

Land East of Cowbridge Road  
St Athan  
Vale of Glamorgan

**astro**

Transport Assessment

January 2018

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## Revision History

Issue 1	15 <sup>th</sup> January 2018	

0911 Cowbridge Road TA Addendum.docx

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Ymgynghorwyr Priffyrdd a Thrafnidiaeth  
 Highways & Transportation Consultants

## 1 Introduction

- 1.1 Acstro Ltd has been appointed to advise on highway and transportation issues associated with the proposed residential development of land to the east of Cowbridge Road, St. Athan, Vale of Glamorgan. The land is allocated for the development of 253 residential units in the Vale of Glamorgan Council's Deposit Local Development Plan under reference MG2(5).
- 1.2 A Transport Assessment has been produced in support of the planning application. This Addendum addresses issues that have been raised by the Highway Authority in respect particularly to the following:
  - The design of the primary site access roundabout and its interaction with an existing access to MOD land.
  - Proposed improvements to the Gilestone Road / B4265 crossroads.
  - Analysis of the safety record of Cowbridge Road and Gilestone Road.

## 2 Site Access

- 2.1 The Highway Authority raised concerns that the previously submitted proposal for a four-arm roundabout at the junction of Cowbridge Road and Eglwys Brewis Road would result in potential conflict between circulating traffic on the roundabout and users of an existing access to MOD land located to the south west of the roundabout.
- 2.2 Following discussions with the Highway Authority the position of the roundabout has been adjusted to increase the separation between the roundabout and MOD access such that vehicles are able to leave the MOD access and be positioned correctly at the roundabout's Eglwys Brewis Road entry.
- 2.3 The revised design is included as Appendix 1.

### **Appendix 1 Proposed Access & Cowbridge Road Off Site Works**

- 2.4 The revised scheme has been the subject of a Stage 1 Road Safety Audit (RSA), which is included as Appendix 2.

### **Appendix 2 Road Safety Audit**

- 2.5 The RSA identified that the roundabout may not be legible to drivers approaching the roundabout from Eglwys Brewis Road, with visibility of the entry to the roundabout being somewhat limited. Consequently the RSA recommended that the roundabout be repositioned.

- 2.6 This has been investigated in detail. The position of the roundabout is governed by several factors including the approach alignments of the existing roads, the position of the MOD access, an archeological feature to the north and land ownership constraints at the roundabout's south western corner. Several variations to the roundabout's position have been attempted but on each occasion this results in conflict with other limiting factors. In particular, a movement of the roundabout to the north or east tightens the turn from Eglwys Brewis Road to St Athan Road and it was found that, in order to accommodate the swept path of HGV's, the Eglwys Brewis Road entry had to be widened on the near side thus cancelling any improvement to forward visibility for the Eglwys Brewis Road approach. It has been concluded that the roundabout is in the optimum location given the various constraints that exist.
- 2.7 Forward visibility on the approach from Eglwys Brewis Road has been considered in more detail. The entry to the roundabout is visible from 43m, the required stopping sight distance for 30mph speeds and the junction conforms to design standard in this respect. This means the layout and approach to the roundabout is visible and legible to drivers in good time for them to slow and stop at the give way line. In addition, the proposed splitter island on this approach is visible from a significant distance, at least 100m. A bollard with 'keep left' sign can be located on the splitter island to increase its visibility. Street lighting will also be provided to increase the visibility and legibility of the junction and its approaches and it is considered that these measures, together with appropriate road markings and signage, will ensure that the junction is legible to approaching drivers.
- 2.8 These measures will be developed further during the detailed design of the junction and the detailed design will subsequently be subject to a Stage 2 RSA.
- 2.9 The capacity of the revised roundabout has been assessed by using the ARCADY software. This calculated the ratio of flow to capacity (RFC) of each arm of the roundabout. A RFC of less than 1 indicated that the junction is operating within its capacity.

### Appendix 3 Primary Site Access Capacity Analysis

- 2.10 The analysis shows that the new roundabout has ample spare capacity with a maximum RFC of 0.31.

	AM				PM			
	Queue (Veh)	Delay (min)	RFC	LOS	Queue (Veh)	Delay (min)	RFC	LOS
<b>Proposed Roundabout - Design 2027</b>								
<b>Site Access</b>	0.11	0.07	0.10	A	0.06	0.07	0.06	A
<b>Cowbridge Road</b>	0.45	0.08	0.31	A	0.31	0.07	0.23	A
<b>Eglwys Brewis Road</b>	0.17	0.06	0.14	A	0.14	0.06	0.12	A
<b>St Athan Road</b>	0.14	0.06	0.12	A	0.23	0.07	0.19	A

**Table 1 Primary Site Access Junction Analysis**

### 3 Gilestone Road / B4265 Junction Improvement

- 3.1 Improvements to the Gilestone Road / B4265 crossroads to the south of St Athan are proposed as part of the development.
- 3.2 Following discussions with the Highway Authority the proposal for the junction have been developed further and the latest is shown in Appendix 4. The latest layout also address recommendations made within a Stage 1 RSA (see Appendix 1)

#### Appendix 4 Gilestone Road / B4265 Junction Improvement

- 3.3 The operation of the existing junction arrangement was described within the Transport Assessment. Congestion is currently experienced on the northern approach to the junction and this is expected to worsen by 2027 whether the development proceeds or not. The Transport Assessment's summary of the junction analysis is reproduced below.

	AM Peak Hour RFC			PM Peak Hour RFC		
	Observed	2027 Baseline	2027 + Development	Observed	2027 Baseline	2027 + Development
B4265 (E)	0.225	0.278	0.310	0.367	0.467	0.562
Gileston Road (S)	0.053	0.063	0.066	0.051	0.064	0.067
B4265 (W)	0.010	0.012	0.013	0.007	0.007	0.007
Gileston Road (N)	0.978	1.020	1.134	0.374	0.448	0.513

**Table 2 Existing B4265 / Gileston Road Junction Layout Analysis**

- 3.4 Analysis of the operation of the proposed improved junction shows that in 2027, with the addition of the proposed development's traffic the junction operates well within its capacity. Significant queuing no longer occurs on the northern approach to the junction and the maximum RFC of 0.646 is significantly less than the 0.978 that is currently experienced at the junction.

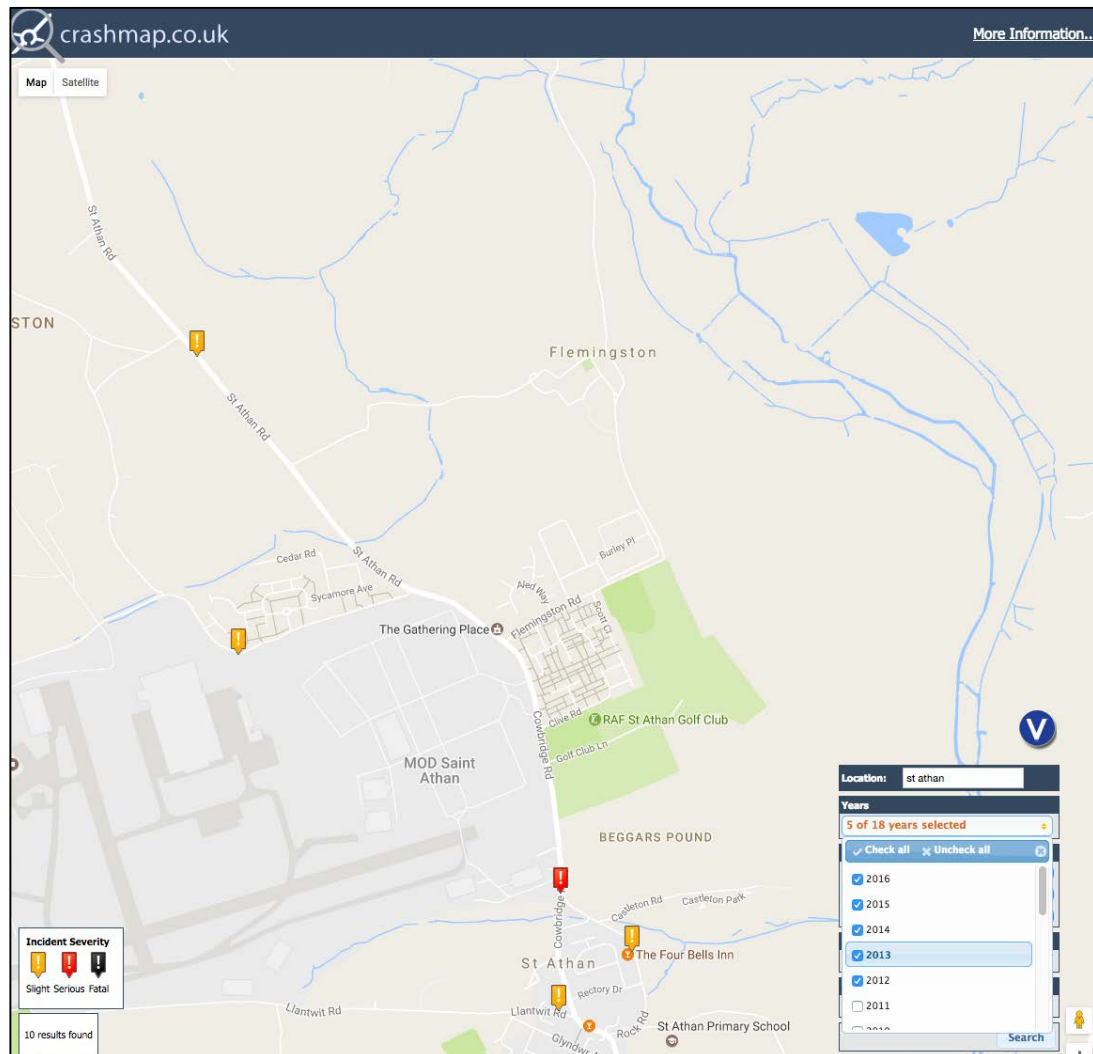
#### Appendix 5 B4265 / Gilestone Road Proposed Improvement Analysis

	AM Peak Hour RFC	PM Peak Hour RFC
	2027 + Development (With Mitigation Measures)	2027 + Development (With Mitigation Measures)
B4265 (E)	0.310	0.562
Gileston Road (S)	0.065	0.067
B4265 (W)	0.013	0.007
Gileston Road (N)	0.646	0.131

**Table 3 B4265 / Gileston Road Junction Analysis With & Without Mitigation**

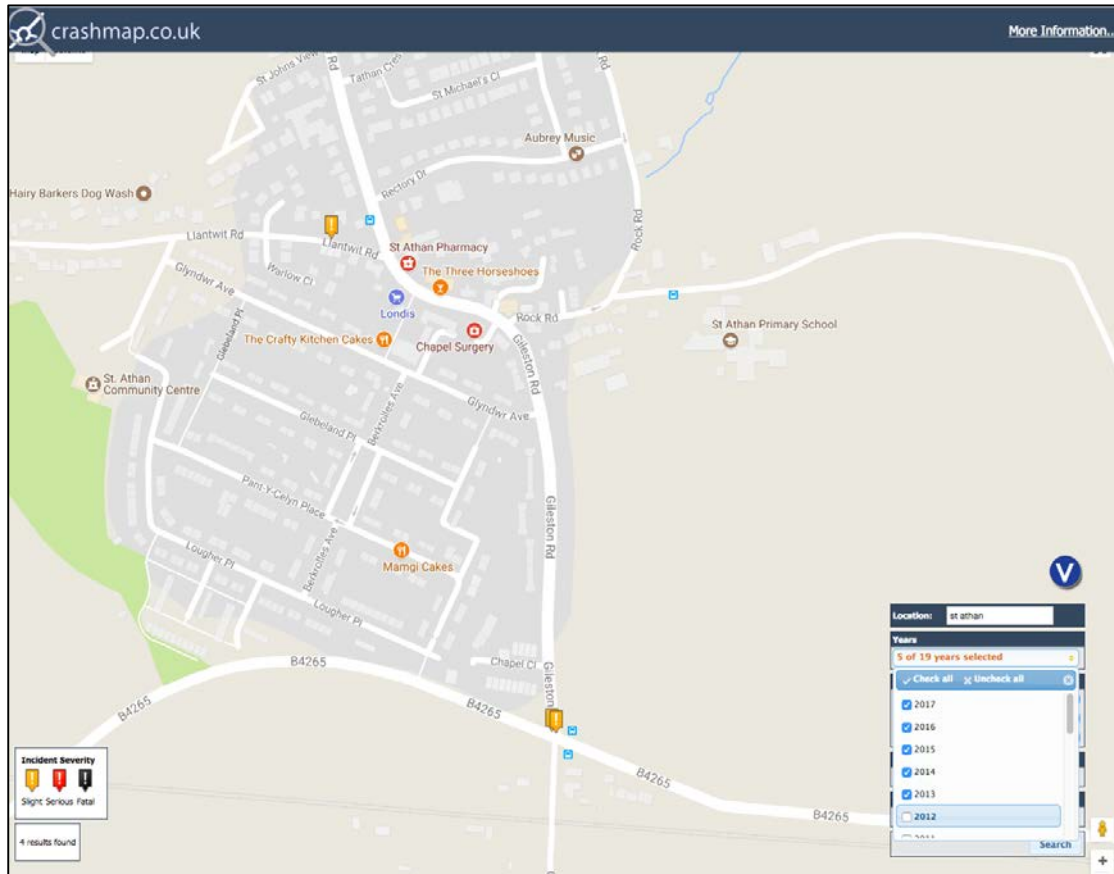
## 4 Road Safety

- 4.1 A review of the safety of the streets and roads near the site was undertaken within the Transport Assessment by reference to the area's personal injury accident history. The figure below shows the location and severity of all recorded injury accidents over the latest five-year period for which data is available (2012 to 2016 inclusive).
- 4.2 The area covered by that assessment is shown in the figure below, which is reproduced from the Transport Assessment.



**Figure 1 Injury Accident Location & Severity**

- 4.3 The Highway Authority requested that the assessment area be extended to include the B4265 / Gilestone Road junction. This is provided in Figure 5 and shows that there have been two slight severity accidents at the Gilestone Road / B4265 junction in the last five-years. These occurred in August 2015 and February 2017 respectively. The accidents are typical of an uncontrolled crossroads where many conflicting vehicle movements occur. The limited number of accidents over five years and the lack of serious or fatal accidents during that period suggest that the junction operates with acceptable safety.



**Figure 2 Injury Accident Location & Severity St Athan – B4265**

## 5 Other Matters

- 5.1 There is potential to extend the shared cycle/footway south of the site, past the Community Centre and to the junction of Flemmington Road. This is dependent on the required land being adopted as public highway by the Highway Authority. If the land does become available the shared cycle/footway would require localized narrowing to 2.5m in order to pass the existing Community Centre car park. A width of 2.5m is acceptable and conforms with the minimum requirement for shared cycle/footways according to Welsh Government's 'Design Guide – Active Travel (Wales) Act 2013.
- 5.2 The Highway Authority has requested further detail of how the narrowing of the shared foot/cycleway will be achieved given that there is a slight level difference between the Community Centre's car park and the adjacent Cowbridge Road. A small section of retaining wall will be required as shown in Appendix 6.

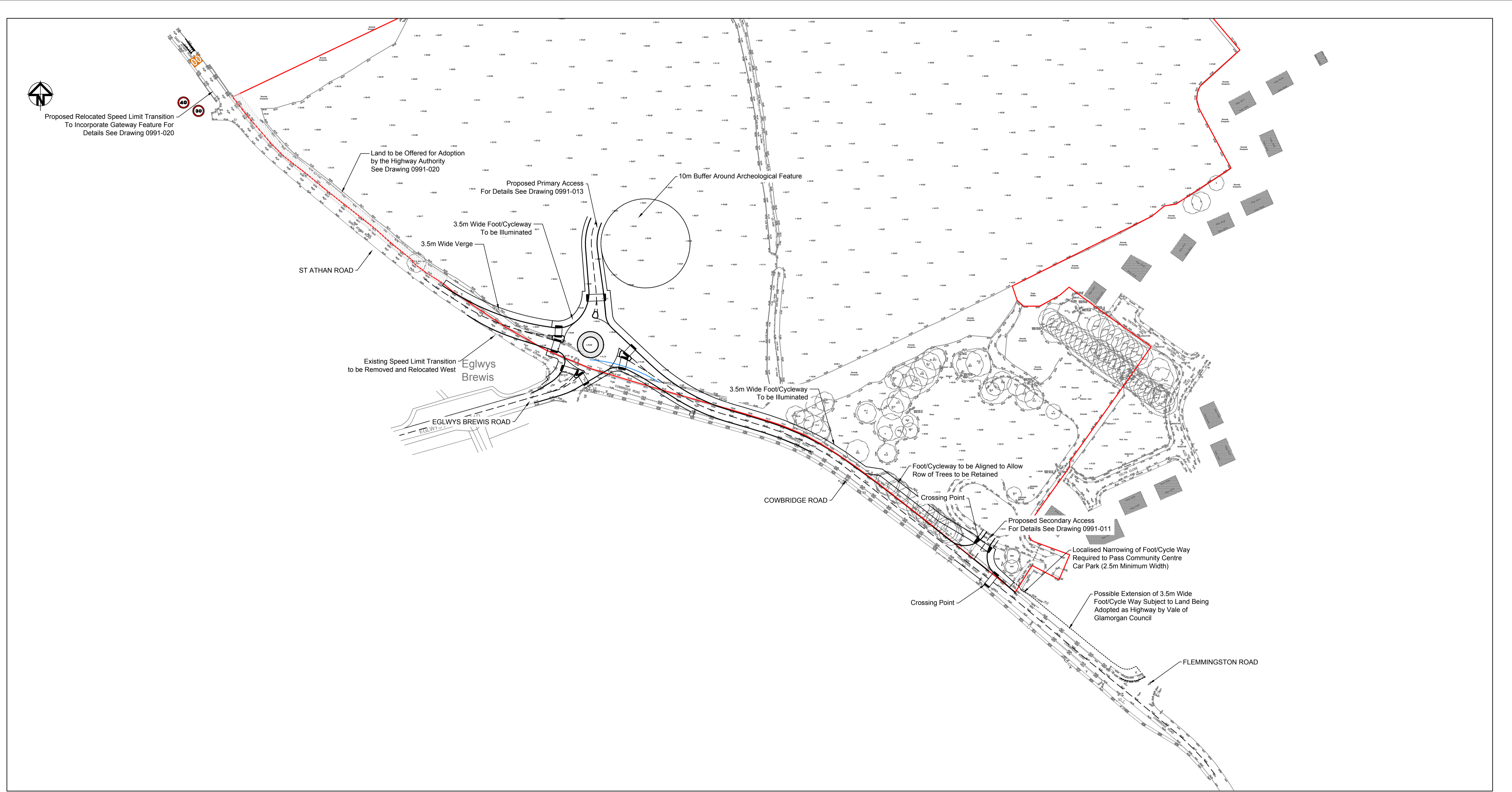
### **Appendix 6 Detail of Cycle/Footway Narrowing**

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# Appendix 1





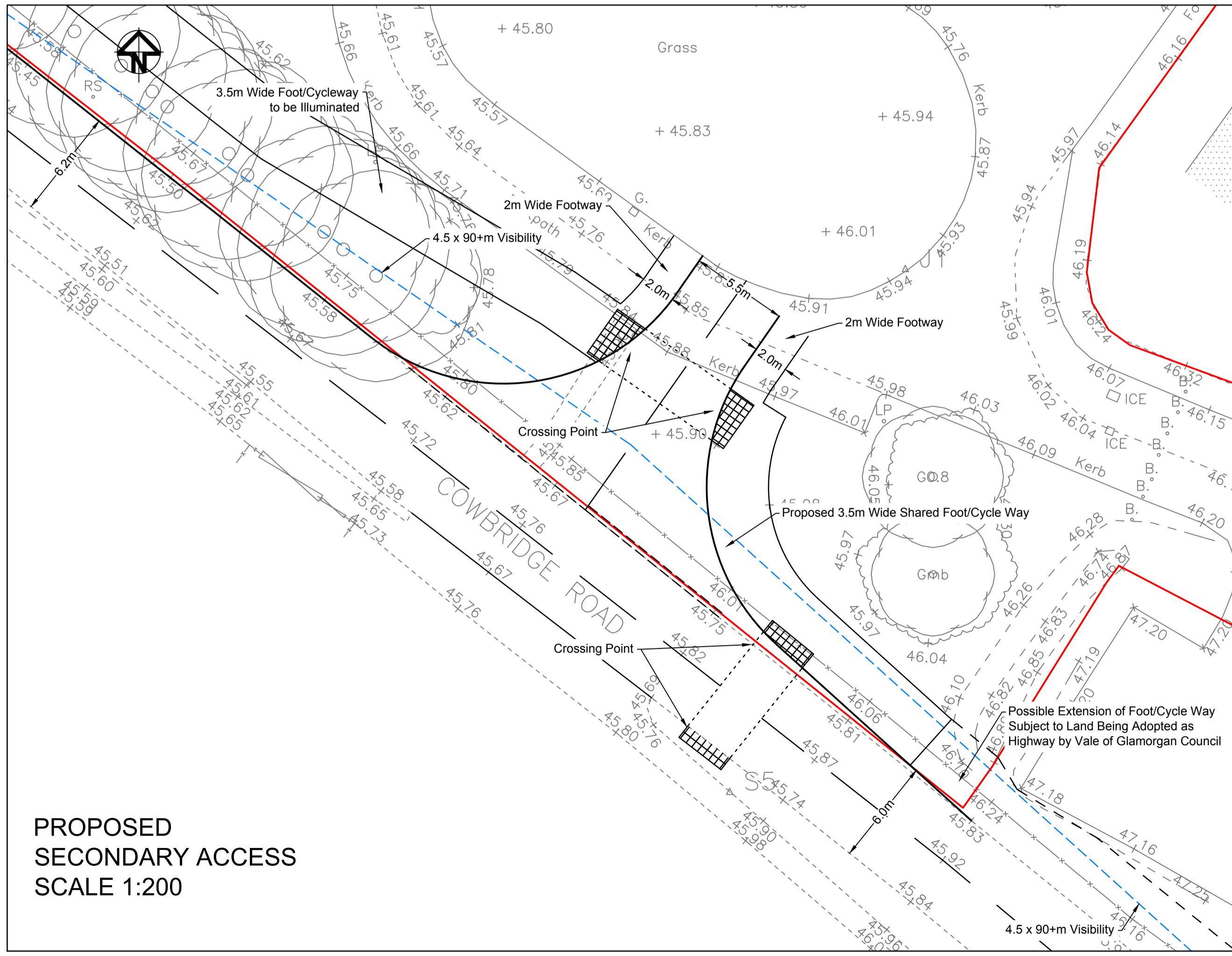
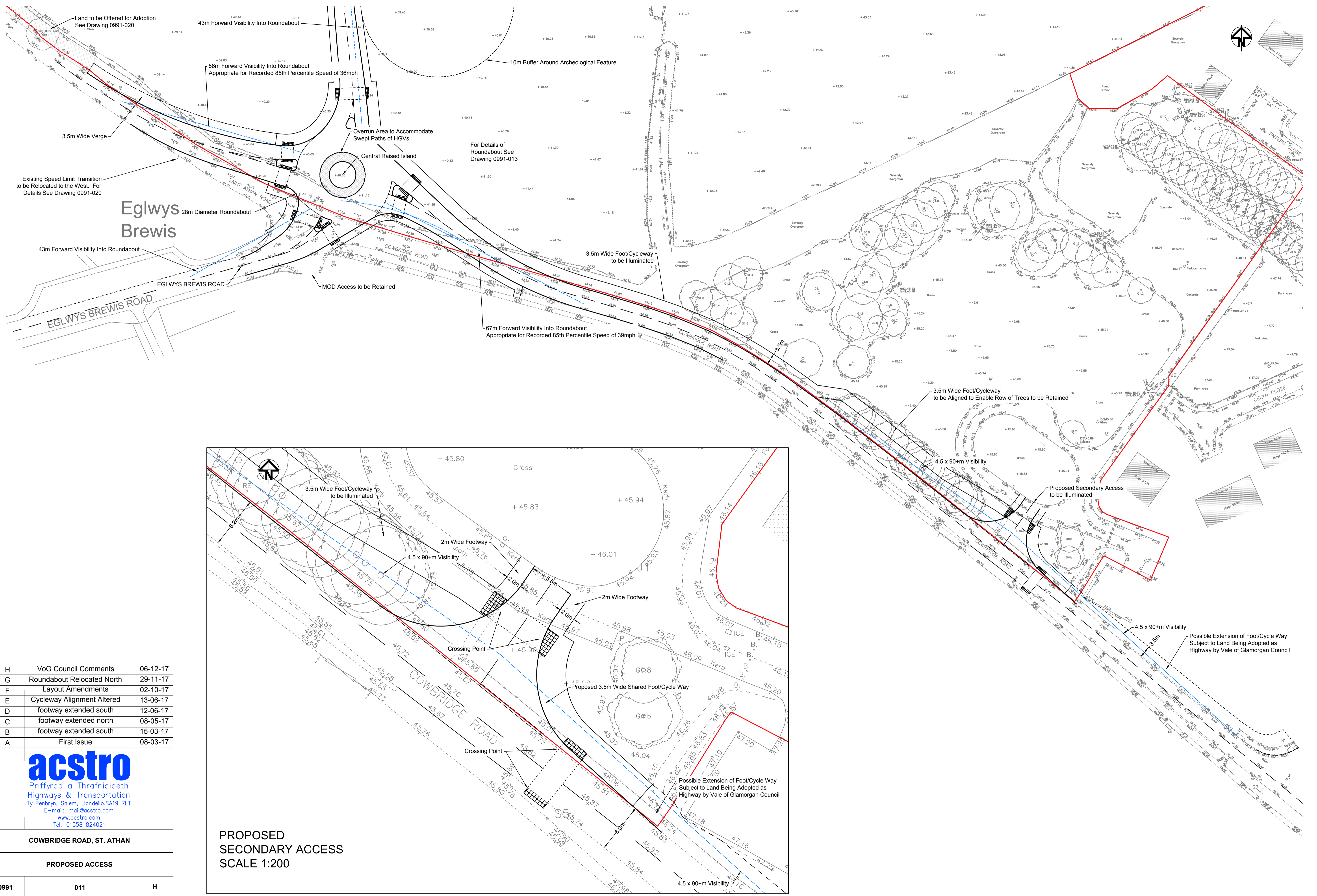
F	VoG Council Requirements	06-12-17
E	Roundabout Relocated North	29-11-17
D	Layout Amendments post RSA	02-10-17
C	Cycleway Alignment	13-06-17
B	Foot/Cycleway Ext. South	12-06-17
A	First Issue	08-05-17

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COWBRIDGE ROAD, ST. ATHAN

**PROPOSED ACCESS & OFF-SITE HIGHWAY WORKS**

0991	0014	F
	1:1000	@ A1



H	VoG Council Comments	06-12-17
G	Roundabout Relocated North	29-11-17
F	Layout Amendments	02-10-17
E	Cycleway Alignment Altered	13-06-17
D	footway extended south	12-06-17
C	footway extended north	08-05-17
B	footway extended south	15-03-17
A	First Issue	08-03-17

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COWBRIDGE ROAD, ST. ATHAN		
PROPOSED ACCESS		
0991	011	H
1:500 & 1:200		@ A1



# Eglwys Brewis

F	VoG Requirements	06-12-17
E	Roundabout Moved North	29-11-17
D	Layout Amendments post RSA	06-10-17
C	Cycleway Alignment	13-06-17
B	Revised Scale	12-06-17
A	First Issue	08-05-17

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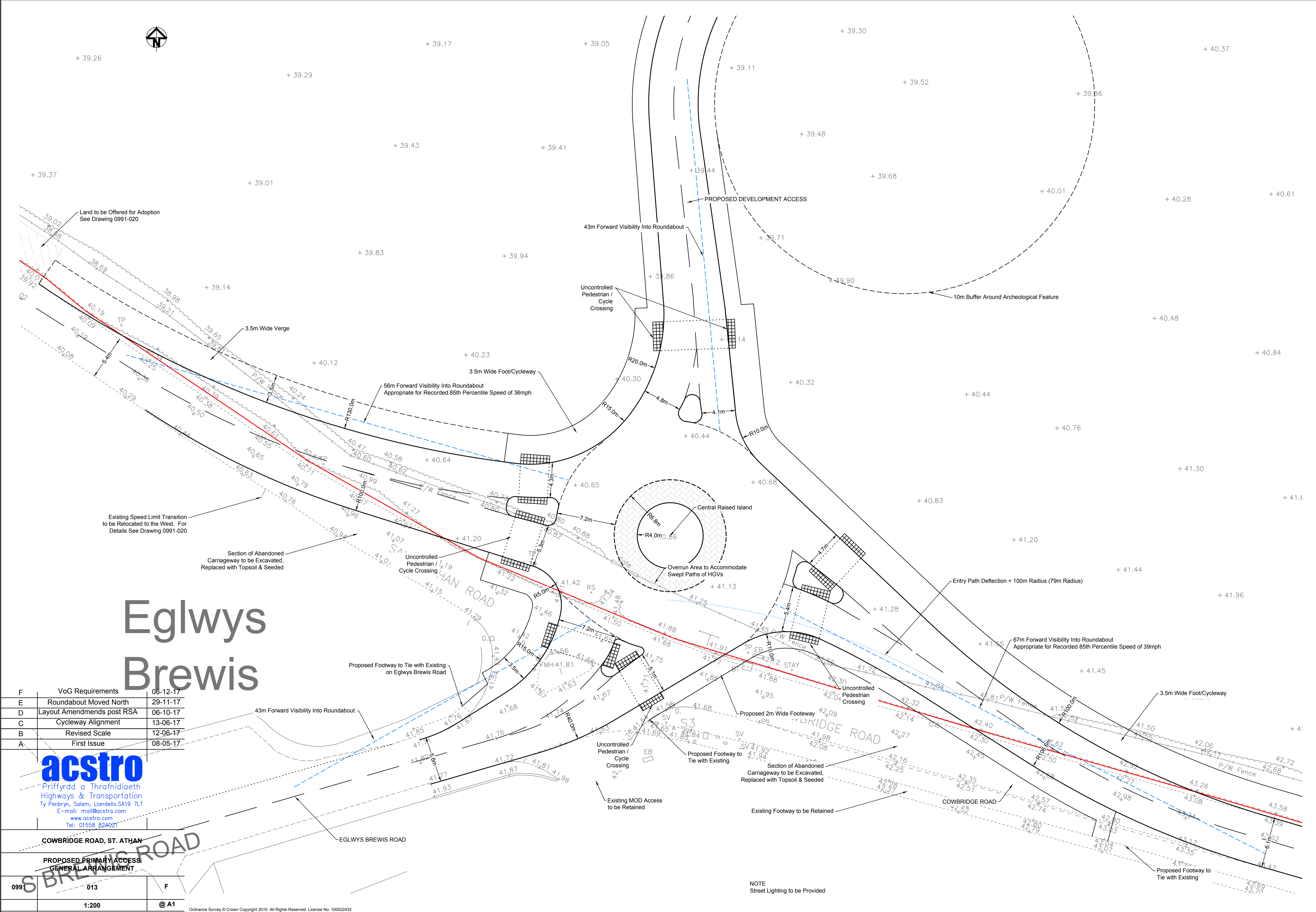
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COWBRIDGE ROAD, ST. ATHAN

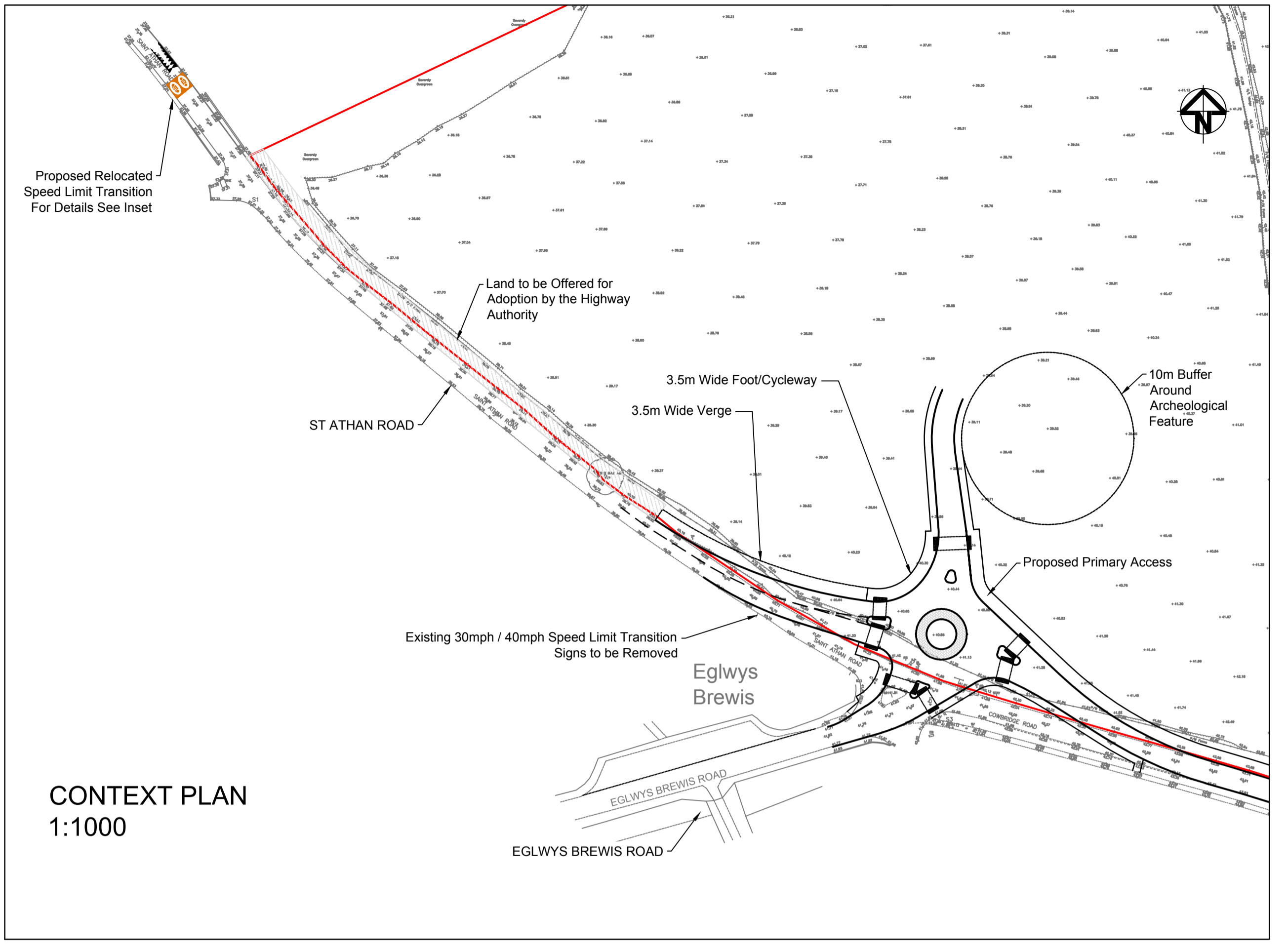
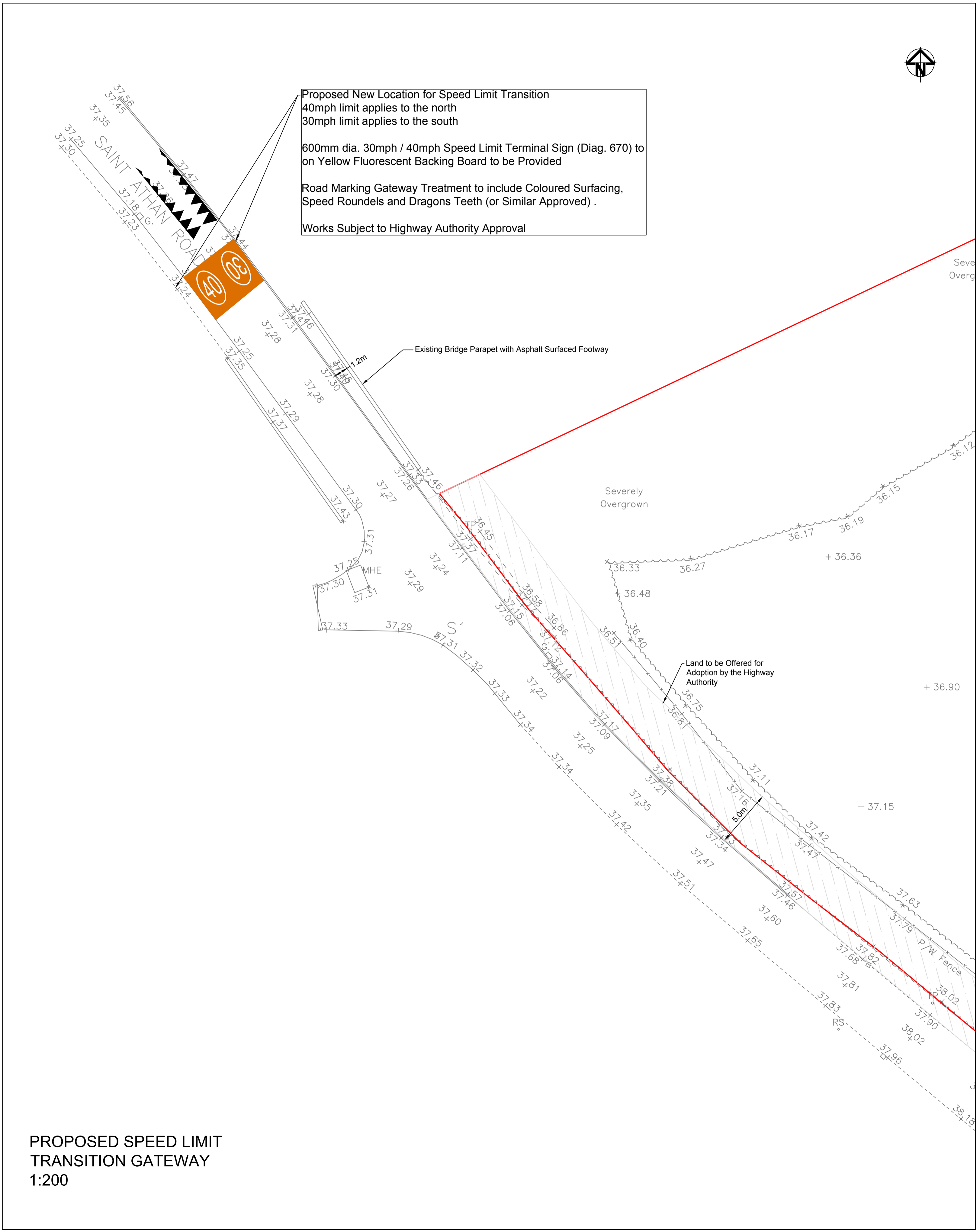
PROPOSED PRIMARY ACCESS  
GENERAL ARRANGEMENT

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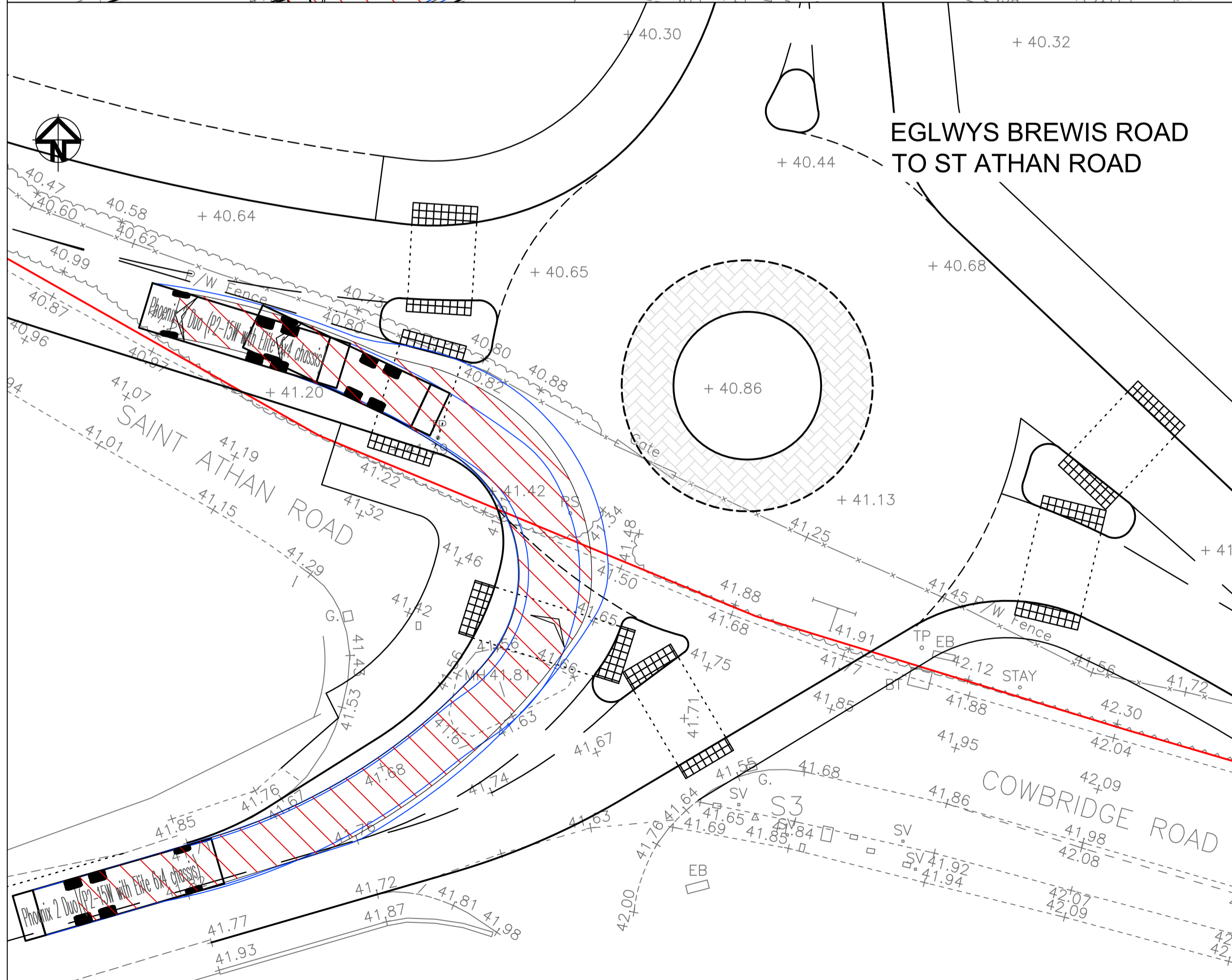
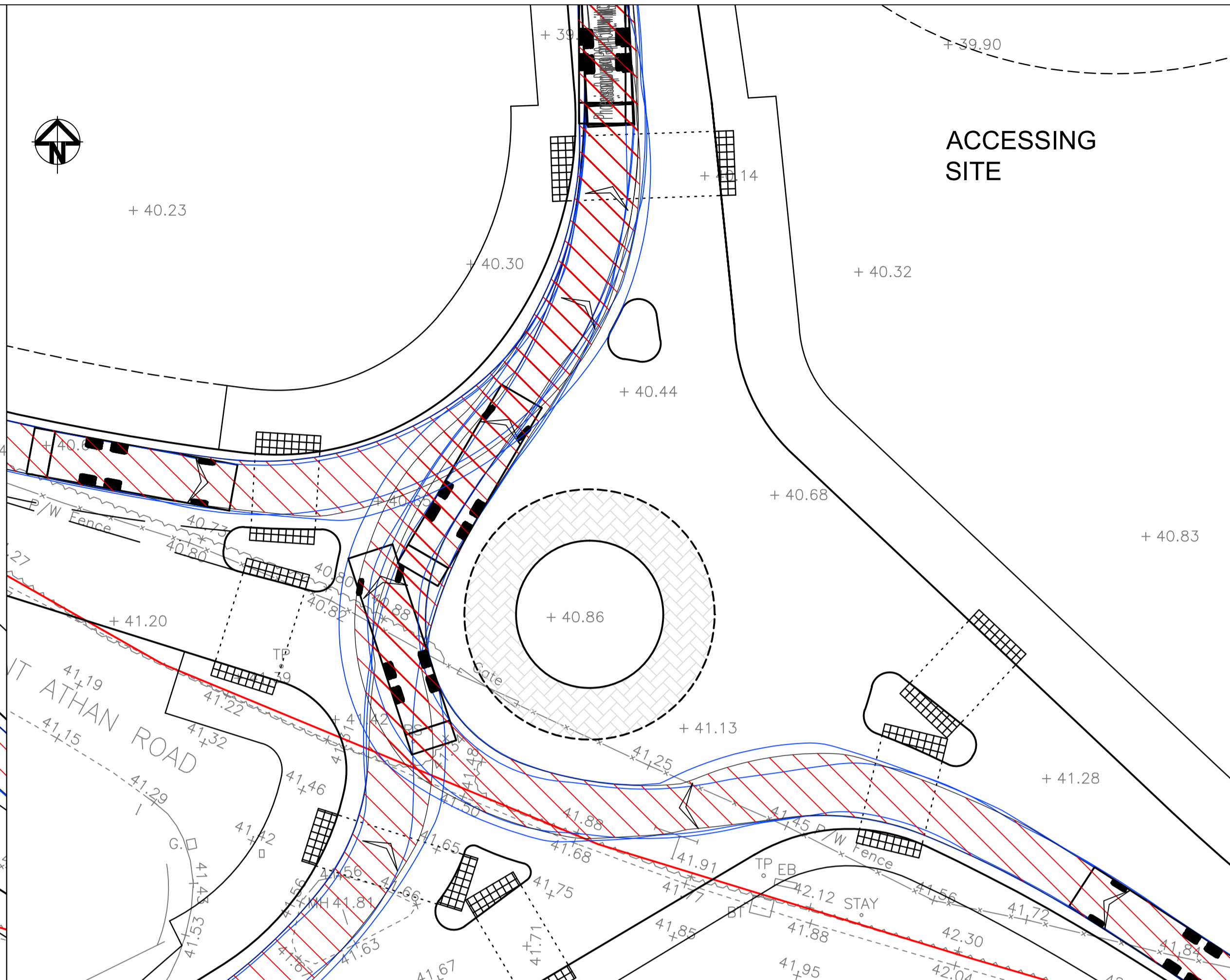
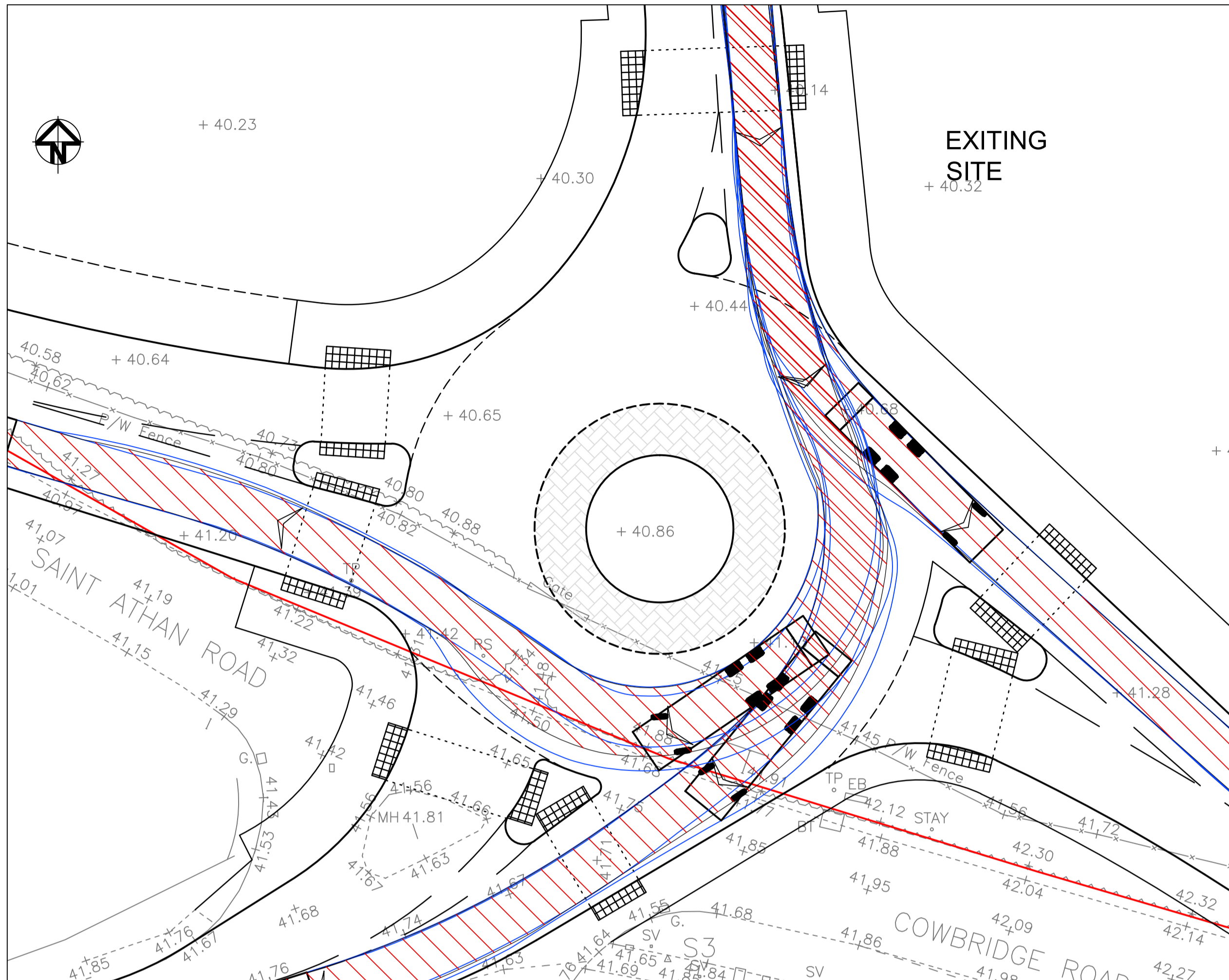
NOTE  
Street Lighting to be Provided



B	VoG Council Requirements	11-12-17
A	First Issue	28-11-17

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COWBRIDGE ROAD, ST. ATHAN		
PROPOSED SPEED LIMIT TRANSITION GATEWAY		
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1:1000 & 1:200		@ A1



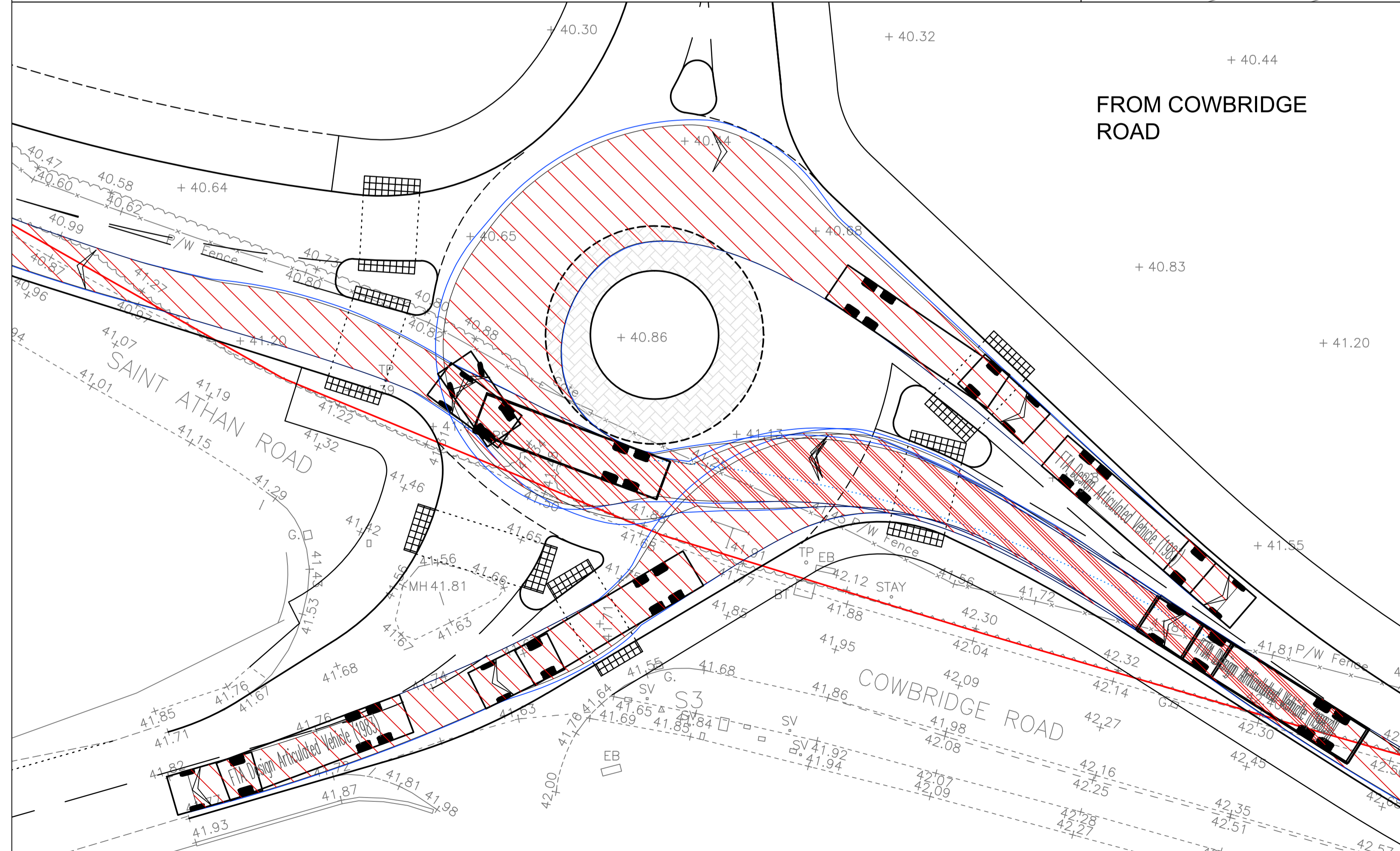
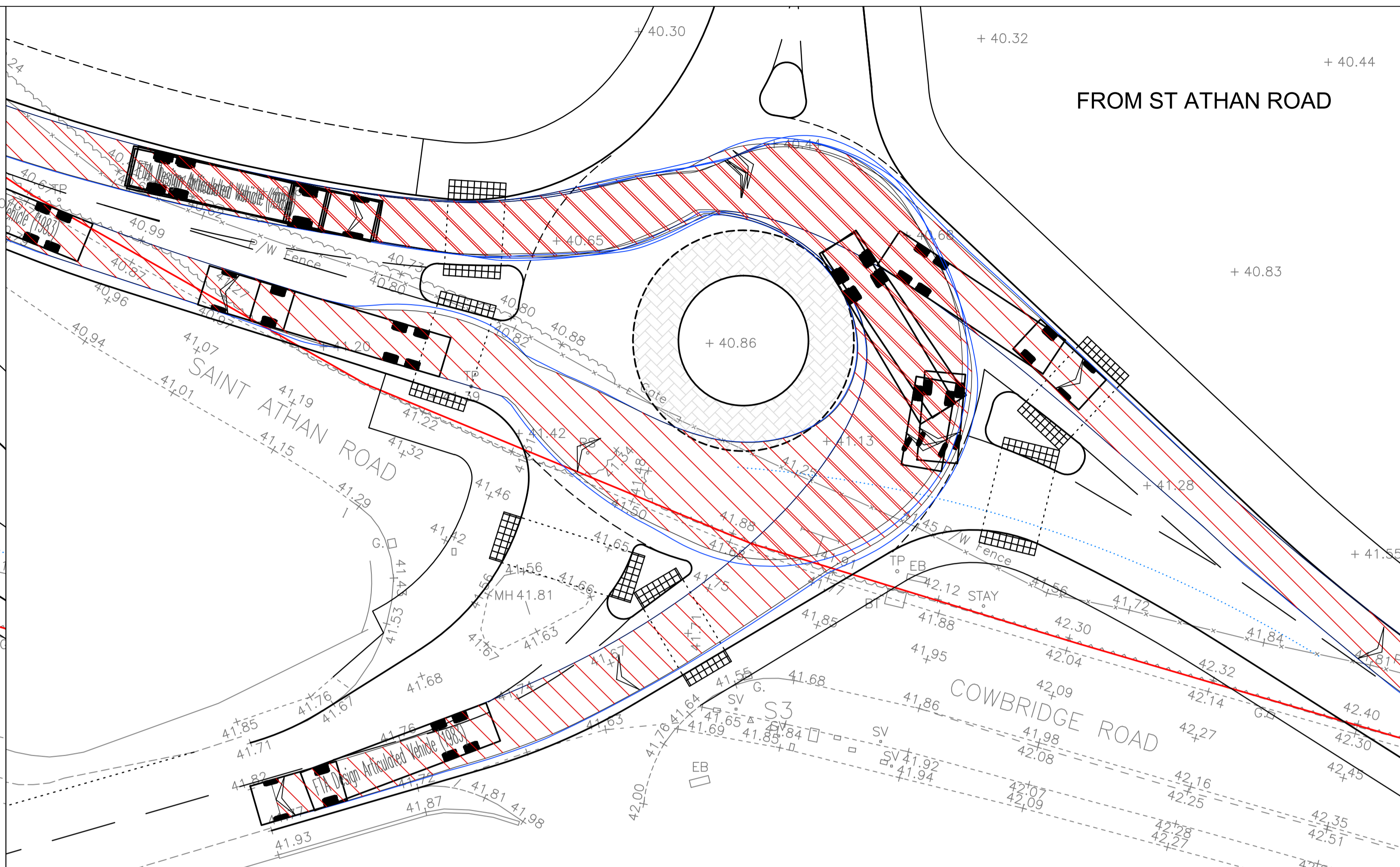
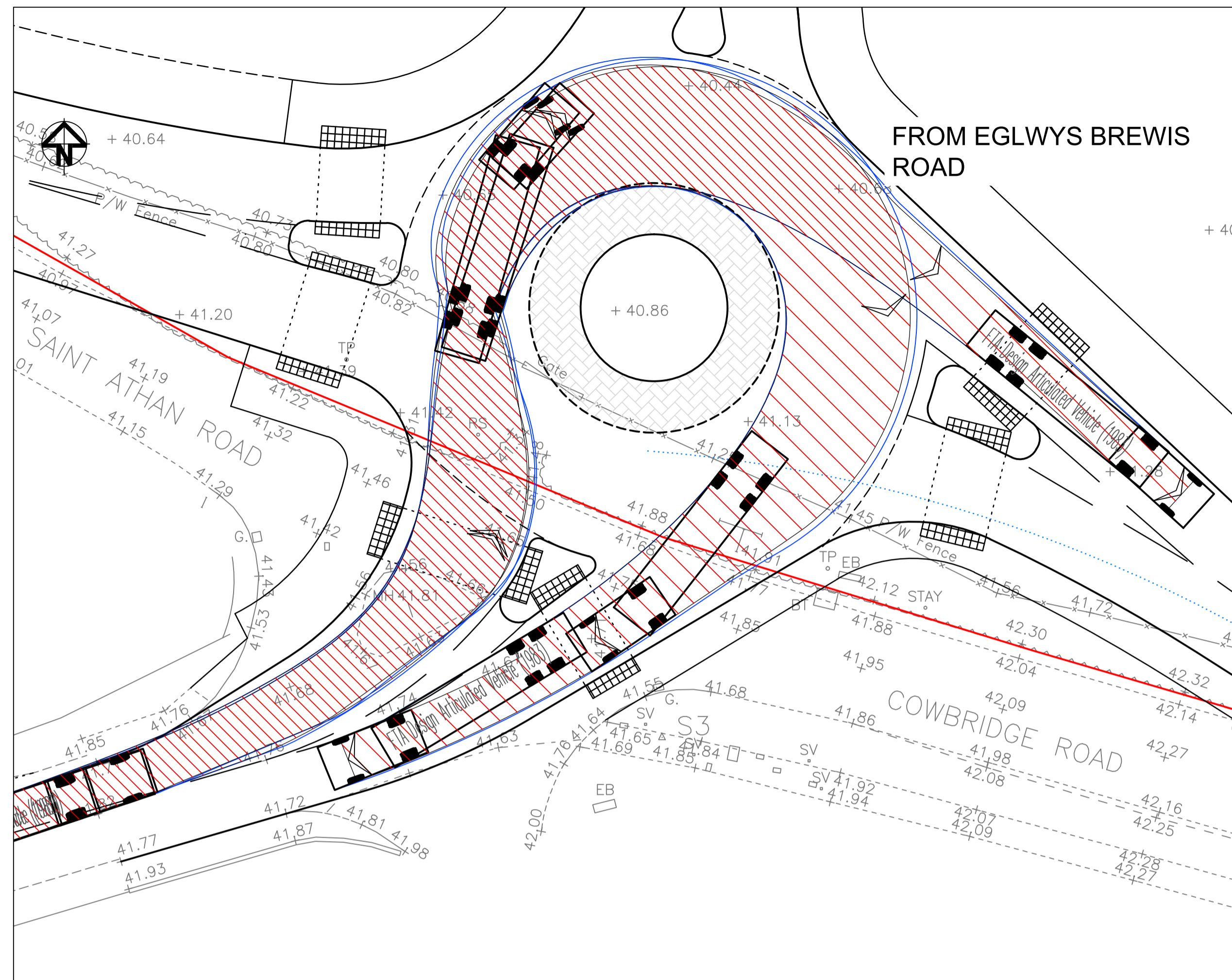
C	VoG Council Requirements	11-12-17
B	Revised Layout	28-11-17
A	First Issue	02-10-17

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COWBRIDGE ROAD, ST. ATHAN

REFUSE LORRY SWEEP PATH ANALYSIS

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FROM ST ATHAN ROAD

FROM COWBRIDGE ROAD

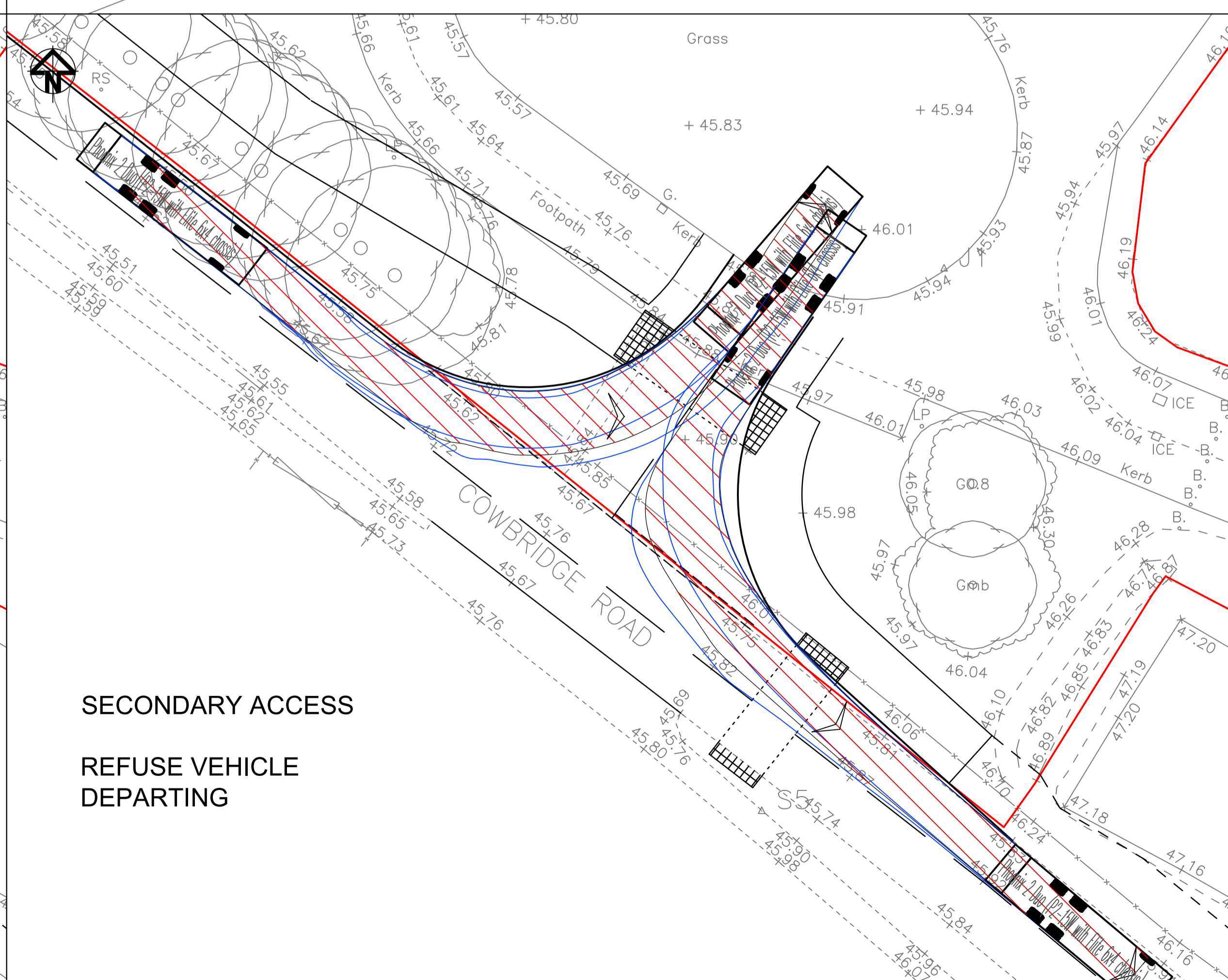
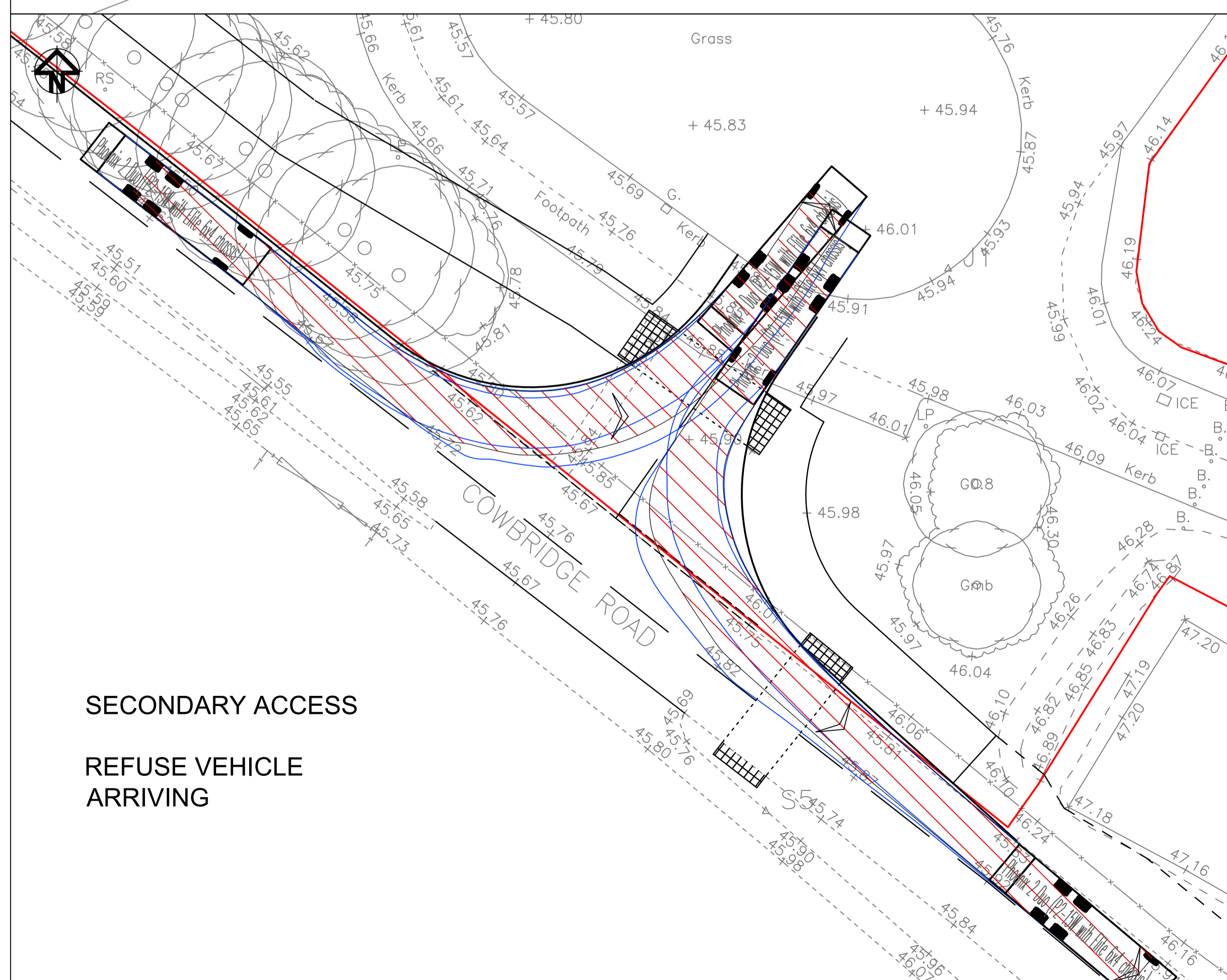
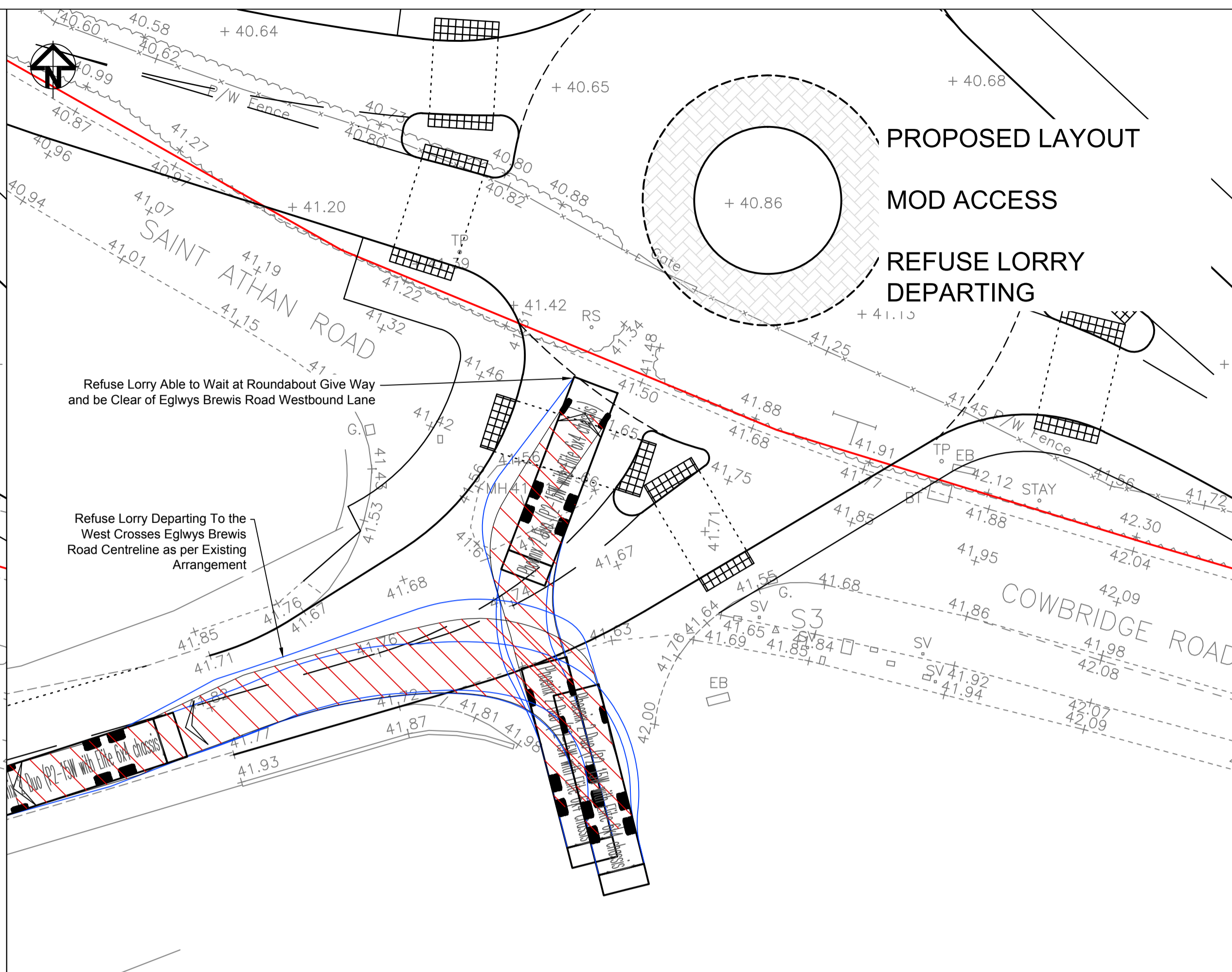
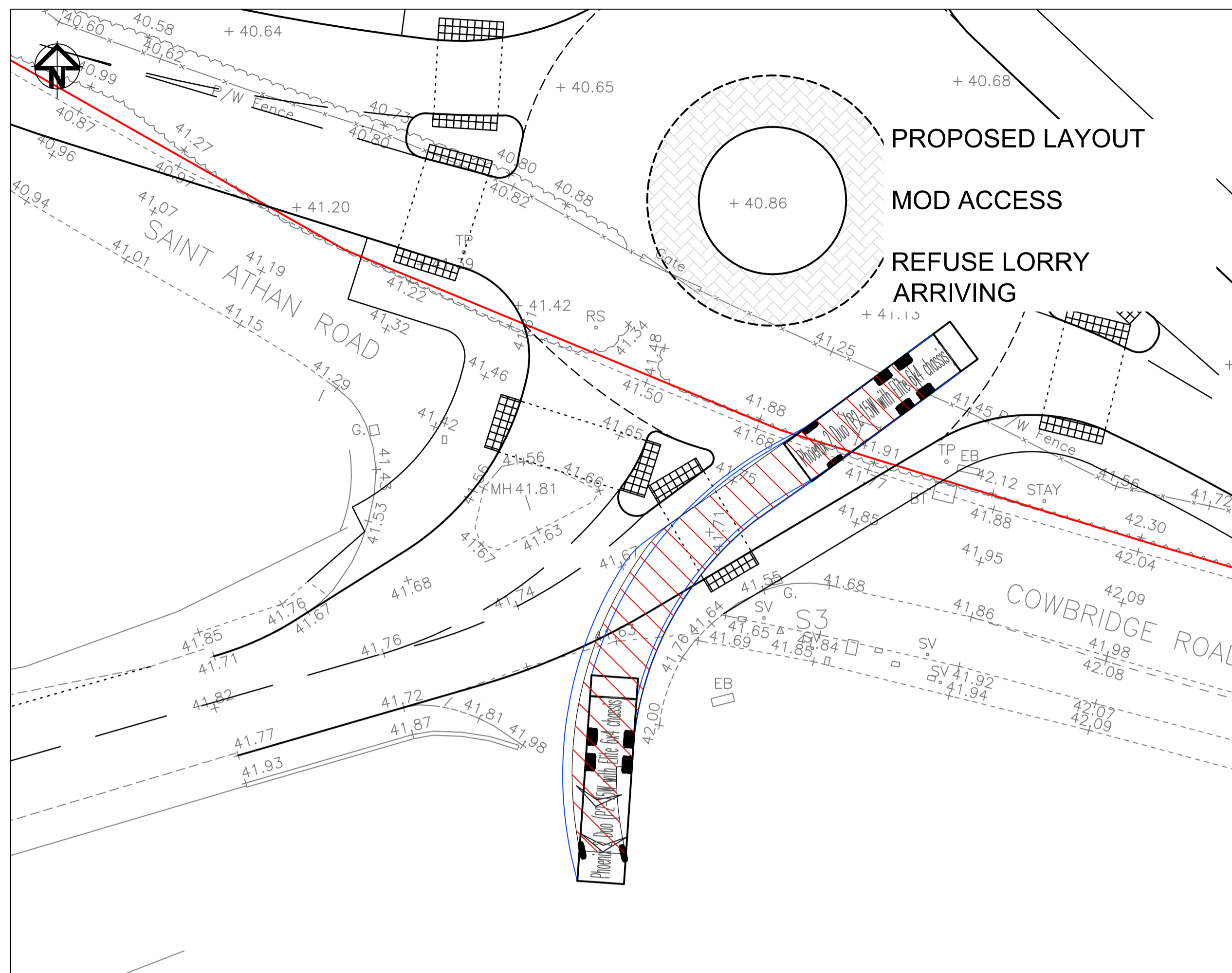
C	VoG Council Requirements	11-12-17
B	Layout Amended	28-11-17
A	First Issue	02-10-17

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COWBRIDGE ROAD, ST. ATHAN

FTA DESIGN ARTICULATED VEHICLE  
 SWEEP PATH ANALYSIS

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C	VoG Council Requirements	11-12-17
B	Revised Layout	28-11-17
A	First Issue	02-10-17

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COWBRIDGE ROAD, ST. ATHAN

SWEPT PATH ANALYSIS  
 EGLWYS BREWIS RD TO ST ATHAN RD  
 & SECONDARY ACCESS

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	1:200	@ A1

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# Appendix 2






**COWBRIDGE ROAD, ST ATHAN**

**PROPOSED RESIDENTIAL DEVELOPMENT  
ACCESS ARRANGEMENTS**

**Stage 1 Road Safety Audit**

**December 2017**

**DS/TS/17/1615/RSA1**

Revision Status	Prepared by: (Name)	Checked by: (Name)	Approved by: (Signature)	Date Approved:
Original	D Swift	T Sterling		18/12/17
Designer's Response				
Authority's Response				
Audit Response				

<b>Client:</b>	
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Date: 18/12/2017	

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**APPENDIX A**            Location Plan

**APPENDIX B**            Road Safety Audit Response

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## 1.0 INTRODUCTION

- 1.1 This report results from a Stage 1 Road Safety Audit (RSA) carried out on proposed access arrangements for a residential development off Cowbridge Road, St Athan, in the Vale of Glamorgan in South Wales.
- 1.2 The highway proposals include: the construction of a new priority controlled T-junction with Cowbridge Road; a new four arm 28m diameter roundabout at the junction of Cowbridge Road and Eglwys Bewis Road with access into the proposed development site; provision of new shared use paths / footways; and relocation of the existing speed limit terminal. Additionally, it is proposed to widen Gileston Road at its junction with the B4265 to provide left and right turn lanes from St Athan onto the B4265
- 1.3 The site is mainly within a 30mph area, with the north-western extent of works located in an existing 40mph area. The junction of Cowbridge Road and Eglwys Bewis Road is located on the edge of a military base, with some housing between Cowbridge Road and Eglwys Bewis Road, and little other existing development within the development area. There is no street lighting in the area of the proposed site on Cowbridge Road. The Gileston Road junction with the B4265 is located to the southern extent of the village of St Athan and forms the main access to the village from the surrounding towns.
- 1.4 This Stage 1 RSA was carried out at the request of Acstro Ltd following alterations to the scheme following a previous Stage 1 RSA carried out by The Safety Forum in October 2017.
- 1.5 The Audit was carried out on 13<sup>th</sup> December 2017 by consultants working on behalf of The Safety Forum Limited.
- 1.6 The Audit Team, which is established from The Safety Forum Ltd and independent of the project design team, has had no involvement with the project.
- 1.7 The Auditors were:
- D Swift – Team Leader (MSoRSA)
- T Sterling – Team Member (MCIHT MSoRSA)
- 1.8 The report has been prepared in accordance with the Design Manual for Roads and Bridges (DMRB) Highways Directive (HD) 19/15.
- 1.9 The Audit consisted of a desktop study and a site visit. The site visit was carried out on 13<sup>th</sup> December 2017, between 14:45 and 15:30 hours by all members of the Audit

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Team together. The weather was dry but cold and the road surface was wet. Traffic conditions were moderate.

- 1.10 Issues relating to the health & safety of operatives constructing, operating or maintaining the highway are not covered by Road Safety Audit. Only issues relating to the design and construction of facilities for highway maintenance that may potentially contribute to a Road Safety Matter are considered by the Road Safety Audit process.

Road Safety Audit is not a technical check that the design conforms to Standards and/or best practice guidance. Design Organisations are responsible for ensuring that their designs have been subjected to the appropriate design reviews (including, where applicable, Non-Motorised User (NMU) assessment and review) prior to Road Safety Audit.

Road Safety Audit is not a check that the scheme has been constructed in accordance with the design.

Whilst reference is made to certain design standards, where safety may be compromised by a reduction in standard, this report is not intended to provide a design check. The Auditors have only reported on matters that might have an adverse effect on road safety in the context of the chosen design. No attempt has been made to comment on the justification of the scheme or the appropriateness of the design. Consequently, the Auditors accept no responsibility for the design or construction of the scheme.

- 1.11 The recommendations in this report are aimed at addressing the road safety problems; however there may be other alternative acceptable ways to overcome a specific problem, when other practical issues are considered. The recommendations contained herein do not absolve the Designer of his/her responsibilities.
- 1.12 The Auditors would be pleased to discuss the acceptability of alternative solutions to problems identified during the Audit, and would encourage the Designer to consult them on this matter.
- 1.13 The LHA response to the RSA should be formally recorded and reported to the Designer and the RSA Team so that a record of the Audit process is contained in the *As Built* design pack to be provided and retained by the LHA on final completion.
- 1.14 All problems identified in this Road Safety Audit Report are indicated on a location plan in Appendix A

## 2.0 ITEMS CONSIDERED

2.1 The Road Safety Audit was undertaken on the scheme detailed in the following documentation.

Drawing No.	Rev	Title
0991 011	H	Proposed Access
0991 013	F	Proposed Primary Access General Arrangement
0991 014	F	Proposed Access and Off-Site Highway Works
0991 015	C	Eglwys Brewis Road junction with Cowbridge Road Swept path analysis
0991 016	C	Eglwys Brewis Road junction with Cowbridge Road Swept path analysis
0991 017	C	Eglwys Brewis Road junction with Cowbridge Road Swept path analysis
0991 018	C	Gileston Road junction proposals
0991 021	A	Gileston Road junction swept path analysis

2.2 No departure from standards or other information was submitted to the Audit Team.

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### 3.0 MATTERS ARISING FROM THE PREVIOUS STAGE 1 AUDIT.

#### 3.1 PROBLEM

LOCATION: Proposed roundabout.

SUMMARY: Lack of street lighting may reduce awareness of roundabout.

The proposed roundabout junction is within an existing 30mph area that is unlit by street lighting, and no new street lighting is proposed. Generally, road users would expect roundabouts of all types to be street lit, and a lack of street lighting is likely to reduce the general awareness of the proposed roundabout. This may result in road users failing to approach or use the junction safely and could result on overshoot / failure to give way conflicts.

#### RECOMMENDATION

Provide street lighting to illuminate and highlight the proposed roundabout.

#### ADDITIONAL COMMENTS

**The audit team reiterate that the lack of street lighting along this length of Cowbridge Road could increase the likelihood of collisions at the junction and involving pedestrians crossing the road in dark conditions. It is recommended that the site is lit throughout.**

#### 3.2 PROBLEM

LOCATION: Eglwys Bewis Road approach to proposed roundabout.

SUMMARY: Drivers may incorrectly interpret splitter island and presence of roundabout.

The positioning of the roundabout, and the alignment of Eglwys Bewis Road on its approach to the proposed roundabout, may make it difficult for road users to accurately perceive the junction type ahead.

The location of the splitter island on the Eglwys Bewis Road approach would be positioned to the nearside of the line of view on the carriageway approach, with the give-way line hidden from view until drivers are within approximately 15-20m. The central island, and chevron signs that would be housed on it, would be only visible from approximately 25-30m from the roundabout centre giving generally poor awareness of the roundabout.

Drivers on this approach would have a clear view through the roundabout circulatory carriageway onto the eastern arm approach. Also, the outer edge of the proposed circulatory carriageway between the Eglwys Bewis Road and Cowbridge Road

southeast arm has a proposed alignment where there is minimal disruption to the sightline through the roundabout. Such drivers may therefore pass the splitter island, on the Eglwys Bewis Road approach, on the wrong side and be at risk of conflicting with opposing traffic.

The lack of proposed street lighting at this roundabout may make this risk greater in darkness.

#### RECOMMENDATION

Ensure that the positioning of the roundabout, and its associated features (including signs, road markings, and street lighting), and the approach alignment on Eglwys Bewis Road, make it clear that there is a roundabout junction ahead and drivers must pass the splitter island to the left before giving way at the roundabout.

#### ADDITIONAL COMMENTS

**Whilst the audit team note that the location and alignment of the proposed roundabout has been altered prior to this stage 1 safety audit and that the potential for collisions as stated above is lessened, the auditors still believe that the layout proposed could still lead to confusion for drivers, which may result in collisions. It is recommended that the junction layout is redesigned to further assist approaching drivers to negotiate the roundabout and traffic islands.**

### 3.3 PROBLEM

LOCATION: Eastern arm of proposed roundabout.

SUMMARY: Lack of facility for cyclists to enter shared use facility.

Right turning cyclists from Eglwya Brewis Road wishing to access the shared use cycle facility are not provided with a suitable access from the circularity carriageway or Cowbridge Road. This may result in cyclists joining the shared use facility via the pedestrian crossing on Cowbridge Road in possible conflict with pedestrians.

#### RECOMMENDATION

Provide a suitable facility for right turning cyclists from Eglwya Brewis Road to access the shared use facility.

#### ADDITIONAL COMMENTS

**It is noted that the facility recommended above has not been proposed as part of the scheme layout provided to the audit team. The auditors reiterate the concerns above and recommend that a dropped kerb is installed for the use of cyclists wishing to access the off carriageway facilities.**



### 3.4 PROBLEM

LOCATION: Commencement of shared use footways.

SUMMARY: Lack of indication that pedestrians are entering shared use footways.

No measures such as tactile paving are shown on the proposed drawings to indicate that pedestrians on existing / proposed footways are approaching proposed shared use cycle / pedestrian footways. This could result in some pedestrians being at risk of conflict with cycles due to lack of awareness.

#### RECOMMENDATION

Ensure that during the detailed design stage measures such as tactile paving, road markings and signing is provided to indicate the shared use footways.

#### ADDITIONAL COMMENTS

**No tactile paving is shown on the plans provided which could lead to some pedestrians being at risk of conflict with cyclists. Appropriate tactile paving should be provided to help pedestrians with visual impairment.**

### 3.5 PROBLEM

LOCATION: Western end of shared use path.

SUMMARY: Pedestrians and cycles emerging into carriageway, possibly unexpectedly.

The proposed shared use gravel path that extends west from the development site roundabout re-joins the carriageway (St Athan Road) just before the bridge over a watercourse. At this point there is no footway on the northern side of the road. Pedestrians and cyclists re-joining will therefore have to continue along St Athan Road within the carriageway. They may therefore be at risk of conflict with road traffic.

#### RECOMMENDATION

Install warning signs to indicate to approaching traffic the presence of pedestrians / cyclists who are on, or entering or exiting the carriageway.

#### ADDITIONAL COMMENTS

**The plans provided show that the proposed footway along the northern side of Cowbridge Road, west of Eglwys Brewis, has been shortened leaving pedestrians and cyclists travelling in the carriageway, where they will be at risk of being hit by passing vehicles for a longer distance. It is recommended that the footway along the northern side of Cowbridge Road is reintroduced to**

**the proposed scheme. As above, at an absolute minimum, signs should also be installed to warn approaching drivers of the location where pedestrians and cyclists are travelling in, or entering, the carriageway. However, if this development is likely to generate appreciable additional pedestrian traffic along this verge, then it is appropriate that a suitable off-road footway should be provided.**

---

## **4.0 MATTERS ARISING FROM THIS STAGE 1 SAFETY AUDIT**

### **4.1 PROBLEM**

LOCATION: Cowbridge Road at junction with Eglwys Brewis.

SUMMARY: Possible head-on or loss of control collisions.

The auditors are concerned that the eastbound approach to the proposed roundabout is aligned as such that the line of sight of a driver approaching the roundabout from the west on Cowbridge Road is to the right (south) of the central roundabout island. They could lead to a driver not adequately comprehending the presence of the roundabout until a late point and either clipping the island prior to reaching the roundabout, or even passing the roundabout on the incorrect side, which could result in head on collisions with oncoming vehicles.

#### **RECOMMENDATION**

Ensure that the positioning of the roundabout, and its associated features (including signs, road markings, and street lighting), and the approach alignment on all approaches, make it clear that there is a roundabout junction ahead and how a driver is to negotiate the junction.

### **4.2 PROBLEM**

LOCATION: Eglwys Brewis south the of the junction with Cowbridge Road.

SUMMARY: Risk of nose to tail shunt type or turning collisions.

The auditors are unsure how often the gateway into the MOD gated access off Eglwys Brewis will be used, or how it will be operated. The auditors are concerned that access into/from the gate could cause confusion for some drivers using the junction and could lead to shunt type or turning collisions.

#### **RECOMMENDATION**

It is recommended that the MOD are contacted to ascertain the likely use and operation of the gateway and that the junction is designed to minimise any disruption of the junction due to any use.

---

#### 4.3 PROBLEM

LOCATION: Cowbridge Road at second development access.

SUMMARY: Possible vehicle/pedestrian collisions.

The audit team note that it is not certain whether the footway link between the proposed second access to the development and Flemingston Road will be constructed at this stage. If the footway is not provided, and no other link from the development to the village centre to the south is provided, it could force pedestrians to cross or walk in the road where they could be at risk of being hit by passing vehicles, especially at night.

#### RECOMMENDATION

It is recommended to ensure that a direct and safe link for pedestrians between the new development and Flemingston Road is provided, either via the footway along Cowbridge Road, or further east through the existing residential estate.

#### 4.4 PROBLEM

LOCATION: Gileston Road junction with B4265.

SUMMARY: Risk of junction type, overshoot, collisions.

The auditors note that the existing traffic island on Gileston Road is to be removed as part of the widening works at the junction. They are concerned, however, that the island provides a space to locate signs warning of the junction via give way signs and breaks up the view ahead for drivers approaching the B4265. Without the island, the view of a southbound driver will be straight across the junction onto its southern arm, which may lead drivers wishing to cross the road to believe that they do not have to give way. This junction layout can often lead to junction type overshoot collisions, which can result in higher severity of injuries.

#### RECOMMENDATION

It is recommended that a traffic island hosting suitable give-way signage is retained at the junction to help break up the straight through view of drivers approaching the junction.

---

#### 4.5 PROBLEM

LOCATION: B4265 junction with Gileston Road.

SUMMARY: Risk of vehicle/pedestrian collisions.

No swept path analysis has been provided for vehicles turning right from Gileston Road onto the B4265. The auditors are concerned that a large vehicle turning right may not be able to pass the existing traffic island in the B4265 due to the apparent narrow lane width. A large vehicle could clip the traffic island and/or a pedestrian stood on the island while waiting to cross the road which could result in injury.

#### RECOMMENDATION

It is recommended that swept path analysis is undertaken for the final junction design to ensure that all movements can be made by large vehicles, especially for a vehicle turning right from Gileston Road onto B4265.

---

## 5.0 AUDITOR STATEMENT

5.1 We certify that this audit has been carried out in accordance with HD 19/15.

### AUDIT TEAM LEADER

D Swift  
The Safety Forum Ltd  
PO Box 831  
Godalming  
Surrey  
GU7 9HT

Signed: 

Date: 15<sup>th</sup> December 2017

### AUDIT TEAM MEMBER

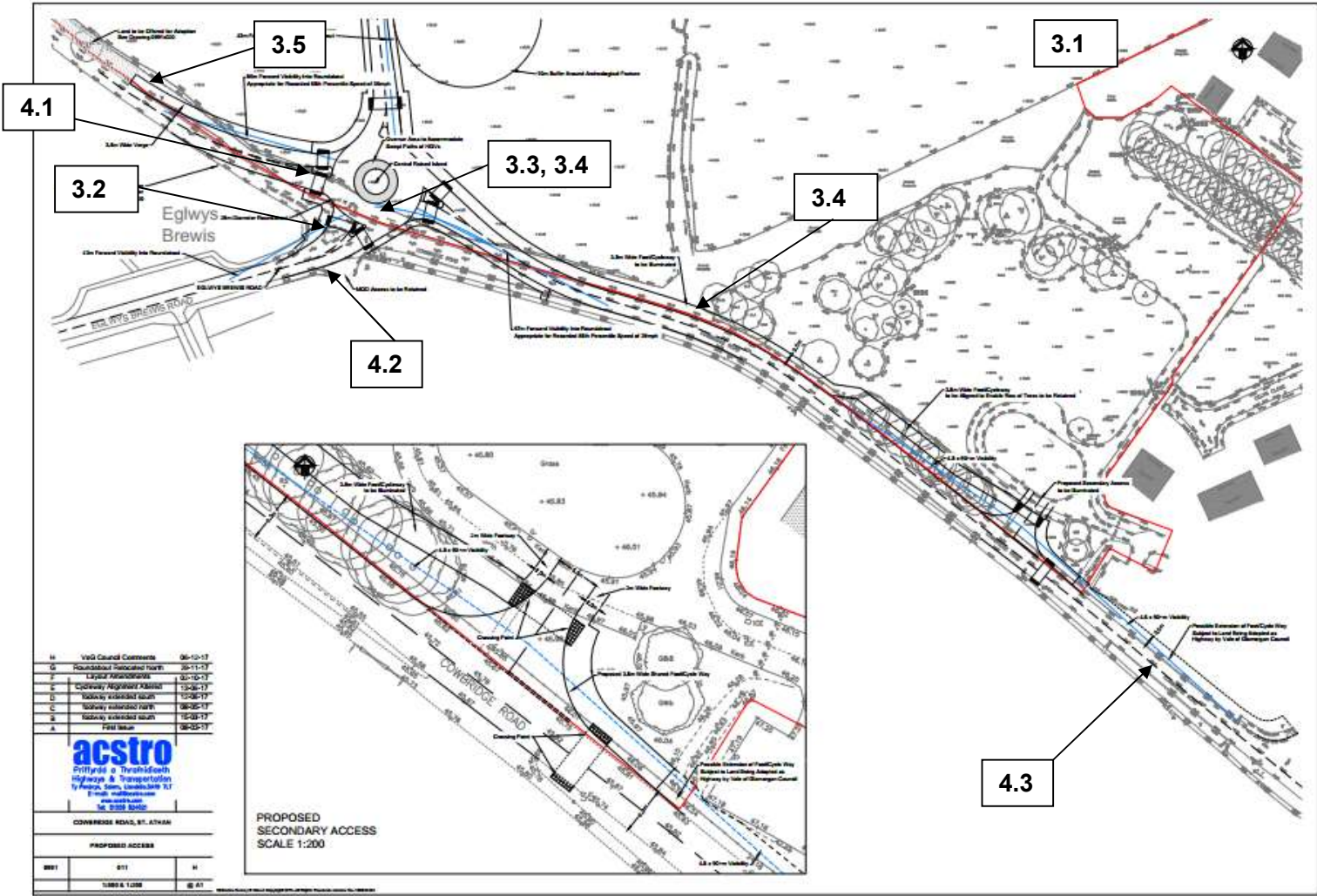
T Sterling

Signed: 

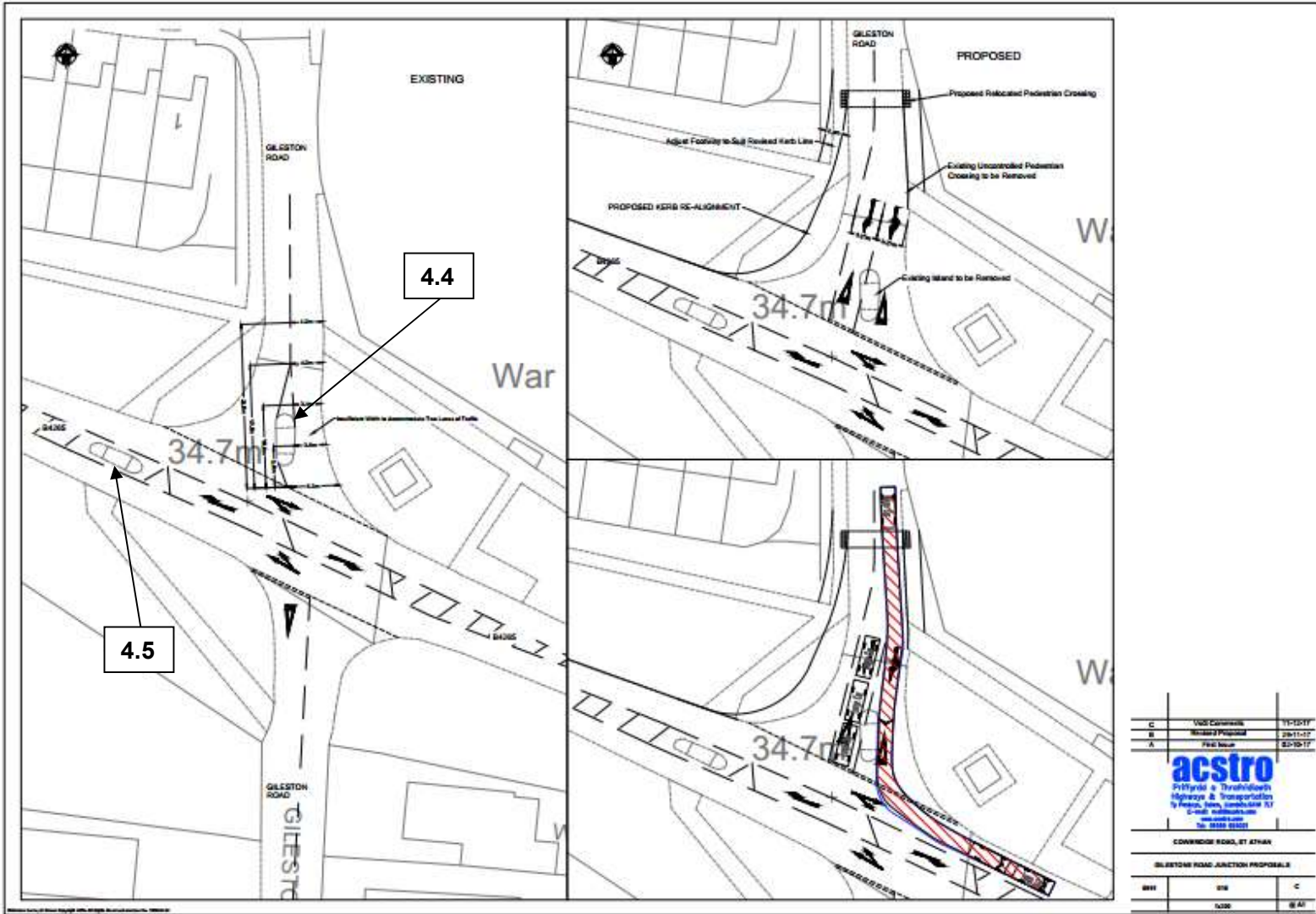
Date: 15<sup>th</sup> December 2017



APPENDIX A: LOCATION PLAN







## APPENDIX B: Road Safety Audit Response

Auditors: D Swift (Team Leader) and T Sterling (Team Member).

Date Response Completed:

Scheme: Cowbridge Road, St Athan. Proposed Access Arrangements.

This response is to a Stage 1 Road Safety Audit to the design standard detailed within HD19/15 of Volume 5, Section 2, Part 2, of the Design Manual for Roads and Bridges, as detailed by the Highways Agency.

Problem no. in safety audit report	Problem accepted (yes/no)	Recommended measure accepted (yes/no)	Alternative measure (detail description)
3.1	Yes	Yes	Street lighting to be provided. Details to be developed at detailed design stage
3.2	Yes	No	<p>Adjusting the position of the roundabout to improve forward visibility into the roundabout from Eglwys Brewis Road has been investigated. To improve the forward visibility the roundabout would need to move to the east. The potential for this is limited due to the requirement to avoid encroaching into the 10m buffer around the architectural feature to the north. Moving the roundabout to the east tightens the left turn from Eglwys Brewis Road to St Athans Road to such a degree that the entry width must be widened further on the nearside to accommodate the path of a HGV, thereby counteracting any improvement gained in forward visibility.</p> <p>At least 43m SSD is available to give-way line of the roundabout as is required in 30mph areas.</p> <p>Street lighting will be provided.</p> <p>Approaching drivers have visibility of the proposed Eglwys Brewis Road splitter island from a distance of at least 100m. 'Keep left' (diag. 610) bollards/signs</p>

			will be provided on this splitter island to ensure that traffic passes the splitter island on the correct side.
3.3	Yes	Yes	To be addressed at detailed design stage
3.4	Yes	Yes	To be addressed at detailed design stage
3.5	Yes	No	Gravel path has been removed following discussions and agreement with Highway Authority. Land to the west of the roundabout and to the north of St Athan Road will be offered for adoption by the Highway Authority.
4.1	Yes	Yes	As per 3.1 above. It is considered that the roundabout is in the optimum location given the various constraints that influence its position. Signage, road markings and street lighting will be used to ensure that the junction's layout is legible to approaching drivers. Proposals for signage, road markings and street lighting to be developed at detailed design stage.
4.2	Yes	Yes	The MOD access is used infrequently. The proposed layout is considered to be superior to the existing in terms of facilitating safe movement to and from the MOD access.
4.3	Yes	Yes	To be addressed at detailed design stage
4.4	Yes	Yes	
4.5	Yes	Yes	

**Principal Engineer's / Audit Project Sponsor's Statement:**

Road Safety Audit for Cowbridge Road, St Athan. Proposed Access Arrangements.

I certify that I have considered the items raised in the Stage 1 Road Safety Audit Report and I am content to accept all of its recommendations except for the ones listed above. I have stated my reasons for not accepting them and I seek the Chief Engineer's endorsement of my proposals.



..... Date.....15/01/2018.....

Principal Engineer

**Chief Engineer's / Director's Decision:**

I accept these proposals by the Principal Engineer.



..... Date.....15/01/2018.....

Chief Engineer

**acstro**

Ymgynghorwyr Priffyrdd a Thrafnidiaeth  
Highways & Transportation Consultants

# Appendix 3

# ARCADY 7

Version: 7.0.0.99 [10 July 2009]  
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File: Z:\OneDrive - Acstro Limited\Shared with Everyone\ACSTRO Jobs\0991 Cowbridge Rd St Athan\ARCADY\site access.arc7  
Report generation date: 1/16/2018 9:23:18 AM

## Summary of roundabout performance

	AM				PM			
	Queue (Veh)	Delay (min)	RFC	LOS	Queue (Veh)	Delay (min)	RFC	LOS
<b>Proposed Roundabout - Design 2027</b>								
Site Access	0.11	0.07	0.10	A	0.06	0.07	0.06	A
Cowbridge Road	0.45	0.08	0.31	A	0.31	0.07	0.23	A
Eglwys Brewis Road	0.17	0.06	0.14	A	0.14	0.06	0.12	A
St Athan Road	0.14	0.06	0.12	A	0.23	0.07	0.19	A

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle.

Design 2027 - AM runs from 07:45:00 to 09:15:00  
Design 2027 - PM runs from 16:45:00 to 18:15:00

## File summary

### File Description

Title	Proposed Access
Date	6/8/2017
Status	(new file)
Enumerator	ALUNREES41AFAdministrator
Results Upto Date	False

## Analysis Options

RFC Threshold	Vehicle Length (m)	Do Queue Variations
0.85	5.75	

## Sorting and Display

Show Arm Names	Arm Grouping	Sorting Direction	Sorting Type	Data Matrix Style	Time Style
Yes	Order	Ascending	Numerical	By Destination	Absolute Time

## Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	Veh	Veh	perHour	min	-Min	perMin

# A1 - Proposed Roundabout - D1 - Design 2027, AM

## Data Errors and Warnings

No errors or warnings

## Analysis Set Details

Name	Description	Include In Report	Use Specific Demand Set	Demand Set	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
Proposed Roundabout		Yes		(D1)		100.000	100.000	

## Demand Set Details

Name	Scenario Name	Time Period Name	Description	Locked	Run Automatically	Use Relationship	Relationship	Start Time (HH:mm)	Finish Time (HH:mm)	Time Period Length (min)	Time Segment Length (min)	Traffic Profile Type
Design 2027, AM	Design 2027	AM			Yes			07:45	09:15	90	15	ONE HOUR

# Roundabout Network

## Roundabout Type(s)

ID	Name	Arm Order	Roundabout Type	Grade Separated	Large Roundabout	Do Geometric Delay
1	(untitled)	1,2,3,4	Standard			

## Roundabout Network Options

Driving Side	Lighting	Road Surface	In London
Left	Normal/unknown	((Mini-roundabouts only))	

# Arms

## Arms

ID	Name	Description
1	Site Access	
2	Cowbridge Road	
3	Eglwys Brewis Road	
4	St Athan Road	

## Capacity Options

Arm	Minimum Capacity (PCU/hr)	Maximum Capacity (PCU/hr)	Assume Flat Start Profile	Initial Queue (PCU)
Site Access	0.00	99999.00		0.00
Cowbridge Road	0.00	99999.00		0.00
Eglwys Brewis Road	0.00	99999.00		0.00
St Athan Road	0.00	99999.00		0.00

## Standard Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
Site Access	3.00	4.10	5.00	10.00	28.00	30.00	
Cowbridge Road	3.00	5.40	5.00	10.00	28.00	30.00	
Eglwys Brewis Road	2.80	7.20	10.00	5.00	28.00	35.00	
St Athan Road	3.13	4.30	5.00	15.00	28.00	25.00	

## Pedestrian Crossings

Arm	Crossing Type
Site Access	None
Cowbridge Road	None
Eglwys Brewis Road	None
St Athan Road	None

## Arm Slope/ Intercept and Capacity

## Slope and Intercept used in model

Arm	Enter Directly	Slope	Intercept (PCU/hr)	Final Slope	Final Intercept (PCU/hr)
Site Access		((calculated))	((calculated))	0.511	1050.584
Cowbridge Road		((calculated))	((calculated))	0.529	1137.279
Eglwys Brewis Road		((calculated))	((calculated))	0.500	1172.047
St Athan Road		((calculated))	((calculated))	0.548	1152.315

The slope and intercept shown above include any corrections and adjustments.

# Traffic Flows

## Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCU Factor for a HV (PCU)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		Yes	Yes	HV Percentages	2.00				Yes	Yes

# Entry Flows

## General Flows Data

Arm	Profile Type	Use Turning Counts	Average Demand Flow (Veh/hr)	Flow Scaling Factor (%)	PHF
Site Access	ONE HOUR	Yes	84.00	100.000	N/A
Cowbridge Road	ONE HOUR	Yes	314.00	100.000	N/A
Eglwys Brewis Road	ONE HOUR	Yes	142.00	100.000	N/A
St Athan Road	ONE HOUR	Yes	119.00	100.000	N/A

# Direct/Resultant Flows

## Direct Flows Data

Time Segment	Arm	Direct Demand Entry Flow (Veh/hr)	DirectDemandEntryFlowInPCU (PCU/hr)	Direct Demand Exit Flow (Veh/hr)	Direct Demand Pedestrian Flow (Ped/hr)
7:45 AM-8:00 AM	Site Access	63.24	63.24	N/A	N/A
7:45 AM-8:00 AM	Cowbridge Road	236.40	236.40	N/A	N/A
7:45 AM-8:00 AM	Eglwys Brewis Road	106.91	106.91	N/A	N/A
7:45 AM-8:00 AM	St Athan Road	89.59	89.59	N/A	N/A
8:00 AM-8:15 AM	Site Access	75.51	75.51	N/A	N/A
8:00 AM-8:15 AM	Cowbridge Road	282.28	282.28	N/A	N/A
8:00 AM-8:15 AM	Eglwys Brewis Road	127.66	127.66	N/A	N/A
8:00 AM-8:15 AM	St Athan Road	106.98	106.98	N/A	N/A
8:15 AM-8:30 AM	Site Access	92.49	92.49	N/A	N/A
8:15 AM-8:30 AM	Cowbridge Road	345.72	345.72	N/A	N/A
8:15 AM-8:30 AM	Eglwys Brewis Road	156.34	156.34	N/A	N/A
8:15 AM-8:30 AM	St Athan Road	131.02	131.02	N/A	N/A
8:30 AM-8:45 AM	Site Access	92.49	92.49	N/A	N/A



8:30 AM-8:45 AM	Cowbridge Road	345.72	345.72	N/A	N/A
8:30 AM-8:45 AM	Eglwys Brewis Road	156.34	156.34	N/A	N/A
8:30 AM-8:45 AM	St Athan Road	131.02	131.02	N/A	N/A
8:45 AM-9:00 AM	Site Access	75.51	75.51	N/A	N/A
8:45 AM-9:00 AM	Cowbridge Road	282.28	282.28	N/A	N/A
8:45 AM-9:00 AM	Eglwys Brewis Road	127.66	127.66	N/A	N/A
8:45 AM-9:00 AM	St Athan Road	106.98	106.98	N/A	N/A
9:00 AM-9:15 AM	Site Access	63.24	63.24	N/A	N/A
9:00 AM-9:15 AM	Cowbridge Road	236.40	236.40	N/A	N/A
9:00 AM-9:15 AM	Eglwys Brewis Road	106.91	106.91	N/A	N/A
9:00 AM-9:15 AM	St Athan Road	89.59	89.59	N/A	N/A

## Turning Proportions

### Turning Counts or Proportions (Veh/hr) - Roundabout 1 (for whole period)

		To			
		1	2	3	4
From	1	0.00	51.00	8.00	25.00
	2	14.00	0.00	181.00	119.00
	3	2.00	109.00	0.00	31.00
	4	7.00	89.00	23.00	0.00

### Turning Proportions (Veh) - Roundabout 1 (for whole period)

		To			
		1	2	3	4
From	1	0.00	0.61	0.10	0.30
	2	0.04	0.00	0.58	0.38
	3	0.01	0.77	0.00	0.22
	4	0.06	0.75	0.19	0.00

## Vehicle Mix

### Average PCU Per Vehicle - Roundabout 1 (for whole period)

		To			
		1	2	3	4
From	1	1.00	1.00	1.00	1.00
	2	1.00	1.00	1.00	1.00
	3	1.00	1.00	1.00	1.00
	4	1.00	1.00	1.00	1.00

### Heavy Vehicle Percentages - Roundabout 1 (for whole period)

		To			
		1	2	3	4
From	1	0.00	0.00	0.00	0.00
	2	0.00	0.00	0.00	0.00
	3	0.00	0.00	0.00	0.00
	4	0.00	0.00	0.00	0.00

# Results

## Results Summary

Arm	Max RFC	Max Delay (min)	Max Queue (Veh)	Max LOS	Total Demand (Veh/hr)	Total Arrivals (Veh)	Total Queueing Delay (Veh-min)	Average Queueing Delay (min)	Rate Of Queueing Delay (Veh-min/min)	Inclusive Queueing Total Delay (Veh-min)	Inclusive Queueing Average Delay (min)	Slope	Intercept (PCU/hr)
Site Access	0.10	0.07	0.11	A	77.08	115.62	7.98	0.07	0.09	7.98	0.07	0.511	1050.584
Cowbridge Road	0.31	0.08	0.45	A	288.13	432.20	31.73	0.07	0.35	31.73	0.07	0.529	1137.279
Eglwys Brewis Road	0.14	0.06	0.17	A	130.30	195.45	12.11	0.06	0.13	12.11	0.06	0.500	1172.047
St Athan Road	0.12	0.06	0.14	A	109.20	163.79	10.02	0.06	0.11	10.02	0.06	0.548	1152.315

## Overview: Standard Roundabout Geometry

### Standard Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only	Final Slope	Final Intercept (PCU/hr)
Site Access	3.00	4.10	5.00	10.00	28.00	30.00		0.511	1050.584
Cowbridge Road	3.00	5.40	5.00	10.00	28.00	30.00		0.529	1137.279
Eglwys Brewis Road	2.80	7.20	10.00	5.00	28.00	35.00		0.500	1172.047
St Athan Road	3.13	4.30	5.00	15.00	28.00	25.00		0.548	1152.315

## Overview: Time Segment Results

### Time Segment Results

Time Segment	Arm	Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Pedestrian Demand (Ped/hr)	Start Queue (Veh)	End Queue (Veh)	Queueing Total Delay (Veh-min)	Geometric Total Delay (Veh-min)	Average Delay Per Arriving Vehicle (min)
7:45 AM-8:00 AM	Site Access	63.24	965.85	0.065	0.00	0.00	0.07	1.02	(0.00)	0.066
7:45 AM-8:00 AM	Cowbridge Road	236.40	1115.07	0.212	0.00	0.00	0.27	3.92	(0.00)	0.068
7:45 AM-8:00 AM	Eglwys Brewis Road	106.91	1112.79	0.096	0.00	0.00	0.11	1.56	(0.00)	0.060
7:45 AM-8:00 AM	St Athan Road	89.59	1100.98	0.081	0.00	0.00	0.09	1.30	(0.00)	0.059
8:00 AM-8:15 AM	Site Access	75.51	949.08	0.080	0.00	0.07	0.09	1.27	(0.00)	0.069
8:00 AM-8:15 AM	Cowbridge Road	282.28	1110.67	0.254	0.00	0.27	0.34	4.99	(0.00)	0.072
8:00 AM-8:15 AM	Eglwys Brewis Road	127.66	1101.04	0.116	0.00	0.11	0.13	1.93	(0.00)	0.062
8:00 AM-8:15 AM	St Athan Road	106.98	1090.82	0.098	0.00	0.09	0.11	1.60	(0.00)	0.061
8:15 AM-8:30 AM	Site Access	92.49	926.29	0.100	0.00	0.09	0.11	1.63	(0.00)	0.072
8:15 AM-8:30 AM	Cowbridge Road	345.72	1104.69	0.313	0.00	0.34	0.45	6.65	(0.00)	0.079
8:15 AM-8:30 AM	Eglwys Brewis Road	156.34	1085.11	0.144	0.00	0.13	0.17	2.48	(0.00)	0.065
8:15 AM-8:30 AM	St Athan Road	131.02	1077.01	0.122	0.00	0.11	0.14	2.04	(0.00)	0.063
8:30 AM-8:45 AM	Site Access	92.49	926.18	0.100	0.00	0.11	0.11	1.66	(0.00)	0.072
8:30 AM-8:45 AM	Cowbridge Road	345.72	1104.66	0.313	0.00	0.45	0.45	6.80	(0.00)	0.079
8:30 AM-8:45 AM	Eglwys Brewis Road	156.34	1085.00	0.144	0.00	0.17	0.17	2.52	(0.00)	0.065

8:30 AM-8:45 AM	St Athan Road	131.02	1076.94	0.122	0.00	0.14	0.14	2.07	(0.00)	0.063
8:45 AM-9:00 AM	Site Access	75.51	948.89	0.080	0.00	0.11	0.09	1.32	(0.00)	0.069
8:45 AM-9:00 AM	Cowbridge Road	282.28	1110.61	0.254	0.00	0.45	0.34	5.24	(0.00)	0.073
8:45 AM-9:00 AM	Eglwys Brewis Road	127.66	1100.86	0.116	0.00	0.17	0.13	2.01	(0.00)	0.062
8:45 AM-9:00 AM	St Athan Road	106.98	1090.70	0.098	0.00	0.14	0.11	1.66	(0.00)	0.061
9:00 AM-9:15 AM	Site Access	63.24	965.44	0.066	0.00	0.09	0.07	1.07	(0.00)	0.067
9:00 AM-9:15 AM	Cowbridge Road	236.40	1114.95	0.212	0.00	0.34	0.27	4.13	(0.00)	0.068
9:00 AM-9:15 AM	Eglwys Brewis Road	106.91	1112.45	0.096	0.00	0.13	0.11	1.62	(0.00)	0.060
9:00 AM-9:15 AM	St Athan Road	89.59	1100.72	0.081	0.00	0.11	0.09	1.35	(0.00)	0.059

## A1 - Proposed Roundabout - D2 - Design 2027, PM

### Data Errors and Warnings

*No errors or warnings*

### Analysis Set Details

Name	Description	Include In Report	Use Specific Demand Set	Demand Set	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
Proposed Roundabout		Yes		(D1)		100.000	100.000	

### Demand Set Details

Name	Scenario Name	Time Period Name	Description	Locked	Run Automatically	Use Relationship	Relationship	Start Time (HH:mm)	Finish Time (HH:mm)	Time Period Length (min)	Time Segment Length (min)	Traffic Profile Type
Design 2027, PM	Design 2027	PM			Yes			16:45	18:15	90	15	ONE HOUR

## Roundabout Network

### Roundabout Type(s)

ID	Name	Arm Order	Roundabout Type	Grade Separated	Large Roundabout	Do Geometric Delay
1	(untitled)	1,2,3,4	Standard			

### Roundabout Network Options

Driving Side	Lighting	Road Surface	In London
Left	Normal/unknown	((Mini-roundabouts only))	

## Arms

### Arms

ID	Name	Description
----	------	-------------

1	Site Access	
2	Cowbridge Road	
3	Eglwys Brewis Road	
4	St Athan Road	

## Capacity Options

Arm	Minimum Capacity (PCU/hr)	Maximum Capacity (PCU/hr)	Assume Flat Start Profile	Initial Queue (PCU)
Site Access	0.00	99999.00		0.00
Cowbridge Road	0.00	99999.00		0.00
Eglwys Brewis Road	0.00	99999.00		0.00
St Athan Road	0.00	99999.00		0.00

## Standard Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
Site Access	3.00	4.10	5.00	10.00	28.00	30.00	
Cowbridge Road	3.00	5.40	5.00	10.00	28.00	30.00	
Eglwys Brewis Road	2.80	7.20	10.00	5.00	28.00	35.00	
St Athan Road	3.13	4.30	5.00	15.00	28.00	25.00	

## Pedestrian Crossings

Arm	Crossing Type
Site Access	None
Cowbridge Road	None
Eglwys Brewis Road	None
St Athan Road	None

## Arm Slope/ Intercept and Capacity

### Slope and Intercept used in model

Arm	Enter Directly	Slope	Intercept (PCU/hr)	Final Slope	Final Intercept (PCU/hr)
Site Access		((calculated))	((calculated))	0.511	1050.584
Cowbridge Road		((calculated))	((calculated))	0.529	1137.279
Eglwys Brewis Road		((calculated))	((calculated))	0.500	1172.047
St Athan Road		((calculated))	((calculated))	0.548	1152.315

*The slope and intercept shown above include any corrections and adjustments.*

## Traffic Flows

### Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCU Factor for a HV (PCU)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		Yes	Yes	HV Percentages	2.00				Yes	Yes

## Entry Flows

### General Flows Data

Arm	Profile Type	Use Turning Counts	Average Demand Flow (Veh/hr)	Flow Scaling Factor (%)	PHF
Site Access	ONE HOUR	Yes	46.00	100.000	N/A
Cowbridge Road	ONE HOUR	Yes	236.00	100.000	N/A
Eglwys Brewis Road	ONE HOUR	Yes	124.00	100.000	N/A
St Athan Road	ONE HOUR	Yes	180.00	100.000	N/A

# Direct/Resultant Flows

## Direct Flows Data

Time Segment	Arm	Direct Demand Entry Flow (Veh/hr)	DirectDemandEntryFlowInPCU (PCU/hr)	Direct Demand Exit Flow (Veh/hr)	Direct Demand Pedestrian Flow (Ped/hr)
4:45 PM-5:00 PM	Site Access	34.63	34.63	N/A	N/A
4:45 PM-5:00 PM	Cowbridge Road	177.67	177.67	N/A	N/A
4:45 PM-5:00 PM	Eglwys Brewis Road	93.35	93.35	N/A	N/A
4:45 PM-5:00 PM	St Athan Road	135.51	135.51	N/A	N/A
5:00 PM-5:15 PM	Site Access	41.35	41.35	N/A	N/A
5:00 PM-5:15 PM	Cowbridge Road	212.16	212.16	N/A	N/A
5:00 PM-5:15 PM	Eglwys Brewis Road	111.47	111.47	N/A	N/A
5:00 PM-5:15 PM	St Athan Road	161.82	161.82	N/A	N/A
5:15 PM-5:30 PM	Site Access	50.65	50.65	N/A	N/A
5:15 PM-5:30 PM	Cowbridge Road	259.84	259.84	N/A	N/A
5:15 PM-5:30 PM	Eglwys Brewis Road	136.53	136.53	N/A	N/A
5:15 PM-5:30 PM	St Athan Road	198.18	198.18	N/A	N/A
5:30 PM-5:45 PM	Site Access	50.65	50.65	N/A	N/A
5:30 PM-5:45 PM	Cowbridge Road	259.84	259.84	N/A	N/A
5:30 PM-5:45 PM	Eglwys Brewis Road	136.53	136.53	N/A	N/A
5:30 PM-5:45 PM	St Athan Road	198.18	198.18	N/A	N/A
5:45 PM-6:00 PM	Site Access	41.35	41.35	N/A	N/A
5:45 PM-6:00 PM	Cowbridge Road	212.16	212.16	N/A	N/A
5:45 PM-6:00 PM	Eglwys Brewis Road	111.47	111.47	N/A	N/A
5:45 PM-6:00 PM	St Athan Road	161.82	161.82	N/A	N/A
6:00 PM-6:15 PM	Site Access	34.63	34.63	N/A	N/A
6:00 PM-6:15 PM	Cowbridge Road	177.67	177.67	N/A	N/A
6:00 PM-6:15 PM	Eglwys Brewis Road	93.35	93.35	N/A	N/A
6:00 PM-6:15 PM	St Athan Road	135.51	135.51	N/A	N/A

## Turning Proportions

### Turning Counts or Proportions (Veh/hr) - Roundabout 1 (for whole period)

		To			
		1	2	3	4
From	1	0.00	27.00	5.00	14.00
	2	43.00	0.00	110.00	83.00
	3	7.00	107.00	0.00	10.00
	4	21.00	126.00	33.00	0.00

### Turning Proportions (Veh) - Roundabout 1 (for whole period)

		To			
		1	2	3	4
From	1	0.00	0.59	0.11	0.30
	2	0.18	0.00	0.47	0.35
	3	0.06	0.86	0.00	0.08
	4	0.12	0.70	0.18	0.00

## Vehicle Mix

### Average PCU Per Vehicle - Roundabout 1 (for whole period)

		To			
		1	2	3	4
From	1	1.00	1.00	1.00	1.00
	2	1.00	1.00	1.00	1.00
	3	1.00	1.00	1.00	1.00
	4	1.00	1.00	1.00	1.00

### Heavy Vehicle Percentages - Roundabout 1 (for whole period)

		To			
		1	2	3	4
From	1	0.00	0.00	0.00	0.00
	2	0.00	0.00	0.00	0.00
	3	0.00	0.00	0.00	0.00
	4	0.00	0.00	0.00	0.00

## Results

### Results Summary

Arm	Max RFC	Max Delay (min)	Max Queue (Veh)	Max LOS	Total Demand (Veh/hr)	Total Arrivals (Veh)	Total Queueing Delay (Veh-min)	Average Queueing Delay (min)	Rate Of Queueing Delay (Veh-min/min)	Inclusive Queueing Total Delay (Veh-min)	Inclusive Queueing Average Delay (min)	Slope	Intercept (PCU/hr)
Site Access	0.06	0.07	0.06	A	42.21	63.32	4.30	0.07	0.05	4.30	0.07	0.511	1050.584
Cowbridge Road	0.23	0.07	0.31	A	216.56	324.84	21.81	0.07	0.24	21.81	0.07	0.529	1137.279
Eglwys Brewis Road	0.12	0.06	0.14	A	113.78	170.68	10.30	0.06	0.11	10.30	0.06	0.500	1172.047
St Athan Road	0.19	0.07	0.23	A	165.17	247.76	16.41	0.07	0.18	16.41	0.07	0.548	1152.315

## Overview: Standard Roundabout Geometry

### Standard Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only	Final Slope	Final Intercept (PCU/hr)
Site Access	3.00	4.10	5.00	10.00	28.00	30.00		0.511	1050.584
Cowbridge Road	3.00	5.40	5.00	10.00	28.00	30.00		0.529	1137.279
Eglwys Brewis Road	2.80	7.20	10.00	5.00	28.00	35.00		0.500	1172.047
St Athan Road	3.13	4.30	5.00	15.00	28.00	25.00		0.548	1152.315

## Overview: Time Segment Results

## Time Segment Results

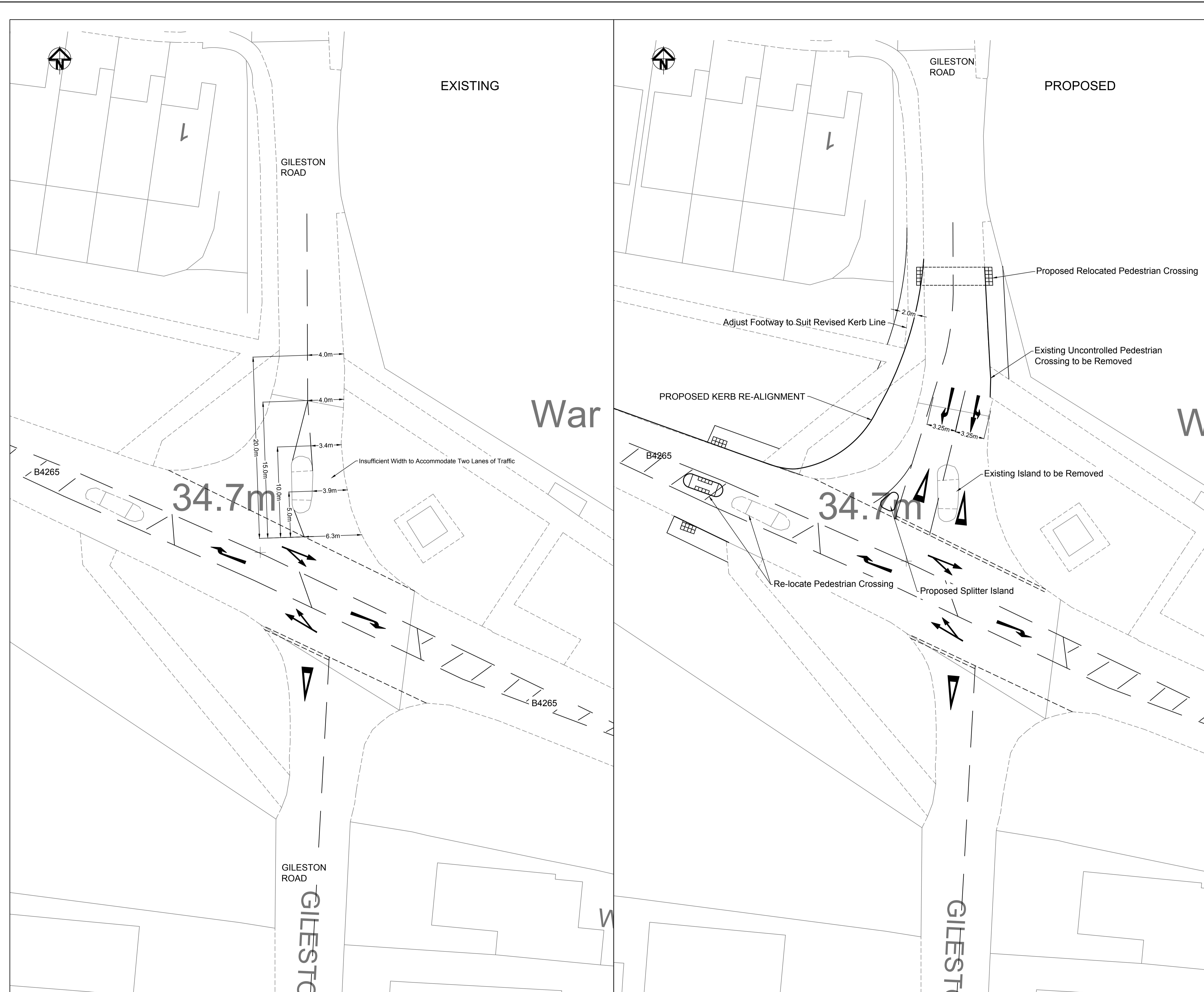
Time Segment	Arm	Demand (Veh/hr)	Capacity (Veh/hr)	RFC	Pedestrian Demand (Ped/hr)	Start Queue (Veh)	End Queue (Veh)	Queueing Total Delay (Veh-min)	Geometric Total Delay (Veh-min)	Average Delay Per Arriving Vehicle (min)
4:45 PM-5:00 PM	Site Access	34.63	948.61	0.037	0.00	0.00	0.04	0.55	(0.00)	0.066
4:45 PM-5:00 PM	Cowbridge Road	177.67	1116.65	0.159	0.00	0.00	0.19	2.76	(0.00)	0.064
4:45 PM-5:00 PM	Eglwys Brewis Road	93.35	1119.53	0.083	0.00	0.00	0.09	1.33	(0.00)	0.058
4:45 PM-5:00 PM	St Athan Road	135.51	1087.84	0.125	0.00	0.00	0.14	2.08	(0.00)	0.063
5:00 PM-5:15 PM	Site Access	41.35	928.42	0.045	0.00	0.04	0.05	0.69	(0.00)	0.068
5:00 PM-5:15 PM	Cowbridge Road	212.16	1112.57	0.191	0.00	0.19	0.23	3.46	(0.00)	0.067
5:00 PM-5:15 PM	Eglwys Brewis Road	111.47	1109.12	0.101	0.00	0.09	0.11	1.65	(0.00)	0.060
5:00 PM-5:15 PM	St Athan Road	161.82	1075.08	0.151	0.00	0.14	0.18	2.61	(0.00)	0.066
5:15 PM-5:30 PM	Site Access	50.65	901.00	0.056	0.00	0.05	0.06	0.88	(0.00)	0.071
5:15 PM-5:30 PM	Cowbridge Road	259.84	1107.02	0.235	0.00	0.23	0.30	4.50	(0.00)	0.071
5:15 PM-5:30 PM	Eglwys Brewis Road	136.53	1095.00	0.125	0.00	0.11	0.14	2.10	(0.00)	0.063
5:15 PM-5:30 PM	St Athan Road	198.18	1057.73	0.187	0.00	0.18	0.23	3.38	(0.00)	0.070
5:30 PM-5:45 PM	Site Access	50.65	900.85	0.056	0.00	0.06	0.06	0.89	(0.00)	0.071
5:30 PM-5:45 PM	Cowbridge Road	259.84	1106.99	0.235	0.00	0.30	0.31	4.58	(0.00)	0.071
5:30 PM-5:45 PM	Eglwys Brewis Road	136.53	1094.92	0.125	0.00	0.14	0.14	2.13	(0.00)	0.063
5:30 PM-5:45 PM	St Athan Road	198.18	1057.64	0.187	0.00	0.23	0.23	3.45	(0.00)	0.070
5:45 PM-6:00 PM	Site Access	41.35	928.18	0.045	0.00	0.06	0.05	0.71	(0.00)	0.068
5:45 PM-6:00 PM	Cowbridge Road	212.16	1112.52	0.191	0.00	0.31	0.24	3.61	(0.00)	0.067
5:45 PM-6:00 PM	Eglwys Brewis Road	111.47	1108.99	0.101	0.00	0.14	0.11	1.71	(0.00)	0.060
5:45 PM-6:00 PM	St Athan Road	161.82	1074.93	0.151	0.00	0.23	0.18	2.71	(0.00)	0.066
6:00 PM-6:15 PM	Site Access	34.63	948.10	0.037	0.00	0.05	0.04	0.58	(0.00)	0.066
6:00 PM-6:15 PM	Cowbridge Road	177.67	1116.55	0.159	0.00	0.24	0.19	2.90	(0.00)	0.064
6:00 PM-6:15 PM	Eglwys Brewis Road	93.35	1119.25	0.083	0.00	0.11	0.09	1.39	(0.00)	0.058
6:00 PM-6:15 PM	St Athan Road	135.51	1087.52	0.125	0.00	0.18	0.14	2.18	(0.00)	0.063

**acstro**

Ymgynghorwyr Priffyrdd a Thrafnidiaeth  
Highways & Transportation Consultants

# Appendix 4





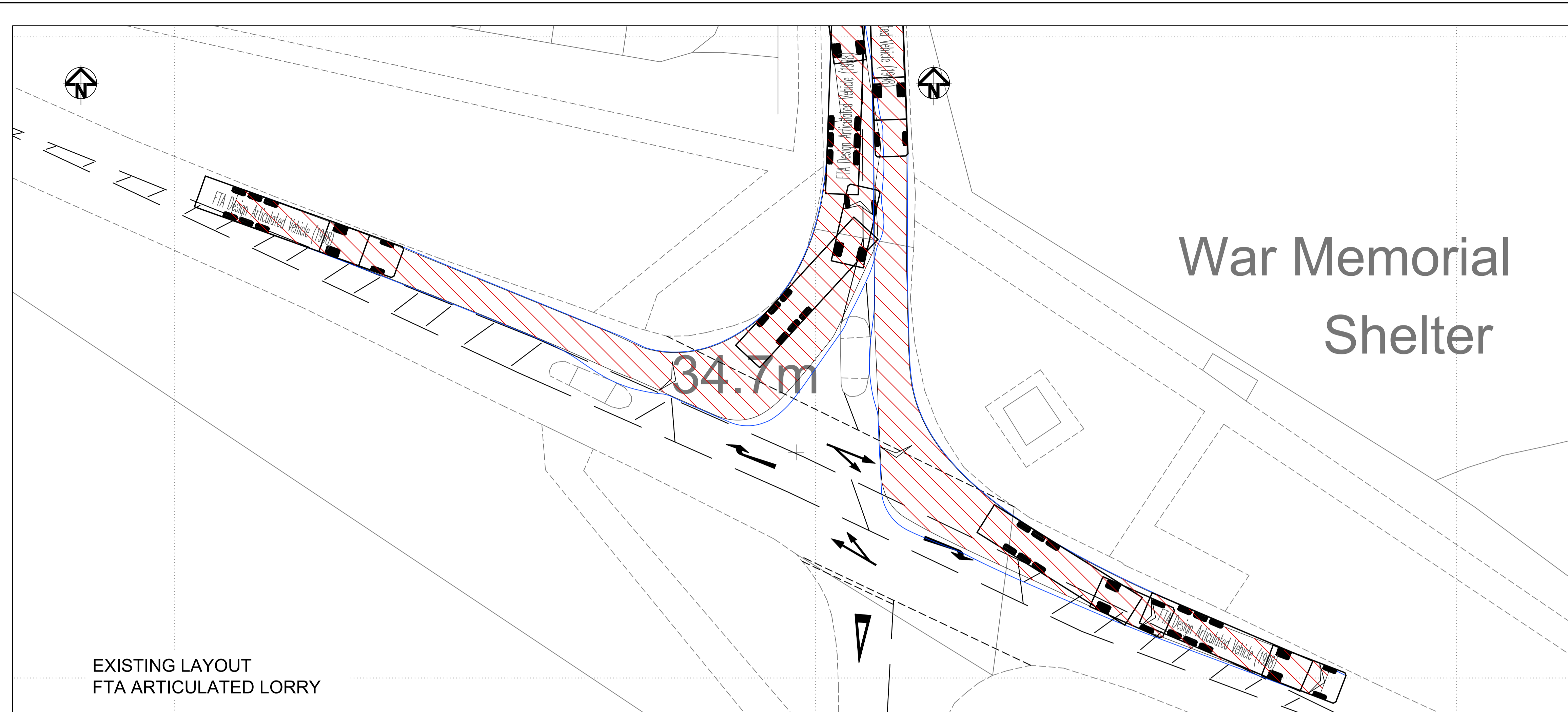
D	Splitter Island Added	11-01-18
C	VoG Comments	11-12-17
B	Revised Proposal	29-11-17
A	First Issue	02-10-17

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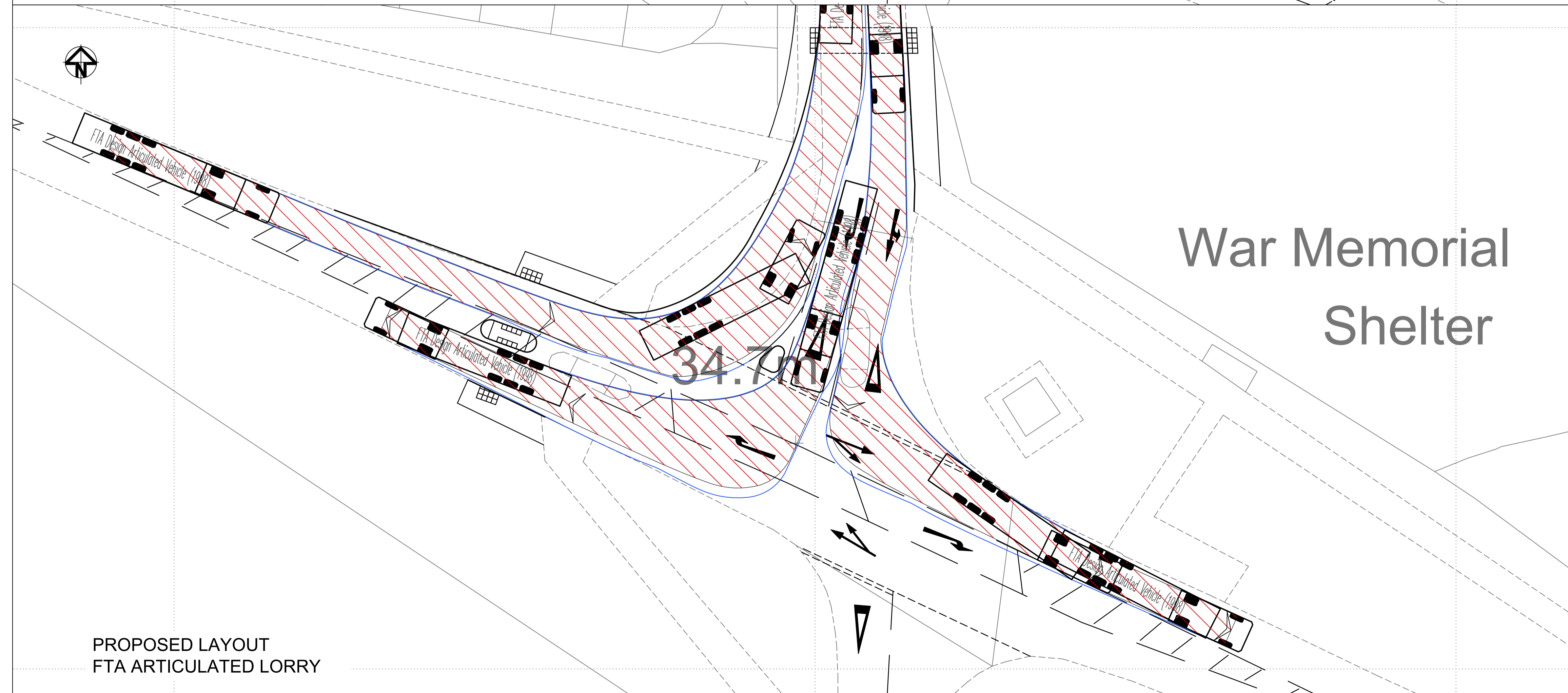
COWBRIDGE ROAD, ST ATHAN

GILESTON ROAD JUNCTION PROPOSALS

0991	018	D
	1:200	@ A1



War Memorial  
Shelter




War Memorial  
Shelter

B	Right Turn Path Added	12-01-18
A	First Issue	12-12-17
 Prifffyrdd a Thrafnidiaeth Highways & Transportation Ty Penbryn, Salem, Llandello, SA19 7LT E-mail: mail@acstro.com www.acstro.com Tel: 01558 824021		
COWBRIDGE ROAD, ST ATHAN		
GILESTONE ROAD JUNCTION SWEEP PATH ANALYSIS		
0991	021	B
	1:200	@ A1

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Ymgynghorwyr Priffyrdd a Thrafnidiaeth  
Highways & Transportation Consultants

# Appendix 5

<b>PICADY</b>		
GUI Version: 5.1 AE Analysis Program Release: 5.0 (MAY 2010)		
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<b>The user of this computer program for the solution of an engineering problem is in no way relieved of their responsibility for the correctness of the solution</b>		

## Run Analysis

Parameter	Values
File Run	Z:\..\Gileston Road\Gileston Rd Proposed.vpi
Date Run	16 January 2018
Time Run	9:27:16 AM
Driving Side	Drive On The Left

## Arm Names and Flow Scaling Factors

Arm	Arm Name	Flow Scaling Factor (%)
Arm A	B4265 (E)	100
Arm B	Gileston Rd (S)	100
Arm C	B4265 (W)	100
Arm D	Gileston Road (N)	100

## Stream Labelling Convention

Stream A-B contains traffic going from A to B etc.

## Run Information

Parameter	Values
Run Title	Gileston Rd / B4265
Location	-
Date	06 June 2017
Enumerator	Administrator [ALUNREES41AF]
Job Number	-
Status	-
Client	-
Description	-

## Errors and Warnings

Parameter	Values
Warning	No Errors Or Warnings

## Geometric Data

### Geometric Parameters

Parameter	Minor Arm B	Minor Arm D
Major Road Carriageway Width (m)	9.00	9.00
Major Road Kerbed Central Reserve Width (m)	0.00	0.00
Major Road Right Turning Lane Width (m)	3.00	3.00
Minor Road First Lane Width (m)	2.50	3.25
Minor Road Second Lane Width (m)	-	3.25
Minor Road Visibility To Right (m)	50	50
Minor Road Visibility To Left (m)	30	50
Major Road Right Turn Visibility (m)	50	50
Major Road Right Turn Blocks Traffic	Yes (if over 2 veh)	Yes (if over 3 veh)

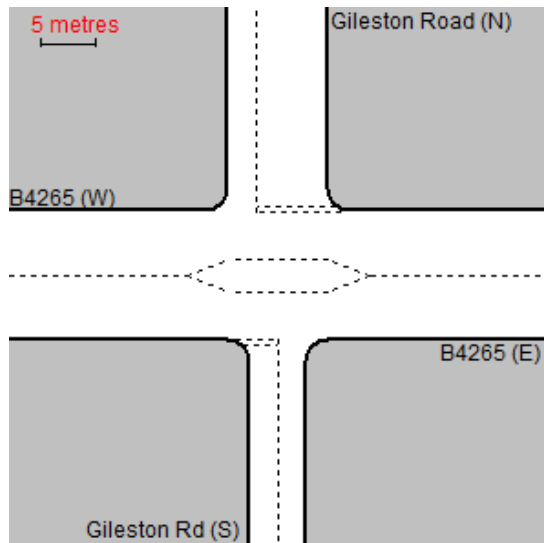
### Slope and Intercept Values

Stream	Intercept for Stream	Slope for A-B	Slope for A-C	Slope for A-D	Slope for B-A	Slope for B-C	Slope for B-D	Slope for C-A	Slope for C-B	Slope for C-D	Slope for D-A	Slope for D-B	Slope for D-C
C-B	655.413	0.221	0.221	0.315	-	-	-	-	-	-	-	-	-
A-D	655.413	-	-	-	-	-	-	0.221	0.315	0.221	-	-	-
B-A	486.263	0.077	0.195	0.195	-	-	-	0.122	0.278	-	0.195	0.195	0.097
B-C	622.604	0.083	0.210	-	-	-	-	-	-	-	-	-	-
B-D(L)	486.263	0.077	0.195	0.195	-	-	-	0.122	0.278	0.122	-	-	-
D-A	671.818	-	-	-	-	-	-	0.226	-	0.090	-	-	-
D-B(L)	531.484	0.134	0.134	0.304	-	-	-	0.213	0.213	0.084	-	-	-
D-C	531.484	-	0.134	0.304	0.106	0.213	0.213	0.213	0.213	0.084	-	-	-
B-D(R)	486.263	0.077	0.195	0.195	-	-	-	0.122	0.278	0.122	-	-	-
D-B(R)	531.484	0.134	0.134	0.304	-	-	-	0.213	0.213	0.084	-	-	-

Note: Streams may be combined in which case capacity will be adjusted  
 These values do not allow for any site-specific corrections

Streams marked with '(L)' and '(R)' refer to the 'left' and 'right' lane of the minor arm that the originating traffic is on.

### Junction Diagram



### Demand Data

#### Modelling Periods

Parameter	Period	Duration (min)	Segment Length (min)
First Modelling Period	08:00-09:00	60	15
Second Modelling Period	17:00-18:00	60	15

### Direct Entry Flows

**Demand Set:** 2027 Baseline + Development AM

**Modelling Period:** 08:00-09:00

**Segment:** 08:00-08:15

Arm	Flow (veh/min)
Arm A	7.93
Arm B	0.34
Arm C	6.64
Arm D	7.96

**Segment:** 08:15-08:30

Arm	Flow (veh/min)
Arm A	7.93
Arm B	0.34
Arm C	6.64
Arm D	7.96

**Segment:** 08:30-08:45

Arm	Flow (veh/min)
Arm A	7.93
Arm B	0.34
Arm C	6.64
Arm D	7.96

**Segment:** 08:45-09:00

Arm	Flow (veh/min)
Arm A	7.93
Arm B	0.34
Arm C	6.64
Arm D	7.96

**Demand Set:** 2027 Baseline+ Development PM

**Modelling Period:** 17:00-18:00

**Segment:** 17:00-17:15

Arm	Flow (veh/min)
Arm A	11.44
Arm B	0.32
Arm C	6.83
Arm D	3.95

**Segment: 17:15-17:30**

Arm	Flow (veh/min)
Arm A	11.44
Arm B	0.32
Arm C	6.83
Arm D	3.95

**Segment: 17:30-17:45**

Arm	Flow (veh/min)
Arm A	11.44
Arm B	0.32
Arm C	6.83
Arm D	3.95

**Segment: 17:45-18:00**

Arm	Flow (veh/min)
Arm A	11.44
Arm B	0.32
Arm C	6.83
Arm D	3.95

**Turning Counts**

**Demand Set:** 2027 Baseline + Development AM

**Modelling Period:** 08:00-09:00

From/To	Arm A	Arm B	Arm C	Arm D
Arm A	-	2	316	157
Arm B	9	-	10	1
Arm C	359	6	-	33
Arm D	280	3	194	-

**Demand Set:** 2027 Baseline+ Development PM

**Modelling Period:** 17:00-18:00

From/To	Arm A	Arm B	Arm C	Arm D
Arm A	-	6	397	284
Arm B	7	-	7	6
Arm C	374	3	-	32
Arm D	198	10	29	-



Turning proportions are calculated from turning count data

### Turning Proportions

**Demand Set:** 2027 Baseline + Development AM  
**Modelling Period:** 08:00-09:00

From/To	Arm A	Arm B	Arm C	Arm D
Arm A	0.000	0.004	0.665	0.331
Arm B	0.450	0.000	0.500	0.050
Arm C	0.902	0.015	0.000	0.083
Arm D	0.587	0.006	0.407	0.000

**Demand Set:** 2027 Baseline+ Development PM  
**Modelling Period:** 17:00-18:00

From/To	Arm A	Arm B	Arm C	Arm D
Arm A	0.000	0.009	0.578	0.413
Arm B	0.350	0.000	0.350	0.300
Arm C	0.914	0.007	0.000	0.078
Arm D	0.835	0.042	0.122	0.000

### Heavy Vehicles Percentages

**Demand Set:** 2027 Baseline + Development AM  
**Modelling Period:** 08:00-09:00

From/To	Arm A	Arm B	Arm C	Arm D
Arm A	-	10.0	10.0	10.0
Arm B	10.0	-	10.0	10.0
Arm C	10.0	10.0	-	10.0
Arm D	10.0	10.0	10.0	-

**Demand Set:** 2027 Baseline+ Development PM  
**Modelling Period:** 17:00-18:00

From/To	Arm A	Arm B	Arm C	Arm D
Arm A	-	10.0	10.0	10.0
Arm B	10.0	-	10.0	10.0
Arm C	10.0	10.0	-	10.0
Arm D	10.0	10.0	10.0	-

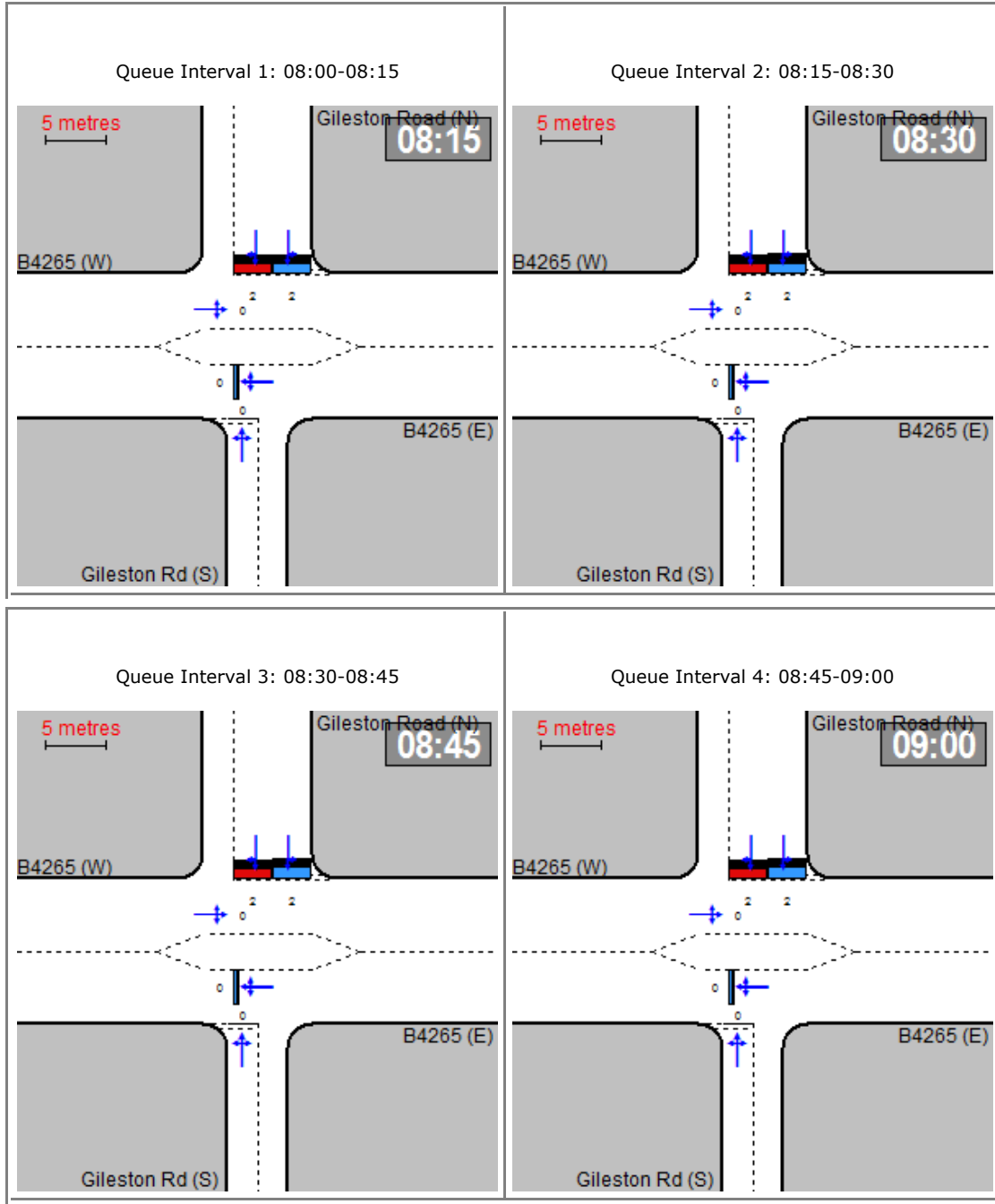
Default proportions of heavy vehicles are used

### Queue Diagrams

**Demand Set:** 2027 Baseline + Development AM

**Modelling Period:** 08:00-09:00

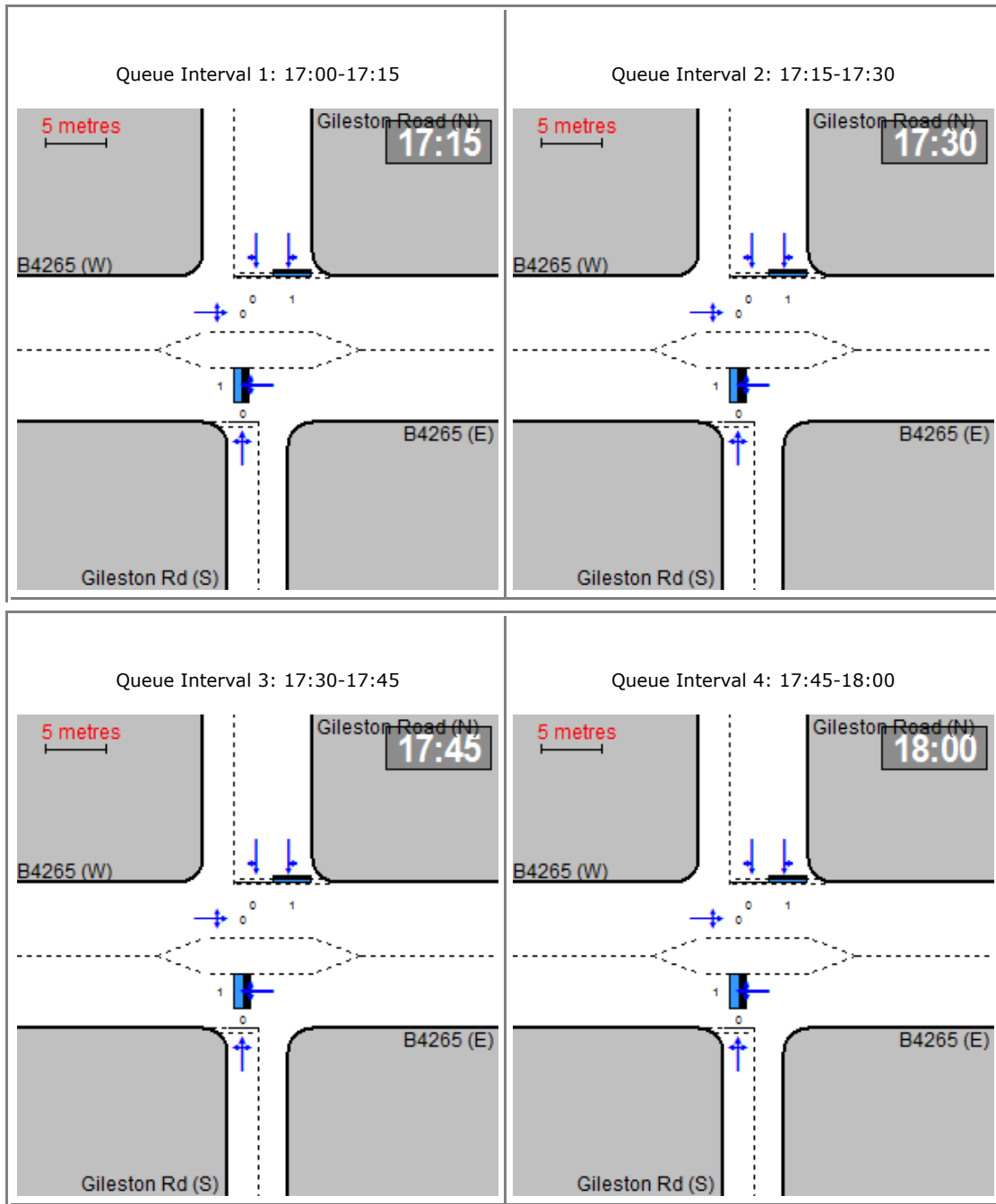
**View Extent:** 40m



**Demand Set:** 2027 Baseline+ Development PM

**Modelling Period:** 17:00-18:00

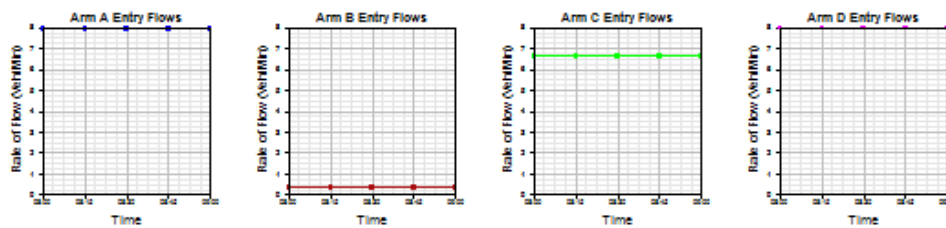
**View Extent:** 40m



### Demand Data Graph

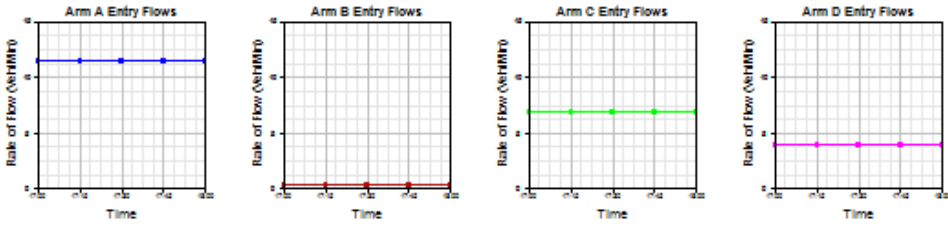
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**Modelling Period:** 08:00-09:00



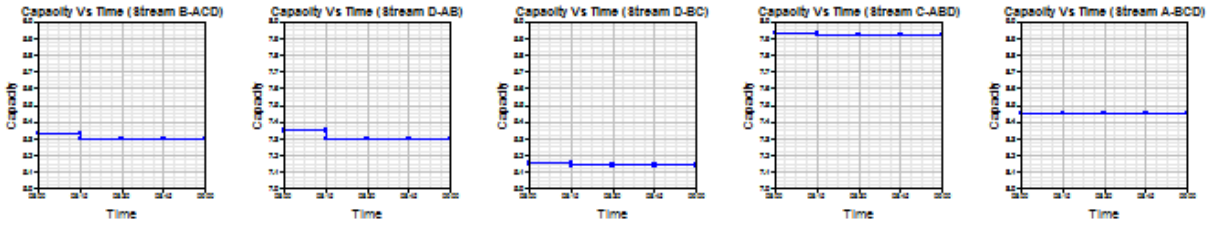
**Demand Set:** 2027 Baseline+ Development PM

**Modelling Period:** 17:00-18:00

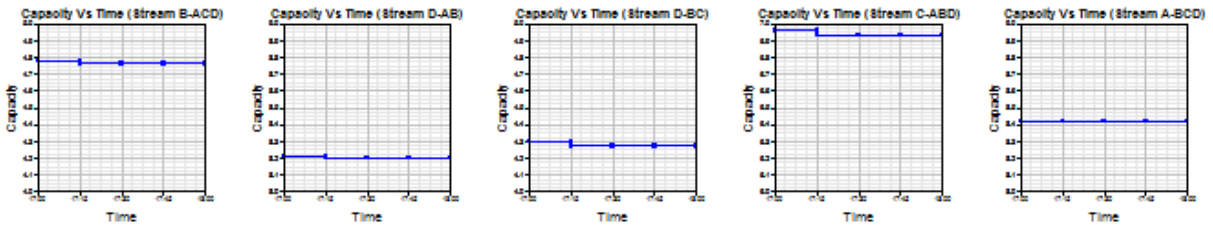


### Capacity Graph

**Demand Set:** 2027 Baseline + Development AM  
**Modelling Period:** 08:00-09:00

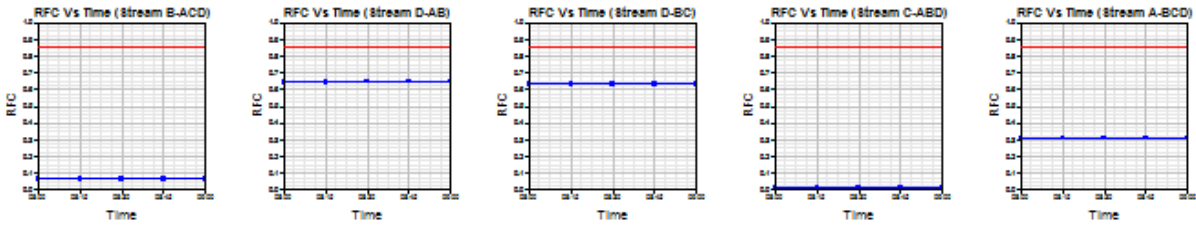


**Demand Set:** 2027 Baseline+ Development PM  
**Modelling Period:** 17:00-18:00

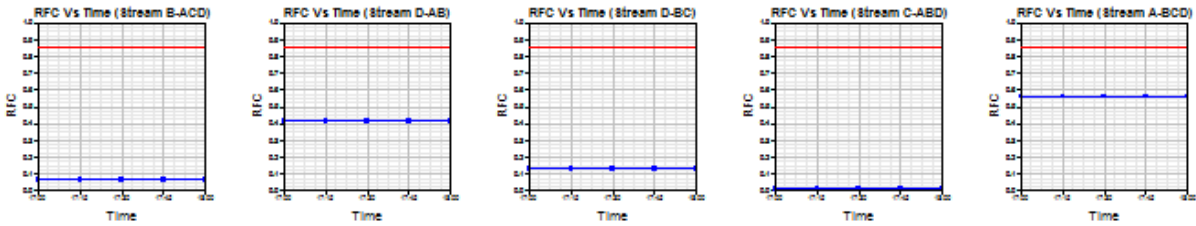


## RFC Graph

**Demand Set:** 2027 Baseline + Development AM  
**Modelling Period:** 08:00-09:00

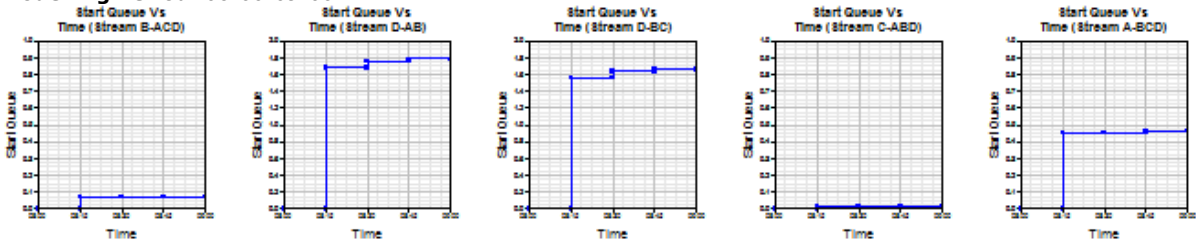


**Demand Set:** 2027 Baseline+ Development PM  
**Modelling Period:** 17:00-18:00

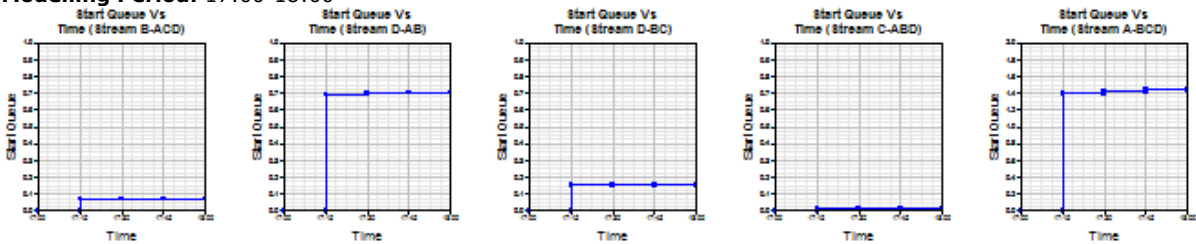


## Start Queue Graph

**Demand Set:** 2027 Baseline + Development AM  
**Modelling Period:** 08:00-09:00



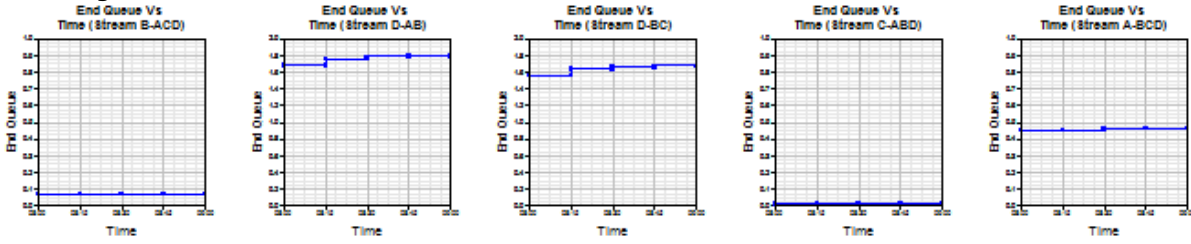
**Demand Set:** 2027 Baseline+ Development PM  
**Modelling Period:** 17:00-18:00



## End Queue Graph

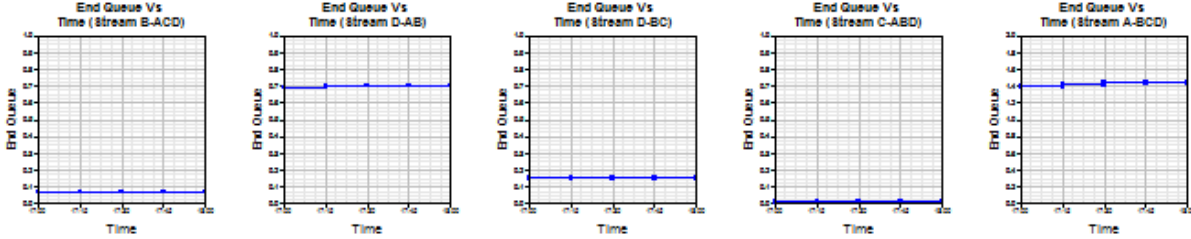
**Demand Set:** 2027 Baseline + Development AM

**Modelling Period:** 08:00-09:00



**Demand Set:** 2027 Baseline+ Development PM

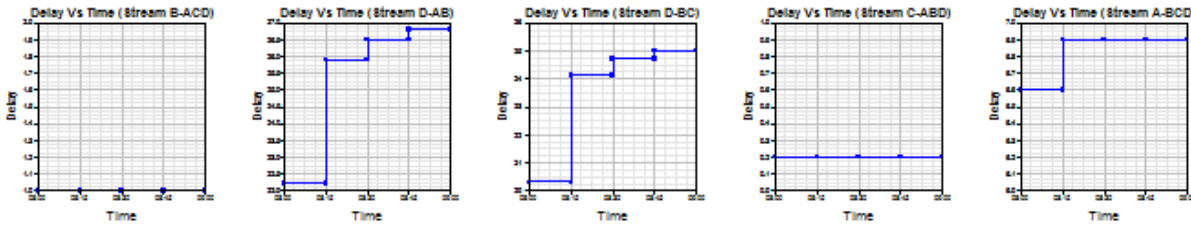
**Modelling Period:** 17:00-18:00



## Delay Graph

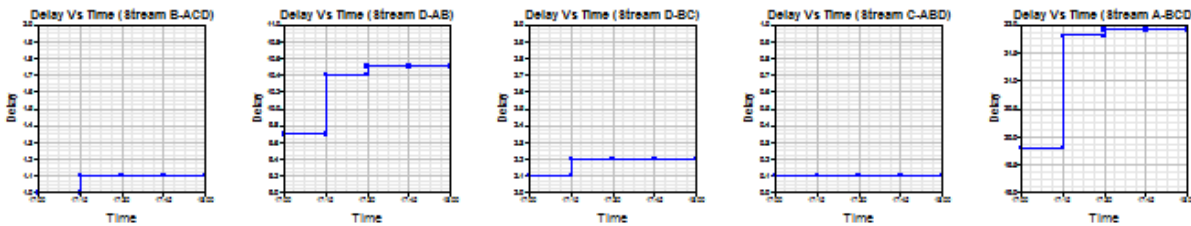
**Demand Set:** 2027 Baseline + Development AM

**Modelling Period:** 08:00-09:00



**Demand Set:** 2027 Baseline+ Development PM

**Modelling Period:** 17:00-18:00



## Queues & Delays

**Demand Set:** 2027 Baseline + Development AM

**Modelling Period:** 08:00-09:00

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
08:00-08:15	B-ACD	0.34	5.33	0.064	-	0.00	0.07	-	1.0	0.20
	D-AB	4.71	7.35	0.641	-	0.00	1.68	-	22.2	0.35
	D-BC	3.25	5.15	0.630	-	0.00	1.56	-	20.3	0.48
	C-ABD	0.10	7.93	0.013	-	0.00	0.01	-	0.2	0.13
	C-A	-	-	-	-	-	-	-	-	-
	C-D	-	-	-	-	-	-	-	-	-
	A-BCD	2.62	8.45	0.310	-	0.00	0.45	-	6.6	0.17
	A-B	-	-	-	-	-	-	-	-	-
A-C	-	-	-	-	-	-	-	-	-	

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
08:15-08:30	B-ACD	0.34	5.30	0.064	-	0.07	0.07	-	1.0	0.20
	D-AB	4.71	7.30	0.646	-	1.68	1.75	-	25.9	0.38
	D-BC	3.25	5.14	0.631	-	1.56	1.63	-	24.1	0.52
	C-ABD	0.10	7.92	0.013	-	0.01	0.01	-	0.2	0.13
	C-A	-	-	-	-	-	-	-	-	-
	C-D	-	-	-	-	-	-	-	-	-
	A-BCD	2.62	8.45	0.310	-	0.45	0.45	-	6.9	0.17
	A-B	-	-	-	-	-	-	-	-	-
A-C	-	-	-	-	-	-	-	-	-	

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
08:30-08:45	B-ACD	0.34	5.30	0.064	-	0.07	0.07	-	1.0	0.20
	D-AB	4.71	7.30	0.646	-	1.75	1.78	-	26.5	0.39
	D-BC	3.25	5.14	0.631	-	1.63	1.66	-	24.7	0.52
	C-ABD	0.10	7.92	0.013	-	0.01	0.01	-	0.2	0.13
	C-A	-	-	-	-	-	-	-	-	-
	C-D	-	-	-	-	-	-	-	-	-
	A-BCD	2.62	8.45	0.310	-	0.45	0.46	-	6.9	0.17
	A-B	-	-	-	-	-	-	-	-	-
A-C	-	-	-	-	-	-	-	-	-	

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
08:45-09:00	B-ACD	0.34	5.30	0.064	-	0.07	0.07	-	1.0	0.20
	D-AB	4.71	7.30	0.646	-	1.78	1.79	-	26.8	0.39
	D-BC	3.25	5.14	0.631	-	1.66	1.67	-	25.0	0.53
	C-ABD	0.10	7.92	0.013	-	0.01	0.01	-	0.2	0.13
	C-A	-	-	-	-	-	-	-	-	-
	C-D	-	-	-	-	-	-	-	-	-
	A-BCD	2.62	8.45	0.310	-	0.46	0.46	-	6.9	0.17
	A-B	-	-	-	-	-	-	-	-	-
A-C	-	-	-	-	-	-	-	-	-	

**Demand Set:** 2027 Baseline+ Development PM

**Modelling Period:** 17:00-18:00

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
17:00-17:15	B-ACD	0.32	4.78	0.067	-	0.00	0.07	-	1.0	0.22
	D-AB	3.39	8.21	0.413	-	0.00	0.69	-	9.7	0.20
	D-BC	0.56	4.30	0.130	-	0.00	0.15	-	2.1	0.27
	C-ABD	0.05	6.96	0.007	-	0.00	0.01	-	0.1	0.14
	C-A	-	-	-	-	-	-	-	-	-
	C-D	-	-	-	-	-	-	-	-	-
	A-BCD	4.73	8.42	0.562	-	0.00	1.39	-	19.8	0.26
	A-B	-	-	-	-	-	-	-	-	-
A-C	-	-	-	-	-	-	-	-	-	

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
17:15-17:30	B-ACD	0.32	4.76	0.067	-	0.07	0.07	-	1.1	0.23
	D-AB	3.39	8.20	0.414	-	0.69	0.70	-	10.4	0.21
	D-BC	0.56	4.27	0.131	-	0.15	0.15	-	2.2	0.27
	C-ABD	0.05	6.93	0.007	-	0.01	0.01	-	0.1	0.15
	C-A	-	-	-	-	-	-	-	-	-
	C-D	-	-	-	-	-	-	-	-	-
	A-BCD	4.73	8.42	0.562	-	1.39	1.42	-	21.8	0.27
	A-B	-	-	-	-	-	-	-	-	-
A-C	-	-	-	-	-	-	-	-	-	



Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
17:30-17:45	B-ACD	0.32	4.76	0.067	-	0.07	0.07	-	1.1	0.23
	D-AB	3.39	8.20	0.414	-	0.70	0.70	-	10.5	0.21
	D-BC	0.56	4.27	0.131	-	0.15	0.15	-	2.2	0.27
	C-ABD	0.05	6.93	0.007	-	0.01	0.01	-	0.1	0.15
	C-A	-	-	-	-	-	-	-	-	-
	C-D	-	-	-	-	-	-	-	-	-
	A-BCD	4.73	8.42	0.562	-	1.42	1.44	-	21.9	0.27
	A-B	-	-	-	-	-	-	-	-	-
A-C	-	-	-	-	-	-	-	-	-	

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
17:45-18:00	B-ACD	0.32	4.76	0.067	-	0.07	0.07	-	1.1	0.23
	D-AB	3.39	8.20	0.414	-	0.70	0.70	-	10.5	0.21
	D-BC	0.56	4.27	0.131	-	0.15	0.15	-	2.2	0.27
	C-ABD	0.05	6.93	0.007	-	0.01	0.01	-	0.1	0.15
	C-A	-	-	-	-	-	-	-	-	-
	C-D	-	-	-	-	-	-	-	-	-
	A-BCD	4.73	8.42	0.562	-	1.44	1.44	-	21.9	0.27
	A-B	-	-	-	-	-	-	-	-	-
A-C	-	-	-	-	-	-	-	-	-	

Entry capacities marked with an '(X)' are dominated by a pedestrian crossing in that time segment.

In time segments marked with a '(B)', traffic leaving the junction may block back from a crossing so impairing normal operation of the junction.

Delays marked with '###' could not be calculated.

## Overall Queues & Delays

### Queueing Delay Information Over Whole Period

**Demand Set:** 2027 Baseline + Development AM

**Modelling Period:** 08:00-09:00

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-ACD	20.4	20.4	4.0	0.2	4.0	0.2
D-AB	282.8	282.8	101.3	0.4	101.5	0.4
D-BC	194.8	194.8	94.1	0.5	94.4	0.5
C-ABD	6.0	6.0	0.8	0.1	0.8	0.1
C-A	-	-	-	-	-	-
C-D	-	-	-	-	-	-
A-BCD	157.3	157.3	27.2	0.2	27.2	0.2
A-B	1372.2	1372.2	227.4	0.2	227.9	0.2
A-C	-	-	-	-	-	-
<b>All</b>	-	-	-	-	-	-

**Demand Set:** 2027 Baseline+ Development PM

**Modelling Period:** 17:00-18:00

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-ACD	19.2	19.2	4.2	0.2	4.2	0.2
D-AB	203.6	203.6	41.1	0.2	41.1	0.2
D-BC	33.4	33.4	8.7	0.3	8.7	0.3
C-ABD	3.0	3.0	0.4	0.1	0.4	0.1
C-A	-	-	-	-	-	-
C-D	-	-	-	-	-	-
A-BCD	283.8	283.8	85.4	0.3	85.5	0.3
A-B	1352.4	1352.4	139.9	0.1	140.1	0.1
A-C	-	-	-	-	-	-
<b>All</b>	-	-	-	-	-	-

Delay is that occurring only within the time period.

Inclusive delay includes delay suffered by vehicles which are still queuing after the end of the time period.

These will only be significantly different if there is a large queue remaining at the end of the time period.

### PICADY 5 Run Successful

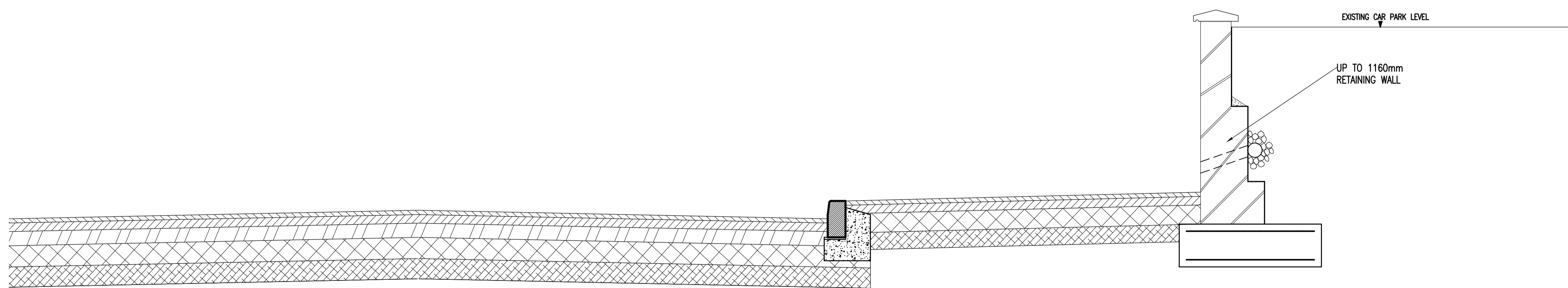
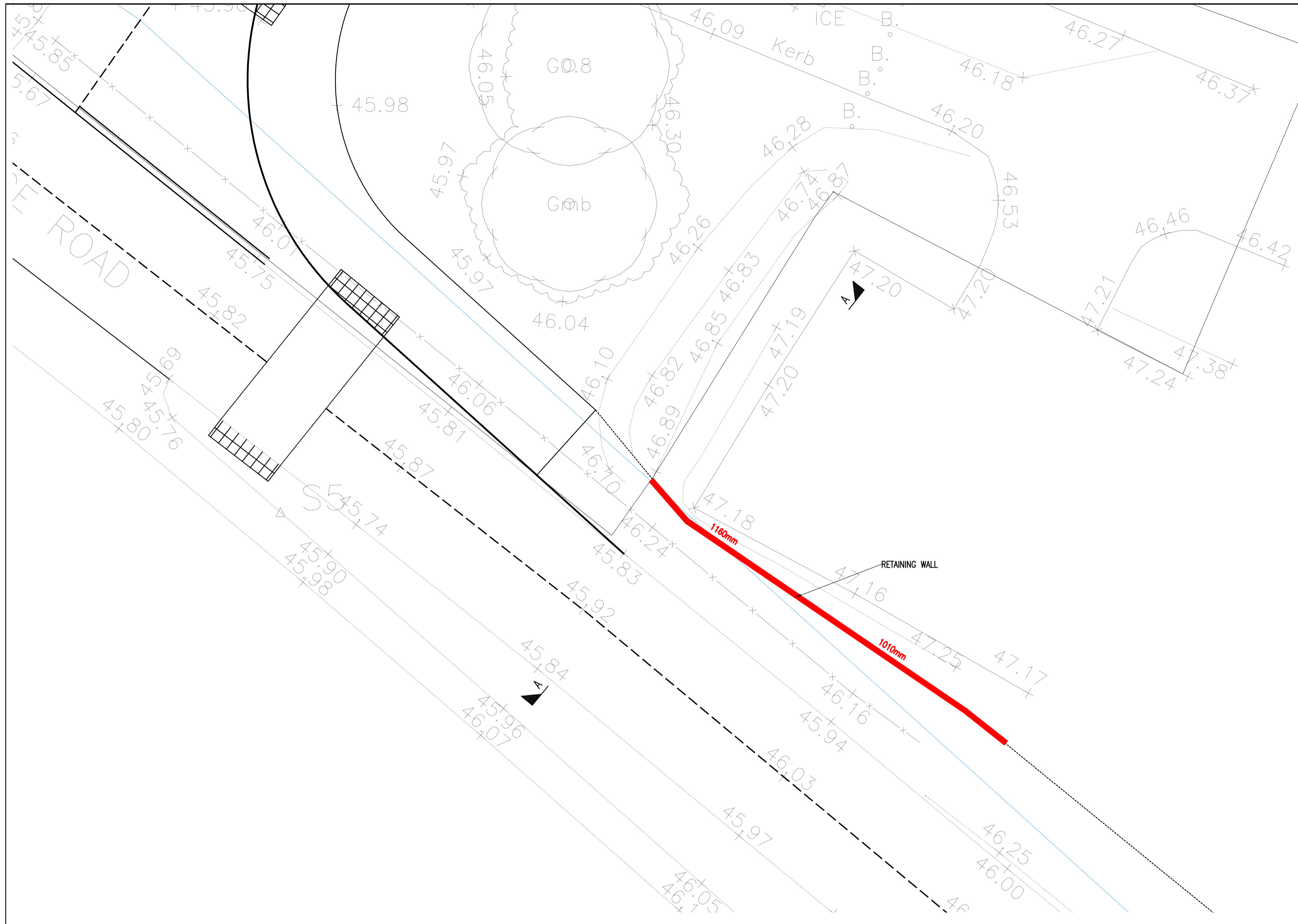
**acstro**

Ymgynghorwyr Priffyrdd a Thrafnidiaeth  
Highways & Transportation Consultants

# Appendix 6

NOTES

- GENERAL**
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
  2. ALL LEVELS RELATE TO ORDNANCE DATUM UNLESS NOTED OTHERWISE.
  3. DO NOT SCALE FROM THIS DRAWING. USE FIGURED DIMENSIONS ONLY.
  4. ANY DISCREPANCIES TO BE REPORTED IMMEDIATELY TO THE ENGINEER.
  5. THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, SUBCONTRACTORS AND SPECIALISTS DRAWINGS AND SPECIFICATIONS.
  6. THIS DRAWING IS COPYRIGHT © PROPERTY OF SHEAR DESIGN LIMITED.



REV	DATE	DESCRIPTION	BY	CHK
AMENDMENTS				

CLIENT: EDENSTONE HOMES

PROJECT: COWBRIDGE ROAD, ST ATHAN RESIDENTIAL DEVELOPMENT

TITLE: OFFSITE COMBINED FOOTWAY & CYCLEWAY OPTION 1



DRAWN	CHECKED	DATE	SCALE
AA	MJ	DEC 2017	1:100 @ A1

STATUS KEY: I = INFORMATION P = PRELIMINARY A = APPROVAL CO = CONTRACT  
T = TENDER C = CONSTRUCTION AB = AS-BUILT

STATUS	DRAWING NUMBER	REVISION
I	16156-SK200	-

**acstro**

Ymgynghorwyr Priffyrdd a Thrafnidiaeth  
Highways & Transportation Consultants

