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Ms H Edwards
Forme Planning Limited
Level 10, 11 Britomart Place
Auckland 1010

1 December 2022

Copy via email: s 9(2)(a)

Dear Hannah

CABRA DEVELOPMENT – SINTON ROAD AND CLARKS LANE, HOBSONVILLE AND 90 TRIG ROAD, WHENUAPAI

FAST-TRACK APPLICATION MEMORANDUM

Further to your instruction, we are pleased to provide this memorandum outlining our initial review comments for the proposed residential and industrial developments in Hobsonville and Whenuapai.

We understand that with respect to the COVID-19 Recovery (Fast-track Consenting) Act 2020, this initial memorandum is required to inform the Minister for the Environment whether to refer the application to an expert consulting panel. If successful, then a more comprehensive assessment would be undertaken to inform the expert consulting panel of the effects of the proposal.

1 INTRODUCTION

This report covers two distinct developments:

- A residential development on three sites at Sinton Road and Clarks Lane in Hobsonville, and
- An industrial development at 90 Trig Road in Whenuapai.

These are discussed further in the following sections.

2 RESIDENTIAL DEVELOPMENT

2.1 THE PROPOSAL

The residential development proposes to establish 227 residential lots on three sites located on Sinton Road and Clarks Lane in Hobsonville. The three sites are located in the 'Future Urban Zone' (FUZ). The three sites are named as follows:

- Site A – 15 Clarks Lane, Hobsonville (84 lots);
- Site B – 10 Sinton Road, Hobsonville (62 lots), and
- Site C – 16 Sinton Road, Hobsonville (81 lots).

All dwellings will gain vehicle access via public roads or Joint Owned Access Lanes (JOALs). Figure 1 shows the proposed layout (internal site roads and paper roads are shown in orange, and indicative connecting roads through neighbouring sites are shown in yellow).

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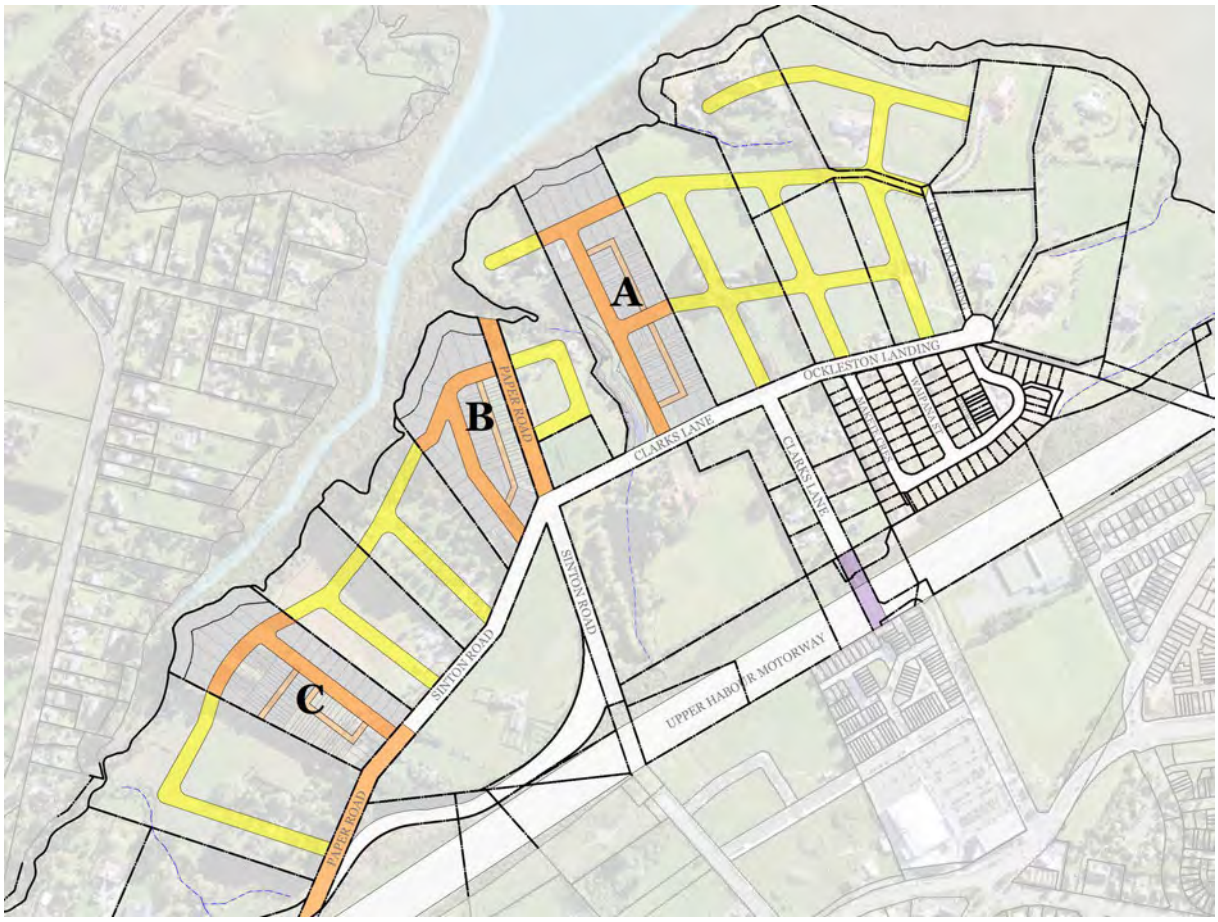
Figure 1: Proposed Residential Development



2.2 TRAFFIC GENERATION AND EFFECTS

The nearest 'major' intersection to the proposed development is the Brigham Creek Road/ Sinton Road roundabout (and includes the eastbound ramps at the SH18 Brigham Creek Road interchange). This roundabout, and the neighbouring roundabout (serving the westbound on-ramp at the interchange), have been assessed to understand the traffic generation effects of the proposed development.

Surveys of the roundabouts were undertaken on 30 March 2022 to understand existing traffic volumes. In terms of traffic generated by the proposed development, some 230 dwellings are proposed and are estimated to generate 150 vehicle movements per hour[1] (this includes inbound and outbound movements), and 1,495 vehicle movements per day.

We have undertaken preliminary analysis of the Brigham Creek Road/ Sinton Road roundabout during the morning and evening commuter peak hours, both with and without development traffic. The preliminary analysis is attached in **Appendix A**. The roundabout continues to operate well with development traffic added, and no further upgrades to the existing configuration are considered necessary.

[1] 'Med um dens ty res dent a f at bu d ng' rate of 0.65 tr ps per dwe ng as per RTA Gu de. Th s s cons dered appropr ate g ven hous ng typo og es and proposed park ng prov s on on s te (one space per dwe ng).

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It is recognised that Waka Kotahi are an authority to be consulted with, given the connection of Sinton Road to the SH18 Brigham Creek Road interchange, and the development occurring on land that is not live-zoned.

2.3 PARKING

As noted, the development proposes some 230 lots, and therefore 230 dwellings. Each dwelling is proposed to be supported by a minimum of one parking space. There are no minimum or maximum parking requirements as per Unitary Plan rules (T46). On-site parking provisions are therefore considered acceptable.

Parking dimensions and formation gradients have been considered in the concept design with all parking spaces intended to have maximum gradients of 1:20 (5%) and sufficient manoeuvring distances being provided (all JOALs are 7 m wide to allow for reverse manoeuvring).

Bicycle parking for residents is required at a rate of 1 bicycle parking space per dwelling. This parking is proposed to be provided through either internal dwelling storage, secure yards or external storage (under building canopies, covered porches etc).

Additional bicycle parking for visitors is required at a rate of 1 bicycle parking space per 20 dwellings (or 12 visitor bicycle spaces). These can be provided in green space around the sites (nominally two 'Sheffield' stands, or 4 bicycles per site). Overall, the bicycle parking space provisions can be satisfied and detailed in subsequent consent stages.

2.4 SERVICING

Due to the length, and number of dwellings, on some of the JOALs, private rubbish collection is likely to be adopted. Where possible, JOALs have been designed to have two vehicle accesses to enable service trucks to travel along the JOAL in one direction and avoid the need for complex turning manoeuvres. There is a 'dead end' JOAL in Site C and a turning head will be required to enable rubbish trucks to visit the site and enter and exit the site in a forward direction. On other JOALs, there are 90 degree bends which will need to be checked for vehicle tracking at subsequent design stages. This may require truncating some of the lots on the inside of the bends to accommodate appropriate swept paths.

2.5 ACCESS

As noted, all lots will gain vehicle access via public roads (Sinton Road or Clarks Lane) or Joint Owned Access Lanes (JOALs). Direct vehicle access to Sinton Road and Clarks Lane has been minimised with the majority of lots gaining access via internal local roads and JOALs. Vehicle crossings will be designed to avoid being located within 10 m of intersections and provide appropriate crossing separation distances (minimum 2 m required).

It is our experience that Council will be supportive of JOALs with up to 10 dwellings, however will likely seek public roads for greater than 10 dwellings. It is our opinion that JOALs can serve greater than 10 dwellings but it is important to ensure low vehicle speeds are achieved, a separate pedestrian path is provided and the JOAL can accommodate private rubbish collection.

The gradients of the JOALs are likely to be in the order of 5-10% and will be determined at subsequent design stages. Given parking pads are likely to front the JOALs, and those parking pads are subject to 5% maximum gradients, the JOALs are likely to have 5% grades in front of parking pads with steeper intermediate sections in between.

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The Unitary Plan also requires a 1:20 safety platform adjacent to the road boundary for 4 m within the site. Given the topography of the sites (relatively flat at the existing road boundaries), and the ability to earthwork the sites, we consider these platforms can be provided, and detailed at subsequent stages.

The public road connections to Sinton Road and Clarks Lane have been reviewed. We have visited the site to check the acceptability of the proposed intersections with respect to visibility along Sinton Road and Clarks Lane and confirm these positions are acceptable and enable relevant sight distance provisions[2] to be met.

2.6 REQUIRED WORKS ON PAPER ROADS

Site B and Site C are located adjacent to paper roads. Site B has a paper road running alongside the eastern boundary and it is our preference to construct a road along that alignment for access to Site B. This however is proposed to be confirmed with AT at subsequent stages. In the meantime, the plan shows a proposed internal road some 25 m southwest of the Sinton Road/ Clarks Lane intersection.

Site C will require an extension to Sinton Road in front of the site (it currently terminates in a dead end near the eastern boundary of the site. The existing road will need to be extended by some 60 m to enable an intersection to be constructed with the new internal road within Site C.

Any construction of roads within these 'paper roads' will be to an urban standard in accordance with AT design requirements.

2.7 RECOMMENDED WORKS ON SINTON ROAD AND CLARKS LANE

Sinton Road to the southwest of the Sinton Road/ Clarks Lane intersection has a carriageway width of approximately 5 m. It is recommended that this approximately 300 m section of carriageway is widened to 6 m to safely accommodate two-way traffic while minimising vehicle speeds. The extent of these works is shown in Figure 2.

[2] Assumes 50 km/hr posted speed m t and 97 m v s b ty n accordance w th Austroads Safe Intersect on S ght D stance

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TRANSPORTATION CONSULTANTS

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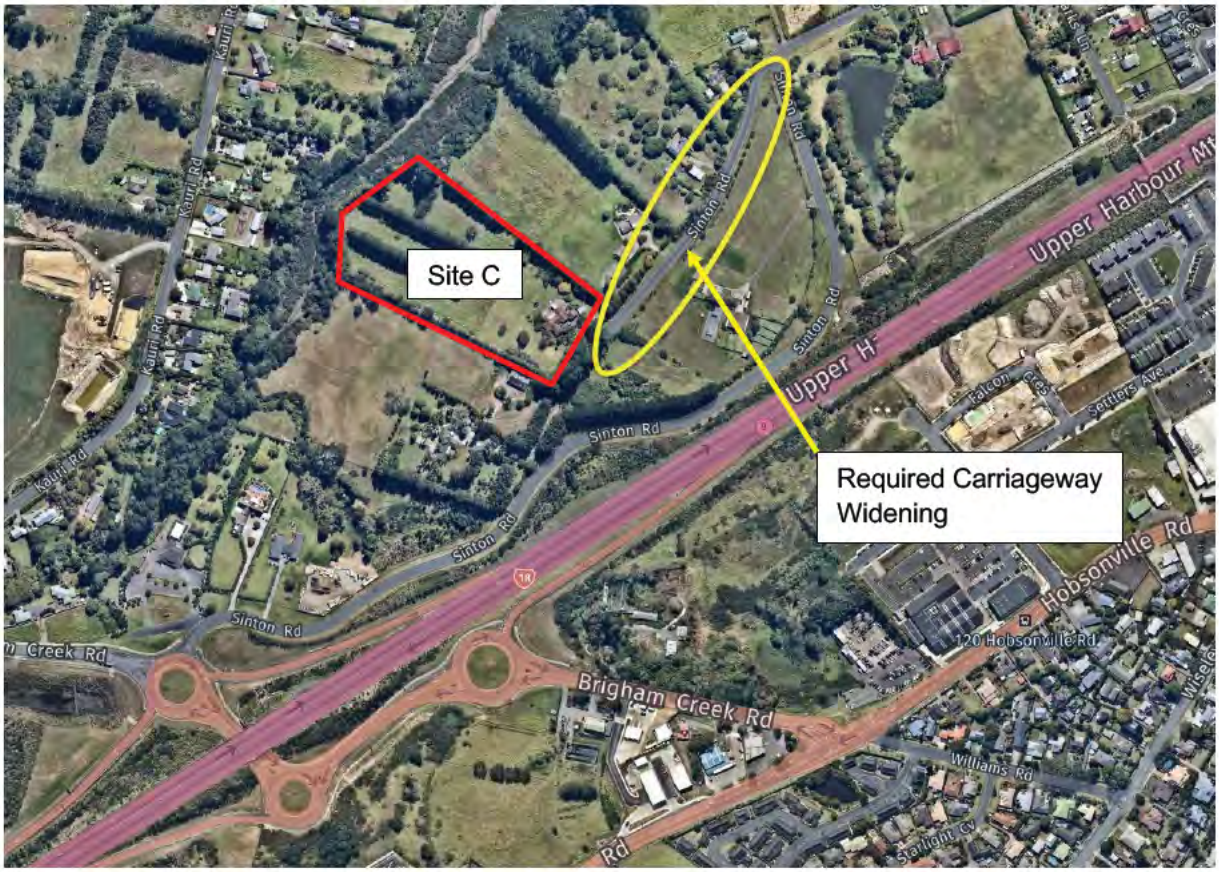
Figure 2: Sinton Road Widening Extent of Works



The frontages of all sites are recommended to be urbanised including kerb and channel, footpaths, landscaping and street lighting etc. In addition, a pedestrian footpath, some 840 m in length, should be provided to connect all sites to the SH18 overbridge at the southern end of Clarks Lane. This will require interim pedestrian facilities to be provided in front of neighbouring undeveloped sites. The extent of this pedestrian facility is shown in Figure 3.

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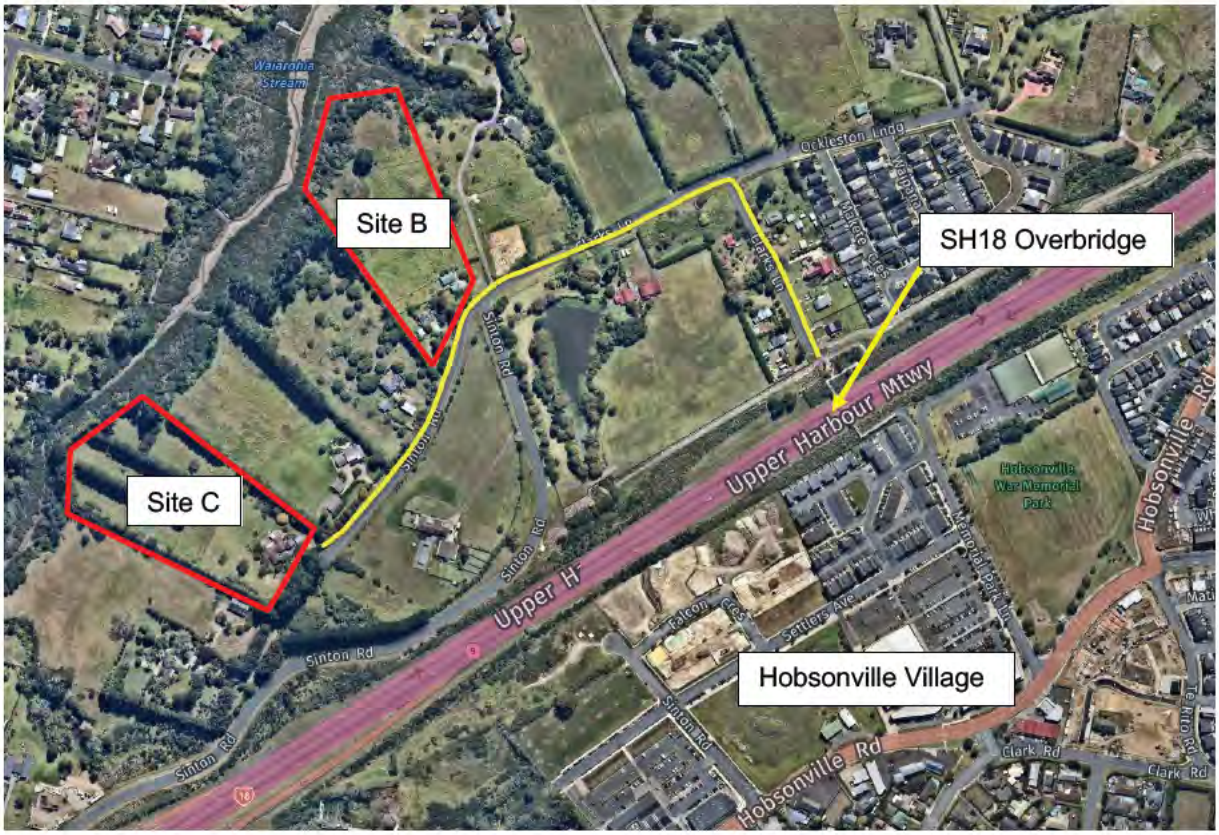
Figure 3: Extent of Footpath Facility



In addition to the above, some NSAAT markings may be required on the site frontages to enable visibility requirements to be achieved. This can be detailed at subsequent consent stages if necessary.

3 INDUSTRIAL DEVELOPMENT

3.1 THE PROPOSAL

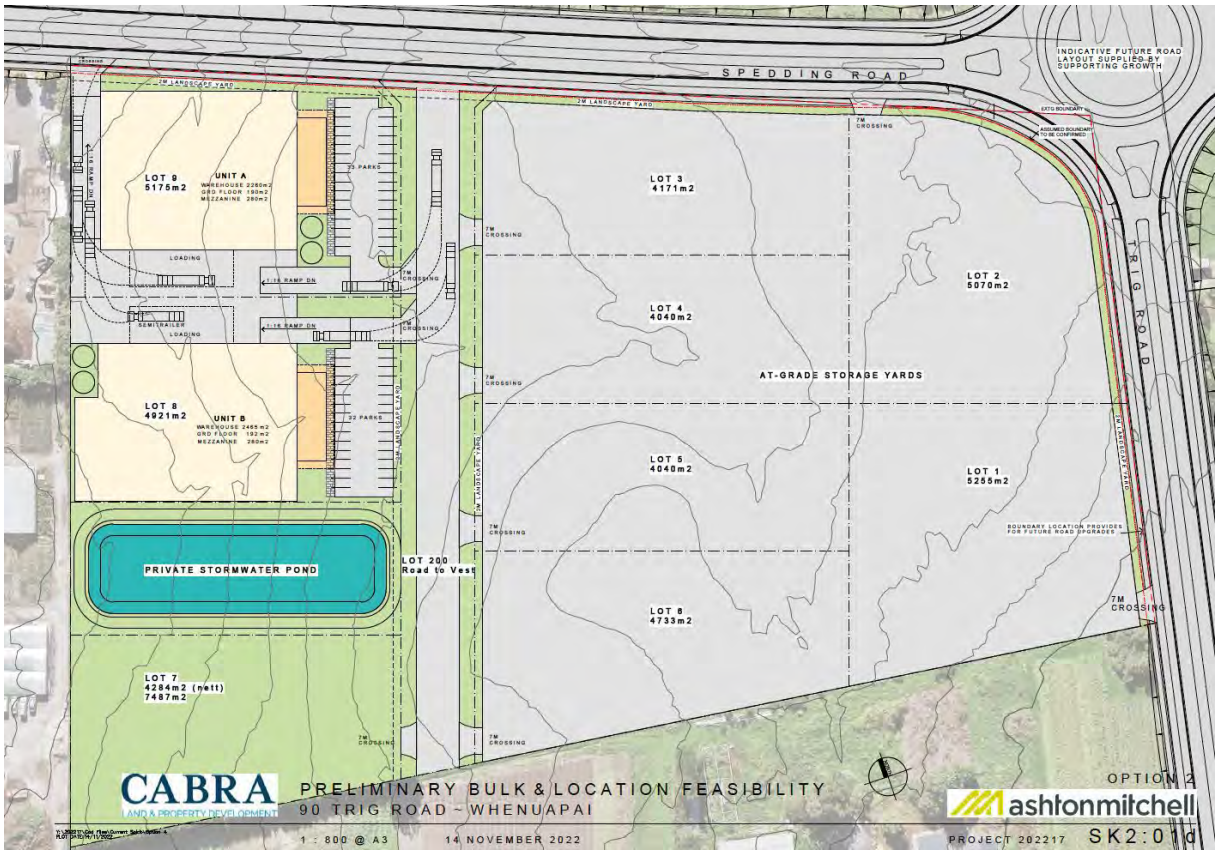
The industrial development proposes to establish 9 industrial lots on one site located at 90 Trig Road in Whenuapai. Two of the lots are expected to have warehouse buildings while the remaining lots are expected to be storage yards (for contractors etc).

The majority of lots (Lots 3 to 9) gain access via a new local road connecting to Spedding Road, while the remaining lots have direct access to either Spedding Road (Lot 1) and Trig Road (Lot 2).

It should be noted that the concept design has made allowance for the future Trig Road/ Spedding Road designation planned by Te Tupu Ngātahi (due for lodgement later this year).

Figure 4 shows the proposed development.

Figure 4: Proposed Industrial Development



3.2 TRAFFIC GENERATION AND EFFECTS

We typically expect industrial developments to generate, on average, 20 trips per ha (net development area) in the morning and evening commuter peak hours. Given the proposed access locations, we estimate that Lot 2 will generate 11 vehicles per hour (vph) directly onto Trig Road, and the remaining development (Lot 1, and Lots 3-9) will generate 73 vph directly onto Spedding Road.

Spedding Road in front of the site has low traffic volumes, circa 50 vph and 200 vehicles per day (vpd)[3]. In combination with low traffic volumes on Trig Road[4], circa 350 vph and 3,300 vpd, we do not have any concerns with the ability of the road network to accommodate the traffic movements generated by the proposed industrial development.

We also recognise that Plan Change 69 has recently been approved[5] which expects to add traffic movements to Spedding Road (and by extension, Trig Road). As part of the plan change however, the Spedding Road carriageway is planned to be widened to 7 m, and the Trig Road/ Spedding Road intersection is being upgraded to traffic signals or roundabout. We will need to clarify in particular how the Lot 2 access integrates with this future design however we do not anticipate any issues and will assess this as part of the resource consent application.

[3] AT traff c count database, ca cu ated based on sum of traff c movements recorded n February 2020 on Spedd ng Road (west of Mamar Road) and Mamar Road (south)

[4] AT traff c count database, Tr g Road, December 2021

[5] https://www.auck andcounc .govt.nz/Un taryP anDocuments/pc 69 dec s on 1.pdf

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Similarly, we do not have concerns with additional background traffic movements increasing on Spedding Road as a result of PC69, and vehicles being able to travel to and from the development site. We anticipate those movements can be accommodated due to the proposed intersection upgrade. We will test this in subsequent consent stages but again, do not anticipate any issues.

3.3 PARKING

As noted, the development proposes 9 industrial lots. There are no minimum or maximum parking requirements as per Unitary Plan rules (T60) for industrial storage activities. On-site parking provisions can therefore be satisfied.

Parking dimensions and formation gradients have not yet been detailed in the concept design however all sites are large enough to ensure parking spaces can have maximum gradients of 1:20 (5%) and complying dimensions.

Bicycle parking for industrial activities is required at a rate of 1 per 300 m^2 of office. This parking is proposed to be provided through either internal storage (within buildings) or external storage (under building canopies, covered porches etc).

Additional bicycle parking for visitors is required at a rate of 1 bicycle parking space per 750 m^2. Given the size of these lots, we have no concerns with the ability to accommodate required bicycle parking.

3.4 SERVICING

As noted, Lots 3-9 are proposed to be served by a new industrial road connecting to Spedding Road. The road is proposed to be 20 m wide with a 12 m wide carriageway. This is considered appropriate to accommodate heavy vehicles. Lots 1 and 2 will have vehicle crossings connecting directly to Trig Road and Spedding Road respectively. We will undertake vehicle tracking to confirm the required width of vehicle crossings but due to swept path requirements of heavy vehicles, these crossings are likely to exceed Unitary Plan maximum widths.

3.5 ACCESS

As noted, the majority of lots will gain vehicle access via a new industrial road. Direct vehicle access to Trig Road and Spedding Road has been minimised with only Lots 1 and 2 gaining access this way. Vehicle crossings have been located at least 10 m from existing and future intersections and provide appropriate crossing separation distances (minimum 2 m required).

The Unitary Plan also requires a 1:20 safety platform adjacent to the road boundary for 6 m within sites. Given the topography of the sites (relatively flat at the existing road boundaries), and the ability to earthwork the sites, we consider these platforms can be provided, and detailed at subsequent stages.

The industrial road connection to Spedding Road, and the direct vehicle crossing connections to Trig Road (Lot 1) and Spedding Road (Lot 2) have been reviewed. We have visited the site to check the acceptability of the proposed intersections, and crossings, with respect to visibility along Trig Road and Spedding Road and confirm these positions are acceptable, and enable relevant sight distance provisions[6] to be met.

[6] Assumes 50 km/hr posted speed m t and 97 m v s b ty n accordance w th Austroads Safe Intersect on S ght D stance

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3.6 RECOMMENDED WORKS ON TRIG ROAD AND SPEDDING ROAD

The frontages of all sites are recommended to be urbanised directly in front of each development site including kerb and channel, footpaths, landscaping and street lighting etc.

As noted, PC69 intends to provide a footpath along the southern side of Spedding Road in front of the site. If the PC69 works have not been implemented in front of the site, the applicant proposes to construct this section of footpath facility instead (in front of the site only). The footpath along the western side of Trig Road will also be upgraded to 1.8 m wide in front of the site in accordance with Auckland Transport specifications.

In addition to the above, some NSAAT markings may be required on the site frontages to enable visibility requirements to be achieved. This can be detailed at subsequent consent stages if necessary.

4 CONCLUSION

Based on the concept designs, and the fundamentals of the proposed developments in terms of dwelling numbers, site areas, effects on the road network, parking, servicing and access provisions, we consider the proposed residential and industrial developments acceptable and can support the current designs moving forward to resource consent stage.

With the recommended works on Sinton Road and Clarks Lane (for the residential development), and Trig Road and Spedding Road (for the industrial development) we do not consider there are any traffic engineering or transport planning reasons why this development should not proceed through the fast-track application process.

Yours Sincerely

Leo Hills

Director

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ATTACHMENT A: SIDRA OUTPUT

MOVEMENT SUMMARY

Site: 101 [Brigham Creek Interchange NB ramps AM Existing (Site Folder: BCR Interchange NB ramps)]

AM Peak Hour
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Brigham Creek Road E														
22	T1	458	31	482	6.8	0.213	1.3	LOS A	1.4	10.7	0.07	0.22	0.07	51.0
23a	R1	10	1	11	10.0	0.213	6.5	LOS A	1.4	10.7	0.07	0.29	0.07	50.6
23	R2	101	11	106	10.9	0.213	7.5	LOS A	1.4	10.7	0.07	0.29	0.07	51.5
23u	U	1	0	1	0.0	0.213	9.6	LOS A	1.4	10.7	0.07	0.29	0.07	53.6
Approach		570	43	600	7.5	0.213	2.5	LOS A	1.4	10.7	0.07	0.24	0.07	51.1
North: Sinton Road														
7b	L3	6	0	6	0.0	0.053	5.5	LOS A	0.2	1.7	0.65	0.69	0.65	46.2
7a	L1	22	2	23	9.1	0.053	4.7	LOS A	0.2	1.7	0.65	0.69	0.65	47.8
9b	R3	5	1	5	20.0	0.053	12.6	LOS B	0.2	1.7	0.65	0.69	0.65	50.3
9u	U	1	0	1	0.0	0.053	13.0	LOS B	0.2	1.7	0.65	0.69	0.65	51.3
Approach		34	3	36	8.8	0.053	6.3	LOS A	0.2	1.7	0.65	0.69	0.65	48.0
NorthWest: Brigham Creek Road W														
27b	L3	3	1	3	33.3	0.470	4.8	LOS A	2.6	19.8	0.58	0.56	0.60	46.6
27	L2	513	43	540	8.4	0.470	3.9	LOS A	2.6	19.8	0.58	0.56	0.60	47.5
28	T1	180	16	189	8.9	0.234	3.5	LOS A	1.0	7.4	0.52	0.42	0.52	49.3
29u	U	1	0	1	0.0	0.234	11.6	LOS B	1.0	7.4	0.52	0.42	0.52	52.3
Approach		697	60	734	8.6	0.470	3.8	LOS A	2.6	19.8	0.56	0.53	0.58	48.0
SouthWest: SH18 NB offramp														
30	L2	67	8	71	11.9	0.188	4.8	LOS A	0.8	5.8	0.50	0.68	0.50	46.3
30a	L1	5	0	5	0.0	0.188	3.2	LOS A	0.8	5.8	0.50	0.68	0.50	47.3
31	T1	1	0	1	0.0	0.188	3.3	LOS A	0.8	5.8	0.50	0.68	0.50	47.9
32	R2	331	42	348	12.7	0.222	9.7	LOS A	0.9	7.3	0.49	0.71	0.49	47.7
Approach		404	50	425	12.4	0.222	8.8	LOS A	0.9	7.3	0.49	0.70	0.49	47.4
All Vehicles		1705	156	1795	9.1	0.470	4.6	LOS A	2.6	19.8	0.38	0.47	0.39	48.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Brigham Creek Interchange NB ramps AM Proposed 230 lot (Site Folder: BCR Interchange NB ramps)]

AM Peak Hour
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Brigham Creek Road E														
22	T1	458	31	482	6.8	0.228	1.4	LOS A	1.6	11.9	0.14	0.23	0.14	50.6
23a	R1	35	1	37	2.9	0.228	6.5	LOS A	1.6	11.9	0.13	0.31	0.13	50.2
23	R2	101	11	106	10.9	0.228	7.6	LOS A	1.6	11.9	0.13	0.31	0.13	51.0
23u	U	1	0	1	0.0	0.228	9.6	LOS A	1.6	11.9	0.13	0.31	0.13	53.1
Approach		595	43	626	7.2	0.228	2.8	LOS A	1.6	11.9	0.14	0.25	0.14	50.7
North: Sinton Road														
7b	L3	25	0	26	0.0	0.206	5.9	LOS A	0.9	6.8	0.69	0.74	0.69	46.1
7a	L1	92	2	97	2.2	0.206	4.9	LOS A	0.9	6.8	0.69	0.74	0.69	47.7
9b	R3	21	1	22	4.8	0.206	12.4	LOS B	0.9	6.8	0.69	0.74	0.69	50.3
9u	U	1	0	1	0.0	0.206	13.3	LOS B	0.9	6.8	0.69	0.74	0.69	51.2
Approach		139	3	146	2.2	0.206	6.3	LOS A	0.9	6.8	0.69	0.74	0.69	47.8
NorthWest: Brigham Creek Road W														
27b	L3	11	1	12	9.1	0.483	4.5	LOS A	2.8	20.9	0.60	0.60	0.63	46.8
27	L2	513	43	540	8.4	0.483	4.1	LOS A	2.8	20.9	0.60	0.60	0.63	47.5
28	T1	180	16	189	8.9	0.239	3.7	LOS A	1.0	7.6	0.54	0.44	0.54	49.2
29u	U	1	0	1	0.0	0.239	11.7	LOS B	1.0	7.6	0.54	0.44	0.54	52.2
Approach		705	60	742	8.5	0.483	4.0	LOS A	2.8	20.9	0.58	0.56	0.61	47.9
SouthWest: SH18 NB offramp														
30	L2	67	8	71	11.9	0.199	5.0	LOS A	0.8	6.3	0.53	0.68	0.53	46.4
30a	L1	18	0	19	0.0	0.199	3.3	LOS A	0.8	6.3	0.53	0.68	0.53	47.4
31	T1	1	0	1	0.0	0.199	3.4	LOS A	0.8	6.3	0.53	0.68	0.53	48.0
32	R2	331	42	348	12.7	0.235	9.8	LOS A	1.0	7.9	0.52	0.72	0.52	47.6
Approach		417	50	439	12.0	0.235	8.8	LOS A	1.0	7.9	0.52	0.71	0.52	47.4
All Vehicles		1856	156	1954	8.4	0.483	4.8	LOS A	2.8	20.9	0.43	0.51	0.44	48.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Brigham Creek Interchange NB ramps PM Existing (Site Folder: BCR Interchange NB ramps)]

PM Peak Hour
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Brigham Creek Road E														
22	T1	638	29	672	4.5	0.308	1.5	LOS A	2.2	15.9	0.08	0.24	0.08	50.8
23a	R1	36	1	38	2.8	0.308	6.4	LOS A	2.2	15.9	0.08	0.33	0.08	50.3
23	R2	164	6	173	3.7	0.308	7.5	LOS A	2.2	15.9	0.08	0.33	0.08	51.2
23u	U	1	0	1	0.0	0.308	9.6	LOS A	2.2	15.9	0.08	0.33	0.08	53.2
Approach		839	36	883	4.3	0.308	2.9	LOS A	2.2	15.9	0.08	0.26	0.08	50.9
North: Sinton Road														
7b	L3	9	0	9	0.0	0.049	5.3	LOS A	0.2	1.4	0.64	0.67	0.64	46.2
7a	L1	19	0	20	0.0	0.049	4.2	LOS A	0.2	1.4	0.64	0.67	0.64	47.9
9b	R3	5	0	5	0.0	0.049	11.7	LOS B	0.2	1.4	0.64	0.67	0.64	50.5
9u	U	1	0	1	0.0	0.049	12.7	LOS B	0.2	1.4	0.64	0.67	0.64	51.4
Approach		34	0	36	0.0	0.049	5.9	LOS A	0.2	1.4	0.64	0.67	0.64	47.9
NorthWest: Brigham Creek Road W														
27b	L3	8	1	8	12.5	0.397	4.6	LOS A	2.1	15.3	0.63	0.59	0.64	46.6
27	L2	397	19	418	4.8	0.397	4.1	LOS A	2.1	15.3	0.63	0.59	0.64	47.4
28	T1	255	14	268	5.5	0.323	3.9	LOS A	1.5	11.0	0.62	0.47	0.62	48.8
29u	U	3	0	3	0.0	0.323	12.0	LOS B	1.5	11.0	0.62	0.47	0.62	51.8
Approach		663	34	698	5.1	0.397	4.1	LOS A	2.1	15.3	0.62	0.55	0.63	48.0
SouthWest: SH18 NB offramp														
30	L2	152	15	160	9.9	0.309	6.5	LOS A	1.3	10.0	0.61	0.76	0.61	46.4
30a	L1	21	1	22	4.8	0.309	4.5	LOS A	1.3	10.0	0.61	0.76	0.61	47.4
31	T1	1	0	1	0.0	0.309	4.5	LOS A	1.3	10.0	0.61	0.76	0.61	48.1
32	R2	457	8	481	1.8	0.364	10.3	LOS B	1.8	12.5	0.61	0.78	0.61	47.3
Approach		631	24	664	3.8	0.364	9.2	LOS A	1.8	12.5	0.61	0.77	0.61	47.1
All Vehicles		2167	94	2281	4.3	0.397	5.1	LOS A	2.2	15.9	0.41	0.50	0.41	48.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Brigham Creek Interchange NB ramps PM Proposed 230 lot (Site Folder: BCR Interchange NB ramps)]

PM Peak Hour
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Brigham Creek Road E														
22	T1	638	29	672	4.5	0.333	1.6	LOS A	2.5	18.3	0.11	0.25	0.11	50.6
23a	R1	94	1	99	1.1	0.333	6.5	LOS A	2.5	18.3	0.11	0.35	0.11	50.0
23	R2	164	6	173	3.7	0.333	7.5	LOS A	2.5	18.3	0.11	0.35	0.11	50.8
23u	U	1	0	1	0.0	0.333	9.6	LOS A	2.5	18.3	0.11	0.35	0.11	52.8
Approach		897	36	944	4.0	0.333	3.2	LOS A	2.5	18.3	0.11	0.28	0.11	50.5
North: Sinton Road														
7b	L3	21	0	22	0.0	0.117	5.6	LOS A	0.5	3.5	0.66	0.71	0.66	46.2
7a	L1	45	0	47	0.0	0.117	4.5	LOS A	0.5	3.5	0.66	0.71	0.66	47.8
9b	R3	12	0	13	0.0	0.117	11.9	LOS B	0.5	3.5	0.66	0.71	0.66	50.5
9u	U	1	0	1	0.0	0.117	13.0	LOS B	0.5	3.5	0.66	0.71	0.66	51.3
Approach		79	0	83	0.0	0.117	6.0	LOS A	0.5	3.5	0.66	0.71	0.66	47.8
NorthWest: Brigham Creek Road W														
27b	L3	21	1	22	4.8	0.426	4.8	LOS A	2.3	17.1	0.66	0.66	0.70	46.6
27	L2	397	19	418	4.8	0.426	4.5	LOS A	2.3	17.1	0.66	0.66	0.70	47.3
28	T1	255	14	268	5.5	0.342	4.2	LOS A	1.6	11.7	0.65	0.51	0.65	48.7
29u	U	3	0	3	0.0	0.342	12.3	LOS B	1.6	11.7	0.65	0.51	0.65	51.6
Approach		676	34	712	5.0	0.426	4.4	LOS A	2.3	17.1	0.66	0.60	0.68	47.8
SouthWest: SH18 NB offramp														
30	L2	152	15	160	9.9	0.337	6.8	LOS A	1.5	11.3	0.64	0.76	0.66	46.6
30a	L1	55	1	58	1.8	0.337	4.8	LOS A	1.5	11.3	0.64	0.76	0.66	47.6
31	T1	1	0	1	0.0	0.337	4.8	LOS A	1.5	11.3	0.64	0.76	0.66	48.2
32	R2	457	8	481	1.8	0.397	10.6	LOS B	2.1	14.7	0.65	0.83	0.68	47.1
Approach		665	24	700	3.6	0.397	9.3	LOS A	2.1	14.7	0.64	0.81	0.67	47.0
All Vehicles		2317	94	2439	4.1	0.426	5.4	LOS A	2.5	18.3	0.44	0.54	0.46	48.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Brigham Creek Interchange SB onramp AM Existing (Site Folder: BCR Interchange SB onramp)]

AM Peak Hour
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
NorthEast: Brigham Creek Road E														
25	T1	564	19	594	3.4	0.412	1.9	LOS A	2.8	20.6	0.33	0.25	0.33	50.0
26	R2	560	44	589	7.9	0.412	8.0	LOS A	2.8	20.6	0.32	0.52	0.32	48.4
26u	U	1	0	1	0.0	0.412	12.5	LOS B	2.8	20.6	0.32	0.52	0.32	52.6
Approach		1125	63	1184	5.6	0.412	5.0	LOS A	2.8	20.6	0.33	0.38	0.33	49.2
NorthWest: Brigham Creek Road W														
27	L2	438	51	461	11.6	0.338	1.9	LOS A	2.4	18.3	0.02	0.35	0.02	48.6
29	R2	113	10	119	8.8	0.338	7.5	LOS A	2.4	18.3	0.02	0.35	0.02	51.6
29u	U	1	0	1	0.0	0.338	9.5	LOS A	2.4	18.3	0.02	0.35	0.02	53.6
Approach		552	61	581	11.1	0.338	3.0	LOS A	2.4	18.3	0.02	0.35	0.02	49.2
All Vehicles		1677	124	1765	7.4	0.412	4.3	LOS A	2.8	20.6	0.23	0.37	0.23	49.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Brigham Creek Interchange SB onramp AM Proposed 230 lot (Site Folder: BCR Interchange SB onramp)]

AM Peak Hour
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
NorthEast: Brigham Creek Road E														
25	T1	564	19	594	3.4	0.425	2.0	LOS A	2.9	21.5	0.35	0.25	0.35	49.9
26	R2	585	44	616	7.5	0.425	8.1	LOS A	2.9	21.5	0.34	0.53	0.34	48.3
26u	U	1	0	1	0.0	0.425	12.5	LOS B	2.9	21.5	0.34	0.53	0.34	52.4
Approach		1150	63	1211	5.5	0.425	5.1	LOS A	2.9	21.5	0.35	0.40	0.35	49.1
NorthWest: Brigham Creek Road W														
27	L2	494	51	520	10.3	0.379	1.9	LOS A	2.8	21.6	0.02	0.35	0.02	48.6
29	R2	127	10	134	7.9	0.379	7.5	LOS A	2.8	21.6	0.02	0.35	0.02	51.6
29u	U	1	0	1	0.0	0.379	9.6	LOS A	2.8	21.6	0.02	0.35	0.02	53.6
Approach		622	61	655	9.8	0.379	3.0	LOS A	2.8	21.6	0.02	0.35	0.02	49.2
All Vehicles		1772	124	1865	7.0	0.425	4.4	LOS A	2.9	21.6	0.23	0.38	0.23	49.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Brigham Creek Interchange SB onramp PM Existing (Site Folder: BCR Interchange SB onramp)]

PM Peak Hour
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
NorthEast: Brigham Creek Road E														
25	T1	522	28	549	5.4	0.406	1.9	LOS A	2.7	19.7	0.36	0.21	0.36	50.4
26	R2	839	38	883	4.5	0.520	8.1	LOS A	4.0	29.1	0.37	0.56	0.37	47.6
26u	U	1	0	1	0.0	0.520	12.6	LOS B	4.0	29.1	0.37	0.56	0.37	51.6
Approach		1362	66	1434	4.8	0.520	5.8	LOS A	4.0	29.1	0.37	0.43	0.37	48.6
NorthWest: Brigham Creek Road W														
27	L2	645	14	679	2.2	0.450	1.8	LOS A	3.8	27.1	0.02	0.33	0.02	48.9
29	R2	119	9	125	7.6	0.450	7.5	LOS A	3.8	27.1	0.02	0.33	0.02	51.9
29u	U	1	0	1	0.0	0.450	9.6	LOS A	3.8	27.1	0.02	0.33	0.02	53.9
Approach		765	23	805	3.0	0.450	2.7	LOS A	3.8	27.1	0.02	0.33	0.02	49.3
All Vehicles		2127	89	2239	4.2	0.520	4.7	LOS A	4.0	29.1	0.24	0.39	0.24	48.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Brigham Creek Interchange SB onramp PM Proposed 230 lot (Site Folder: BCR Interchange SB onramp)]

PM Peak Hour
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
NorthEast: Brigham Creek Road E														
25	T1	522	28	549	5.4	0.410	2.0	LOS A	2.7	19.9	0.37	0.21	0.37	50.4
26	R2	897	38	944	4.2	0.557	8.2	LOS A	4.5	32.7	0.39	0.57	0.39	47.6
26u	U	1	0	1	0.0	0.557	12.6	LOS B	4.5	32.7	0.39	0.57	0.39	51.5
Approach		1420	66	1495	4.6	0.557	5.9	LOS A	4.5	32.7	0.38	0.44	0.38	48.5
NorthWest: Brigham Creek Road W														
27	L2	667	14	702	2.1	0.466	1.8	LOS A	4.0	28.9	0.03	0.33	0.03	48.9
29	R2	123	9	129	7.3	0.466	7.5	LOS A	4.0	28.9	0.03	0.33	0.03	51.9
29u	U	1	0	1	0.0	0.466	9.6	LOS A	4.0	28.9	0.03	0.33	0.03	53.9
Approach		791	23	833	2.9	0.466	2.7	LOS A	4.0	28.9	0.03	0.33	0.03	49.3
All Vehicles		2211	89	2327	4.0	0.557	4.8	LOS A	4.5	32.7	0.26	0.40	0.26	48.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.