the new EB/WB link (Ch50 – Sheering Road Roundabout). This phase would also include construction of the M11 overbridge (including construction of the Bridge abutments).

The EB/WB link would be connected to Sheering Road Roundabout in this phase but would not be opened to the public until completion of Section B, Phase C.

Majority of works in this phase would be carried out offline except for the installation of the Bridge structure over the existing M11 N/B & S/B carriageways, requiring traffic management and overnight road closures on the M11.

See drawing B3553F05-0100-DR-0810 P2 for further details.

2.3 Section B, Phase C (M11 Dumbbell Roundabouts, Remaining EB/WB Link & Remaining Slip Construction)

This phase would commence following completion of Phase B. This phase would involve construction of the eastern and western M11 dumbbell roundabouts including earthworks backfill up to M11 bridge abutments.

It would also include construction of the remaining EB/WB link (Ch0-Ch50) and remaining sections for all four slip roads, which would connect to the partly constructed slips during Phase A; NB merge (Ch90-Ch292), NB diverge (Ch310-Ch410), SB merge (Ch290-Ch365), SB diverge (Ch120-Ch360).

This phase would be conducted offline and link all the already constructed elements together. Once this phase is complete, Section B can be open to traffic.

See drawing B3553F05-0100-DR-0810 P2 for further details.