REPORT NO 20744

TRAFFIC IMPACT ASSESSMENT

PROPOSED MIXED USE DEVELOPMENT ON REMAINDER OF PORTION 12 OF THE FARM WEMMERHUIS 379-JT AND REMAINDER OF THE FARM BERGENDAL 981-JT, BELFAST

SEPTEMBER 2016

WSP | PARSONS BRINCKERHOFF

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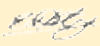
Signature				
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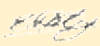
Signature				
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Certification

It is herewith certified that this Traffic Impact Assessment has been prepared according to requirements of the South African Traffic Impact and Site Traffic Assessment Manual.

Signatory :  Date : 21 September 2016 ECSA no : 2003 701 33

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PRODUCTION TEAM

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LIST OF ABBREVIATIONS

COTO	Committee of Transport Officials
ELM	Emakhazeni Local Municipality
GLA	Gross Leasable Area
LOS	Level of Service
LVO	Low Vehicle Ownership
MDoPWR&T	Mpumalanga Department of Public Works, Roads & Transport
MUD	Mixed Use Development
NLTA	National Land Transport Act
SANRAL	South African National Roads Agency Limited
SATGR	South African Trip Generation Rates
SEC	Seconds
SIDRA	Micro-analytical traffic evaluation
TMH	Technical Methods for Highways
V/C	Volume/Capacity ratio
VLVO	Very Low Vehicle Ownership
vph	Vehicle per hour

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1 INTRODUCTION

1.1 BACKGROUND

WSP Group Africa (Pty) Ltd. (WSP) has been appointed to undertake a Traffic Impact Assessment for the proposed mixed use development situated on Remainder of Portion 12 of the Farm Wemmershuis 379-JT and the Remainder of the Farm Bergendal 981-JT, Belfast located in Mpumalanga Province. The proposed site is located approximately 510m south of the N4/R33 interchange. The site locality is illustrated on **Figure 1**.

A TIA was previously submitted in November 2015 for the proposed mixed-use development. This study revises the previously submitted study as the development will now be implemented in phases.

The purpose of this traffic impact assessment is to illustrate the proposed development's traffic impact on the surrounding road network and possible mitigation of the anticipated traffic impact. This report also comments on the proposed site accesses and non-motorised and public transport aspects.

1.2 EXTENT OF THE DEVELOPMENT

The extent of the proposed development as well as the land-uses are indicated in **Table 1** below:

Table 1: Extent of the development

LAND USE	PHASE 1	PHASE 2	PHASE 3	PHASE 4	TOTAL
Single Residential	31 Stands	-	97 Stands	33 Stands	161 Stands
High Residential	-	-	-	387 Units	387 Units
Agricultural	-	-	-	522 357 m^2	
Institutional – Crèche	-	-	^200 Pupils	-	200 Pupils
– Church	-	-	-	*12 796 m^2	*12 796 m^2
Retail (Shops)	31 830 m^2 GLA	-	1 460 m^2 GLA	-	33 290 m^2 GLA
Business Park	-	-	8 554 m^2 GLA	33 790m^2 GLA	42 344 m^2 GLA
Industrial	-	14 252 m^2 GLA	-	-	14 252 m^2 GLA
Open Space	-	7 529 m^2	-	105 068 m^2	112 597 m^2
Utilities	1 915 m^2	-	-	-	1 915m^2

The following assumptions were made:

^ 200 Pupils for Institutional (Phase 3)
* Assumed to be internal trips

The township layout and phasing plan are contained in **Appendix A-1**.

1.3 APPROVAL OF SUBMISSION

This traffic impact assessment report will be subject to approval from the relevant roads authorities listed below:

- Emakhazeni Local Municipality (ELM)
- Mpumalanga Department of Public Works, Roads and Transport (MDoPWR&T)
- South African National Roads Agency Limited (SANRAL)

2 DATA COLLECTION AND LIAISONS

2.1 SITE VISIT

On 29 October 2015 a site visit was undertaken for the development and the following was confirmed:

- Layouts of intersections considered in the study
- Appropriateness of recommended site access
- Intersection control for relevant intersections
- Presence of existing public transport and non-motorised facilities

A set of photos is included in **Appendix A-2** depicting the intersections observed during the site visit.

2.2 LIAISON WITH THE AUTHORITIES

SANRAL

A meeting was held with SANRAL Messr. Mr. Izak van der Linde and it was requested that the Applicant should consider providing an additional access to the north of the application site to alleviate the impact of the proposed development on the N4 interchange. A limited road master plan was undertaken by WSP and is included in **Appendix A-3**.

MPUMALANGA DEPARTMENT OF PUBLIC WORKS, ROAD AND TRANSPORT

A discussion was held with MDoPW&R, Messr. Ben Viljoen and it was indicated that the proposed traffic circle at the access on Road D1477 is not supported therefore an alternative access layout was investigated in this study.

3 SURROUNDING ROAD NETWORK & STUDY AREA

3.1 SURROUNDING ROAD NETWORK

The following roads in the vicinity of the proposed development are regarded as relevant to this study and are discussed in detailed below:

- **N4 Freeway:** This is a Class 1 road located to the north of the site; this road follows an east-west alignment and it abuts the application site to the north.
- **Road D1477**: This is a Class 2/3 road located to the west of the site; this road follows a north-south alignment with one lane per direction. The proposed development will gain access directly from this road
- **R33**: This is a Class 3 road located to the west of the site; this road follows an east-west alignment with one lane per direction.
- **New Link Road**: As requested by SANRAL a limited road master plan was undertaken to provide an additional access to the north of the proposed development link road with Road D1477. The proposed road link (over/under the N4) will be a Class 3 road with one lane per direction. The link road is required to prevent congestion of the N4/Road D1477 interchange.

3.2 DETERMINATION OF THE STUDY AREA

In determining the site area TMH 16 volume 1 recommends the following:

- "Class 4 and 5 roads in the vicinity of the development up to the first Class 1 to 3 roads that can be reached by the Class 4 and 5 road network from the development, up to and including the first connection(s) on the Class 1 to 3 roads.
- The elements shall be restricted to those within a maximum distance of 1.5km from the accesses to the site, measured along the shortest routes to the accesses, provided that there is at least one intersection within this distance. Where there is no such intersection, the distance will be extended to include at least one intersection."

TMH 16 also states that judgement should be used in selecting the intersections considered and therefore specific elements like extent of the development were also considered. A larger development will by its nature require a wider study area to be considered while for a smaller development the opposite will be true. It was decided that the following key intersections as mentioned below (refer to **Figure 1**) would be sufficient for analyses:

- Road D1477 and N4 Off-ramp;
- Road D1477 and N4 Off-ramp/Belfast 1Stop Access and
- Road D1477 and R33/Site access

4 SITE ACCESS & PARKING

4.1 SITE ACCESS

The following accesses are proposed for the development:

- **Access 1** : A full access is proposed on Road D1477 directly opposite the existing R33 Road. The access is situated approximately 350m north of the southern terminal of the N4/Road D1477 interchange. This access will be implemented in Phase 1 of the proposed development.
- **Access 2** : A secondary full access is proposed on Road D1477. The access is situated approximately 290m south of the proposed Access 1. This access will be implemented in Phase 2 of the proposed development.
- **Access 3** : A full access is proposed on the proposed link road to the north of the proposed development. This access will be implemented in Phase 3 and 4 of the proposed development.

The proposed accesses are shown conceptually on **Drawings SKC 003 Rev B** and **SKC 004 Rev A.**

The secondary access position was discussed and approved in principle by MDoPWR&T Messr. Ben Viljoen.

4.2 PARKING

The South African Parking Standards was considered for the parking requirement. **Table 2** shows the required parking.

Table 2: Parking requirements

LAND USE	EXTENT	PARKING REQUIRED	REQUIREMENTS FOR LOADING	NO. BAYS REQUIRED
Industry	14 252m^2 GLA	1 bay / 100m^2 & 3 bays / 100m^2 office floor area	1 bay / first 1000m^2 floor area or part thereof & 1 bay / every 1000m^2 floor area thereafter	*To be confirmed during SDP submission stage*
Dwelling House	161 Stands	1 bay / on-site unit	Not Applicable	161
Dwelling Units	387 Units	1 covered bay / Dwelling unit & 1 uncovered bay / 2 dwelling units	1 bay / 10 dwelling units	622
Crèche	200 Pupils	1 bay / 4 children	1 bay / first 2000m^2 floor area or part thereof & 1 bay / every 2000m^2 floor area thereafter	*To be confirmed during SDP submission stage*
Shopping Centre	33 290m^2 GLA	6 bays / 100m^2	1 bay / first 2000m^2 floor area or part thereof & 1 bay / every 2000m^2 floor area thereafter	*To be confirmed during SDP submission stage*
Business Centre	*Parking ratio to be agreed with ELM during SDP submission stage*			

Since the site development plan (SDP) was not yet finalized during the writing of this report, it is recommended that a parking study (Site Traffic Assessment) be undertaken during the SDP submission stage.

5 EXISTING TRAFFIC VOLUMES

5.1 GENERAL

Traffic counts were used to estimate the traffic demand and traffic volume for the development. A traffic count was commissioned on Friday 11 September 2015 at the following intersections:

- Road D1477 and N4 Off-ramp;
- Road D1477 and N4 Off-ramp/Belfast 1Stop Access and
- Road D1477 and R33/Site access

The counted intersections are indicated on **Figure 1**.

From the traffic count a common peak hour was determined (the busiest hour) for each counted period and was found to be:

- Friday AM peak hour 08:00 – 09:00
- Friday PM peak hour 16:00 – 17:00

The existing 2015 Peak Hour Traffic Volumes are shown on **Figure 2**. The following subheadings provide a brief overview of the existing intersections.

5.2 ROAD D1477 / N4 OFF-RAMP

This intersection is currently a priority side stop with the Road D1477 being the major road. Traffic counts have revealed that Road D1477 has in the order of 590vph and 970vph during the AM and PM peak hours respectively (in both directions). The intersection currently operates at LOS A or B for the southern approach, LOS A for the northern approach and LOS A and LOS C for the western approach.

5.3 ROAD D1477 / N4 OFF-RAMP / BELFAST 1STOP ACCESS

This intersection is currently a priority side stop with Road D1477 being the major road. Traffic counts have revealed that the N4 Off-ramp has in the order of 240vph and 285vph during the AM and PM peak hours respectively (in both directions). The intersection currently operates at LOS A for the north and south approaches during both the AM and PM peak hours. The east approach operates at LOS C and the west approach at LOS B during the AM and PM peak hours.

5.4 ROAD D1477 / R33 / SITE ACCESS

This intersection is currently an all-way stop. Traffic counts have revealed that R33 has in the order of 140vph and 125vph during the AM and PM peak hours respectively (in both directions). The intersection currently operates at LOS C for the north, south and east approaches during both the AM and PM peak hours. However the west approach operates at LOS D during the AM and PM peak hours.

5.5 ROAD D1477 / SITE ACCESS 2

This is a new intersection and it will be all-way stop controlled. Traffic counts have revealed that currently 10vph and 13vph pass the site during the AM and PM peak hours respectively.

6 DEVELOPMENT TRIP GENERATION AND TRAFFIC VOLUMES SCENARIOS

6.1 TRIP GENERATION

The South African Trip Data Manual – COTO – (TMH17) was used to estimate the trip generation for the proposed development. Trip rates for the various land-uses are summarized below:

INDUSTRIAL

The recommended trip generation according to the COTO document for Industrial is:

- Weekday AM Peak period 0.80 trips per 100m^2 GLA
- Weekday PM Peak period 0.80 trips per 100m^2 GLA

SINGLE DWELLING UNITS

The recommended trip generation according to the COTO document for Single Dwelling Units is:

- Weekday AM Peak period 1.00 trip per Dwelling Unit
- Weekday PM Peak period 1.00 trip per Dwelling Unit

APARTMENTS AND FLATS

The recommended trip generation according to the COTO document for Apartments and Flats is:

- Weekday AM Peak period 0.65 trips per Dwelling Unit
- Weekday PM Peak period 0.65 trips per Dwelling Unit

PRE-SCHOOL

The recommended trip generation according to the COTO document for Pre-school is:

- Weekday AM Peak period 1.00 trip per Pupil
- Weekday PM Peak period 0.80 trips per Pupil

SHOPPING CENTRE

The recommended trip generation according to the COTO document for Shopping Centre is:

- Weekday AM Peak period 0.60 trips per 100m^2 GLA
- Friday PM Peak period 3.40 trips per 100m^2 GLA
- Saturday Peak period 4.50 trips per 100m^2 GLA

The size adjustment factor for Shopping Centre as per COTO TMH17 has been applied. The trips for the shopping centre were calculated by first adjusting the Gross Leasable Area (GLA) of the site, i.e. the size adjustment factor (S) = 1+ A/(1+sqm size/B). Factor A and B are parameters provided in the trip rate table.

BUSINESS CENTRE

The proposed development will also consist of small pockets of business/commercial related uses. Therefore a trip rate for Business Centre which includes a range of mixed land-uses, such as offices, banking facilities, light industrial and warehousing was considered realistic. The recommended trip generation according to the COTO document for Business Centre is:

- Weekday AM Peak period 1.50 trips per 100m^2 GLA
- Weekday PM Peak period 1.50 trips per 100m^2 GLA

6.2 ADJUSTMENT FACTORS

Various trip adjustment factors have been introduced into the COTO document to allow for trip reductions. These adjustment factors are discussed briefly below.

MIXED USE DEVELOPMENT (MUD)

According to the COTO manual "mixed use development is defined as development in an area that consist of two or more single-use development between which trips can be made by means of non-motorised modes of transport (such as walking). This has the net effect of reducing the vehicle trip generation in the area."

This study considered mixed use development reduction factor. The reduction factor which has been applied is listed in **Table 3** below. Note **P_M** = Reduction factor for mixed use development.

LOW VEHICLE OWNERSHIP (LVO) & VERY LOW VEHICLE OWNERSHIP (VLVO)

According to COTO "the vehicle ownership in areas with high levels of vehicle ownership varies between one or two per household. In areas with a low level of vehicle ownership, the majority of households (more than 50%) does not own a vehicle and relies on public transport for transportation. In areas with very low level of vehicle ownership, nearly all households (more than 90%) do not own a vehicle and rely on public transportation."

This study considered low vehicle ownership and the reduction factor which have been applied is listed in Table 3 below. Note **P_V** = Reduction factor for vehicle ownership.

TRANSIT NODE OR CORRIDORS

According to COTO "the transit reduction factors are applicable to developments that are located within a reasonable walking distance from a major transit node or stops on a major transit corridor."

The reduction factors recommended for transit node or corridors in the manual were not applied.

Table 3: Adjustment Factors Applied for Trip Reductions

LAND USE	P_M	P_V
Industrial	5%	20%
Single Dwelling Units	10%	40%
Apartments & Flats	15%	30%
Pre-School	5%	50%
Business Centre	15%	20%
Shopping Centre	10%	30%

6.3 TRIP SUMMARY

The detailed trip generation calculations are included in **Appendix A-4**. Using the COTO document the expected peak hour development trips generation was calculated and indicated in **Tables 4** to **8** for the different Phases**.**

Table 4: Phase 1 – Development Generated Trips

LAND USE	EXTENT	AM PEAK			FRIDAY PM PEAK		
		In	Out	Total	In	Out	Total
Single Dwelling Units	31 Units	*4*	*13*	*17*	*12*	*5*	*17*
Shopping Centre		**PRIMARY TRIPS**					
		125	*67*	*192*	*315*	*315*	*630*
		PASS-BY TRIPS					
		-	*-*	*-*	*96*	*96*	*193*
		DIVERTED TRIPS					
		-	*-*	*-*	*99*	*99*	*198*
Total (Shopping Centre)	31 830m² GLA	*125*	*67*	*192*	*510*	*510*	*1021*
Total Phase 1 Trips		**129**	**80**	**209**	**522**	**515**	**1038**

From **Table 4** it can be seen that Phase 1 of the proposed development will generate a maximum of **209** peak hour trips in the AM peak hour and a maximum of **1038** peak hour trips in the PM peak hour.

Table 5: Phase 2 – Development Generated Trips

LAND USE	EXTENT	AM PEAK			FRIDAY PM PEAK		
		In	Out	Total	In	Out	Total
Industrial Area (Park)	14 252m² GLA	*65*	*26*	*91*	*22*	*65*	*87*
Total Phase 2 Trips		**65**	**26**	**91**	**22**	**65**	**87**

From **Table 5** it can be seen that Phase 2 of the proposed development will generate a maximum of **91** peak hour trips in the AM peak hour and a maximum of **87** peak hour trips in the PM peak hour.

Table 6: Phase 3 – Development Generated Trips

LAND USE	EXTENT	AM PEAK			FRIDAY PM PEAK		
		In	Out	Total	In	Out	Total
Single Dwelling Units	97 Units	*13*	*39*	*52*	*37*	*16*	*52*
Pre-school (Day Care Centre)	200 Students	*48*	*48*	*95*	*38*	*38*	*76*
Business Centre (Park)	8 554m² GLA	*74*	*13*	*87*	*17*	*70*	*87*
Shopping Centre		**PRIMARY TRIPS**					
		19	*10*	*29*	*47*	*47*	*95*
		PASS-BY TRIPS					
		-	*-*	*-*	*6*	*6*	*12*
		DIVERTED TRIPS					
		-	*-*	*-*	*5*	*5*	*9*
Total (Shopping Centre)	1 460m² GLA	*19*	*10*	*29*	*58*	*58*	*116*
Total Phase 3 Trips		**154**	**110**	**264**	**150**	**182**	**332**

From **Table 6** it can be seen that Phase 3 of the proposed development will generate a maximum of **264** peak hour trips in the AM peak hour and a maximum of **332** peak hour trips in the PM peak hour.

The trips for Institutional (Church) in Phase 3 and 4 was not considered in the calculations of the trip generation as it was assumed that these will be internal trips serving the community within the proposed development and will not affect the external road network.

Table 7: Phase 4 – Development Generated Trips

LAND USE	EXTENT	AM PEAK			FRIDAY PM PEAK		
		In	Out	Total	In	Out	Total
Single Dwelling Units	33 Units	*4*	*13*	*18*	*12*	*5*	*18*
Apartments and Flats	387 Units	*37*	*112*	*150*	*105*	*45*	*150*
Business Centre (Park)	33 790m^2 GLA	*293*	*52*	*345*	*69*	*276*	*345*
Total Phase 4 Trips		**335**	**177**	**512**	**186**	**326**	**512**

From **Table 7** it can be seen that Phase 4 of the proposed development will generate a maximum of **512** peak hour trips in the AM peak hour and the PM peak hour.

Table 8: Total Development Generated Trips (All Phases)

LAND USE	TYPE OF TRIPS	AM PEAK			FRIDAY PM PEAK		
		In	Out	Total	In	Out	Total
Industrial	Primary Trips	*65*	*26*	*91*	*22*	*65*	*87*
Single Dwelling Units	Primary Trips	*22*	*65*	*87*	*61*	*26*	*87*
Apartments & Flats	Primary Trips	*37*	*112*	*150*	*105*	*45*	*150*
Crèche	Primary Trips	*48*	*48*	*95*	*38*	*38*	*76*
Shopping Centre	Primary Trips	*144*	*77*	*221*	*362*	*362*	*724*
	Pass-by Trips	*0*	*0*	*0*	*102*	*102*	*204*
	Diverted Trips	*0*	*0*	*0*	*104*	*104*	*208*
Business Centre	Primary Trips	*367*	*65*	*432*	*86*	*345*	*432*
Total (All Phases)		**683**	**393**	**1076**	**880**	**1087**	**1968**

From **Table 8** it can be seen that the proposed development (All Phases) will generate a maximum of **1076** trips in the Friday AM peak hour and a maximum of **1968** trips during the Friday PM peak hour.

The TMH 16 Volume 1 requires that a traffic impact assessment be done for development which generates more than 50 peak hour trips.

6.4 GROWTH RATE

TMH 16 Volume 1 requires that a five year horizon be considered for development that generates more than 50 trips. TMH 17 recommends growth rates for development as shown in **Table 9**.

Table 9: Typical Traffic Growth Rates

DEVELOPMENT AREA	GROWTH RATES
Low growth areas	0 – 3%
Average growth areas	3 – 4%
Above average growth areas	4 – 6%
Fast growing areas	6 – 8%
Exceptionally high growth areas	>8%

Source: City Council of Pretoria (1998)

A growth rate of 3% was considered appropriate for this study.

6.5 TRAFFIC VOLUME SCENARIOS

The existing 2015 peak hour traffic volumes (see **Figure 2**) were thus subjected to a 3% growth rate over five years; this is in line with an average growth rate as given in **Table 9**. The 2020 background peak hour traffic volumes are shown on **Figure 3**.

6.6 TRIP DISTRIBUTION AND ASSIGNMENT

Assumptions with respect to the expected trip distribution were based on the location of the site access in relation to the surrounding road network; the existing traffic volumes, travel patterns as well as the land use nature of the proposed development.

The total development trips for Phase 1, 2, 3 and 4 are shown on **Figures 4A, 4B, 4C** and **4D** respectively. Ultimately the expected 2020 peak hour traffic volumes plus the total development trips for Phase 1, 2, 3 and 4 are shown on **Figures 5A, 5B, 5C** and **5D** respectively.

7 TRAFFIC IMPACT AND CAPACITY ANALYSIS

7.1 GENERAL

In order to determine the traffic impact the proposed development will have on the surrounding road network, SIDRA traffic engineering software was used. A capacity analysis was done for the key intersections identified in **Section 3.2**.

The AM and PM peak hour trip generation of the development was analysed.

7.2 ANALYSED SCENARIOS

The different traffic scenarios considered for analysis are tabulated in **Table 4.**

Table 10: Traffic Scenarios Considered

TRAFFIC SCENARIO	DESCRIPTION
Scenario 1	2020 Peak Hour Background Traffic Volumes (**Figure 3**) ***With Existing Intersection Layouts***
Scenario 2	2020 Peak Hour Background Traffic Plus Phase 1 Development Traffic (**Figure 5A**) ***With Development Upgrades if Applicable***
Scenario 3	2020 Peak Hour Background Traffic Plus Phase 1 & 2 Development Traffic (**Figure 5B**) ***With Development Upgrades if Applicable***
Scenario 4	2020 Peak Hour Background Traffic Plus Phase 1, 2 & 3 Development Traffic (**Figure 5C**) ***With Development Upgrades if Applicable***
Scenario 5	2020 Peak Hour Background Traffic Plus Phase 1, 2, 3 & 4 Development Traffic (**Figure 5D**) ***With Development Upgrades if Applicable***

7.3 CAPACITY ANALYSIS

The existing and proposed geometric layout and traffic control of each key intersection is indicated in **Appendix A-5**.

The results of the SIDRA capacity analysis for the key intersections are summarised and discussed in **Tables 10** to **13**. Detailed SIDRA outputs are enclosed as **Appendix A-6**.

Table 11: Road D1477 and N4 Off-ramp

ROAD D1477 & N4 OFF-RAMP											
TRAFFIC SCENARIO	TRAFFIC SCENARIO & LAYOUT	OVERALL INTERSECTION OPERATING CONDITIONS									
		Approach	AM PEAK HOUR				PM PEAK HOUR				
			LOS	v/c	Delay(s)	COMMENTS	LOS	v/c	Delay(s)	COMMENTS
1	**2020 Peak Hour Background Traffic *(With existing intersection layout)***	South	NA	0.10	1.0	Acceptable operating conditions expected.	NA	0.13	1.7	Acceptable operating conditions expected.
		East	NA	0.00	0.0		NA	0.00	0.0	
		North	NA	0.17	1.4		NA	0.18	2.1	
		West	B	0.12	10.7		B	0.29	10.1	
		OVERALL	**NA**	**0.17**	**3.7**		**NA**	**0.29**	**5.6**	
2	**2020 Peak Hour Background Traffic + Phase 1 Development Traffic *(With development upgrades)***	South	A	0.19	4.4	Acceptable operating conditions expected. Proposed upgrades are summarized in ***Chapter 7.4.***	A	0.45	7.3	Acceptable operating conditions expected. Proposed upgrades are summarized in ***Chapter 7.4.***
		East	NA	0.00	0.0		NA	0.00	0.0	
		North	A	0.32	4.7		A	0.54	6.6	
		West	B	0.32	15.7		B	0.53	13.5	
		OVERALL	**A**	**0.32**	**7.1**		**A**	**0.54**	**8.9**	
3	**2020 Peak Hour Background Traffic + Phase 1 & 2 Development Traffic**	South	A	0.21	5.0	Acceptable operating conditions expected.	A	0.49	7.5	Acceptable operating conditions expected.
		East	NA	0.00	0.0		NA	0.00	0.0	
		North	A	0.37	5.2		A	0.55	6.7	
		West	B	0.32	16.3		B	0.55	13.7	
		OVERALL	**A**	**0.37**	**7.5**		**A**	**0.55**	**9.0**	
4	**2020 Peak Hour Background Traffic + Phase 1, 2 & 3 Development Traffic**	South	A	0.25	5.2	Acceptable operating conditions expected.	A	0.56	8.1	Acceptable operating conditions expected.
		East	NA	0.00	0.0		NA	0.00	0.0	
		North	A	0.42	5.3		A	0.61	6.9	
		West	B	0.38	17.4		B	0.59	14.2	
		OVERALL	**A**	**0.42**	**7.7**		**A**	**0.61**	**9.3**	

5	**2020 Peak Hour Background Traffic + Phase 1, 2, 3 & 4 Development Traffic**	South	A	0.32	5.7	Acceptable operating conditions expected.	A	0.69	9.4	Acceptable operating conditions expected.
		East	NA	0.00	0.0		NA	0.00	0.0	
		North	A	0.55	5.7		A	0.68	7.3	
		West	B	0.52	19.7		B	0.66	14.9	
		OVERALL	**A**	**0.55**	**8.3**		**A**	**0.69**	**10.0**	

Note: NA = Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements

The conceptual intersection geometric layout for the above intersection is shown on **Drawing SKC 001 Rev A**.

Table 12: Road D1477 and N4 Off-ramp/Belfast One Stop Access

ROAD D1477 & N4 OFF-RAMP/BELFAST ONE STOP ACCESS											
TRAFFIC SCENARIO	TRAFFIC SCENARIO & LAYOUT	OVERALL INTERSECTION OPERATING CONDITIONS									
		Approach	AM PEAK HOUR				PM PEAK HOUR				
			LOS	v/c	Delay(s)	COMMENTS	LOS	v/c	Delay(s)	COMMENTS
1	**2020 Peak Hour Background Traffic *(With existing intersection layout)***	South	NA	0.05	2.1	Acceptable operating conditions expected.	NA	0.06	2.3	Acceptable operating conditions expected.
		East	C	0.29	20.5		NA	0.47	24.6	
		North	NA	0.17	6.5		NA	0.18	7.2	
		West	B	0.08	12.5		B	0.11	12.8	
		OVERALL	**NA**	**0.29**	**9.2**		**NA**	**0.47**	**11.5**	
2	**2020 Peak Hour Background Traffic + Phase 1 Development Traffic *(With development upgrades)***	South	A	0.16	7.3	Acceptable operating conditions expected. Proposed upgrades are summarized in ***Chapter 7.4.***	B	0.49	10.1	Acceptable operating conditions expected. Proposed upgrades are summarized in ***Chapter 7.4.***
		East	C	0.37	27.5		C	0.54	27.4	
		North	B	0.38	11.6		B	0.56	13.7	
		West	C	0.26	30.7		C	0.45	30.3	
		OVERALL	**B**	**0.38**	**14.9**		**B**	**0.56**	**15.6**	
3	**2020 Peak Hour Background Traffic + Phase 1&2 Development Traffic**	South	A	0.18	7.4	Acceptable operating conditions expected.	A	0.53	9.8	Acceptable operating conditions expected.
		East	C	0.37	27.5		C	0.58	28.7	
		North	B	0.39	11.1		B	0.60	13.5	
		West	C	0.29	30.9		C	0.50	31.5	
		OVERALL	**B**	**0.39**	**14.4**		**B**	**0.60**	**15.4**	
4	**2020 Peak Hour Background Traffic + Phase 1, 2 & 3 Development Traffic**	South	A	0.23	7.1	Acceptable operating conditions expected.	A	0.61	9.7	Acceptable operating conditions expected.
		East	C	0.41	28.6		C	0.63	30.5	
		North	B	0.40	10.4		B	0.70	13.9	
		West	C	0.36	32.3		C	0.59	33.4	
		OVERALL	**B**	**0.41**	**13.6**		**B**	**0.70**	**15.6**	

5	**2020 Peak Hour Background Traffic + Phase 1, 2, 3 & 4 Development Traffic *(With development upgrades)***	South	A	0.31	6.9	Acceptable operating conditions expected. Proposed upgrades are summarized in ***Chapter 7.4.***	A	0.72	9.0	Acceptable operating conditions expected. Proposed upgrades are summarized in ***Chapter 7.4.***
		East	C	0.45	29.8		D	0.90	45.4	
		North	A	0.48	9.9		B	0.86	15.3	
		West	C	0.49	34.2		D	0.90	50.1	
		OVERALL	**B**	**0.49**	**12.9**		**B**	**0.90**	**18.0**	

Note: NA = Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements

The conceptual intersection geometric layout for the above intersection is shown on **Drawing SKC 002 Rev A**.

Table 13: Road D1477 and R33/Site Access 1

ROAD D1477 & R33/SITE ACCESS 1											
TRAFFIC SCENARIO	TRAFFIC SCENARIO & LAYOUT	OVERALL INTERSECTION OPERATING CONDITIONS									
		Approach	AM PEAK HOUR				PM PEAK HOUR				
			LOS	v/c	Delay(s)	COMMENTS	LOS	v/c	Delay(s)	COMMENTS
1	**2020 Peak Hour Background Traffic *(With existing intersection layout)***	South	A	0.01	8.6	Acceptable operating conditions expected.	A	0.00	9.1	Acceptable operating conditions expected.
		East	A	0.02	9.5		A	0.02	9.7	
		North	B	0.16	10.1		A	0.12	10.0	
		West	A	0.05	8.3		A	0.05	8.2	
		OVERALL	**NA**	**0.16**	**9.4**		**NA**	**0.12**	**9.2**	
2	**2020 Peak Hour Background Traffic + Phase 1 Development Traffic *(With development upgrades)***	South	A	0.01	9.2	Acceptable operating conditions expected. Proposed upgrades are summarized in ***Chapter 7.4.***	B	0.04	13.7	Acceptable operating conditions expected. Proposed upgrades are summarized in ***Chapter 7.4.***
		East	A	0.10	8.7		D	0.88	26.8	
		North	A	0.14	8.3		A	0.24	7.7	
		West	A	0.04	7.9		A	0.05	7.6	
		OVERALL	**A**	**0.14**	**8.4**		**NA**	**0.88**	**16.8**	
3	**2020 Peak Hour Background Traffic + Phase 1 & 2 Development Traffic**	South	A	0.03	9.6	Acceptable operating conditions expected.	B	0.08	14.1	Acceptable operating conditions expected.
		East	A	0.10	8.7		D	0.88	26.8	
		North	A	0.14	8.3		A	0.24	7.7	
		West	A	0.04	7.9		A	0.05	7.6	
		OVERALL	**NA**	**0.14**	**8.4**		**NA**	**0.88**	**16.5**	
4	**2020 Peak Hour Background Traffic + Phase 1, 2 & 3 Development Traffic**	South	B	0.04	10.8	Acceptable operating conditions expected.	C	0.10	16.2	Intersection will operate at a v/c ratio of 1.00 but with acceptable overall LOS and delays.
		East	A	0.18	9.3		E	1.00	35.2	
		North	A	0.14	8.1		A	0.28	7.7	
		West	A	0.04	7.9		A	0.05	7.8	
		OVERALL	**NA**	**0.18**	**8.6**		**NA**	**1.00**	**20.8**	

5	**2020 Peak Hour Background Traffic + Phase 1, 2, 3 & 4 Development Traffic *(With development upgrades)***	South	B	0.07	14.2	Acceptable operating conditions expected.	C	0.13	19.6	Intersection will operate at a v/c ratio of 1.00 but with acceptable overall LOS and delays.
		East	B	0.38	11.3		D	1.00	30.4	
		North	A	0.22	7.9		A	0.34	7.7	
		West	A	0.04	7.9		A	0.05	8.0	
		OVERALL	**NA**	**0.38**	**9.2**		**NA**	**1.00**	**19.4**	

Note: NA = Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements

The conceptual intersection geometric layout for the above intersection is shown on **Drawing SKC 003 Rev B**.

Table 14: Road D1477 and Site Access 2

ROAD D1477 & SITE ACCESS 2											
TRAFFIC SCENARIO	TRAFFIC SCENARIO & LAYOUT	OVERALL INTERSECTION OPERATING CONDITIONS									
		Approach	AM PEAK HOUR				PM PEAK HOUR				
			LOS	v/c	Delay(s)	COMMENTS	LOS	v/c	Delay(s)	COMMENTS
1	**2020 Peak Hour Background Traffic** ***(With existing layout)***	South				Not Applicable				Not Applicable
		East								
		North								
		West								
		OVERALL								
2	**2020 Peak Hour Background Traffic + Phase 1 Development Traffic**	South				Not Applicable				Not Applicable
		East								
		North								
		West								
		OVERALL								
3	**2020 Peak Hour Background Traffic + Phase 1&2 Development Traffic** ***(With development upgrades)***	South	NA	0.01	1.9	Acceptable operating conditions expected.	NA	0.01	0.7	Acceptable operating conditions expected.
		East	B	0.04	12.3		B	0.10	12.4	
		North	NA	0.04	7.9		NA	0.03	3.9	
		West	-	-	-		-	-	-	
		OVERALL	**NA**	**0.04**	**7.9**		**NA**	**0.10**	**7.5**	
4	**2020 Peak Hour Background Traffic + Phase 1, 2 & 3 Development Traffic**	South	NA	0.01	1.6	Acceptable operating conditions expected.	NA	0.02	0.7	Acceptable operating conditions expected.
		East	B	0.04	12.4		B	0.10	12.5	
		North	NA	0.05	7.4		NA	0.03	3.5	
		West	-	-	-		-	-	-	
		OVERALL	**NA**	**0.05**	**7.4**		**NA**	**0.10**	**7.1**	

5	**2020 Peak Hour Background Traffic + Phase 1, 2, 3 & 4 Development Traffic**	South	NA	0.02	1.3	Acceptable operating conditions expected.	NA	0.02	0.6	Acceptable operating conditions expected.
		East	B	0.04	6.9		B	0.10	12.8	
		North	NA	0.05	7.4		NA	0.04	3.0	
		West	-	-	-		-	-	-	
		OVERALL	**NA**	**0.05**	**6.7**		**NA**	**0.10**	**6.5**	

Note: NA = Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements

The conceptual intersection geometric layout for the above intersection is shown on **Drawing SKC 004 Rev A**.

7.4 ROADS UPGRADES REQUIRED

Based on the capacity analyses the following road upgrades are required as summarized in **Table 14.**

Table 14: Proposed Road Upgrades

No.	Intersection	Phase 1	Phase 2	Phase 3	Phase 4
1.	Road D1477 and N4 Off-ramp	- Signalize intersection. Refer **Drawing SKC 002 Rev A.**	No further road upgrades required.	No further road upgrades required.	No further road upgrades required.
2.	Road D1477 and N4 Off-ramp/Belfast 1 Stop Access	- Signalize intersection. Refer **Drawing SKC 002 Rev A.**	No further road upgrades required.	No further road upgrades required.	Optimize signal settings.
3.	Road D1477 R33/Site Access 1	- Provide an exclusive left turn lane (60m) and an exclusive slip lane (60m) on the northern approach. - Provide an exclusive right turn lane (60m) and a shared through and left turn lane on the eastern approach. - Refer Drawing **SKC003 Rev B**.	No further road upgrades required.	No further road upgrades required, although a traffic circle/signal can be considered in this phase.	No further road upgrades required, although a traffic circle/signal can be considered in this phase.
4.	Road D1477 R33/Site Access 2	Not Applicable	New intersection. Provide eastern leg as shown on **Drawing SKC 004 Rev A**.	No further road upgrades required.	No further road upgrades required.
5.	Proposed link road	Not Applicable	Not Applicable	Link road required to prevent congestion of the N4/Road D1477 interchange	Link road required to prevent congestion of the N4/Road D1477 interchange

8 NON-MOTORISED AND PUBLIC TRANSPORT

8.1 BACKGROUND

In terms of the National Land Transport Act 5 of 2009, section 38, it is a requirement that an assessment of the public transport be included in a traffic impact assessment.

8.2 EXISTING PUBLIC TRANSPORT SERVICES AND FACILITIES

The proposed development is in close proximity to the following public transport services:

MINIBUS TAXIS

There is an existing formalised taxi rank facility located at the corner of Fitzgerald Street and Vermooten Street in Belfast (approximately 3.3km north-west of the proposed site). The trips that are made by these minibus taxis are to surrounding towns such as Middelburg and Nelspruit.

8.3 PROPOSED / NEW FACILITIES

MINIBUS TAXI LAYBYS

There are no taxi laybys available within the proximity of the proposed site. Therefore it is recommended that a pair of laybys be positioned along Road D1477 at the main access. The proposed laybys are illustrated on **Drawing SKC003**.

PEDESTRIAN FACILITIES

It is proposed that surfaced pedestrian sidewalks should be provided along the site frontage to facilitate pedestrian movements to and from the site.

9 CONCLUSIONS

Based on the assessment of the existing road network, traffic counts, a traffic and capacity analysis of road links in the study area, the following concluding remarks are relevant:

- The proposed development is situated on Remainder of Portion 12 of the Farm Wemmerhuis 379-JT and Remainder of the Farm Bergendal 981-JR in Belfast, Mpumalanga Province (see **Figure 1**). The proposed development will be implemented in phases.
- This study considered the following land-uses:
  - Industrial 14 252m^2
  - Single Dwelling Units 161 Stands
  - Apartments and Flats 387 Units
  - Pre-school 200 Pupils
  - Shopping Centre 33 290m^2
  - Business Centre 42 344m^2
- Detailed traffic surveys were carried at the following intersections (see **Figure 1**):
  - Road D1477 and N4 Offramp;
  - Road D1477 and N4 Offramp/Belfast 1Stop Access and
  - Road D1477 and R33
- The proposed development will generate approximately 1052 and 1887 trips during the AM and PM peak hour respectively.
- It is proposed that the development be served by two full accesses off Road D1477 plus and additional access to the north of the proposed development (over/under the N4) to serve Phase 3 and 4. The main access will be via the eastern leg of the intersection of Road D1477 and R33.
- The site development plans have not yet been finalized. It is proposed that a parking assessment be undertaken during the site development submission stage.
- Roads upgrades required are stated in **Chapter 7.4** and as shown on **Drawings SKC001** to **SKC004**.
- There are public transport services provided within the vicinity of site. There are no taxi laybys available within the proximity of the proposed site. Therefore it is recommended that a pair of laybys be positioned along Road D1477 at the main access. The proposed laybys are illustrated on **Drawing SKC003.**

From a traffic engineering perspective; the proposed development is supported.

10 REFERENCES

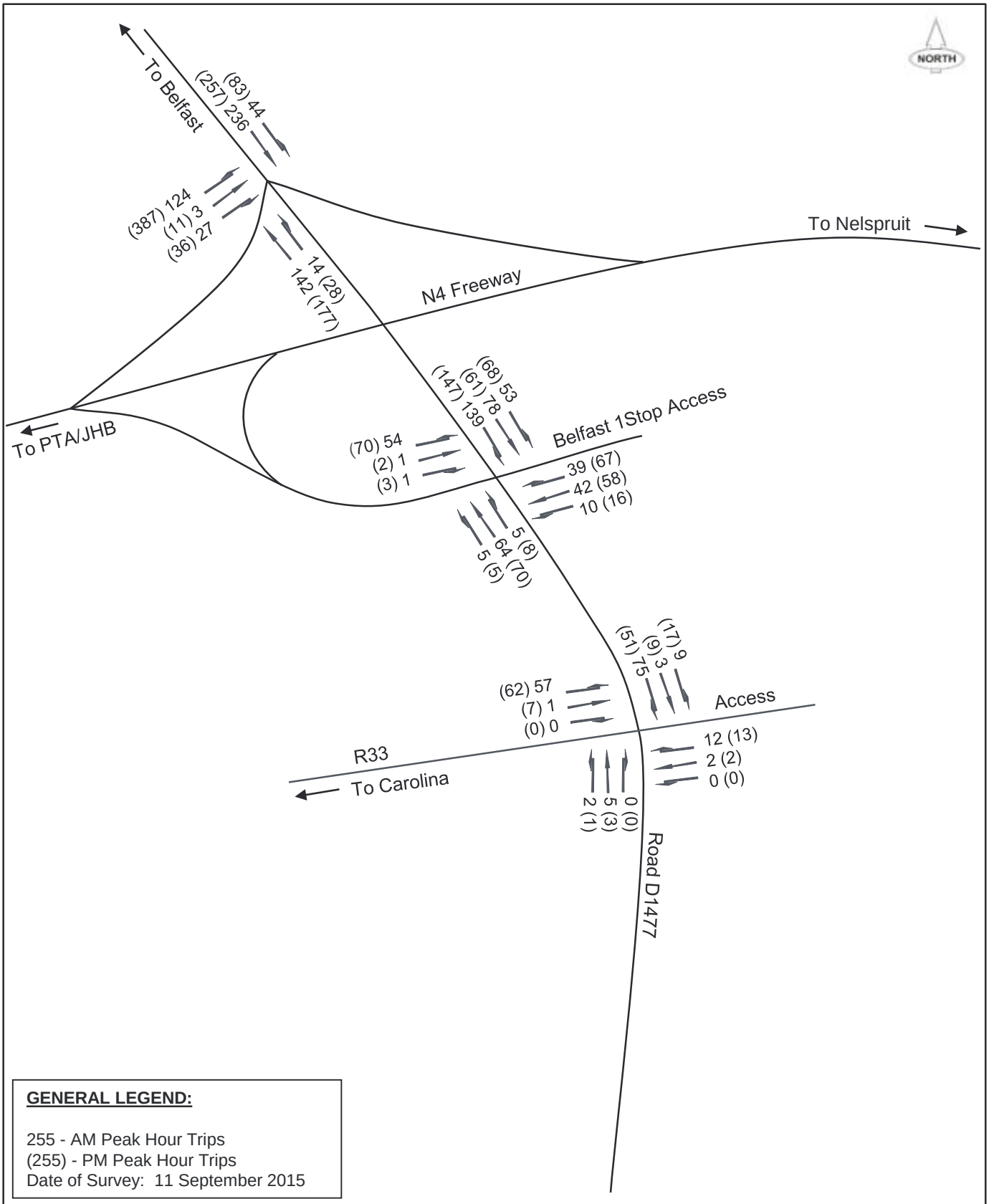
- TMH 16 Volume 2, South African Traffic Impact and Site Traffic Assessment Standards and Requirements Manual, Version 1.0, Committee of Transport Officials (COTO) August 2012
- TMH 17 Volume 1, South African Trip Data Manual, Version 1.0, Committee of Transport Officials (COTO) September 2012.
- Highway Capacity Manual, Transportation Research Board, National Research Council Washington D.C., 2010.
- Manual for Traffic Impact Studies, Department of Transport, October 1995
- South African Trip Generation Rates, 2nd edition, Department of Transport, June 1995
- South African Parking Standards, 2nd edition, Department of Transport, November 1985

FIGURES

FIGURES

20744.R_Belfast Development_Locality Plan_1

Project: **PROPOSED BELFAST MIXED USE DEVELOPMENT**	Figure Description: **LOCALITY PLAN**	No. **1**



GENERAL LEGEND:

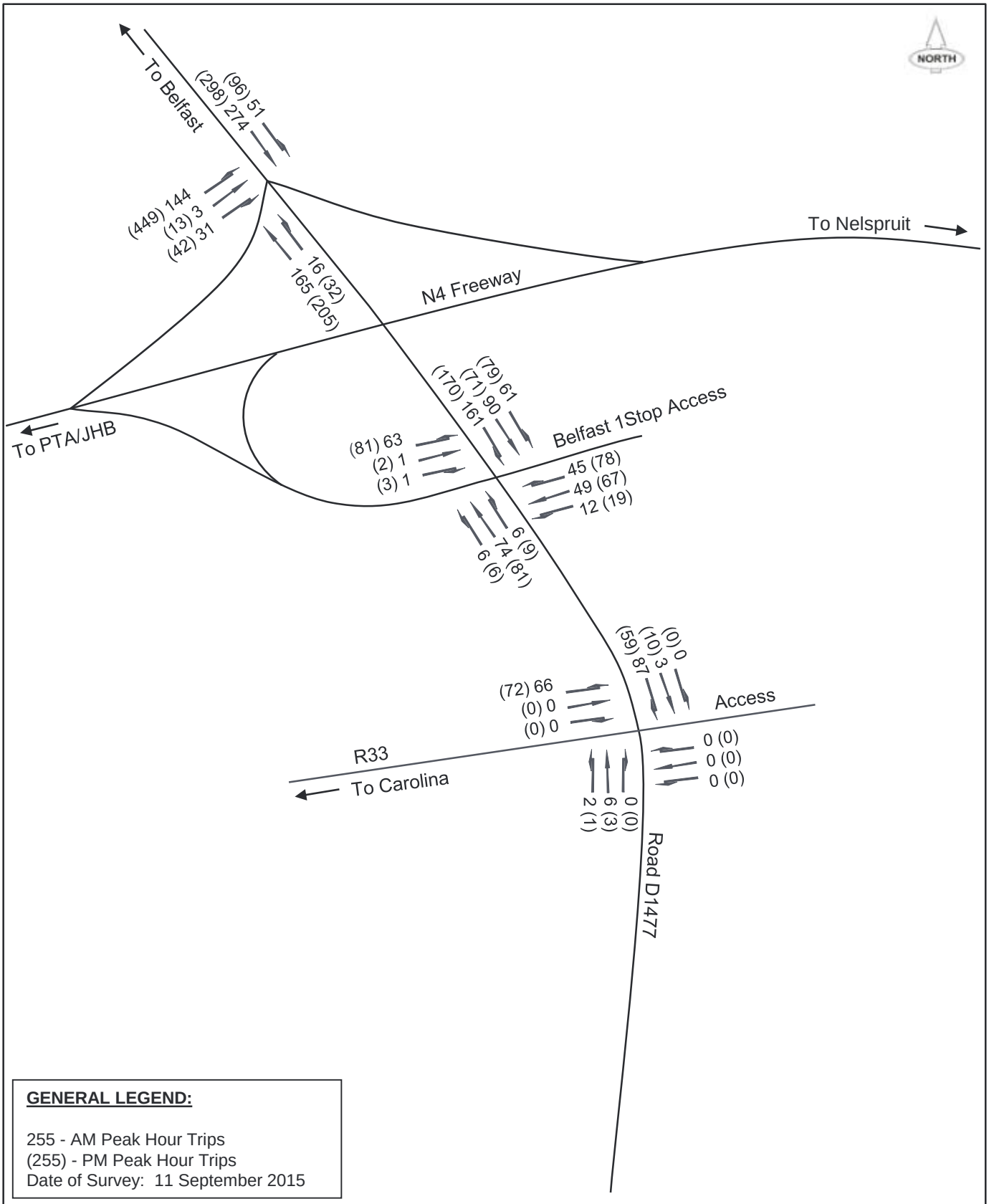
255 - AM Peak Hour Trips
(255) - PM Peak Hour Trips
Date of Survey: 11 September 2015

Not to scale - Diagrammatic only

Checked by : ED Kotze Pr. Tech. Eng

20744R. Belfast Development_2015 Existing Traffic Volumes_2

Project:	Figure:	No:
PROPOSED BELFAST MIXED USE DEVELOPMENT	**2015 EXISTING TRAFFIC VOLUMES**	**2**



GENERAL LEGEND:

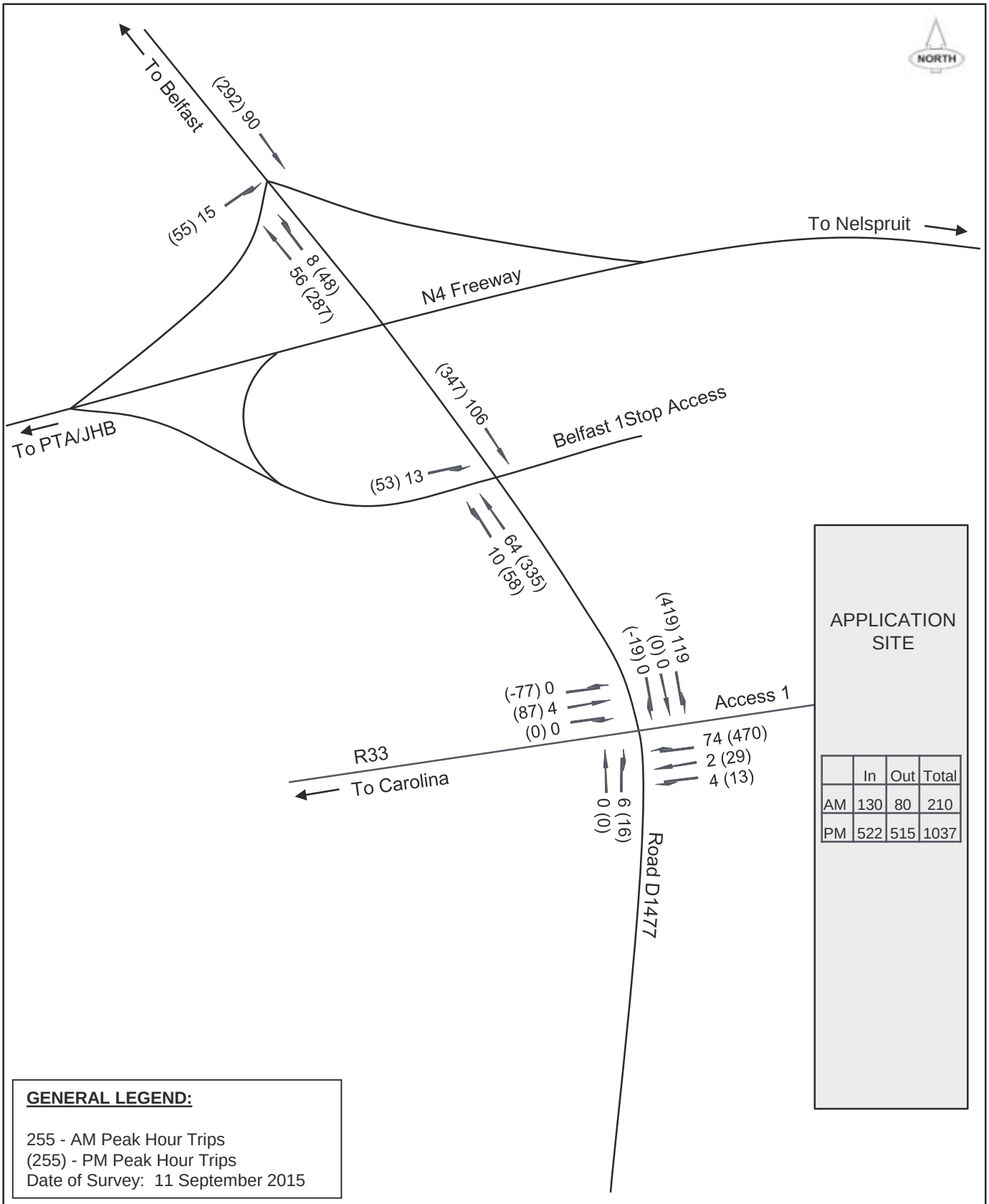
255 - AM Peak Hour Trips
(255) - PM Peak Hour Trips
Date of Survey: 11 September 2015

Not to scale - Diagrammatic only

Checked by : ED Kotze Pr. Tech. Eng

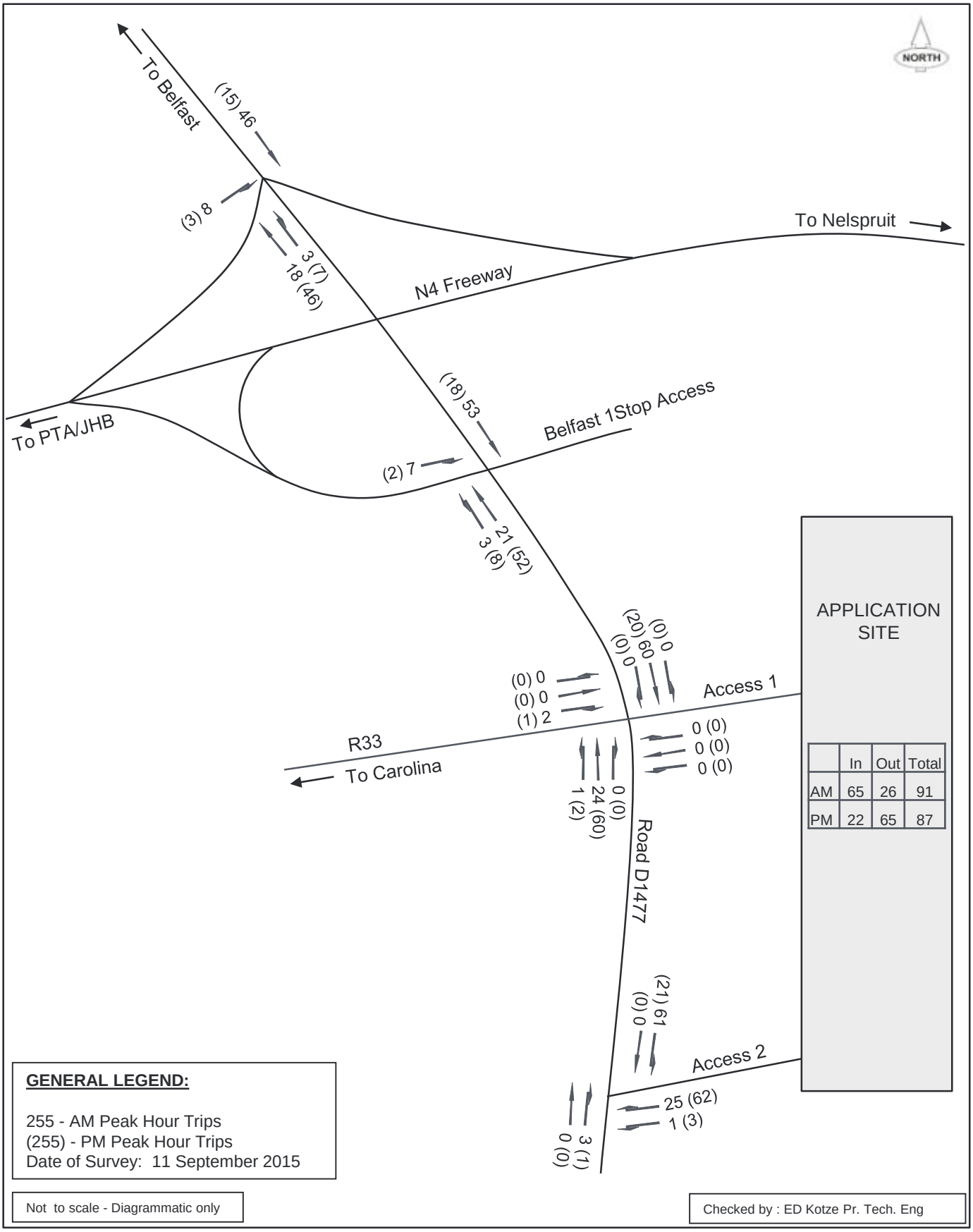
20744R. Belfast Development_2020 Background Traffic Volumes_3

Project: **PROPOSED BELFAST MIXED USE DEVELOPMENT**	Figure: **2020 BACKGOUND TRAFFIC VOLUMES**	No: **3**



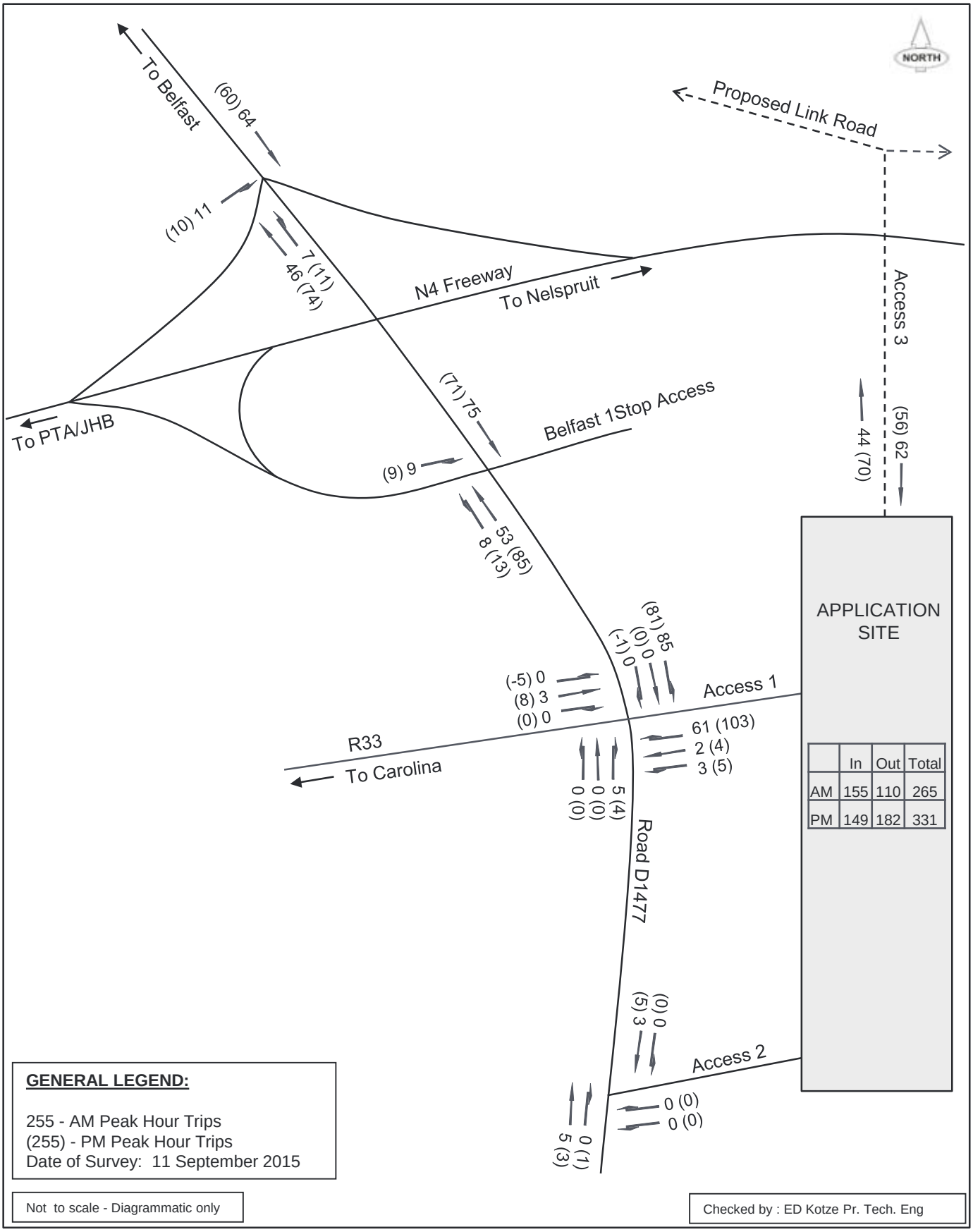
20744R. Belfast Development_Phase 1 Peak Hour Development Trips_4A

Project:	Figure:	No:
PROPOSED BELFAST MIXED USE DEVELOPMENT	**PHASE 1 PEAK HOUR DEVELOPMENT TRIPS**	**4A**



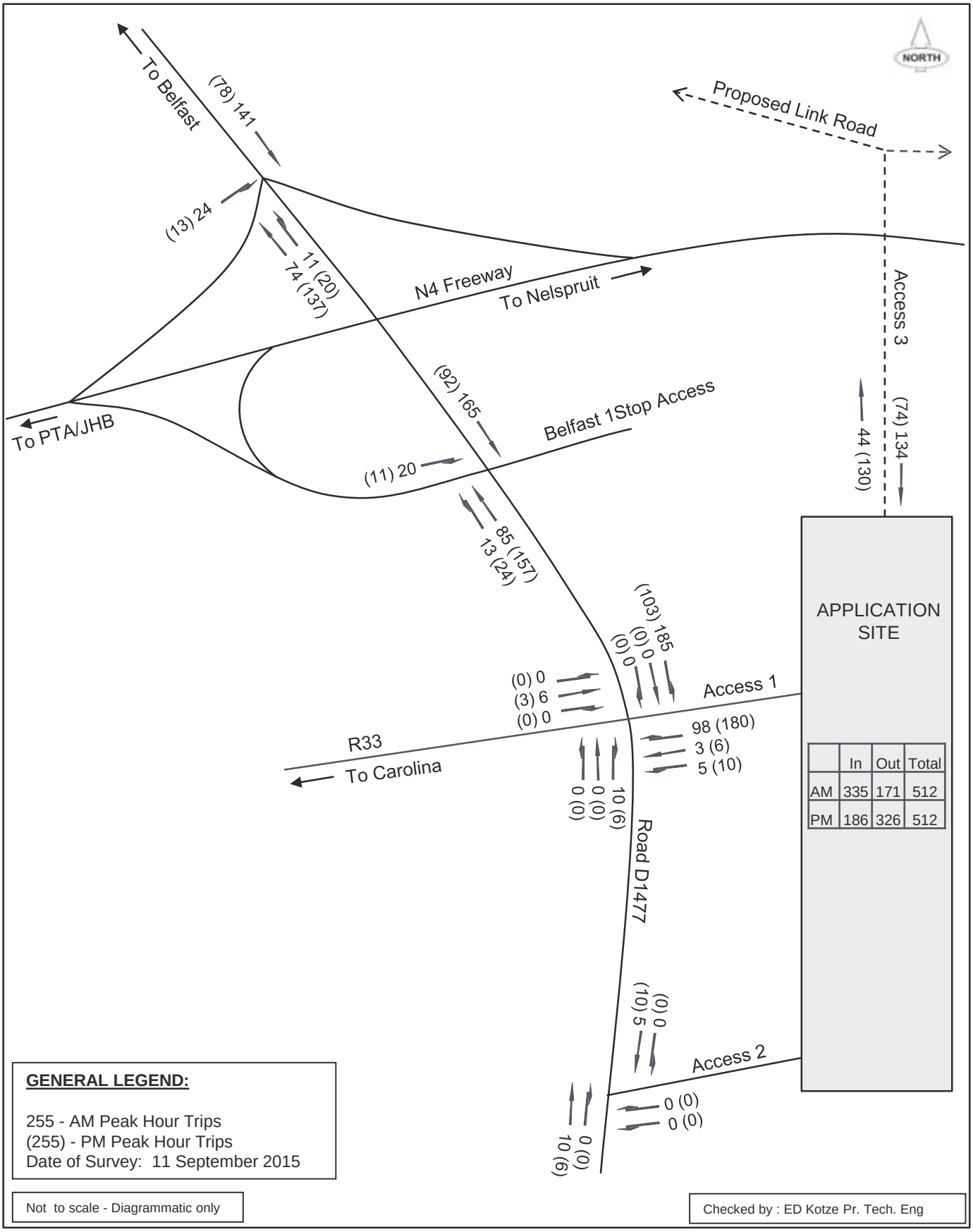
20744R. Belfast Development_Phase 2 Peak Hour Development Trips_4B

Project:	Figure:	No:
PROPOSED BELFAST MIXED USE DEVELOPMENT	PHASE 2 PEAK HOUR DEVELOPMENT TRIPS	4B



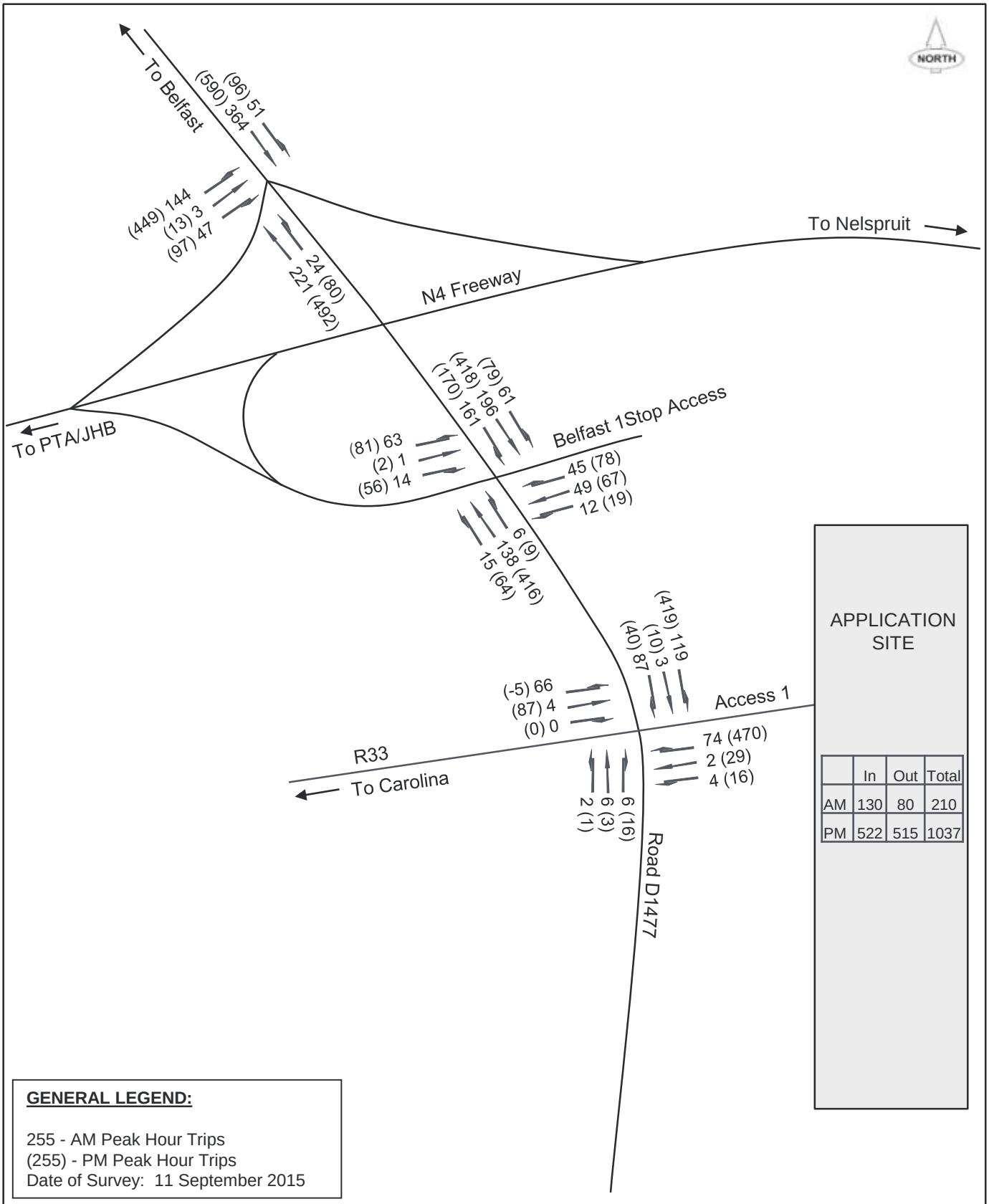
20744R. Belfast Development_Phase 3 Peak Hour Development Trips_4C

Project:	Figure:	No:
PROPOSED BELFAST MIXED USE DEVELOPMENT	PHASE 3 PEAK HOUR DEVELOPMENT TRIPS	4C



20744R. Belfast Development_Phase 4 Peak Hour Development Trips_4D

Project:	Figure:	No:
PROPOSED BELFAST MIXED USE DEVELOPMENT	PHASE 4 PEAK HOUR DEVELOPMENT TRIPS	4D



	In	Out	Total
AM	130	80	210
PM	522	515	1037

GENERAL LEGEND:

255 - AM Peak Hour Trips
(255) - PM Peak Hour Trips
Date of Survey: 11 September 2015

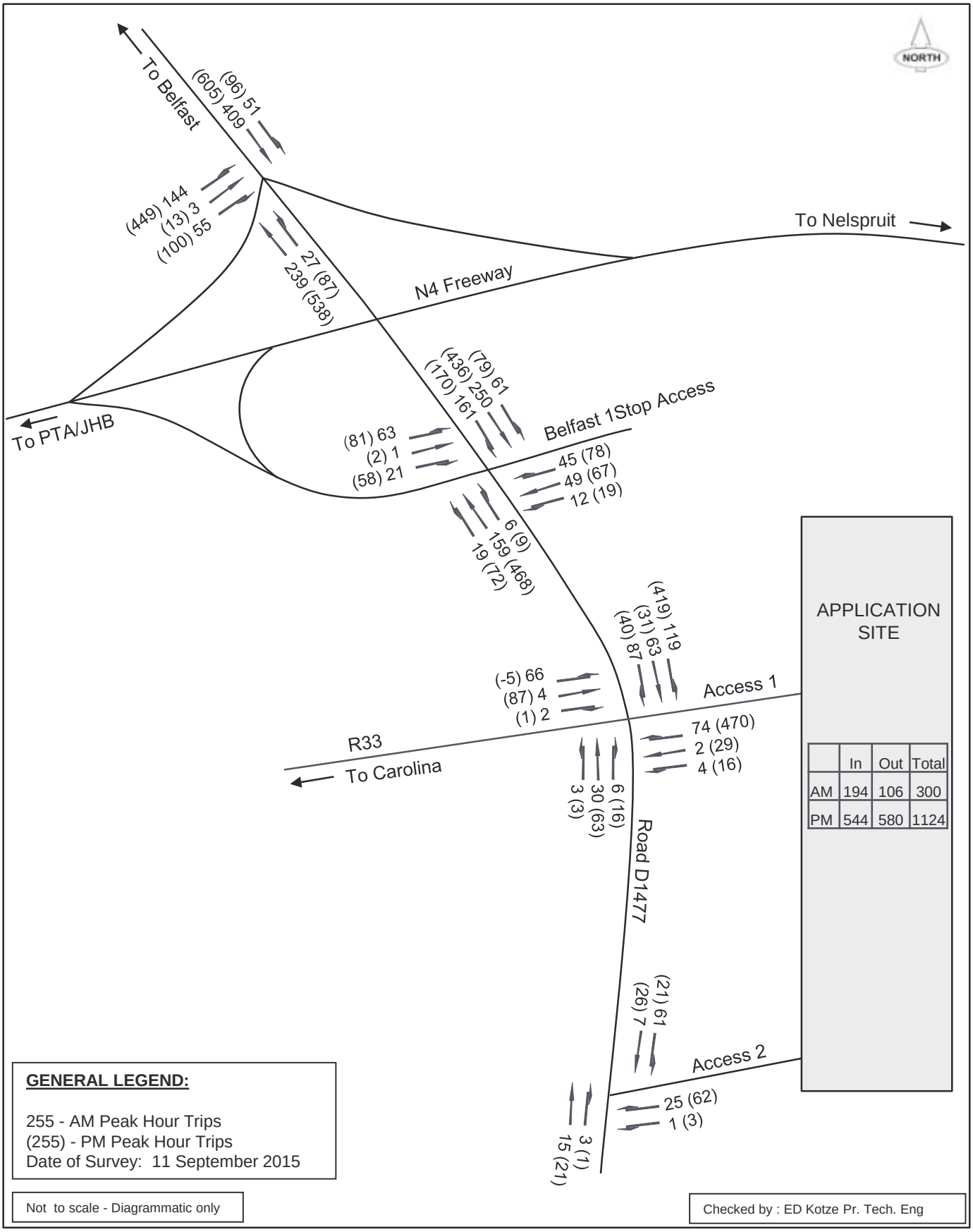
Not to scale - Diagrammatic only

Checked by : ED Kotze Pr. Tech. Eng

20744R. Belfast Development_2020 Peak Hour Background plus Phase 1 Development Traffic_5A

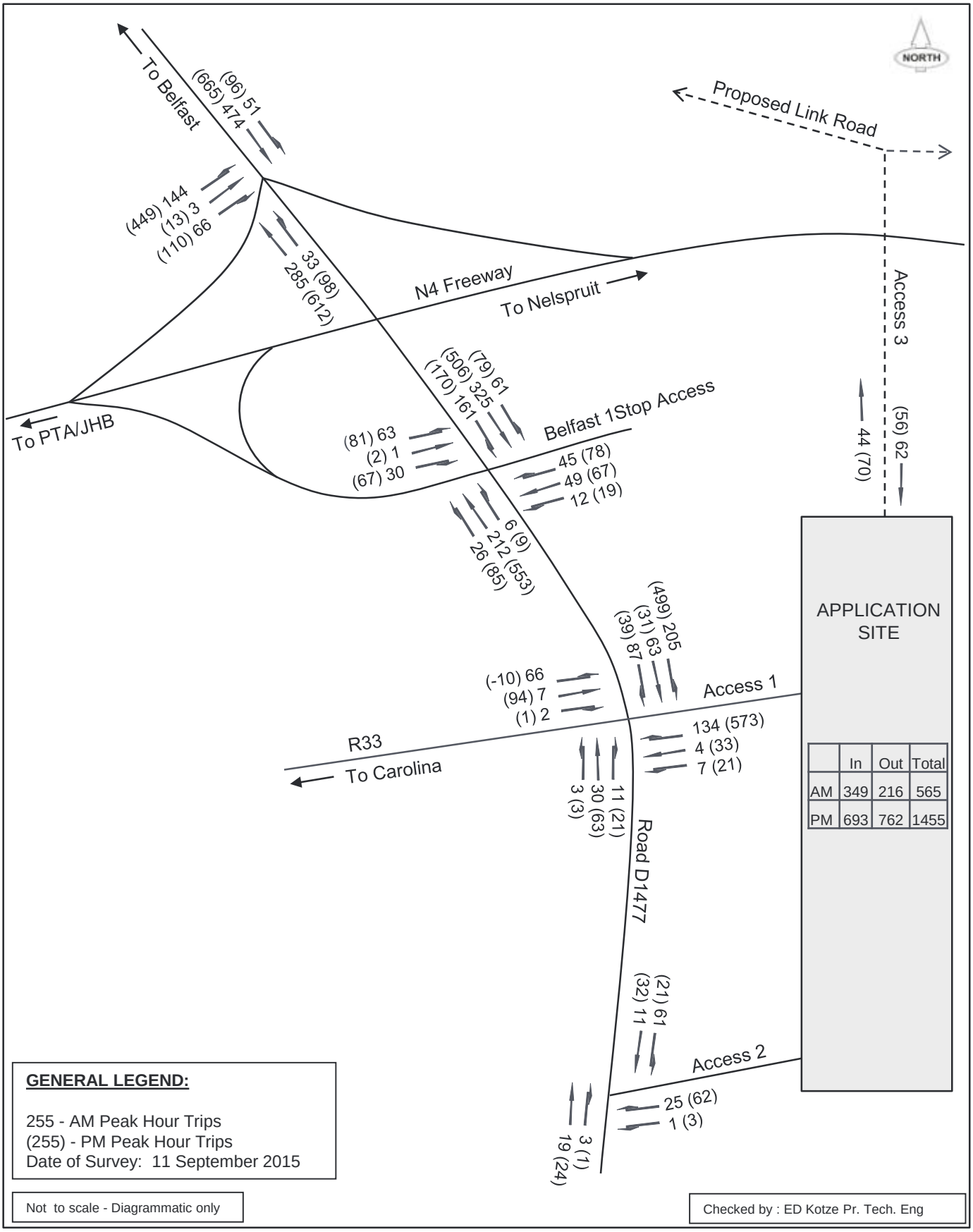
WSP PARSONS BRINCKERHOFF

Project:	Figure:	No:
PROPOSED BELFAST MIXED USE DEVELOPMENT	**2020 PEAK HOUR BACKGROUND PLUS PHASE 1 DEVELOPMENT TRAFFIC**	**5A**



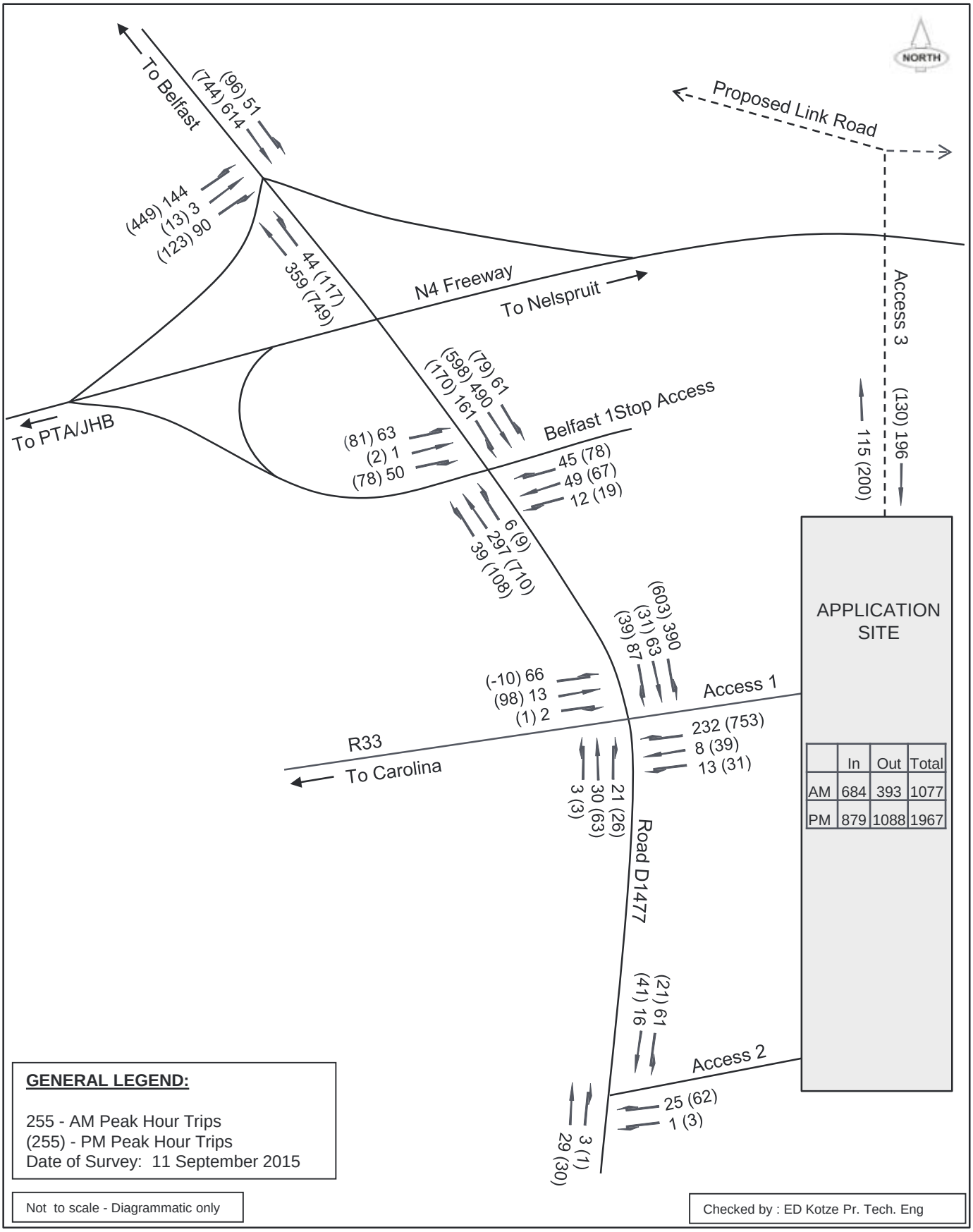
20744R. Belfast Development_2020 Peak Hour Background Plus Phase 1&2 Development Traffic_5B

Project: PROPOSED BELFAST MIXED USE DEVELOPMENT	Figure: 2020 PEAK HOUR BACKGROUND PLUS PHASE 1&2 DEVELOPMENT TRAFFIC	No: 5B



20744R. Belfast Development_2020 Background Plus Phase 1, 2 & 3 Development Traffic Volumes_5C

Project: PROPOSED BELFAST MIXED USE DEVELOPMENT	Figure: 2020 BACKGROUND PLUS PHASE 1, 2 & 3 DEVELOPMENT TRAFFIC VOLUMES	No: 5C



20744R. Belfast Development_2020 Background Plus Phase 1, 2, 3 & 4 Development Traffic Volumes_5D

Project: PROPOSED BELFAST MIXED USE DEVELOPMENT	Figure: 2020 BACKGROUND PLUS PHASE 1, 2, 3 & 4 DEVELOPMENT TRAFFIC VOLUMES	No: 5D

DRAWINGS

DRAWINGS

Drawing SKC001 Rev A: D1477/N4 Offramp Intersection Layout Plan
Drawing SKC002 Rev A: D1477/N4 Offramp/Belfast 1Stop Intersection Layout Plan
Drawing SKC003 Rev B: D1477/R33/Site Access Intersection Layout Plan
Drawing SKC004 Rev A: D1477/Site Access 2 Intersection Layout Plan

REV	DATE	BY	DESCRIPTION	CHK
A	-	-	INITIAL ISSUE	-

If drawing status = construction, a signed copy of this drawing (either in hardcopy electronic format) is available at the office of origin and at the office of issue.

DRAWING STATUS:
FOR INFORMATION

WSP Group Africa (Pty) Ltd
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CLIENT:
-

ARCHITECT:
-

PROJECT:
BELFAST MIXED USE DEVELOPMENT

TITLE:
D1477-N4 OFF RAMP INTERSECTION LAYOUT PLAN

SCALE @ A1:	CHECKED:	APPROVED:
1:250	-	-
DESIGN	**DRAWN**	**DATE:**
Z BUSO	Z BUSO	2015/11/19

PROJECT No	DRAWING No	REV:
20744	SKC001	A

CESA

TEMPLATE V1B1.1

REV	DATE	BY	DESCRIPTION	CHK	APD
A	-	-	INITIAL ISSUE	-	-

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CLIENT:
-

ARCHITECT:
-

PROJECT:
BELFAST MIXED USE DEVELOPMENT

TITLE:
D1477-N4 BELFAST 1 STOP
INTERSECTION LAYOUT PLAN

SCALE @ A1:	CHECKED:	APPROVED:
1:250	-	-
DESIGN:	DRAWN:	DATE:
Z BUSO	Z BUSO	2015/11/19

PROJECT No:	DRAWING No:	REV:
20744	SKC002	A

CESA

TEMPLATE VERSION 1.1

PLOT DATE: 2015/12/03 2:54 PM

REV	DATE	BY	DESCRIPTION	CHK
A	-	-	INITIAL ISSUE	-

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CLIENT: -

ARCHITECT: -

PROJECT: BELFAST MIXED USE DEVELOPMENT

TITLE: D1477-R33-SITE ACCESS INTERSECTION LAYOUT PLAN

SCALE @ A1:	CHECKED:	APPROVED:
1:250	E KOTZE	E KOTZE
DESIGN:	**DRAWN:**	**DATE:**
Z BUSO	Z BUSO	2015/11/19

PROJECT No:	DRAWING No:	REV:
20744	SKC003	B

CESA

TEMPLATE V1B19

REV	DATE	BY	DESCRIPTION	CHK	APD
A	-	-	INITIAL ISSUE	-	-

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CLIENT:
-

ARCHITECT:
-

PROJECT:
BELFAST MIXED USE DEVELOPMENT

TITLE:
D1477-SITE ACCESS 2 INTERSECTION LAYOUT PLAN

SCALE @ A1:	CHECKED:	APPROVED:
1:250	-	-
DESIGN:	DRAWN:	DATE:
Z BUSO	Z BUSO	2015/11/19
PROJECT No:	DRAWING No:	REV:
20744	SKC004	A

LEGEND:

PROPOSED ROAD UPGRADE

CESA

TEMPLATE VERSION 1.1

PLOT DATE: 23/11/2015 2:01:37 PM

APPENDICES

APPENDIX A-1

TOWNSHIP LAYOUT PLAN

N4 Highway

N4 Highway

Portion 18 Wemmershuis 379

16m Wide Road

16m Wide Road

25m Wide Road

16m Wide Road

16m Wide Road

25m Wide Road

0.5m Wide Road

30m Wide Road

25m Wide Road

16m Wide Road

N4 Highway

30m Wide Road

25m Wide Road

Remainder of Portion 13
Wemmershuis 379

Remainder of Portion 1
Wemmershuis 379

Remainder of Portion 13
Bergendal 378

Portion 17
Bergendal 378

Portion 16
Bergendal 378

APPENDIX A-2

RECORD OF SITE VISIT

Annexure A-2 – Record of site visit
Photo Sheet 1 of 2

Road D1477 & N4 Offramp (facing north)

Access to Belfast 1Stop (facing east)

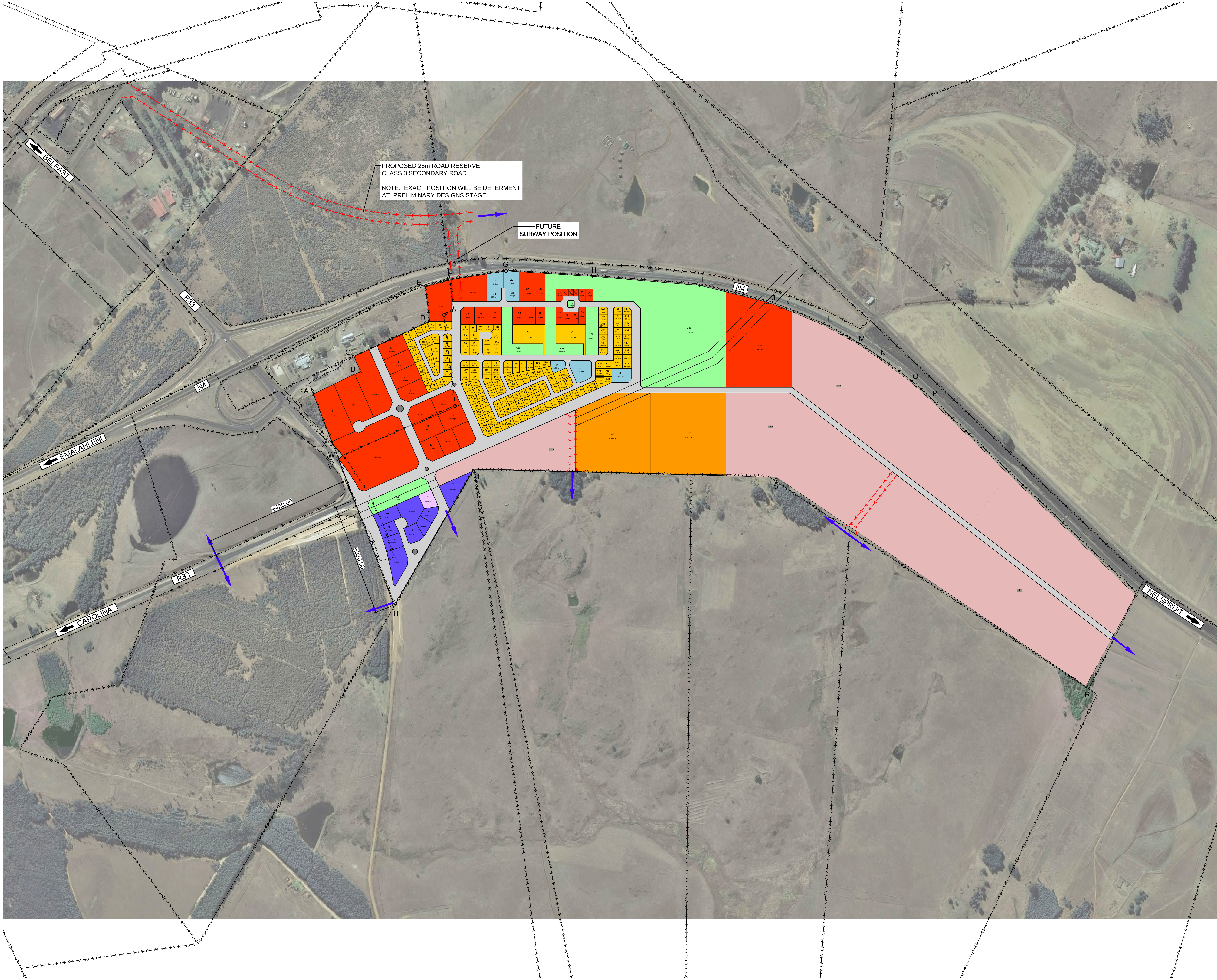
Annexure A-2 – Record of site visit
Photo Sheet 2 of 2

Road D1477 and Site Access 1 (facing east)

R33 (facing west)

APPENDIX A-3

LIMITED ROAD MASTER PLAN



REV	DATE	BY	DESCRIPTION	CHK	APD
A	-	-	INITIAL ISSUE	-	-

If drawing status = construction, a signed copy of this drawing (either in hardcopy or electronic format) is available at the office of origin and at the office of issue.

DRAWING STATUS: ####

WSP

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CLIENT: -

ARCHITECT: -

PROJECT: BELFAST MALL

TITLE: ROAD MASTER PLAN

SCALE @ A1: 1:5000	CHECKED: C BILANKULU	APPROVED: R KOTZE
DESIGN: -	DRAWN: T JOUBERT	DATE: 2016/05/27
PROJECT No: 20744	DRAWING No: SKC002	REV: A

APPENDIX A-4

TRIP GENERATION CALCULATIONS

COTO - TMH 17 - SA Trip Data Manual
Trip Generation Calculations
Project name : 20744
Project number : Belfast Mixed Use Development (Phase 1)

Adjustment Factor	Yes / No
Mixed-use-Development (MUD) =	Yes
Low Vehicle Ownership (LVO) =	Yes
Very Low Vehicle Ownership (VLVO) =	No
Transit Nodes or Corridors (TNoC) =	No

Code	Land Use	Vehicle Occupancy	Extent (Input)	Unit	Daily Rate	Adjustment Factors					Trip Generation Rates							In / Out Split												Trip Categories		
						MUD	LVO	VLVO	TNoC	Comb	AM Peak	PM Peak	Friday PM	Midday	Evening	Saturday	Sunday	AM Peak		PM Peak		Friday PM		Midday		Evening		Saturday		Sunday		Primary	Pass-By	Diverted
																		In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out			
200	Residential																																
210	Single Dwelling Units		31	1 Dwelling Unit	4.00	10%	40%	0%	0%	46%	1.00	1.00				0.50	0.50	25%	75%	70%	30%							50%	50%	50%	50%	100%	0%	0%
800	Retail																																
820	Shopping Centre		31830	100m2 GLA	35.00	10%	30%	0%	0%	37%	0.60		3.40			4.50		65%	35%			50%	50%					50%	50%			See table at bottom of page		

Trip Type for retail developments	AM Peak			Friday PM			Saturday		
	Primary	Pass-By	Diverted	Primary	Pass-By	Diverted	Primary	Pass-By	Diverted
	100%	0%	0%	58%	13%	29%	50%	12%	38%

Size adjustment factor for retail developments	Primary factor	Pass-By factor
	1.59	2.17

Tables above excludes adjustment factor

Tables below includes adjustment factor

Code	Land Use	Total Trips																						Primary Trips														
		Daily	AM Peak			PM Peak			Friday PM			Midday			Evening			Saturday			Sunday			AM Peak			PM Peak			Friday PM			Midday			Evening			Saturday			Sunday		
			In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total
200	Residential																																									
210	Single Dwelling Units	67	4	13	17	12	5	17										4	4	8	4	4	8	4	13	17	12	5	17										4	4	8	4	4	8
800	Retail																																									
820	Shopping Centre	7019	125	67	192				510	510	1021							649	649	1298				125	67	192				315	315	630							360	360	719			
	TOTAL	7085	129	80	209	12	5	17	510	510	1021							653	653	1306	4	4	8	129	80	209	12	5	17	315	315	630							364	364	728	4	4	8

Code	Land Use	PassBy Trips																						Diverted Trips																	
		AM Peak			PM Peak			Friday PM			Midday			Evening			Saturday			Sunday			AM Peak			PM Peak			Friday PM			Midday			Evening			Saturday			Sunday		
		In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total
200	Residential																																									
210	Single Dwelling Units																																										
800	Retail																																									
820	Shopping Centre							96	96	193							118	118	235										99	99	198							171	171	343			
	TOTAL							96	96	193							118	118	235										99	99	198							171	171	343			

COTO - TMH 17 - SA Trip Data Manual
Trip Generation Calculations
Project name : 20744
Project number : Belfast Mixed Use Development (Phase 2)

Adjustment Factor	Yes / No
Mixed-use-Development (MUD) =	Yes
Low Vehicle Ownership (LVO) =	Yes
Very Low Vehicle Ownership (VLVO) =	No
Transit Nodes or Corridors (TNoC) =	No

Code	Land Use	Vehicle Occupancy	Extent (Input)	Unit	Daily Rate	Adjustment Factors					Trip Generation Rates							In / Out Split												Trip Categories		
						MUD	LVO	VLVO	TNoC	Comb	AM Peak	PM Peak	Friday PM	Midday	Evening	Saturday	Sunday	AM Peak		PM Peak		Friday PM		Midday		Evening		Saturday		Sunday				
																		In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	Primary	Pass-By	Diverted
100	Industrial																																
130	Industrial Area (Park)	1.8	14252	100m2 GLA	6.00	5%	20%	0%	0%	24%	0.80	0.80				0.40		75%	30%	25%	75%							30%	70%			100%	0%	0%

Trip Type for retail developments	AM Peak			Friday PM			Saturday			Size adjustment factor for retail developments	Primary factor	Pass-By factor
	Primary	Pass-By	Diverted	Primary	Pass-By	Diverted	Primary	Pass-By	Diverted			
	100%	0%	0%	58%	13%	29%	50%	12%	38%		1.57	2.15

Tables above excludes adjustment factor

Tables below includes adjustment factor

Code	Land Use	Daily	Total Trips																				Primary Trips														
			AM Peak			PM Peak			Friday PM			Midday			Evening			Saturday			Sunday			AM Peak			PM Peak			Friday PM			Midday			Evening			Saturday			Sunday		
			In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total
100	Industrial																																									
130	Industrial Area (Park)	650	65	26	91	22	65	87										13	30	43				65	26	91	22	65	87										13	30	43			
	TOTAL	650	65	26	91	22	65	87										13	30	43				65	26	91	22	65	87										13	30	43			

COTO - TMH 17 - SA Trip Data Manual
Trip Generation Calculations
Project name : 20744
Project number : Belfast Mixed Use Development (Phase 3)

Adjustment Factor	Yes / No
Mixed-use-Development (MUD) =	Yes
Low Vehicle Ownership (LVO) =	Yes
Very Low Vehicle Ownership (VLVO) =	No
Transit Nodes or Corridors (TNoC) =	No

Code	Land Use	Vehicle Occupancy	Extent (Input)	Unit	Daily Rate	Adjustment Factors					Trip Generation Rates							In / Out Split												Trip Categories		
						MUD	LVO	VLVO	TNoC	Comb	AM Peak	PM Peak	Friday PM	Midday	Evening	Saturday	Sunday	AM Peak		PM Peak		Friday PM		Midday		Evening		Saturday		Sunday				
																		In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	Primary	Pass-By	Diverted
200	**Residential**																																
210	Single Dwelling Units		97	1 Dwelling Unit	4.00	10%	40%	0%	0%	46%	1.00	1.00				0.50	0.50	25%	75%	70%	30%							50%	50%	50%	50%	100%	0%	0%
500	**Institutional**																																
565	Pre-School (Day Care Centre)		200	1 Student	3.00	5%	50%	0%	0%	53%	1.00	0.80		0.30				50%	50%	50%	50%			50%	50%							100%	0%	0%
700	**Office**																																
770	Business Centre (Park)		8554	100m2 GLA	10.00	15%	20%	0%	0%	32%	1.50	1.50						85%	15%	20%	80%											100%	0%	0%
800	**Retail**																																
820	Shopping Centre		1460	100m2 GLA	35.00	10%	30%	0%	0%	37%	0.60		3.40			4.50		65%	35%			50%	50%					50%	50%			See table at bottom of page		

Trip Type for retail developments	AM Peak			Friday PM			Saturday			Size adjustment factor for retail developments	Primary factor	Pass-By factor
	Primary	Pass-By	Diverted	Primary	Pass-By	Diverted	Primary	Pass-By	Diverted			
	100%	0%	0%	58%	13%	29%	50%	12%	38%		5.23	2.89

⇧ Tables above excludes adjustment factor

Tables below includes adjustment factor ⇩

Code	Land Use	Daily	Total Trips																						Primary Trips																	
			AM Peak			PM Peak			Friday PM			Midday			Evening			Saturday			Sunday			AM Peak			PM Peak			Friday PM			Midday			Evening			Saturday			Sunday		
			In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total
200	**Residential**																																										
210	Single Dwelling Units	210	13	39	52	37	16	52										13	13	26	13	13	26	13	39	52	37	16	52										13	13	26	13	13	26
500	**Institutional**																																										
565	Pre-School (Day Care Centre)	285	48	48	95	38	38	76				14	14	29										48	48	95	38	38	76				14	14	29								
700	**Office**																																										
770	Business Centre (Park)	582	74	13	87	17	70	87																74	13	87	17	70	87														
800	**Retail**																																										
820	Shopping Centre	322	19	10	29				58	58	116							69	69	138				19	10	29				47	47	95							54	54	108			
	TOTAL	**1398**	**154**	**110**	**264**	**92**	**124**	**216**	**58**	**58**	**116**	**14**	**14**	**29**				**82**	**82**	**165**	**13**	**13**	**26**	**154**	**110**	**264**	**92**	**124**	**216**	**47**	**47**	**95**	**14**	**14**	**29**				**67**	**67**	**135**	**13**	**13**	**26**

Code	Land Use	PassBy Trips																						Diverted Trips																			
		AM Peak			PM Peak			Friday PM			Midday			Evening			Saturday			Sunday			AM Peak			PM Peak			Friday PM			Midday			Evening			Saturday			Sunday		
		In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total
200	**Residential**																																										
210	Single Dwelling Units																																										
500	**Institutional**																																										
565	Pre-School (Day Care Centre)																																										
700	**Office**																																										
770	Business Centre (Park)																																										
800	**Retail**																																										
820	Shopping Centre							6	6	12							7	7	14										5	5	9							8	8	16			
	TOTAL							**6**	**6**	**12**							**7**	**7**	**14**										**5**	**5**	**9**							**8**	**8**	**16**			

COTO - TMH 17 - SA Trip Data Manual
Trip Generation Calculations
Project name : 20744
Project number : Belfast Mixed Use Development (Phase 4)

Adjustment Factor	Yes / No
Mixed-use-Development (MUD) =	Yes
Low Vehicle Ownership (LVO) =	Yes
Very Low Vehicle Ownership (VLVO) =	No
Transit Nodes or Corridors (TNoC) =	No

Code	Land Use	Vehicle Occupancy	Extent (Input)	Unit	Daily Rate	Adjustment Factors					Trip Generation Rates							In / Out Split												Trip Categories		
						MUD	LVO	VLVO	TNoC	Comb	AM Peak	PM Peak	Friday PM	Midday	Evening	Saturday	Sunday	AM Peak		PM Peak		Friday PM		Midday		Evening		Saturday		Sunday				
																		In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	Primary	Pass-By	Diverted
200	Residential																																
210	Single Dwelling Units		33	1 Dwelling Unit	4.00	10%	40%	0%	0%	46%	1.00	1.00				0.50	0.50	25%	75%	70%	30%							50%	50%	50%	50%	100%	0%	0%
220	Apartments and Flats		387	1 Dwelling Unit	2.75	15%	30%	0%	0%	41%	0.65	0.65				0.35	0.35	25%	75%	70%	30%							50%	50%	50%	50%	100%	0%	0%
700	Office																																
770	Business Centre (Park)		33790	100m2 GLA	10.00	15%	20%	0%	0%	32%	1.50	1.50						85%	15%	20%	80%											100%	0%	0%

Trip Type for retail developments	AM Peak			Friday PM			Saturday			Size adjustment factor for retail developments	Primary factor	Pass-By factor
	Primary	Pass-By	Diverted	Primary	Pass-By	Diverted	Primary	Pass-By	Diverted			
	100%	0%	0%	58%	13%	29%	50%	12%	38%		1.57	2.15

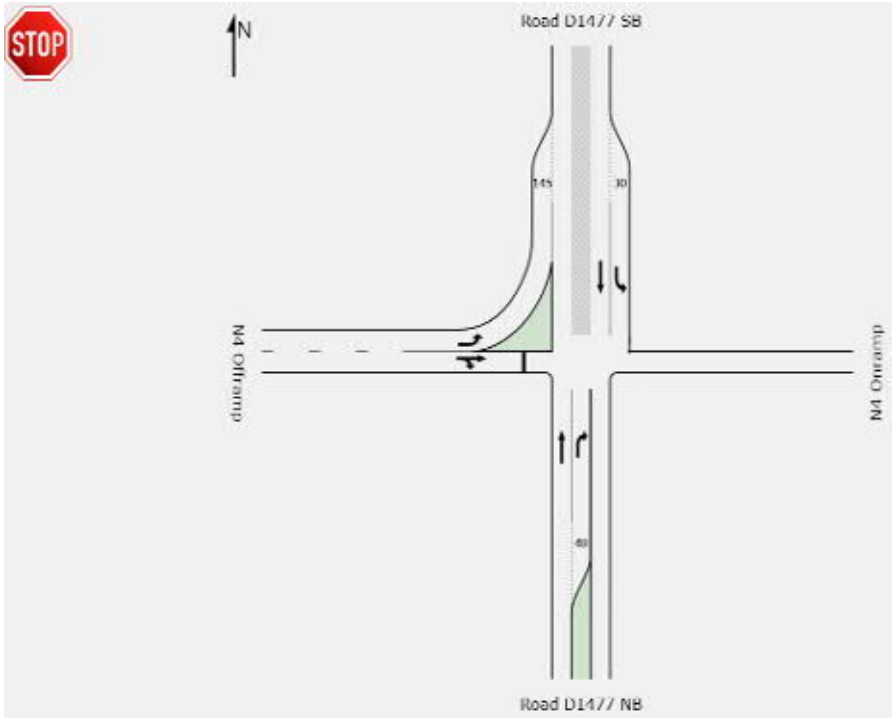
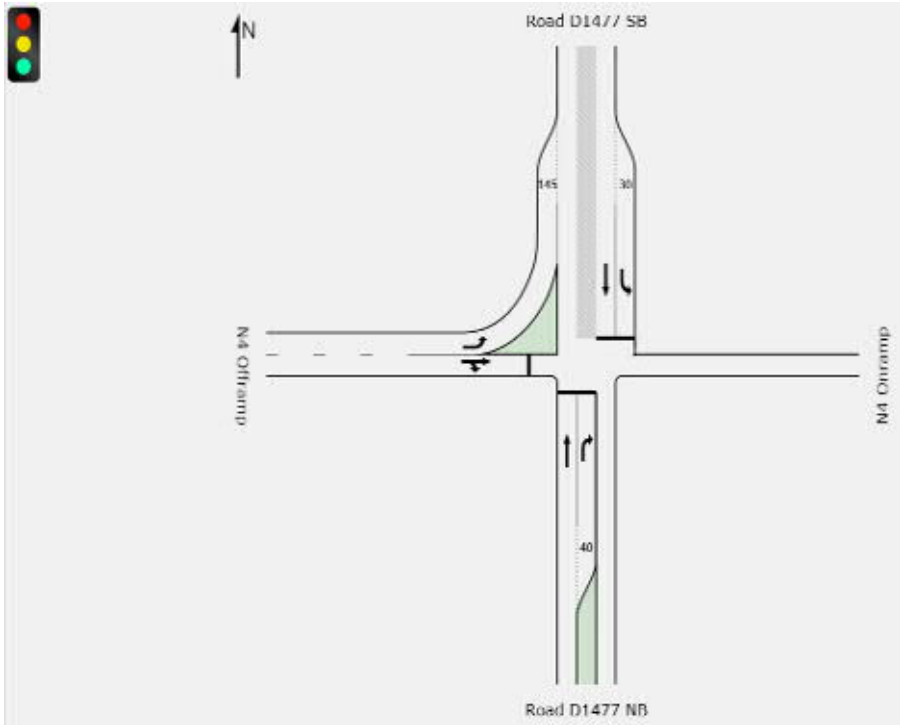
Tables above excludes adjustment factor

Tables below includes adjustment factor

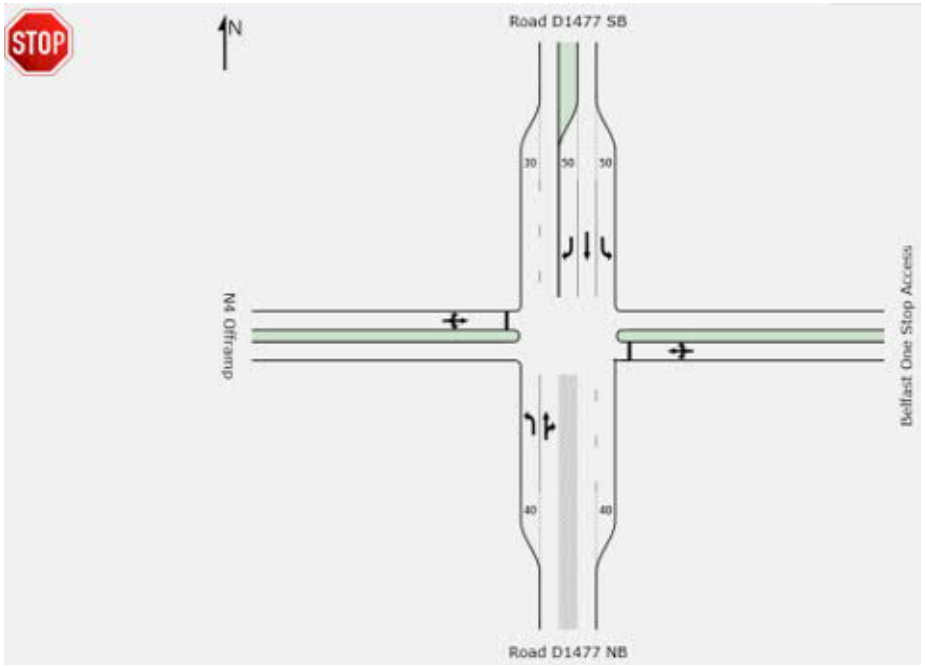
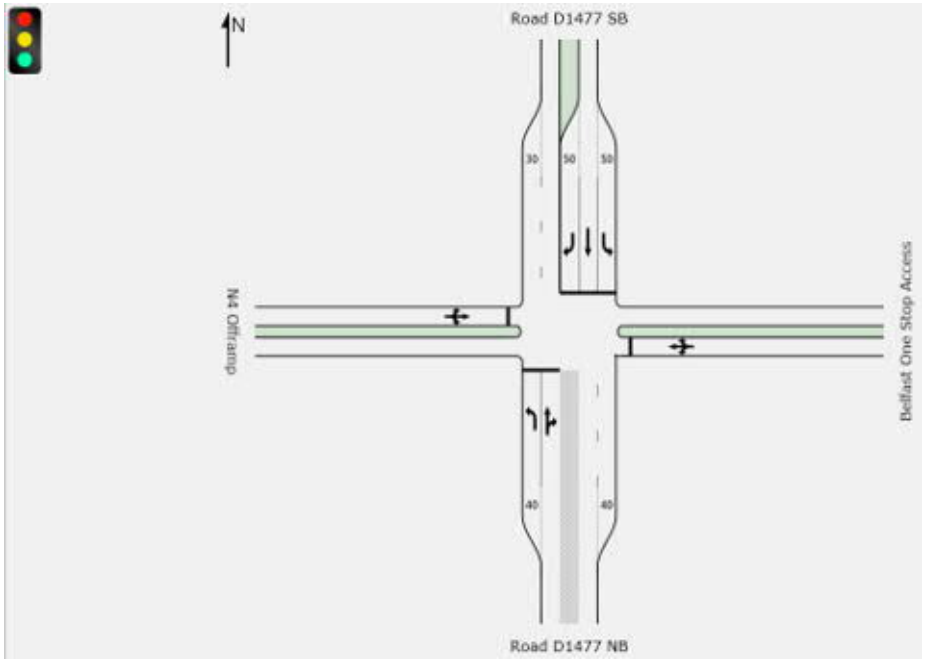
Code	Land Use	Total Trips																						Primary Trips																	
		Daily	AM Peak			PM Peak			Friday PM			Midday			Evening			Saturday			Sunday			AM Peak			PM Peak			Friday PM			Midday			Evening			Saturday			Sunday		
			In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total
200	Residential																																									
210	Single Dwelling Units	71	4	13	18	12	5	18										4	4	9	4	4	9	4	13	18	12	5	18										4	4	9	4	4	9
220	Apartments and Flats	633	37	112	150	105	45	150										40	40	81	40	40	81	37	112	150	105	45	150										40	40	81	40	40	81
700	Office																																									
770	Business Centre (Park)	2298	293	52	345	69	276	345																293	52	345	69	276	345														
	TOTAL	3002	335	177	512	186	326	512										45	45	90	45	45	90	335	177	512	186	326	512										45	45	90	45	45	90

APPENDIX A-5
INTERSECTION GEOMETRIC LAYOUTS

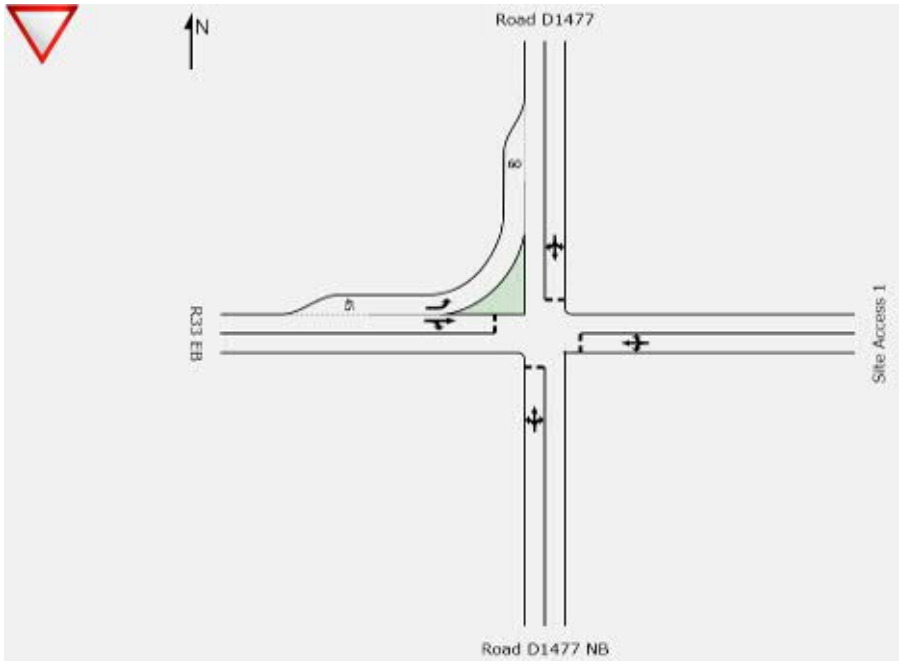
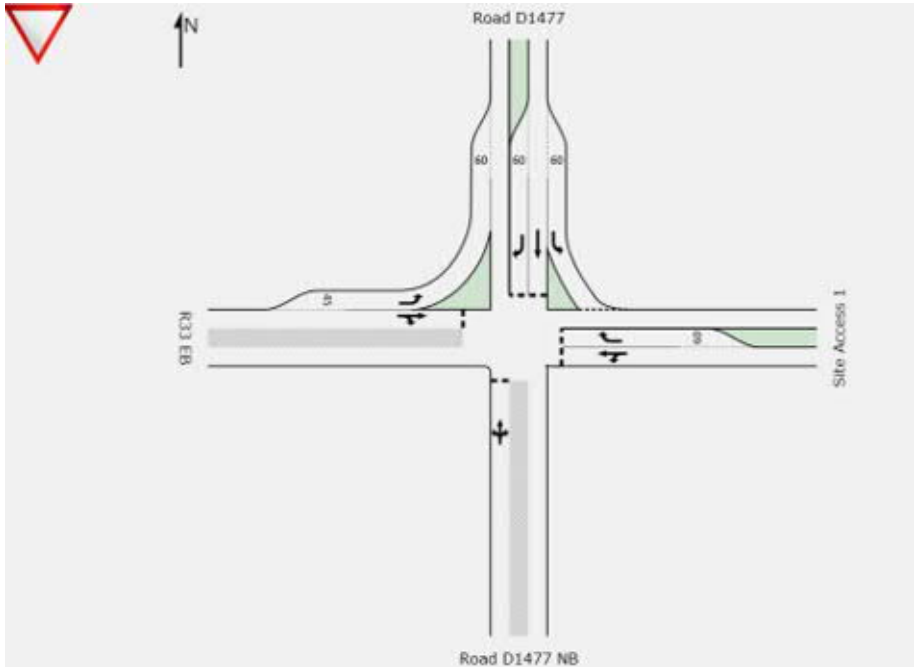
Appendix A-5: Existing vs. Proposed Intersection Layout and Control

INTERSECTION	EXISTING LAYOUT & TRAFFIC CONTROL	PROPOSED LAYOUT & TRAFFIC CONTROL
1 – Road D1477 and N4 Off-ramp	**TRAFFIC CONTROL: SIDE-STOP** 	**TRAFFIC CONTROL: SIGNALISED** 

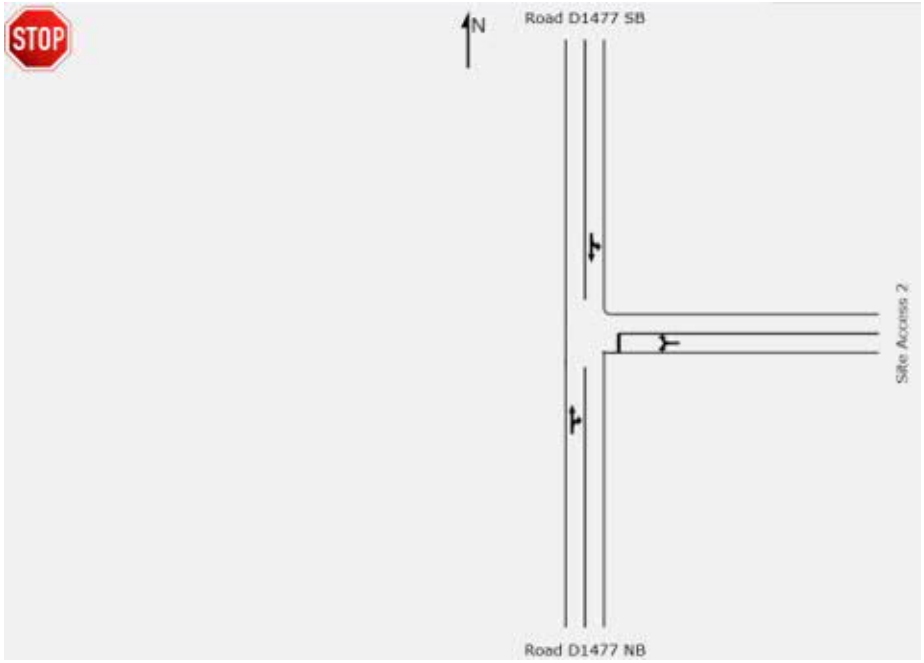
Appendix A-5 (continue): Existing vs. Proposed Intersection Layout and Control

INTERSECTION	EXISTING LAYOUT & TRAFFIC CONTROL	PROPOSED LAYOUT & TRAFFIC CONTROL
2 – Road D1477 and N4 Off-ramp/Belfast One Stop Shop	**TRAFFIC CONTROL:** SIDE STOP 	**TRAFFIC CONTROL:** SIGNALISED 

Appendix A-5 (continue): Existing vs. Proposed Intersection Layout and Control

INTERSECTION	EXISTING LAYOUT & TRAFFIC CONTROL	PROPOSED LAYOUT & TRAFFIC CONTROL
3 –Road D1477 and R33/Site Access 1	**TRAFFIC CONTROL:** ALL-WAY STOP 	**TRAFFIC CONTROL:** ALL-WAY STOP 

Appendix A-5 (continue): Existing vs. Proposed Intersection Layout and Control

INTERSECTION	EXISTING LAYOUT & TRAFFIC CONTROL	PROPOSED LAYOUT & TRAFFIC CONTROL
4 – Road D1477 and Site Access 2	**TRAFFIC CONTROL:** **NOT APPLICABLE**	**TRAFFIC CONTROL: SIDE STOP** 

APPENDIX A-6
DETAILED SIDRA RESULTS

MOVEMENT SUMMARY

2020 AM Horizon Year Traffic
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Road D1477 NB											
2	T	174	20.0	0.101	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
3	R	17	20.0	0.021	11.7	LOS B	0.1	0.7	0.45	0.71	45.9
Approach		191	20.0	0.101	1.0	NA	0.1	0.7	0.04	0.06	58.4
North: Road D1477 SB											
7	L	54	20.0	0.033	8.8	LOS A	0.0	0.0	0.00	0.66	49.0
8	T	288	20.0	0.167	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		342	20.0	0.167	1.4	NA	0.0	0.0	0.00	0.10	58.0
West: N4 Offramp											
10	L	152	20.0	0.093	8.0	X	X	X	X	0.59	49.8
11	T	3	20.0	0.123	22.3	LOS C	0.4	3.6	0.66	0.99	38.6
12	R	33	20.0	0.123	22.0	LOS C	0.4	3.6	0.66	1.00	38.8
Approach		187	20.0	0.123	10.7	LOS B	0.4	3.6	0.13	0.67	47.3
All Vehicles		720	20.0	0.167	3.7	NA	0.4	3.6	0.04	0.24	54.8

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

2020 PM Horizon Year Traffic
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Road D1477 NB											
2	T	216	20.0	0.125	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
3	R	34	20.0	0.047	12.5	LOS B	0.2	1.5	0.50	0.76	45.2
Approach		249	20.0	0.125	1.7	NA	0.2	1.5	0.07	0.10	57.5
North: Road D1477 SB											
7	L	101	20.0	0.062	8.8	LOS A	0.0	0.0	0.00	0.66	49.0
8	T	314	20.0	0.182	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		415	20.0	0.182	2.1	NA	0.0	0.0	0.00	0.16	56.9
West: N4 Offramp											
10	L	473	20.0	0.291	8.0	X	X	X	X	0.59	49.7
11	T	14	20.0	0.246	27.6	LOS D	0.9	7.8	0.76	1.02	35.4
12	R	44	20.0	0.246	27.3	LOS D	0.9	7.8	0.76	1.03	35.6
Approach		531	20.0	0.291	10.1	LOS B	0.9	7.8	0.08	0.64	47.7
All Vehicles		1195	20.0	0.291	5.6	NA	0.9	7.8	0.05	0.36	52.5

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: 01_Road D1477 & N4 Offramp_2020 AM Peak Hour Background+Phase 1 Development Traffic

2020 AM Background + Phase 1 Development Traffic
Signals - Fixed Time Cycle Time = 60 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Road D1477 NB											
2	T	233	20.0	0.193	3.3	LOS A	2.4	19.3	0.37	0.31	53.2
3	R	25	20.0	0.068	14.5	LOS B	0.3	2.5	0.41	0.74	43.3
Approach		258	20.0	0.193	4.4	LOS A	2.4	19.3	0.37	0.35	52.0
North: Road D1477 SB											
7	L	54	20.0	0.111	11.7	LOS B	0.5	4.0	0.32	0.70	45.9
8	T	383	20.0	0.317	3.7	LOS A	4.3	35.5	0.41	0.36	52.5
Approach		437	20.0	0.317	4.7	LOS A	4.3	35.5	0.40	0.40	51.6
West: N4 Offramp											
10	L	152	20.0	0.093	8.0	X	X	X	X	0.59	49.8
11	T	3	20.0	0.323	29.4	LOS C	1.6	12.8	0.97	0.72	29.7
12	R	49	20.0	0.323	38.5	LOS D	1.6	12.8	0.97	0.75	29.4
Approach		204	20.0	0.323	15.7	LOS B	1.6	12.8	0.25	0.63	42.3
All Vehicles		899	20.0	0.323	7.1	LOS A	4.3	35.5	0.36	0.44	49.2

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

2020 PM Background + Phase 1 Development Traffic
Signals - Fixed Time Cycle Time = 60 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Road D1477 NB											
2	T	518	20.0	0.450	5.1	LOS A	7.3	59.5	0.51	0.45	50.4
3	R	84	20.0	0.288	20.2	LOS C	1.6	13.0	0.63	0.79	38.9
Approach		602	20.0	0.450	7.3	LOS A	7.3	59.5	0.53	0.50	48.4
North: Road D1477 SB											
7	L	101	20.0	0.227	12.6	LOS B	1.0	8.6	0.37	0.71	45.1
8	T	621	20.0	0.540	5.6	LOS A	9.5	78.1	0.56	0.50	49.6
Approach		722	20.0	0.540	6.6	LOS A	9.5	78.1	0.53	0.53	48.9
West: N4 Offramp											
10	L	473	20.0	0.291	8.0	X	X	X	X	0.59	49.7
11	T	14	20.0	0.531	28.2	LOS C	3.4	28.0	0.98	0.77	30.2
12	R	102	20.0	0.531	37.2	LOS D	3.4	28.0	0.98	0.79	30.0
Approach		588	20.0	0.531	13.5	LOS B	3.4	28.0	0.19	0.63	44.1
All Vehicles		1913	20.0	0.540	8.9	LOS A	9.5	78.1	0.43	0.55	47.2

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: 01_Road D1477 & N4 Offramp_2020 AM Peak Hour Background+Phase 1&2 Development Traffic

2020 AM Background + Phase 1&2 Development Traffic
Signals - Fixed Time Cycle Time = 60 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Road D1477 NB											
2	T	252	20.0	0.213	3.8	LOS A	2.7	22.3	0.39	0.34	52.5
3	R	28	20.0	0.082	15.5	LOS B	0.4	3.0	0.45	0.74	42.5
Approach		280	20.0	0.213	5.0	LOS A	2.7	22.3	0.40	0.38	51.3
North: Road D1477 SB											
7	L	54	20.0	0.116	12.1	LOS B	0.5	4.2	0.34	0.70	45.6
8	T	431	20.0	0.365	4.3	LOS A	5.3	43.7	0.45	0.40	51.6
Approach		484	20.0	0.365	5.2	LOS A	5.3	43.7	0.44	0.43	50.8
West: N4 Offramp											
10	L	152	20.0	0.093	8.0	X	X	X	X	0.59	49.8
11	T	3	20.0	0.321	28.3	LOS C	1.8	14.5	0.96	0.72	30.2
12	R	58	20.0	0.321	37.3	LOS D	1.8	14.5	0.96	0.75	29.8
Approach		213	20.0	0.321	16.3	LOS B	1.8	14.5	0.27	0.64	41.9
All Vehicles		977	20.0	0.365	7.5	LOS A	5.3	43.7	0.39	0.46	48.7

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

2020 PM Background + Phase 1&2 Development Traffic
Signals - Fixed Time Cycle Time = 60 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Road D1477 NB											
2	T	566	20.0	0.492	5.4	LOS A	8.3	67.8	0.53	0.48	50.0
3	R	92	20.0	0.323	20.5	LOS C	1.8	14.4	0.65	0.79	38.7
Approach		658	20.0	0.492	7.5	LOS A	8.3	67.8	0.55	0.52	48.1
North: Road D1477 SB											
7	L	101	20.0	0.227	12.6	LOS B	1.0	8.6	0.37	0.71	45.1
8	T	637	20.0	0.554	5.7	LOS A	9.9	81.2	0.57	0.51	49.5
Approach		738	20.0	0.554	6.7	LOS A	9.9	81.2	0.54	0.54	48.8
West: N4 Offramp											
10	L	473	20.0	0.291	8.0	X	X	X	X	0.59	49.7
11	T	14	20.0	0.545	28.3	LOS C	3.5	28.9	0.98	0.78	30.2
12	R	105	20.0	0.545	37.4	LOS D	3.5	28.9	0.98	0.80	29.9
Approach		592	20.0	0.545	13.7	LOS B	3.5	28.9	0.20	0.63	44.0
All Vehicles		1987	20.0	0.554	9.0	LOS A	9.9	81.2	0.44	0.56	47.0

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

2020 AM Background + Phase 1, 2 & 3 Development Traffic
Signals - Fixed Time Cycle Time = 60 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Road D1477 NB											
2	T	300	20.0	0.254	3.9	LOS A	3.4	27.6	0.41	0.35	52.3
3	R	35	20.0	0.107	16.1	LOS B	0.5	3.9	0.48	0.75	42.0
Approach		335	20.0	0.254	5.2	LOS A	3.4	27.6	0.42	0.39	51.0
North: Road D1477 SB											
7	L	54	20.0	0.116	12.1	LOS B	0.5	4.2	0.34	0.70	45.6
8	T	499	20.0	0.423	4.6	LOS A	6.5	53.5	0.48	0.42	51.2
Approach		553	20.0	0.423	5.3	LOS A	6.5	53.5	0.47	0.45	50.6
West: N4 Offramp											
10	L	152	20.0	0.093	8.0	X	X	X	X	0.59	49.8
11	T	3	20.0	0.382	28.5	LOS C	2.1	17.4	0.96	0.74	30.0
12	R	69	20.0	0.382	37.6	LOS D	2.1	17.4	0.96	0.76	29.7
Approach		224	20.0	0.382	17.4	LOS B	2.1	17.4	0.31	0.65	41.0
All Vehicles		1112	20.0	0.423	7.7	LOS A	6.5	53.5	0.42	0.47	48.4

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: 01_Road D1477 & N4 Offramp_2020 PM Peak Hour Background+Phase 1, 2 & 3 Development Traffic

2020 PM Background + Phase 1, 2, 3 & 4 Development Traffic
Signals - Fixed Time Cycle Time = 60 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Road D1477 NB											
2	T	644	20.0	0.560	5.8	LOS A	10.1	82.7	0.57	0.52	49.4
3	R	103	20.0	0.407	22.5	LOS C	2.2	18.0	0.71	0.80	37.4
Approach		747	20.0	0.560	8.1	LOS A	10.1	82.7	0.59	0.56	47.3
North: Road D1477 SB											
7	L	101	20.0	0.227	12.6	LOS B	1.0	8.6	0.37	0.71	45.1
8	T	700	20.0	0.608	6.1	LOS A	11.6	94.9	0.60	0.55	48.9
Approach		801	20.0	0.608	6.9	LOS A	11.6	94.9	0.58	0.57	48.4
West: N4 Offramp											
10	L	473	20.0	0.291	8.0	X	X	X	X	0.59	49.7
11	T	14	20.0	0.594	28.8	LOS C	3.9	32.0	0.99	0.81	29.9
12	R	116	20.0	0.594	37.9	LOS D	3.9	32.0	0.99	0.82	29.7
Approach		602	20.0	0.594	14.2	LOS B	3.9	32.0	0.21	0.64	43.5
All Vehicles		2151	20.0	0.608	9.3	LOS A	11.6	94.9	0.48	0.58	46.6

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: 01_Road D1477 & N4 Offramp_2020 AM Peak Hour Background+Phase 1, 2, 3 & 4 Development Traffic

2020 AM Background + Phase 1, 2, 3 & 4 Development Traffic
Signals - Fixed Time Cycle Time = 60 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Road D1477 NB											
2	T	378	20.0	0.320	4.2	LOS A	4.5	36.8	0.43	0.38	51.9
3	R	46	20.0	0.166	18.7	LOS B	0.8	6.4	0.57	0.77	40.0
Approach		424	20.0	0.320	5.7	LOS A	4.5	36.8	0.45	0.42	50.3
North: Road D1477 SB											
7	L	54	20.0	0.116	12.1	LOS B	0.5	4.2	0.34	0.70	45.6
8	T	646	20.0	0.548	5.2	LOS A	9.6	79.0	0.55	0.49	50.2
Approach		700	20.0	0.548	5.7	LOS A	9.6	79.0	0.53	0.51	49.8
West: N4 Offramp											
10	L	152	20.0	0.093	8.0	X	X	X	X	0.59	49.8
11	T	3	20.0	0.515	29.2	LOS C	2.9	24.0	0.98	0.77	29.7
12	R	95	20.0	0.515	38.2	LOS D	2.9	24.0	0.98	0.78	29.4
Approach		249	20.0	0.515	19.7	LOS B	2.9	24.0	0.39	0.67	39.3
All Vehicles		1374	20.0	0.548	8.3	LOS A	9.6	79.0	0.48	0.51	47.6

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

2020 PM Background + Phase 1, 2, 3 & 4 Development Traffic
Signals - Fixed Time Cycle Time = 60 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Road D1477 NB											
2	T	788	20.0	0.685	6.7	LOS A	14.3	117.0	0.66	0.60	48.1
3	R	123	20.0	0.567	26.6	LOS C	3.1	25.8	0.82	0.84	34.9
Approach		912	20.0	0.685	9.4	LOS A	14.3	117.0	0.68	0.64	45.8
North: Road D1477 SB											
7	L	101	20.0	0.227	12.6	LOS B	1.0	8.6	0.37	0.71	45.1
8	T	783	20.0	0.681	6.6	LOS A	14.1	115.6	0.66	0.60	48.1
Approach		884	20.0	0.681	7.3	LOS A	14.1	115.6	0.63	0.61	47.8
West: N4 Offramp											
10	L	473	20.0	0.291	8.0	X	X	X	X	0.59	49.7
11	T	14	20.0	0.657	29.6	LOS C	4.4	36.2	1.00	0.85	29.5
12	R	129	20.0	0.657	38.7	LOS D	4.4	36.2	1.00	0.85	29.4
Approach		616	20.0	0.657	14.9	LOS B	4.4	36.2	0.23	0.65	42.9
All Vehicles		2412	20.0	0.685	10.0	LOS B	14.3	117.0	0.55	0.63	45.7

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: 02_Road D1477 & N4 Offramp/Belfast One Stop Access_2020 AM Peak Hour Horizon Year Traffic

2020 AM Horizon Year Traffic
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Road D1477 NB											
1	L	6	20.0	0.004	8.8	LOS A	0.0	0.0	0.00	0.66	49.0
2	T	78	20.0	0.051	0.9	LOS A	0.3	2.7	0.34	0.00	53.7
3	R	6	20.0	0.051	9.8	LOS A	0.3	2.7	0.34	0.92	49.1
Approach		91	20.0	0.051	2.1	NA	0.3	2.7	0.32	0.11	53.0
East: Belfast One Stop Access											
4	L	13	20.0	0.288	20.3	LOS C	1.3	10.6	0.60	0.83	40.1
5	T	52	20.0	0.288	20.7	LOS C	1.3	10.6	0.60	1.03	39.8
6	R	47	20.0	0.288	20.3	LOS C	1.3	10.6	0.60	1.02	40.1
Approach		112	20.0	0.288	20.5	LOS C	1.3	10.6	0.60	1.00	40.0
North: Road D1477 SB											
7	L	64	20.0	0.040	8.8	LOS A	0.0	0.0	0.00	0.66	49.0
8	T	95	20.0	0.055	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R	169	20.0	0.173	9.4	LOS A	0.7	5.4	0.23	0.63	47.9
Approach		328	20.0	0.173	6.5	NA	0.7	5.4	0.12	0.45	51.1
West: N4 Offramp											
10	L	66	20.0	0.077	12.5	LOS B	0.3	2.3	0.22	0.89	46.0
11	T	1	20.0	0.077	12.9	LOS B	0.3	2.3	0.22	0.99	45.6
12	R	1	20.0	0.077	12.5	LOS B	0.3	2.3	0.22	1.00	46.1
Approach		68	20.0	0.077	12.5	LOS B	0.3	2.3	0.22	0.89	46.0
All Vehicles		599	20.0	0.288	9.2	NA	1.3	10.6	0.25	0.55	48.2

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: 02_Road D1477 & N4 Offramp/Belfast One Stop Access_2020 PM Peak Hour Horizon Year Traffic

2020 PM Horizon Year Traffic
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Road D1477 NB											
1	L	6	20.0	0.004	8.8	LOS A	0.0	0.0	0.00	0.66	49.0
2	T	85	20.0	0.059	1.0	LOS A	0.4	3.1	0.34	0.00	53.7
3	R	9	20.0	0.059	9.8	LOS A	0.4	3.1	0.34	0.91	49.0
Approach		101	20.0	0.059	2.3	NA	0.4	3.1	0.32	0.13	52.9
East: Belfast One Stop Access											
4	L	20	20.0	0.474	24.4	LOS C	2.8	22.8	0.66	0.92	37.4
5	T	71	20.0	0.474	24.8	LOS C	2.8	22.8	0.66	1.12	37.2
6	R	82	20.0	0.474	24.4	LOS C	2.8	22.8	0.66	1.10	37.4
Approach		173	20.0	0.474	24.6	LOS C	2.8	22.8	0.66	1.09	37.3
North: Road D1477 SB											
7	L	83	20.0	0.051	8.8	LOS A	0.0	0.0	0.00	0.66	49.0
8	T	75	20.0	0.043	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R	179	20.0	0.183	9.4	LOS A	0.7	5.8	0.25	0.63	47.8
Approach		337	20.0	0.183	7.2	NA	0.7	5.8	0.13	0.50	50.4
West: N4 Offramp											
10	L	85	20.0	0.107	12.8	LOS B	0.4	3.3	0.24	0.88	45.7
11	T	2	20.0	0.107	13.3	LOS B	0.4	3.3	0.24	0.99	45.3
12	R	3	20.0	0.107	12.8	LOS B	0.4	3.3	0.24	1.01	45.8
Approach		91	20.0	0.107	12.8	LOS B	0.4	3.3	0.24	0.89	45.7
All Vehicles		701	20.0	0.474	11.5	NA	2.8	22.8	0.30	0.64	46.1

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: 02_Road D1477 & N4 Offramp/Belfast One Stop Access_2020 AM Peak Background+Phase 1 Development Traff

2020 AM Background+Phase 1 Development Traffic
Signals - Fixed Time Cycle Time = 60 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Road D1477 NB											
1	L	16	20.0	0.034	14.4	LOS B	0.2	1.6	0.44	0.68	43.5
2	T	145	20.0	0.157	6.2	LOS A	2.0	16.7	0.48	0.40	49.2
3	R	6	20.0	0.157	15.0	LOS B	2.0	16.7	0.48	0.98	44.7
Approach		167	20.0	0.157	7.3	LOS A	2.0	16.7	0.48	0.45	48.4
East: Belfast One Stop Access											
4	L	13	20.0	0.373	31.6	LOS C	2.9	24.2	0.89	0.80	33.2
5	T	52	20.0	0.373	22.8	LOS C	2.9	24.2	0.89	0.71	33.8
6	R	47	20.0	0.373	31.5	LOS C	2.9	24.2	0.89	0.80	33.2
Approach		112	20.0	0.373	27.5	LOS C	2.9	24.2	0.89	0.76	33.5
North: Road D1477 SB											
7	L	64	20.0	0.118	14.6	LOS B	0.8	6.7	0.45	0.71	43.3
8	T	206	20.0	0.205	6.4	LOS A	2.9	23.5	0.50	0.42	49.0
9	R	169	20.0	0.385	16.8	LOS B	2.7	22.2	0.56	0.77	41.5
Approach		440	20.0	0.385	11.6	LOS B	2.9	23.5	0.52	0.60	45.0
West: N4 Offramp											
10	L	66	20.0	0.256	30.8	LOS C	2.1	17.2	0.87	0.77	32.7
11	T	1	20.0	0.256	22.0	LOS C	2.1	17.2	0.87	0.68	33.4
12	R	15	20.0	0.256	30.8	LOS C	2.1	17.2	0.87	0.77	32.7
Approach		82	20.0	0.256	30.7	LOS C	2.1	17.2	0.87	0.77	32.8
All Vehicles		801	20.0	0.385	14.9	LOS B	2.9	24.2	0.60	0.61	42.0

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

2020 PM Background+Phase 1 Development Traffic
Signals - Fixed Time Cycle Time = 60 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop Queued	Effective Stop Rate per veh	Average Speed km/h
South: Road D1477 NB											
1	L	67	20.0	0.153	15.6	LOS B	0.9	7.6	0.49	0.72	42.4
2	T	438	20.0	0.491	9.1	LOS A	8.2	67.1	0.66	0.58	45.6
3	R	9	20.0	0.491	17.9	LOS B	8.2	67.1	0.66	0.97	42.9
Approach		515	20.0	0.491	10.1	LOS B	8.2	67.1	0.64	0.61	45.1
East: Belfast One Stop Access											
4	L	20	20.0	0.537	31.0	LOS C	4.6	38.1	0.91	0.82	33.4
5	T	71	20.0	0.537	22.3	LOS C	4.6	38.1	0.91	0.75	33.9
6	R	82	20.0	0.537	30.9	LOS C	4.6	38.1	0.91	0.82	33.4
Approach		173	20.0	0.537	27.4	LOS C	4.6	38.1	0.91	0.79	33.6
North: Road D1477 SB											
7	L	83	20.0	0.161	15.7	LOS B	1.2	9.5	0.50	0.72	42.4
8	T	440	20.0	0.464	8.9	LOS A	7.9	64.5	0.65	0.57	45.9
9	R	179	20.0	0.558	24.8	LOS C	4.3	35.4	0.82	0.82	36.0
Approach		702	20.0	0.558	13.7	LOS B	7.9	64.5	0.67	0.65	42.5
West: N4 Offramp											
10	L	85	20.0	0.455	30.4	LOS C	3.8	31.5	0.89	0.80	32.9
11	T	2	20.0	0.455	21.7	LOS C	3.8	31.5	0.89	0.73	33.5
12	R	59	20.0	0.455	30.5	LOS C	3.8	31.5	0.89	0.80	32.9
Approach		146	20.0	0.455	30.3	LOS C	3.8	31.5	0.89	0.80	32.9
All Vehicles		1536	20.0	0.558	15.6	LOS B	8.2	67.1	0.71	0.67	40.9

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

2020 AM Background+Phase 1&2 Development Traffic
Signals - Fixed Time Cycle Time = 60 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Road D1477 NB											
1	L	20	20.0	0.043	14.4	LOS B	0.2	2.0	0.44	0.69	43.5
2	T	167	20.0	0.180	6.3	LOS A	2.4	19.5	0.49	0.41	49.0
3	R	6	20.0	0.180	15.1	LOS B	2.4	19.5	0.49	0.99	44.7
Approach		194	20.0	0.180	7.4	LOS A	2.4	19.5	0.49	0.46	48.3
East: Belfast One Stop Access											
4	L	13	20.0	0.374	31.6	LOS C	2.9	24.2	0.89	0.80	33.2
5	T	52	20.0	0.374	22.8	LOS C	2.9	24.2	0.89	0.72	33.8
6	R	47	20.0	0.374	31.5	LOS C	2.9	24.2	0.89	0.80	33.2
Approach		112	20.0	0.374	27.5	LOS C	2.9	24.2	0.89	0.76	33.5
North: Road D1477 SB											
7	L	64	20.0	0.118	14.6	LOS B	0.8	6.7	0.45	0.71	43.3
8	T	263	20.0	0.261	6.6	LOS A	3.8	31.2	0.52	0.44	48.6
9	R	169	20.0	0.392	16.8	LOS B	2.7	22.4	0.57	0.77	41.4
Approach		497	20.0	0.392	11.1	LOS B	3.8	31.2	0.53	0.59	45.2
West: N4 Offramp											
10	L	66	20.0	0.288	31.0	LOS C	2.3	18.9	0.87	0.77	32.6
11	T	1	20.0	0.288	22.2	LOS C	2.3	18.9	0.87	0.69	33.3
12	R	22	20.0	0.288	31.1	LOS C	2.3	18.9	0.87	0.77	32.6
Approach		89	20.0	0.288	30.9	LOS C	2.3	18.9	0.87	0.77	32.6
All Vehicles		892	20.0	0.392	14.4	LOS B	3.8	31.2	0.60	0.60	42.3

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: 02_Road D1477 & N4 Offramp/Belfast One Stop Access_2020 PM Peak Background+Phase 1&2 Development Tra

2020 PM Background+Phase 1&2 Development Traffic
Signals - Fixed Time Cycle Time = 60 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop Queued	Effective Stop Rate per veh	Average Speed km/h
South: Road D1477 NB											
1	L	76	20.0	0.167	15.1	LOS B	1.0	8.3	0.48	0.72	42.8
2	T	493	20.0	0.533	8.8	LOS A	9.2	75.8	0.67	0.59	45.9
3	R	9	20.0	0.533	17.6	LOS B	9.2	75.8	0.67	0.97	43.2
Approach		578	20.0	0.533	9.8	LOS A	9.2	75.8	0.64	0.61	45.4
East: Belfast One Stop Access											
4	L	20	20.0	0.581	32.4	LOS C	4.8	39.5	0.94	0.84	32.7
5	T	71	20.0	0.581	23.6	LOS C	4.8	39.5	0.94	0.78	33.2
6	R	82	20.0	0.581	32.3	LOS C	4.8	39.5	0.94	0.83	32.8
Approach		173	20.0	0.581	28.7	LOS C	4.8	39.5	0.94	0.81	32.9
North: Road D1477 SB											
7	L	83	20.0	0.157	15.1	LOS B	1.1	9.1	0.48	0.72	42.8
8	T	459	20.0	0.469	8.3	LOS A	8.0	65.7	0.63	0.56	46.5
9	R	179	20.0	0.600	25.9	LOS C	4.6	37.3	0.84	0.84	35.3
Approach		721	20.0	0.600	13.5	LOS B	8.0	65.7	0.67	0.65	42.7
West: N4 Offramp											
10	L	85	20.0	0.500	31.6	LOS C	4.0	32.9	0.91	0.80	32.3
11	T	2	20.0	0.500	22.9	LOS C	4.0	32.9	0.91	0.75	32.8
12	R	61	20.0	0.500	31.7	LOS C	4.0	32.9	0.91	0.81	32.3
Approach		148	20.0	0.500	31.5	LOS C	4.0	32.9	0.91	0.80	32.3
All Vehicles		1620	20.0	0.600	15.4	LOS B	9.2	75.8	0.71	0.67	41.1

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: 02_Road D1477 & N4 Offramp/Belfast One Stop Access_2020 AM Peak Background+Phase 1,2&3 Development

2020 AM Background+Phase 1, 2 & 3 Development Traffic
Signals - Fixed Time Cycle Time = 60 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Road D1477 NB											
1	L	27	20.0	0.057	14.0	LOS B	0.3	2.6	0.42	0.69	43.8
2	T	223	20.0	0.231	6.0	LOS A	3.1	25.7	0.49	0.42	49.4
3	R	6	20.0	0.231	14.8	LOS B	3.1	25.7	0.49	1.00	45.0
Approach		257	20.0	0.231	7.1	LOS A	3.1	25.7	0.49	0.46	48.6
East: Belfast One Stop Access											
4	L	13	20.0	0.408	32.7	LOS C	3.0	24.8	0.91	0.80	32.7
5	T	52	20.0	0.408	24.0	LOS C	3.0	24.8	0.91	0.73	33.2
6	R	47	20.0	0.408	32.6	LOS C	3.0	24.8	0.91	0.80	32.7
Approach		112	20.0	0.408	28.6	LOS C	3.0	24.8	0.91	0.77	32.9
North: Road D1477 SB											
7	L	64	20.0	0.115	14.1	LOS B	0.8	6.4	0.44	0.71	43.7
8	T	342	20.0	0.330	6.5	LOS A	5.0	41.2	0.53	0.46	48.8
9	R	169	20.0	0.403	17.0	LOS B	2.8	22.8	0.58	0.77	41.3
Approach		576	20.0	0.403	10.4	LOS B	5.0	41.2	0.53	0.58	45.8
West: N4 Offramp											
10	L	66	20.0	0.356	32.4	LOS C	2.6	21.7	0.90	0.78	32.0
11	T	1	20.0	0.356	23.6	LOS C	2.6	21.7	0.90	0.71	32.5
12	R	32	20.0	0.356	32.5	LOS C	2.6	21.7	0.90	0.78	32.0
Approach		99	20.0	0.356	32.3	LOS C	2.6	21.7	0.90	0.78	32.0
All Vehicles		1043	20.0	0.408	13.6	LOS B	5.0	41.2	0.60	0.59	42.8

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: 02_Road D1477 & N4 Offramp/Belfast One Stop Access_2020 PM Peak Background+Phase 1,2&3 Development

2020 PM Background+Phase 1, 2 & 3 Development Traffic
Signals - Fixed Time Cycle Time = 60 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop Queued	Effective Stop Rate per veh	Average Speed km/h
South: Road D1477 NB											
1	L	89	20.0	0.192	14.7	LOS B	1.2	9.5	0.46	0.72	43.2
2	T	582	20.0	0.610	8.8	LOS A	11.3	93.0	0.70	0.62	45.7
3	R	9	20.0	0.610	17.6	LOS B	11.3	93.0	0.70	0.97	43.3
Approach		681	20.0	0.610	9.7	LOS A	11.3	93.0	0.67	0.64	45.4
East: Belfast One Stop Access											
4	L	20	20.0	0.634	34.2	LOS C	5.0	41.3	0.96	0.86	31.9
5	T	71	20.0	0.634	25.4	LOS C	5.0	41.3	0.96	0.83	32.2
6	R	82	20.0	0.634	34.1	LOS C	5.0	41.3	0.96	0.86	31.9
Approach		173	20.0	0.634	30.5	LOS C	5.0	41.3	0.96	0.85	32.0
North: Road D1477 SB											
7	L	83	20.0	0.153	14.7	LOS B	1.1	8.8	0.46	0.72	43.2
8	T	533	20.0	0.529	8.2	LOS A	9.5	77.8	0.65	0.57	46.6
9	R	179	20.0	0.695	30.7	LOS C	5.3	43.2	0.90	0.91	32.8
Approach		795	20.0	0.695	13.9	LOS B	9.5	77.8	0.69	0.66	42.2
West: N4 Offramp											
10	L	85	20.0	0.589	33.5	LOS C	4.5	36.9	0.95	0.83	31.5
11	T	2	20.0	0.589	24.7	LOS C	4.5	36.9	0.95	0.79	31.8
12	R	71	20.0	0.589	33.5	LOS C	4.5	36.9	0.95	0.83	31.5
Approach		158	20.0	0.589	33.4	LOS C	4.5	36.9	0.95	0.83	31.5
All Vehicles		1806	20.0	0.695	15.6	LOS B	11.3	93.0	0.73	0.69	40.8

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: 02_Road D1477 & N4 Offramp/Belfast One Stop Access_2020 AM Peak Background+Phase 1,2,3&4 Development

2020 AM Background+Phase 1, 2, 3 & 4 Development Traffic
Signals - Fixed Time Cycle Time = 60 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Road D1477 NB											
1	L	41	20.0	0.083	13.6	LOS B	0.5	3.8	0.41	0.70	44.2
2	T	313	20.0	0.313	5.9	LOS A	4.5	36.6	0.51	0.44	49.5
3	R	6	20.0	0.313	14.7	LOS B	4.5	36.6	0.51	1.00	45.1
Approach		360	20.0	0.313	6.9	LOS A	4.5	36.6	0.50	0.48	48.7
East: Belfast One Stop Access											
4	L	13	20.0	0.451	33.9	LOS C	3.1	25.6	0.93	0.80	32.1
5	T	52	20.0	0.451	25.2	LOS C	3.1	25.6	0.93	0.74	32.5
6	R	47	20.0	0.451	33.8	LOS C	3.1	25.6	0.93	0.80	32.1
Approach		112	20.0	0.451	29.8	LOS C	3.1	25.6	0.93	0.77	32.3
North: Road D1477 SB											
7	L	64	20.0	0.112	13.7	LOS B	0.7	6.1	0.42	0.71	44.1
8	T	516	20.0	0.485	6.8	LOS A	8.3	68.2	0.59	0.52	48.2
9	R	169	20.0	0.431	17.9	LOS B	3.0	24.4	0.61	0.78	40.6
Approach		749	20.0	0.485	9.9	LOS A	8.3	68.2	0.58	0.59	45.9
West: N4 Offramp											
10	L	66	20.0	0.494	34.2	LOS C	3.4	27.8	0.94	0.79	31.1
11	T	1	20.0	0.494	25.4	LOS C	3.4	27.8	0.94	0.76	31.5
12	R	53	20.0	0.494	34.3	LOS C	3.4	27.8	0.94	0.79	31.1
Approach		120	20.0	0.494	34.2	LOS C	3.4	27.8	0.94	0.79	31.1
All Vehicles		1341	20.0	0.494	12.9	LOS B	8.3	68.2	0.62	0.60	43.2

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: 02_Road D1477 & N4 Offramp/Belfast One Stop Access_2020 PM Peak Background+Phase 1,2,3&4 Development

2020 PM Background+Phase 1, 2, 3 & 4 Development Traffic
Signals - Fixed Time Cycle Time = 60 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Road D1477 NB											
1	L	114	20.0	0.223	13.4	LOS B	1.3	10.7	0.42	0.72	44.3
2	T	747	20.0	0.717	8.2	LOS A	15.2	124.5	0.73	0.66	46.2
3	R	9	20.0	0.717	17.1	LOS B	15.2	124.5	0.73	0.98	43.9
Approach		871	20.0	0.717	9.0	LOS A	15.2	124.5	0.68	0.67	45.9
East: Belfast One Stop Access											
4	L	20	20.0	0.897	49.0	LOS D	6.6	54.0	1.00	1.08	26.2
5	T	71	20.0	0.897	40.3	LOS D	6.6	54.0	1.00	1.08	26.3
6	R	82	20.0	0.897	48.9	LOS D	6.6	54.0	1.00	1.08	26.2
Approach		173	20.0	0.897	45.4	LOS D	6.6	54.0	1.00	1.08	26.3
North: Road D1477 SB											
7	L	83	20.0	0.140	13.3	LOS B	0.9	7.7	0.41	0.71	44.4
8	T	629	20.0	0.576	6.9	LOS A	10.7	87.9	0.62	0.56	48.0
9	R	179	20.0	0.864	45.6	LOS D	7.1	57.9	0.99	1.09	26.7
Approach		892	20.0	0.864	15.3	LOS B	10.7	87.9	0.68	0.68	41.1
West: N4 Offramp											
10	L	85	20.0	0.905	50.2	LOS D	6.6	53.9	1.00	1.09	25.3
11	T	2	20.0	0.905	41.5	LOS D	6.6	53.9	1.00	1.09	25.4
12	R	82	20.0	0.905	50.3	LOS D	6.6	53.9	1.00	1.09	25.3
Approach		169	20.0	0.905	50.1	LOS D	6.6	53.9	1.00	1.09	25.3
All Vehicles		2104	20.0	0.905	18.0	LOS B	15.2	124.5	0.73	0.74	39.1

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

2020 AM Horizon Year Traffic
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Road D1477 NB											
1	L	2	35.0	0.007	9.4	LOS A	0.1	0.5	0.15	0.59	48.4
2	T	6	35.0	0.007	8.2	LOS A	0.1	0.5	0.15	0.48	49.5
3	R	1	35.0	0.007	9.9	LOS A	0.1	0.5	0.15	0.69	48.2
Approach		9	35.0	0.007	8.6	LOS A	0.1	0.5	0.15	0.53	49.1
East: Site Access 1											
4	L	1	35.0	0.024	9.3	LOS A	0.1	0.9	0.07	0.60	48.6
5	T	2	35.0	0.024	8.1	LOS A	0.1	0.9	0.07	0.49	49.9
6	R	15	35.0	0.024	9.7	LOS A	0.1	0.9	0.07	0.68	48.4
Approach		18	35.0	0.024	9.5	LOS A	0.1	0.9	0.07	0.65	48.5
North: Road D1477											
7	L	11	35.0	0.156	10.2	LOS B	0.7	6.7	0.25	0.50	47.9
8	T	3	35.0	0.156	8.9	LOS A	0.7	6.7	0.25	0.41	48.8
9	R	92	35.0	0.156	10.2	LOS B	0.7	6.7	0.25	0.62	47.9
Approach		105	35.0	0.156	10.1	LOS B	0.7	6.7	0.25	0.60	47.9
West: R33 EB											
10	L	69	35.0	0.047	8.2	X	X	X	X	0.58	49.8
11	T	1	35.0	0.002	8.0	LOS A	0.0	0.1	0.05	0.52	50.0
12	R	1	35.0	0.002	9.7	LOS A	0.0	0.1	0.05	0.71	48.4
Approach		72	35.0	0.047	8.3	LOS A	0.0	0.1	0.00	0.59	49.8
All Vehicles		204	35.0	0.156	9.4	NA	0.7	6.7	0.14	0.60	48.7

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

2020 PM Horizon Year Traffic
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Road D1477 NB											
1	L	1	35.0	0.004	9.7	LOS A	0.0	0.3	0.22	0.54	48.1
2	T	3	35.0	0.004	8.5	LOS A	0.0	0.3	0.22	0.44	49.1
3	R	1	35.0	0.004	10.2	LOS B	0.0	0.3	0.22	0.67	48.0
Approach		5	35.0	0.004	9.1	LOS A	0.0	0.3	0.22	0.50	48.6
East: Site Access 1											
4	L	1	35.0	0.024	9.5	LOS A	0.1	0.9	0.13	0.56	48.3
5	T	2	35.0	0.024	8.3	LOS A	0.1	0.9	0.13	0.46	49.5
6	R	15	35.0	0.024	10.0	LOS A	0.1	0.9	0.13	0.66	48.1
Approach		18	35.0	0.024	9.7	LOS A	0.1	0.9	0.13	0.63	48.3
North: Road D1477											
7	L	21	35.0	0.120	10.1	LOS B	0.6	5.8	0.25	0.50	47.9
8	T	11	35.0	0.120	8.9	LOS A	0.6	5.8	0.25	0.41	48.8
9	R	62	35.0	0.120	10.1	LOS B	0.6	5.8	0.25	0.62	47.9
Approach		94	35.0	0.120	10.0	LOS A	0.6	5.8	0.25	0.57	48.0
West: R33 EB											
10	L	76	35.0	0.051	8.2	X	X	X	X	0.58	49.8
11	T	8	35.0	0.007	8.0	LOS A	0.1	0.5	0.06	0.54	50.0
12	R	1	35.0	0.007	9.7	LOS A	0.1	0.5	0.06	0.75	48.4
Approach		85	35.0	0.051	8.2	LOS A	0.1	0.5	0.01	0.58	49.8
All Vehicles		202	35.0	0.120	9.2	NA	0.6	5.8	0.14	0.58	48.8

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

2020 AM Background+Phase 1 Development Traffic
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Road D1477 NB											
1	L	2	20.0	0.013	9.9	LOS A	0.1	0.6	0.32	0.47	47.7
2	T	6	20.0	0.013	8.6	LOS A	0.1	0.6	0.32	0.38	48.5
3	R	6	0.0	0.013	9.4	LOS A	0.1	0.6	0.32	0.64	47.7
Approach		15	11.4	0.013	9.2	LOS A	0.1	0.6	0.32	0.50	48.0
East: Site Access 1											
4	L	4	0.0	0.003	8.2	LOS A	0.0	0.0	0.00	0.68	49.0
5	T	2	0.0	0.003	7.1	LOS A	0.0	0.0	0.00	0.57	50.2
6	R	78	0.0	0.103	8.8	LOS A	0.4	2.7	0.21	0.62	48.1
Approach		84	0.0	0.103	8.7	LOS A	0.4	2.7	0.19	0.62	48.1
North: Road D1477											
7	L	125	0.0	0.067	7.6	LOS A	0.0	0.0	0.00	0.60	49.8
8	T	3	20.0	0.002	7.5	LOS A	0.0	0.0	0.00	0.59	50.4
9	R	92	20.0	0.143	9.4	LOS A	0.5	4.3	0.20	0.62	48.1
Approach		220	8.6	0.143	8.3	LOS A	0.5	4.3	0.08	0.61	49.1
West: R33 EB											
10	L	69	20.0	0.043	8.0	X	X	X	X	0.59	49.8
11	T	4	0.0	0.004	7.1	LOS A	0.0	0.2	0.07	0.54	49.8
12	R	1	20.0	0.004	9.2	LOS A	0.0	0.2	0.07	0.73	48.4
Approach		75	18.9	0.043	7.9	LOS A	0.0	0.2	0.00	0.59	49.8
All Vehicles		394	8.8	0.143	8.4	NA	0.5	4.3	0.10	0.61	49.0

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: 03_Road D1477 & R33/Site Access 1_2020 PM Background +Phase 1 Development Traffic

2020 PM Background+Phase 1 Development Traffic
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Road D1477 NB											
1	L	1	20.0	0.040	14.2	LOS B	0.2	1.2	0.54	0.31	43.6
2	T	3	20.0	0.040	13.0	LOS B	0.2	1.2	0.54	0.25	44.3
3	R	17	0.0	0.040	13.8	LOS B	0.2	1.2	0.54	0.78	43.5
Approach		21	4.0	0.040	13.7	LOS B	0.2	1.2	0.54	0.67	43.6
East: Site Access 1											
4	L	17	0.0	0.025	8.2	LOS A	0.0	0.0	0.00	0.70	49.0
5	T	31	0.0	0.025	7.1	LOS A	0.0	0.0	0.00	0.58	50.2
6	R	495	0.0	0.884	28.7	LOS D	16.3	114.0	0.94	1.54	33.5
Approach		542	0.0	0.884	26.8	LOS D	16.3	114.0	0.86	1.46	34.5
North: Road D1477											
7	L	441	0.0	0.237	7.6	LOS A	0.0	0.0	0.00	0.60	49.8
8	T	11	20.0	0.006	7.5	LOS A	0.0	0.0	0.00	0.59	50.4
9	R	42	20.0	0.065	8.8	LOS A	0.2	1.7	0.05	0.64	48.7
Approach		494	2.1	0.237	7.7	LOS A	0.2	1.7	0.00	0.61	49.7
West: R33 EB											
10	L	1	20.0	0.001	8.0	X	X	X	X	0.59	49.8
11	T	92	0.0	0.048	7.6	LOS A	0.5	3.5	0.26	0.44	48.8
12	R	1	20.0	0.048	9.7	LOS A	0.5	3.5	0.26	0.69	48.0
Approach		94	0.4	0.048	7.6	LOS A	0.5	3.5	0.25	0.45	48.8
All Vehicles		1151	1.0	0.884	16.8	NA	16.3	114.0	0.44	1.00	41.1

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: 03_Road D1477 & R33/Site Access 1_2020 AM Background +Phase 1, & 2 Development Traffic

2020 AM Background+Phase 1 & 2 Development Traffic
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Road D1477 NB											
1	L	3	20.0	0.030	10.6	LOS B	0.2	1.8	0.43	0.40	47.2
2	T	32	20.0	0.030	9.4	LOS A	0.2	1.8	0.43	0.33	47.9
3	R	6	0.0	0.030	10.2	LOS B	0.2	1.8	0.43	0.68	47.2
Approach		41	16.9	0.030	9.6	LOS A	0.2	1.8	0.43	0.39	47.8
East: Site Access 1											
4	L	4	0.0	0.003	8.2	LOS A	0.0	0.0	0.00	0.68	49.0
5	T	2	0.0	0.003	7.1	LOS A	0.0	0.0	0.00	0.57	50.2
6	R	78	0.0	0.103	8.8	LOS A	0.4	2.7	0.21	0.62	48.1
Approach		84	0.0	0.103	8.7	LOS A	0.4	2.7	0.19	0.62	48.1
North: Road D1477											
7	L	125	0.0	0.067	7.6	LOS A	0.0	0.0	0.00	0.60	49.8
8	T	66	20.0	0.038	7.5	LOS A	0.0	0.0	0.00	0.59	50.4
9	R	92	20.0	0.144	9.8	LOS A	0.6	4.6	0.26	0.63	47.8
Approach		283	11.2	0.144	8.3	LOS A	0.6	4.6	0.08	0.61	49.3
West: R33 EB											
10	L	69	20.0	0.043	8.0	X	X	X	X	0.59	49.8
11	T	4	0.0	0.005	7.1	LOS A	0.0	0.2	0.07	0.53	49.8
12	R	2	20.0	0.005	9.2	LOS A	0.0	0.2	0.07	0.72	48.4
Approach		76	18.9	0.043	7.9	LOS A	0.0	0.2	0.01	0.59	49.7
All Vehicles		484	10.9	0.144	8.4	NA	0.6	4.6	0.12	0.59	49.0

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: 03_Road D1477 & R33/Site Access 1_2020 PM Background +Phase 1 & 2 Development Traffic

2020 PM Background+Phase 1 & 2 Development Traffic
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Road D1477 NB											
1	L	3	20.0	0.080	15.2	LOS C	0.8	6.1	0.63	0.26	43.1
2	T	66	20.0	0.080	13.9	LOS B	0.8	6.1	0.63	0.21	43.7
3	R	17	0.0	0.080	14.7	LOS B	0.8	6.1	0.63	0.85	43.1
Approach		86	16.1	0.080	14.1	LOS B	0.8	6.1	0.63	0.34	43.6
East: Site Access 1											
4	L	17	0.0	0.025	8.2	LOS A	0.0	0.0	0.00	0.70	49.0
5	T	31	0.0	0.025	7.1	LOS A	0.0	0.0	0.00	0.58	50.2
6	R	495	0.0	0.884	28.7	LOS D	16.3	114.0	0.94	1.54	33.5
Approach		542	0.0	0.884	26.8	LOS D	16.3	114.0	0.86	1.46	34.5
North: Road D1477											
7	L	441	0.0	0.237	7.6	LOS A	0.0	0.0	0.00	0.60	49.8
8	T	33	20.0	0.019	7.5	LOS A	0.0	0.0	0.00	0.59	50.4
9	R	42	20.0	0.066	9.7	LOS A	0.2	2.0	0.25	0.62	47.9
Approach		516	2.9	0.237	7.7	LOS A	0.2	2.0	0.02	0.60	49.7
West: R33 EB											
10	L	1	20.0	0.001	8.0	X	X	X	X	0.59	49.8
11	T	92	0.0	0.048	7.6	LOS A	0.5	3.5	0.26	0.44	48.8
12	R	1	20.0	0.048	9.7	LOS A	0.5	3.5	0.26	0.69	48.0
Approach		94	0.4	0.048	7.6	LOS A	0.5	3.5	0.26	0.44	48.8
All Vehicles		1238	2.4	0.884	16.5	NA	16.3	114.0	0.45	0.95	41.3

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

2020 AM Background+Phase 1,2 & 3 Development Traffic
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Road D1477 NB											
1	L	3	20.0	0.040	11.7	LOS B	0.3	2.4	0.49	0.35	46.1
2	T	32	20.0	0.040	10.5	LOS B	0.3	2.4	0.49	0.29	46.9
3	R	12	0.0	0.040	11.3	LOS B	0.3	2.4	0.49	0.72	46.1
Approach		46	15.0	0.040	10.8	LOS B	0.3	2.4	0.49	0.40	46.7
East: Site Access 1											
4	L	7	0.0	0.006	8.2	LOS A	0.0	0.0	0.00	0.69	49.0
5	T	4	0.0	0.006	7.1	LOS A	0.0	0.0	0.00	0.57	50.2
6	R	141	0.0	0.185	9.4	LOS A	0.8	5.6	0.31	0.64	47.6
Approach		153	0.0	0.185	9.3	LOS A	0.8	5.6	0.29	0.64	47.8
North: Road D1477											
7	L	216	0.0	0.116	7.6	LOS A	0.0	0.0	0.00	0.60	49.8
8	T	66	20.0	0.038	7.5	LOS A	0.0	0.0	0.00	0.59	50.4
9	R	92	20.0	0.144	9.8	LOS A	0.6	4.6	0.26	0.63	47.8
Approach		374	8.5	0.144	8.1	LOS A	0.6	4.6	0.06	0.61	49.4
West: R33 EB											
10	L	69	20.0	0.043	8.0	X	X	X	X	0.59	49.8
11	T	7	0.0	0.007	7.2	LOS A	0.0	0.3	0.10	0.52	49.7
12	R	2	20.0	0.007	9.3	LOS A	0.0	0.3	0.10	0.72	48.3
Approach		79	18.1	0.043	7.9	LOS A	0.0	0.3	0.01	0.59	49.7
All Vehicles		652	8.1	0.185	8.6	NA	0.8	5.6	0.14	0.60	48.8

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: 03_Road D1477 & R33/Site Access 1_2020 PM Background +Phase 1,2, & 3 Development Traffic

2020 PM Background+Phase 1,2 & 3 Development Traffic
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Road D1477 NB											
1	L	3	20.0	0.100	17.2	LOS C	1.0	7.5	0.66	0.24	41.4
2	T	66	20.0	0.100	16.0	LOS C	1.0	7.5	0.66	0.20	42.0
3	R	22	0.0	0.100	16.7	LOS C	1.0	7.5	0.66	0.91	41.4
Approach		92	15.2	0.100	16.2	LOS C	1.0	7.5	0.66	0.37	41.8
East: Site Access 1											
4	L	22	0.0	0.077	8.2	LOS A	0.0	0.0	0.00	0.68	49.0
5	T	123	0.0	0.077	7.1	LOS A	0.0	0.0	0.00	0.57	50.2
6	R	515	0.0	1.000[3]	43.1	LOS E	21.3	149.1	1.00	1.76	27.4
Approach		660	0.0	1.000	35.2	LOS E	21.3	149.1	0.78	1.50	30.5
North: Road D1477											
7	L	525	0.0	0.283	7.6	LOS A	0.0	0.0	0.00	0.60	49.8
8	T	33	20.0	0.019	7.5	LOS A	0.0	0.0	0.00	0.59	50.4
9	R	41	20.0	0.065	9.7	LOS A	0.2	1.9	0.25	0.62	47.9
Approach		599	2.5	0.283	7.7	LOS A	0.2	1.9	0.02	0.60	49.7
West: R33 EB											
10	L	1	20.0	0.001	8.0	X	X	X	X	0.59	49.8
11	T	99	0.0	0.052	7.7	LOS A	0.5	3.8	0.29	0.42	48.7
12	R	1	20.0	0.052	9.8	LOS A	0.5	3.8	0.29	0.69	47.9
Approach		101	0.4	0.052	7.8	LOS A	0.5	3.8	0.29	0.43	48.7
All Vehicles		1452	2.0	1.000	20.8	NA	21.3	149.1	0.42	0.98	38.3

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model used.

3 x = 1.00 due to short lane. Refer to the Lane Summary report for information about excess flow and related conditions.

MOVEMENT SUMMARY

Site: 03_Road D1477 & R33/Site Access 1_2020 AM Background +Phase 1,2,3&4 Development Traffic

2020 AM Background+Phase 1,2,3&4 Development Traffic
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Road D1477 NB											
1	L	3	20.0	0.072	15.1	LOS C	0.5	3.9	0.58	0.29	43.0
2	T	32	20.0	0.072	13.8	LOS B	0.5	3.9	0.58	0.24	43.7
3	R	22	0.0	0.072	14.6	LOS B	0.5	3.9	0.58	0.83	43.0
Approach		57	12.2	0.072	14.2	LOS B	0.5	3.9	0.58	0.47	43.4
East: Site Access 1											
4	L	14	0.0	0.012	8.2	LOS A	0.0	0.0	0.00	0.69	49.0
5	T	8	0.0	0.012	7.1	LOS A	0.0	0.0	0.00	0.57	50.2
6	R	244	0.0	0.375	11.6	LOS B	2.1	14.6	0.50	0.77	45.5
Approach		266	0.0	0.375	11.3	LOS B	2.1	14.6	0.46	0.76	45.8
North: Road D1477											
7	L	411	0.0	0.221	7.6	LOS A	0.0	0.0	0.00	0.60	49.8
8	T	66	20.0	0.038	7.5	LOS A	0.0	0.0	0.00	0.59	50.4
9	R	92	20.0	0.144	9.8	LOS A	0.6	4.6	0.26	0.63	47.8
Approach		568	5.6	0.221	7.9	LOS A	0.6	4.6	0.04	0.61	49.5
West: R33 EB											
10	L	69	20.0	0.043	8.0	X	X	X	X	0.59	49.8
11	T	14	0.0	0.010	7.3	LOS A	0.1	0.6	0.15	0.50	49.4
12	R	2	20.0	0.010	9.4	LOS A	0.1	0.6	0.15	0.71	48.2
Approach		85	16.8	0.043	7.9	LOS A	0.1	0.6	0.03	0.58	49.7
All Vehicles		977	5.4	0.375	9.2	NA	2.1	14.6	0.19	0.64	48.1

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: 03_Road D1477 & R33/Site Access 1_2020 PM Background +Phase 1,2,3&4 Development Traffic

2020 PM Background+Phase 1,2,3&4 Development Traffic
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Road D1477 NB											
1	L	1	20.0	0.130	20.6	LOS C	1.2	9.5	0.76	0.17	38.9
2	T	66	20.0	0.130	19.3	LOS C	1.2	9.5	0.76	0.14	39.4
3	R	27	0.0	0.130	20.1	LOS C	1.2	9.5	0.76	0.93	38.9
Approach		95	14.2	0.130	19.6	LOS C	1.2	9.5	0.76	0.37	39.2
East: Site Access 1											
4	L	33	0.0	0.215	8.2	LOS A	0.0	0.0	0.00	0.68	49.0
5	T	369	0.0	0.215	7.1	LOS A	0.0	0.0	0.00	0.56	50.2
6	R	464	0.0	1.000[3]	50.5	LOS F	21.3	149.1	1.00	1.91	25.1
Approach		866	0.0	1.000	30.4	LOS D	21.3	149.1	0.54	1.29	32.7
North: Road D1477											
7	L	635	0.0	0.342	7.6	LOS A	0.0	0.0	0.00	0.60	49.8
8	T	33	20.0	0.019	7.5	LOS A	0.0	0.0	0.00	0.59	50.4
9	R	41	20.0	0.065	9.7	LOS A	0.2	1.9	0.24	0.62	47.9
Approach		708	2.1	0.342	7.7	LOS A	0.2	1.9	0.01	0.60	49.7
West: R33 EB											
10	L	1	20.0	0.001	8.0	X	X	X	X	0.59	49.8
11	T	103	0.0	0.054	7.9	LOS A	0.6	4.1	0.33	0.40	48.4
12	R	1	20.0	0.054	10.0	LOS B	0.6	4.1	0.33	0.69	47.8
Approach		105	0.4	0.054	8.0	LOS A	0.6	4.1	0.33	0.40	48.5
All Vehicles		1775	1.6	1.000	19.4	NA	21.3	149.1	0.33	0.91	39.2

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model used.

3 x = 1.00 due to short lane. Refer to the Lane Summary report for information about excess flow and related conditions.

MOVEMENT SUMMARY

2020 AM Background+Phase 2 Development
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Road D1477 NB											
2	T	16	20.0	0.012	0.4	LOS A	0.1	0.5	0.21	0.00	55.9
3	R	3	20.0	0.012	9.5	LOS A	0.1	0.5	0.21	0.96	48.7
Approach		19	20.0	0.012	1.9	NA	0.1	0.5	0.21	0.16	54.6
East: Site Access 2											
4	L	1	20.0	0.039	12.4	LOS B	0.1	1.2	0.21	0.82	46.0
6	R	26	20.0	0.039	12.3	LOS B	0.1	1.2	0.21	0.88	46.2
Approach		27	20.0	0.039	12.3	LOS B	0.1	1.2	0.21	0.88	46.2
North: Road D1477 SB											
7	L	64	20.0	0.044	8.8	LOS A	0.0	0.0	0.00	0.69	49.0
8	T	7	20.0	0.044	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		72	20.0	0.044	7.9	NA	0.0	0.0	0.00	0.62	49.9
All Vehicles		118	20.0	0.044	7.9	NA	0.1	1.2	0.08	0.61	49.7

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

2020 PM Background+Phase 2 Development
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Road D1477 NB											
2	T	22	20.0	0.014	0.3	LOS A	0.1	0.6	0.17	0.00	56.7
3	R	1	20.0	0.014	9.4	LOS A	0.1	0.6	0.17	1.08	48.8
Approach		23	20.0	0.014	0.7	NA	0.1	0.6	0.17	0.05	56.3
East: Site Access 2											
4	L	3	20.0	0.097	12.5	LOS B	0.4	3.2	0.23	0.82	45.9
6	R	65	20.0	0.097	12.4	LOS B	0.4	3.2	0.23	0.89	46.1
Approach		68	20.0	0.097	12.4	LOS B	0.4	3.2	0.23	0.88	46.1
North: Road D1477 SB											
7	L	22	20.0	0.029	8.8	LOS A	0.0	0.0	0.00	0.86	49.0
8	T	27	20.0	0.029	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		49	20.0	0.029	3.9	NA	0.0	0.0	0.00	0.38	54.5
All Vehicles		141	20.0	0.097	7.5	NA	0.4	3.2	0.14	0.57	50.3

Level of Service (LOS) Method: Delay (HCM 2000).
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Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

2020 AM Background+Phase 2 & 3 Development
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Road D1477 NB											
2	T	20	20.0	0.014	0.4	LOS A	0.1	0.6	0.22	0.00	55.8
3	R	3	20.0	0.014	9.5	LOS A	0.1	0.6	0.22	0.98	48.8
Approach		23	20.0	0.014	1.6	NA	0.1	0.6	0.22	0.13	54.7
East: Site Access 2											
4	L	1	20.0	0.039	12.6	LOS B	0.2	1.2	0.23	0.81	45.9
6	R	26	20.0	0.039	12.4	LOS B	0.2	1.2	0.23	0.88	46.1
Approach		27	20.0	0.039	12.4	LOS B	0.2	1.2	0.23	0.88	46.1
North: Road D1477 SB											
7	L	64	20.0	0.046	8.8	LOS A	0.0	0.0	0.00	0.71	49.0
8	T	12	20.0	0.046	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		76	20.0	0.046	7.4	NA	0.0	0.0	0.00	0.60	50.4
All Vehicles		126	20.0	0.046	7.4	NA	0.2	1.2	0.09	0.57	50.1

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

2020 PM Background+Phase 2 & 3 Development
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Road D1477 NB											
2	T	25	20.0	0.016	0.3	LOS A	0.1	0.7	0.19	0.00	56.5
3	R	1	20.0	0.016	9.4	LOS A	0.1	0.7	0.19	1.08	48.9
Approach		26	20.0	0.016	0.7	NA	0.1	0.7	0.19	0.04	56.1
East: Site Access 2											
4	L	3	20.0	0.099	12.7	LOS B	0.4	3.3	0.25	0.81	45.8
6	R	65	20.0	0.099	12.5	LOS B	0.4	3.3	0.25	0.88	46.0
Approach		68	20.0	0.099	12.5	LOS B	0.4	3.3	0.25	0.88	46.0
North: Road D1477 SB											
7	L	22	20.0	0.033	8.8	LOS A	0.0	0.0	0.00	0.88	49.0
8	T	34	20.0	0.033	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		56	20.0	0.033	3.5	NA	0.0	0.0	0.00	0.35	55.1
All Vehicles		151	20.0	0.099	7.1	NA	0.4	3.3	0.15	0.54	50.7

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model used.

SIDRA INTERSECTION

MOVEMENT SUMMARY

2020 AM Background+Phase 2, 3 & 4 Development
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Road D1477 NB											
2	T	31	20.0	0.020	0.4	LOS A	0.1	1.0	0.23	0.00	55.6
3	R	3	20.0	0.020	9.6	LOS A	0.1	1.0	0.23	1.01	48.8
Approach		34	20.0	0.020	1.3	NA	0.1	1.0	0.23	0.09	54.9
East: Site Access 2											
4	L	1	20.0	0.040	12.8	LOS B	0.2	1.3	0.26	0.80	45.7
6	R	26	20.0	0.040	12.6	LOS B	0.2	1.3	0.26	0.87	45.9
Approach		27	20.0	0.040	12.6	LOS B	0.2	1.3	0.26	0.87	45.9
North: Road D1477 SB											
7	L	64	20.0	0.049	8.8	LOS A	0.0	0.0	0.00	0.72	49.0
8	T	17	20.0	0.049	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		81	20.0	0.049	6.9	NA	0.0	0.0	0.00	0.57	50.9
All Vehicles		142	20.0	0.049	6.7	NA	0.2	1.3	0.10	0.52	50.7

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

2020 PM Background+Phase 2, 3 & 4 Development
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Road D1477 NB											
2	T	32	20.0	0.019	0.3	LOS A	0.1	0.9	0.20	0.00	56.1
3	R	1	20.0	0.019	9.5	LOS A	0.1	0.9	0.20	1.07	48.9
Approach		33	20.0	0.019	0.6	NA	0.1	0.9	0.20	0.03	55.9
East: Site Access 2											
4	L	3	20.0	0.102	12.9	LOS B	0.4	3.4	0.28	0.80	45.6
6	R	65	20.0	0.102	12.8	LOS B	0.4	3.4	0.28	0.88	45.8
Approach		68	20.0	0.102	12.8	LOS B	0.4	3.4	0.28	0.88	45.8
North: Road D1477 SB											
7	L	22	20.0	0.039	8.8	LOS A	0.0	0.0	0.00	0.91	49.0
8	T	43	20.0	0.039	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		65	20.0	0.039	3.0	NA	0.0	0.0	0.00	0.31	55.7
All Vehicles		166	20.0	0.102	6.5	NA	0.4	3.4	0.16	0.49	51.2

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model used.