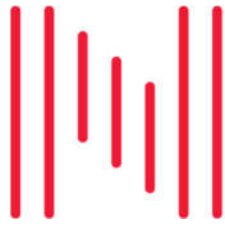




Appendix D

Integrated Transport Assessment



NOVO group
Planning. Traffic. Development.

Integrated Transport Assessment
Prepared for

**ROLLESTON WEST
RESIDENTIAL LTD**

**Dunns Crossing Road
Rolleston**

November 2020



Integrated Transport Assessment
Prepared for

Rolleston West Residential Ltd

Dunns Crossing Road
Rolleston

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Introduction

1. Rolleston West Residential Ltd has commissioned Novo Group to prepare an Integrated Transport Assessment (ITA) to support the proposed Plan Change for land at Dunns Crossing Road, on the western edge of Rolleston.
2. This report provides an assessment of the transport aspects of the proposed development. It also describes the transport environment in the vicinity of the site and describes the transport related components of the proposal. It has been prepared broadly in accordance with the Integrated Transportation Assessment Guidelines specified in New Zealand Transport Agency Research report 422.
3. The land associated with this proposed Plan Change is illustrated in **Figure 1**, which is two sites on Dunns Crossing Road. The northern site (Holmes Block) is located at the south-western corner of the State Highway 1 / Dunns Crossing Road intersection. It is proposed that the Holmes Block could provide up to 1,150 residential Lots, plus a small Local Centre. The southern site (Skellerup Block) is located approximately 690m north of Selwyn Road and is proposed to accommodate up to 950 residential Lots, plus a small Local Centre.
4. Copies of the Outline Development Plans for these sites are included in **Appendix 1**.

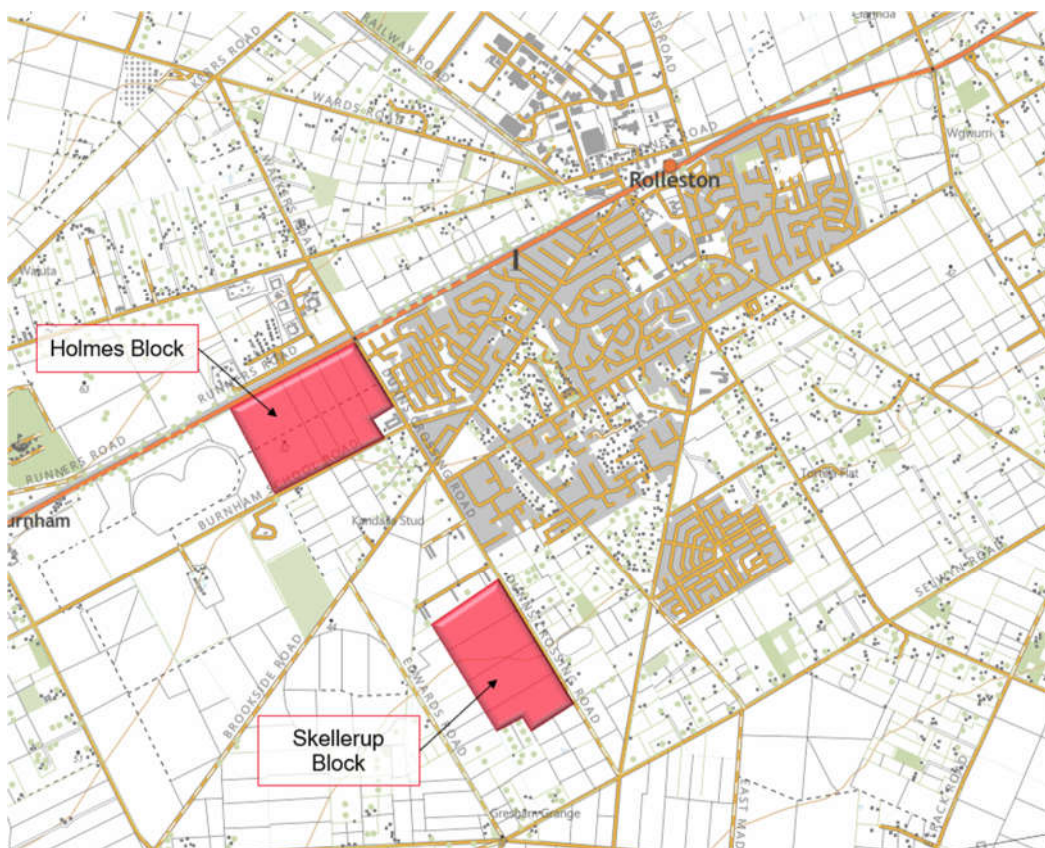


Figure 1: Site Location



Transport Environment

Road Network

State Highway 1

5. **Table 1** sets out the transport characteristics of State Highway 1 (SH1) in the vicinity of the application site.

Table 1: State Highway 1 Road Characteristics

Key Feature or Characteristic	Comment
Road Classification	State Highway and Arterial Road
Cross-Section Description	3.5m lanes in both directions, plus sealed shoulders.
Traffic Volumes	20,500 vehicles per day ¹ .
Speed	100km/hr (although currently a 70km/hr limit at the intersection with Dunns Crossing Road)
Cycling, Pedestrian Infrastructure and Public Transport	None

6. The SH1 / Dunns Crossing Road / Walkers Road intersection is a priority controlled cross-road, with SH1 having the priority. This intersection is currently operating poorly with regards to traffic capacity and it is understood that the NZ Transport Agency (NZTA) and Selwyn District Council (the Council) are committed to upgrading this intersection with the current proposal being a roundabout. The design of this roundabout is understood to be under investigation and it would be constructed within three to four years (to coincide with the opening of an over-bridge of SH1 between Rolleston Drive and Jones Road). There is funding committed for this project, although the final design of the roundabout is not yet known.
7. The NZTA Crash Analysis System (CAS) has been reviewed to identify crashes that have been reported within 100m of this intersection in the most recent five-year period available. **Figure 2** is the collision diagram, and the crashes are summarised below.
- i. SH1 South-West Bound Approach: 1 minor injury and 4 non-injury crashes:
- (a) Head-on when a south-west bound driver hit a vehicle waiting to turn right into Dunns Crossing Road – 1 minor injury crash.
 - (b) Merging crash where a driver in the right turn bay changed to the through lane without checking – 2 non-injury crashes.
 - (c) Loss of control turning right to Walkers Road – 1 non-injury crash.
 - (d) Rear-end when vehicles have stopped for road works – 1 non-injury crash.

¹ From Mobile Road website



ii. Dunns Crossing Road: 1 serious, 4 minor injury and 3 non-injury crashes:

(a) Failure to give-way to traffic – 1 serious injury crash, 4 minor injury crashes and 3 non-injury crashes.

iii. Walkers Road: 2 minor injury and 2 non-injury crashes:

(a) Failure to give-way to through traffic – 2 minor injury crash and 2 non-injury crashes.

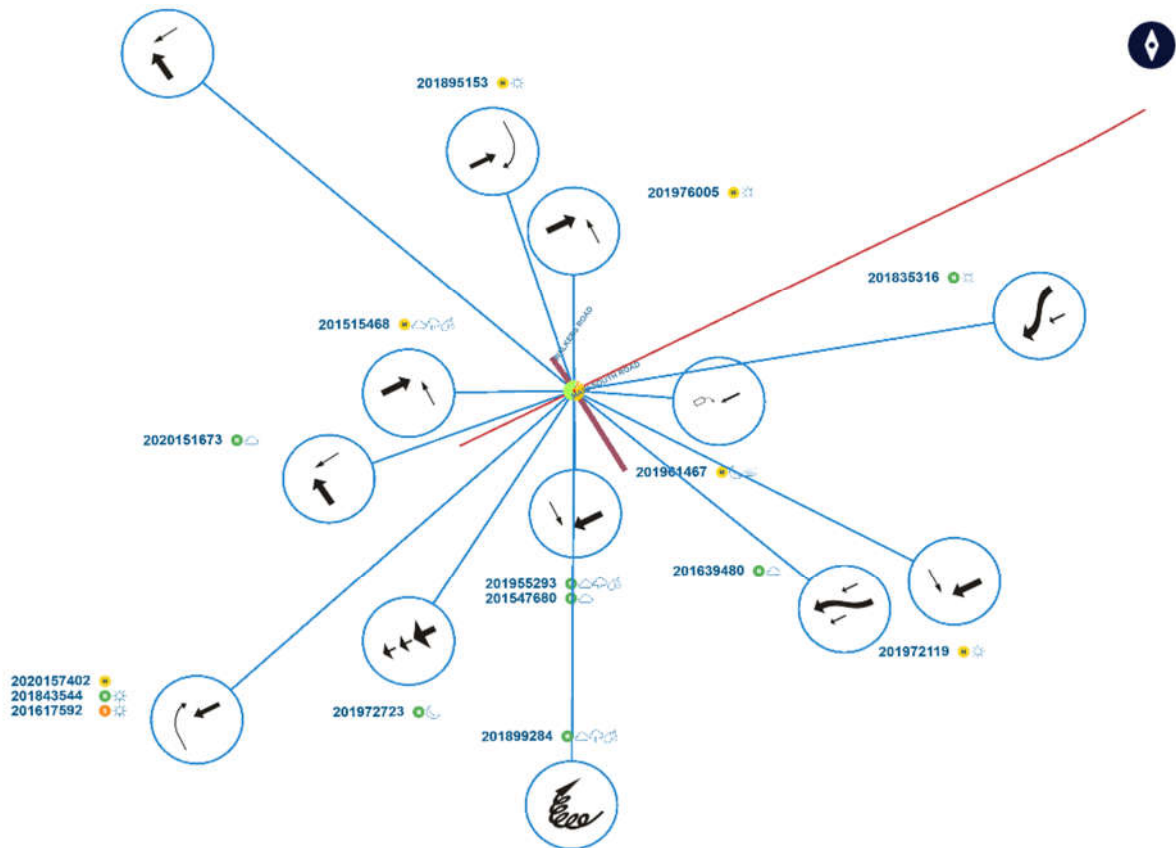


Figure 2: SH1 / Dunns Crossing Rd / Walkers Rd Collision Diagram

8. The above identifies that a number of crashes have occurred at the SH1 / Dunns Crossing Road / Walkers Road intersection. These are primarily caused by vehicles on the minor arms failing to give-way to through traffic on SH1 and these crashes would be addressed by the provision of a roundabout, as anticipated to occur at this location.

Dunns Crossing Road

9. **Table 2** sets out the transport characteristics of Dunns Crossing Road.



Table 2: Dunns Crossing Rd Characteristics

Key Feature or Characteristic	Comment
Road Classification	Arterial Road between Lowes Road and SH1. Local Road south of Lowes Road.
Cross-Section Description	Carriageway width of 8.4m (i.e. two 4.2m wide traffic lanes).
Traffic Volumes	1,600 to 2,500 vehicles per day ² depending on location.
Speed	60km/hr north of Granite Drive. 50km/hr south of Granite Drive until south of Lowes Road, which is 60km/hr. The rural area south of Lowes Road is 80km/hr.
Cycling, Pedestrian Infrastructure and Public Transport	1.5m wide footpath on the eastern side where the urban development has occurred. No footpaths on the western side, with the exception of immediately adjacent to the West Rolleston Primary School and pre-school (both of which are at the Burnham School Road intersection). There is also a kea crossing of Dunns Crossing Road outside the primary school. No dedicated cycling facilities or public transport are provided.

Newman Road

10. **Table 3** sets out the transport details of Newman Road.

Table 3: Newman Rd Characteristics

Key Feature or Characteristic	Comment
Road Classification	Local Road
Cross-Section Description	Carriageway width of 8.0m (i.e. two 4.0m wide traffic lanes).
Traffic Volumes	50 to 400 vehicles per day ³ depending on location.
Speed	50km/hr
Cycling, Pedestrian Infrastructure and Public Transport	1.5m wide footpaths are provided on both sides of the road. No dedicated cycling facilities or public transport are provided.
Connectivity	Provides a connection to Granite Drive, which in turn links to Brookside Road to /from central Rolleston.

11. The Dunns Crossing Road / Newman Road intersection is a priority controlled T-intersection, with Dunns Crossing Road having the priority. No crashes have been reported at this intersection in the most recent five-year period available.

Granite Drive

12. **Table 4** sets out the transport details of Granite Drive.

² From Mobile Road website

³ From Mobile Road website



Table 4: Granite Dr Characteristics

Key Feature or Characteristic	Comment
Road Classification	Local Road
Cross-Section Description	Carriageway width of 8.8m (i.e. two 4.4m wide traffic lanes).
Traffic Volumes	900 to 1,600 vehicles per day ⁴ depending on location.
Speed	50km/hr
Cycling, Pedestrian Infrastructure and Public Transport	1.5m wide footpaths are provided on both sides of the road. No dedicated cycling facilities or public transport are provided.
Connectivity	Provides a connection to Brookside Road, which links to /from central Rolleston.

13. The Dunns Crossing Road / Granite Drive intersection is a priority controlled T-intersection, with Dunns Crossing Road having the priority. No crashes have been reported at this intersection in the most recent five-year period available.

Burnham School Road

14. **Table 5** sets out the transport details of Burnham School Road, west of Dunns Crossing Road.

Table 5: Burnham School Rd Characteristics – West of Dunns Crossing Rd

Key Feature or Characteristic	Comment
Road Classification	Local Road
Cross-Section Description	Approximately 170m has an urbanised carriageway that is 7.4m wide and includes no-stopping lines both sides of the road. Beyond this, Burnham School Road is rural in character, with a 6.8m wide sealed carriageway.
Traffic Volumes	575 vehicles per day ⁵ .
Speed	50km/hr for the section leading up to Dunns Crossing Road and 100km/hr west of this.
Cycling, Pedestrian Infrastructure and Public Transport	1.5m wide footpaths are provided on both sides of the road for the urban section only. No dedicated cycling facilities or public transport are provided.

15. **Table 6** sets out the transport details of Burnham School Road, east of Dunns Crossing Road.

⁴ From Mobile Road website

⁵ From Mobile Road website



Table 6: Burnham School Rd Characteristics – East of Dunns Crossing Rd

Key Feature or Characteristic	Comment
Road Classification	Local Road
Cross-Section Description	Carriageway of approximately 7.0m.
Traffic Volumes	800 vehicles per day ⁶ .
Speed	50km/hr.
Cycling, Pedestrian Infrastructure and Public Transport	1.5m wide footpaths are provided on both sides of the road. No dedicated cycling facilities or public transport are provided.

16. The Dunns Crossing Road / Burnham School Road intersection is a priority controlled cross-road, with Dunns Crossing Road having the priority. No crashes have been reported at this intersection in the most recent five-year period available.
17. We understand that Council is investigating a set of traffic signals at this intersection, although we are unaware of the specific design for these signals at this stage.

Lowes Road

18. **Table 6** sets out the transport details of Lowes Road.

Table 7: Lowes Rd Characteristics

Key Feature or Characteristic	Comment
Road Classification	Arterial Road
Cross-Section Description	Carriageway width of 6.0m (i.e. two 3.0m wide traffic lanes), plus on-street parking on both sides.
Traffic Volumes	1,700 to 4,000 vehicles per day ⁷ depending on location.
Speed	50km/hr
Cycling, Pedestrian Infrastructure and Public Transport	1.5m wide footpaths are provided on both sides of the road. No dedicated cycling facilities or public transport are provided.
Connectivity	Provides a connection to Levi Road, which links toward central Rolleston, plus the Weedons – Ross interchange with SH1.

19. The Dunns Crossing Road / Lowes Road intersection is a priority controlled T-intersection, with Dunns Crossing Road having the priority. No crashes have been reported at this intersection in the most recent five-year period available.

⁶ From Mobile Road website

⁷ From Mobile Road website



Selwyn Road

20. **Table 8** sets out the transport details of Selwyn Road in the vicinity of the sites.

Table 8: Selwyn Rd Characteristics

Key Feature or Characteristic	Comment
Road Classification	Local Road, although this becomes an Arterial Road east of Lincoln Rolleston Road.
Cross-Section Description	Carriageway width of 6.6m (i.e. two 3.3m wide traffic lanes)
Traffic Volumes	700 to 3,000 vehicles per day ⁸ depending on location.
Speed	80km/hr
Cycling, Pedestrian Infrastructure and Public Transport	None.
Connectivity	Provides a connection to Shands Road, which links toward the Christchurch Southern Motorway interchange.

21. The Dunns Crossing Road intersection in this location is with Goulds Road, which in turn has an intersection with Selwyn Road. This configuration is illustrated in **Figure 3**.

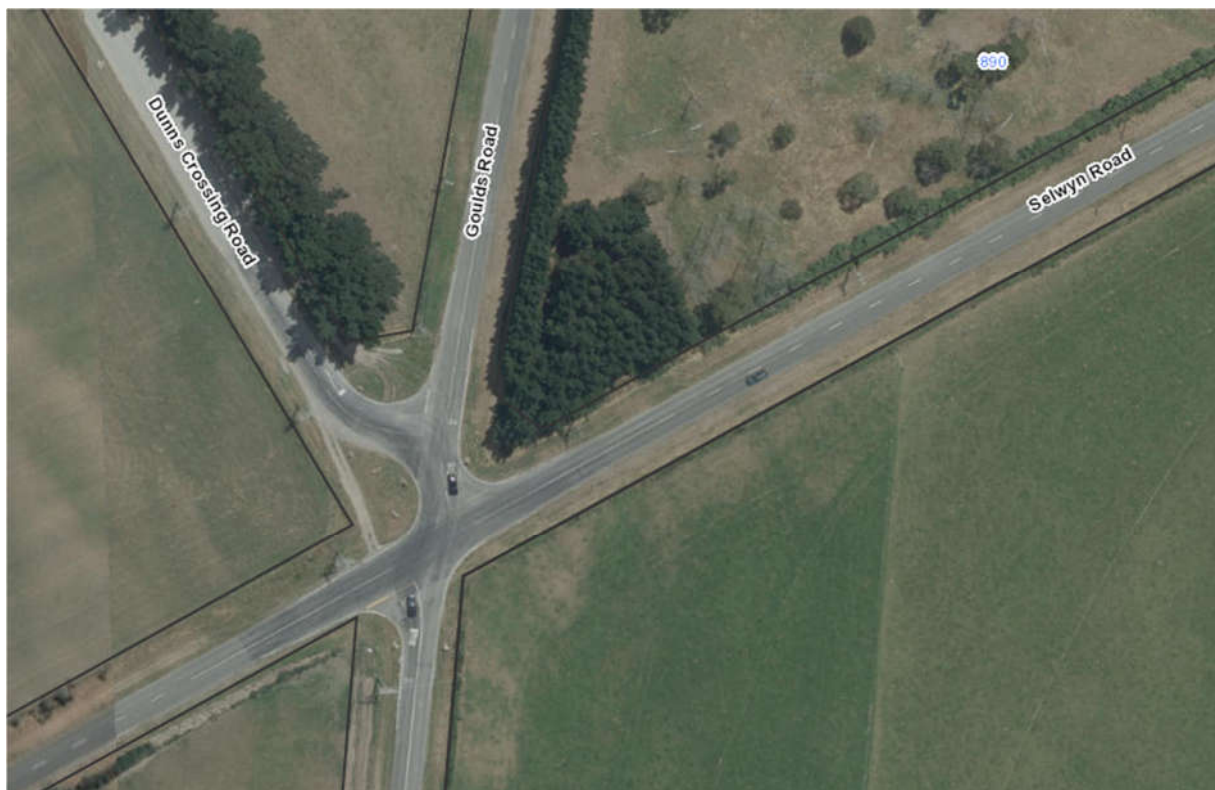


Figure 3: Dunns Crossing Rd / Goulds Rd / Selwyn Rd Intersection Arrangement

⁸ From Mobile Road website



22. The NZTA CAS database has been reviewed to identify crashes that have been reported within 100m of this intersection in the most recent five-year period available. **Figure 2** is the collision diagram, and the crashes are summarised below.

- i. Goulds Road Northbound Approach: 2 minor injury and 1 non-injury crashes:
 - (a) Failure to give-way – 2 minor injury crashes and 1 non-injury crash.
- ii. Goulds Road Southbound Approach: 1 serious injury, 1 minor injury and 2 non-injury crashes:
 - (a) Failure to give-way – 1 serious injury crash, 1 minor injury crash and 2 non-injury crash.

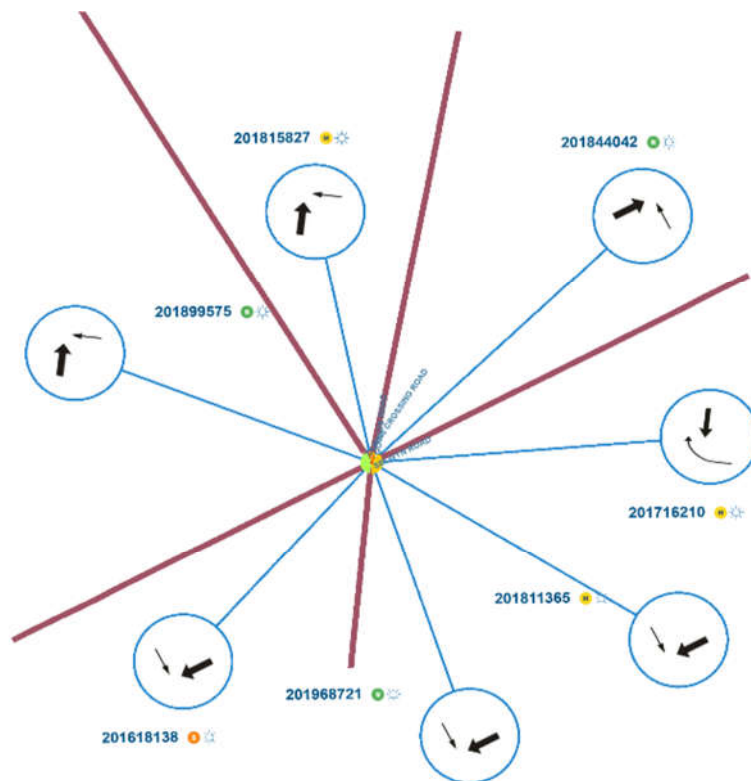


Figure 4: Dunns Crossing Rd / Goulds Rd / Selwyn Rd Collision Diagram

23. The above crash review indicates there is a trend in which drivers exiting the Goulds Road approaches are failing to give-way to traffic on Selwyn Road.



The Proposal

24. The transport components of the two proposed ODP areas are set out in turn in the following sections.
25. Unless otherwise stated, it is proposed to adopt the transport provisions of the Operative District Plan or Proposed District Plan, whichever is relevant at the time.

Holmes Block

26. The proposed Plan Change would enable up to 1,150 residential lots and a small commercial zone to be established at the application site. A copy of the ODP is included in **Figure 5** and included in more detail in **Appendix 1**.



Figure 5: Holmes Block ODP

Site Layout

Access Intersections

27. The ODP proposes a Primary Road access to Dunns Crossing Road, which is indicatively opposite Granite Drive. A Secondary Road access is also proposed to Dunns Crossing Road, which is indicatively opposite Newman Road.
28. A Primary Road access is also proposed to Burnham School Road. This has the potential to link to land further south of this site, should that land ever be developed.



29. The potential intersection layouts to Dunns Crossing Road will be cross-road arrangements. The intersection with Burnham School Road will be a T-intersection.
30. The detailed design and sight distances at the intersections will be confirmed at subdivision stage, although these are anticipated to comply as the road alignments are straight and flat.
31. No direct property access is proposed to Burnham School Road, although direct access is proposed to Dunns Crossing Road to be consistent with the existing development on the opposite side of the road.

Road Standards

32. The road cross-sections and intersection spacings within the Plan Change area are proposed to comply with the requirements of the District Plan. It is proposed that the roads identified on the ODP would be constructed as either Local Major or Local Intermediate roads.

Pedestrian & Cycle Links

33. Greenlink connections are provided within Outline Development Plan area. These are intended to reduce walking and cycling times within the subdivision, as well as connecting to the proposed commercial area and West Rolleston Primary School.

Off-Site Transport Improvements

34. The ODP acknowledges that an intersection upgrade is proposed by Council and NZTA at the SH1 / Dunns Crossing Road / Walkers Road intersection. It is anticipated that the construction of this as a roundabout (as is currently proposed by Council and NZTA) may require some of the Plan Change land and the proposed ODP allows for this eventuality. Ultimately, the details of the intersection design will be determined by Council and NZTA for implementation following rezoning.

Traffic Generation & Distribution

Traffic Generation

35. The traffic generation is based on an 85th percentile rate of 0.9 vehicles per dwelling in the peak hours and 8.2 vehicles per dwelling per day⁹. Applying this to the proposed 1,150 dwellings leads to the traffic generation set out in **Table 9**. This assumes the following arrival / departure splits from the ITE *Trip Generation* guidebook:
 - i. AM Peak – 25% arrivals / 75% departures;
 - ii. PM Peak – 63% arrivals / 37% departures; and
 - iii. Daily – 50% arrivals / 50% departures.

⁹ Based on Outer Suburban dwellings in the NZTA Research Report 453 – *Trips and Parking Related to Land Use*.



Table 9: Holmes Block Traffic Generation

	Arrivals	Departure	Total
AM Peak	259	776	1,035
PM Peak	652	383	1,035
Daily	4,715	4,715	9,430

36. No traffic generation has been assumed for the local centre, as this is intended to be of a scale that would accommodate pass-by trips associated with the dwellings in the proposed subdivision.

Traffic Distribution

37. The distribution of traffic across the accesses to the wider road network is based on the broad catchments within the subdivision to each of these roads. This leads to an assumption that:
- Dunns Crossing Road northern access accommodates approximately 35% of the Plan Change traffic;
 - Dunns Crossing Road southern access accommodates approximately 40% of the Plan Change traffic; and
 - Burnham School Road accommodates approximately 25% of the Plan Change traffic.
38. The above traffic has also been distributed across the wider road network in accordance with information provided from the Rolleston traffic model from 2028. This used data from the residential development coded in that model for the Holmes Block. This distribution is included on the figures included in **Appendix 2**.

Skellerup Block

39. The proposed Plan Change would enable up to 950 residential lots and a small commercial zone to be established at the application site. A copy of the ODP is included in **Figure 6** and included in more detail in **Appendix 1**.



Figure 6: Skellerup Block ODP

Site Layout

Access Intersections

40. The ODP proposes three Primary Road accesses to Dunns Crossing Road, as well as a Secondary Access. The southern Primary Road access has the potential to connect to subdivision on the opposite side of Dunns Crossing Road, when that occurs.
41. The ODP also includes potential connections through to adjacent land to the north and west, should that land be developed.
42. The potential intersection layouts are proposed to be T-intersections for all the accesses. That said, the southern Primary Access intersection could be made into a cross-road to tie-in with access to the land on the eastern side of Dunns Crossing Road (if required).
43. The detailed design and sight distances at the intersections will be confirmed at subdivision stage, although these are anticipated to comply as the road alignments are straight and flat.

Road Standards

44. The road cross-sections and intersection spacings within the Plan Change area are proposed to comply with the requirements of the District Plan. It is proposed that the roads identified on the ODP would be constructed as either Local Major or Local Intermediate roads.



Traffic Generation & Distribution

Traffic Generation

45. The traffic generation rates and assumptions set out in paragraph 35 have been applied to the 950 lots proposed at the Skellerup Block. The resultant traffic generation for this block is set out in **Table 10**. Again, no traffic generation has been assumed for the local centre because this is intended to be of a scale that would accommodate pass-by trips associated with the dwellings in the proposed subdivision.

Table 10: Skellerup Block Traffic Generation

	Arrivals	Departure	Total
AM Peak	214	641	855
PM Peak	556	299	855
Daily	3,895	3,895	7,790

Traffic Distribution

46. The distribution of this traffic across the accesses to the wider road network is based on the broad catchments within the subdivision to each of these roads. This leads to an assumption that:
- Dunns Crossing Road Northern primary access accommodates approximately 22% of the Plan Change traffic;
 - Dunns Crossing Road Central primary access accommodates approximately 40% of the Plan Change traffic;
 - Dunns Crossing Road Southern primary access accommodates approximately 19% of the Plan Change traffic; and
 - Dunns Crossing Road Southern secondary access accommodates approximately 19% of the Plan Change traffic.
47. The traffic has also been distributed across the wider road network in accordance with information provided from the Rolleston traffic model from 2028. This used data from the residential development coded in that model for the Skellerup Block. This distribution is included on the figures included in **Appendix 2**.

Assessment of Effects

48. Key matters for the assessment of transport effects associated with the proposed Plan Change are considered to be:
- Parking & Loading:** Whether the District Plan rules adequately provide for the layout and provision of car parking and loading at the application site;
 - Access Arrangements:** Where the accesses are anticipated to operate safely and efficiently and whether the District Plan rules adequately provide for access. Also, the internal roading pattern proposed in the ODP and the associated rules and formation standards; and



- iii. **Wider Network Effects:** Whether the effects of the proposed activity can be satisfactorily accommodated by the surrounding road network. Whether the proposed Plan Change will be accessible by a range of transport modes.

49. The above matters are assessed in turn in the following sections.

Parking & Loading

50. The District Plan rules regarding parking and loading will be adopted for this Plan Change. This is considered to be sufficient to confirm that parking and loading will be satisfactorily provided for in a functional and practical manner.

Access Arrangements

51. The following assessment has been undertaken using 2028 traffic volume data from the Rolleston Paramics model as a basis for the background traffic volumes. It is understood that this is an interim model, although it is considered to be a reasonable basis for the determining of background traffic on the road network¹⁰. It is understood this model includes:
- i. A roundabout at the State Highway 1 / Dunns Crossing Road / Walkers Road intersection;
 - ii. Anticipated land use growth (and associated increase in traffic volumes) in Rolleston to 2028; and
 - iii. An assumption that 96 dwellings are constructed in the Holmes Block and 51 in the Skellerup Block.
52. In addition to the above, the proposed Plan Change traffic has been added to the network as described in previous sections of this report. The traffic flow diagrams that form the basis of the following assessment are contained in **Appendix 2** and these set out the calculation and distribution of the development generated traffic. These follow a process of:
- i. Setting out the received network traffic data;
 - ii. Isolating the Holmes Block and Skellerup Block traffic volumes;
 - iii. Determining the distribution of traffic associated with the Holmes Block and Skellerup Block based on the above;
 - iv. Removing the Holmes Block and Skellerup Block traffic that was included in the model; and
 - v. Adding in the quantum of traffic associated with the Holmes Block and Skellerup Block as proposed in this Plan Change.
53. The following assessments are undertaken using the 'Base Plus Plan Change' traffic volumes from **Appendix 2**.

¹⁰ Note: this assessment does not consider or attempt to evaluate the implications of traffic associated with the *potential* future rezoning of other land.



Holmes Block

Dunns Crossing Road / Newman Road / Access

54. The Dunns Crossing Road / Newman Road / Site Access intersection has been modelled as a cross-road, with Dunns Crossing Road having the priority. It has also been assumed that the speed environment would be reduced to 50km/hr with the urbanisation of the western side of Dunns Crossing Road.
55. The concept layout for this intersection is illustrated in **Figure 7** (which includes a new right turn bay on Newman Road), with the intersection modelling results being included in **Appendix 3**. These results are summarised as:
- AM Peak Hour: Overall the intersection is considered to operate satisfactorily, with no movement being worse than Level of Service C¹¹. The degree of saturations are also lower than the practical threshold for this type of intersection¹²; and
 - PM Peak Hour: Overall the intersection is considered to operate satisfactorily. The worst Level of Service is E, which occurs on the through and right turn movements from the site access and the right turn out of Newman Road. This is considered to be acceptable given this occurs in the weekday PM peak hour on movements that are not high volume. The degree of saturations are again lower than the practical threshold for this type of intersection.

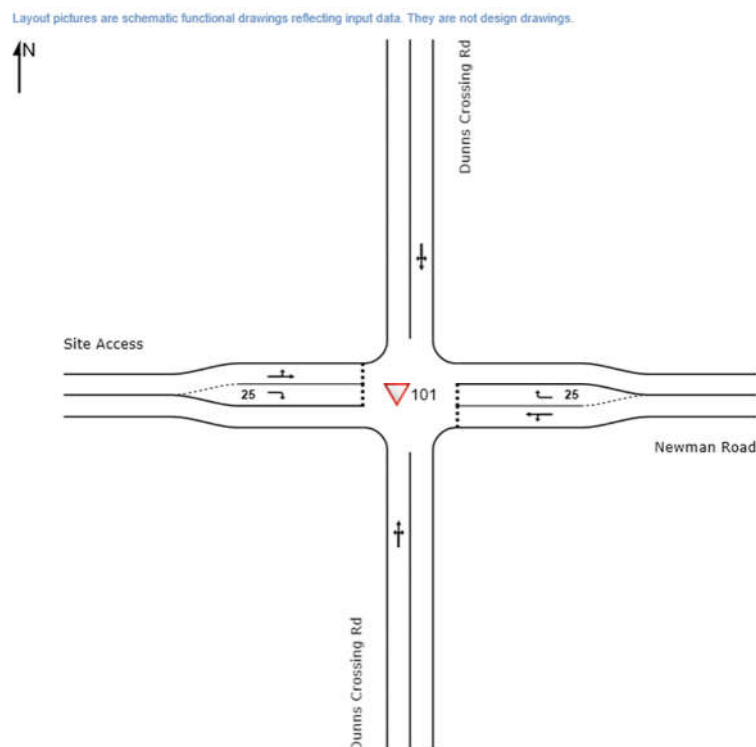


Figure 7: Dunns Crossing Rd / Newman Rd / Access Concept Arrangement

¹¹ Where 'A' is considered to be excellent operation, 'E' is at capacity and 'F' is over-capacity.

¹² The practical threshold for degree of saturation for unsignalized intersections is considered to be 0.85.



56. Overall, this access is predicted to operate satisfactorily in the 2028 peak periods.

Dunns Crossing Road / Granite Drive / Access

57. The Dunns Crossing Road / Granite Drive / Site Access intersection has been modelled as a cross-road, with Dunns Crossing Road having the priority. It has again been assumed that the speed environment would be reduced to 50km/hr.

58. The concept layout for this intersection is illustrated in **Figure 8**, with the intersection modelling results being included in **Appendix 4**. These results are summarised as:

- i. AM Peak Hour: Overall the intersection is considered to operate satisfactorily, with no movement being worse than Level of Service C. The degree of saturations are also lower than the practical threshold for this type of intersection; and
- ii. PM Peak Hour: Overall the intersection is considered to operate satisfactorily, with no movement being worse than Level of Service E, which is the through and right turn out of Granite Drive. This is again considered to be acceptable given this is the 2028 PM peak hour. The degree of saturations are also lower than the practical threshold for this type of intersection.

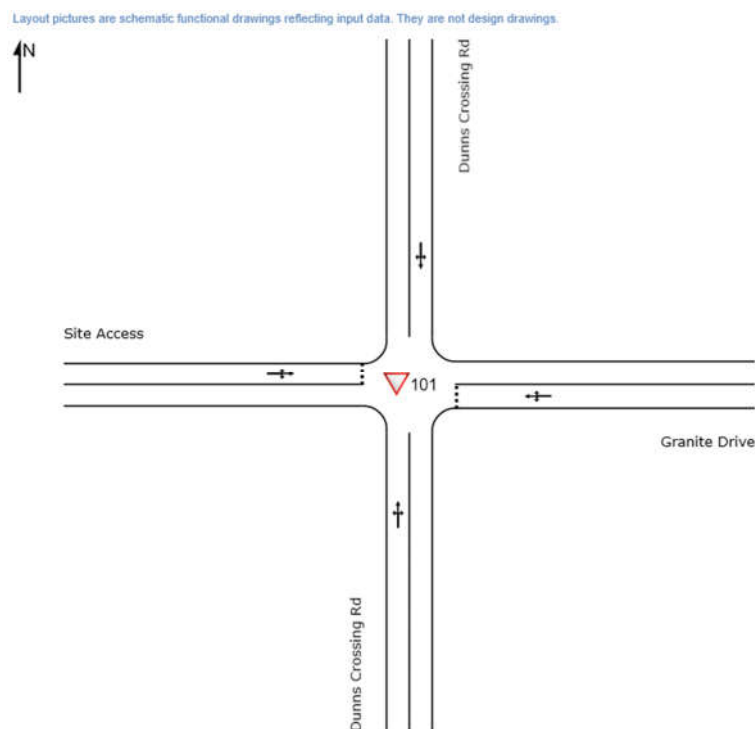


Figure 8: Dunns Crossing Rd / Granite Dr / Access Concept Arrangement

59. Overall, this access is predicted to operate satisfactorily in the 2028 peak periods.

Burnham School Road / Access

60. The Burnham School Road / Site Access intersection has been modelled as a T-intersection, with Burnham School Road having the priority. The concept layout for this intersection is illustrated in **Figure 9**, with the intersection modelling results being included in **Appendix 5**. These results are summarised as the intersection is predicted to operate satisfactorily, with no movement being worse than Level of



Service A. The degree of saturations are also lower than the practical threshold for this type of intersection.

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.

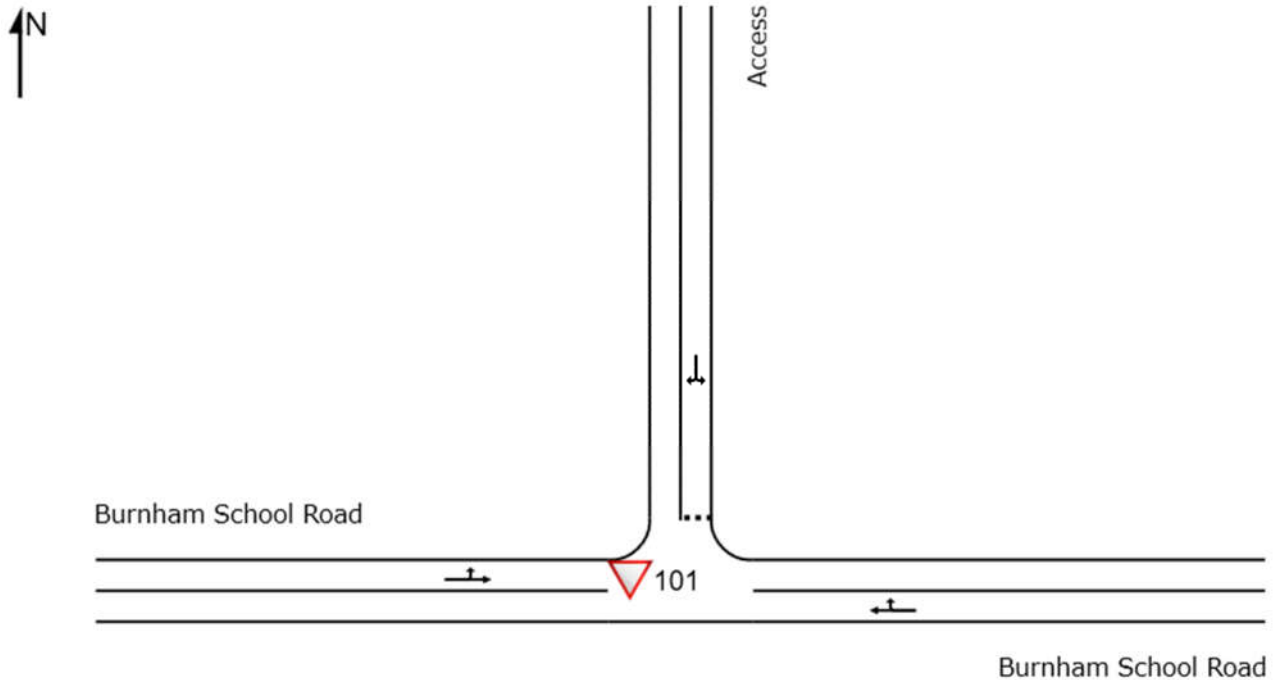


Figure 9: Burnham School Rd / Access Concept Arrangement

61. Overall, this access is predicted to operate satisfactorily in the 2028 peak periods.

Skellerup Block

62. The Dunns Crossing Road / Site Access intersections have been modelled as T-intersections, with Dunns Crossing Road having the priority. The concept layout for these intersections is illustrated in **Figure 10**, with the intersection modelling results being included in:

- i. **Appendix 6:** Dunns Crossing Road / Northern Primary Access;
- ii. **Appendix 7:** Dunns Crossing Road / Central Primary Access;
- iii. **Appendix 8:** Dunns Crossing Road / Southern Primary Access; and
- iv. **Appendix 9:** Dunns Crossing Road / Southern Secondary Access.



Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.

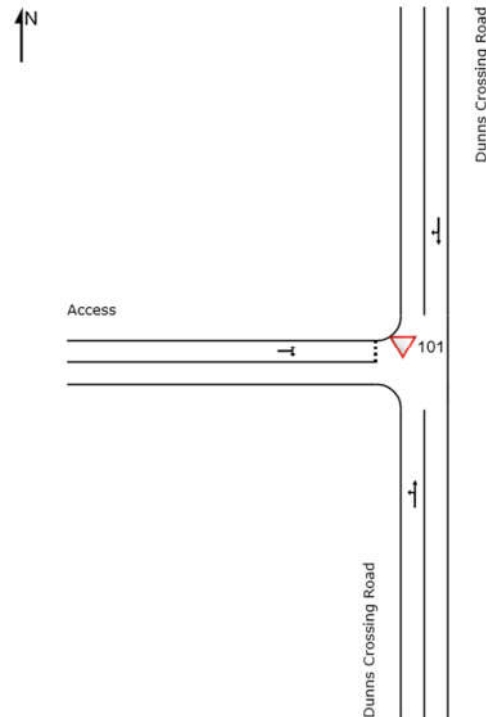


Figure 10: Dunns Crossing Rd / Access Concept Arrangement

63. These results of these intersection models are summarised as:
- i. AM Peak Hour: Overall the intersection is considered to operate satisfactorily, with no movement being worse than Level of Service B. The degree of saturations are also lower than the practical threshold for this type of intersection; and
 - ii. PM Peak Hour: Overall the intersection is considered to operate satisfactorily, with no movement being worse than Level of Service C. The degree of saturations are also lower than the practical threshold for this type of intersection.
64. Overall, these accesses are predicted to operate satisfactorily in the 2028 peak periods.

Internal Access Roads

65. The internal access roads and intersections are proposed to comply with the District Plan requirements and will again be subject to road safety audits. This is considered to be sufficient to confirm the internal network will operate safely and efficiently.
66. Access to individual properties is also proposed to comply with the District Plan requirements. Any non-compliances will either be sought at subdivision stage or addressed on an individual basis and the effects of this on safety and efficiency considered at that stage.
67. The above is considered to be sufficient to confirm that the internal transport network will be safe and efficient.



Wider Effects

68. The following assessment sets out the traffic effects at key intersections on the wider road network. This assessment is undertaken using the 'Base Plus Plan Change' traffic volumes in **Appendix 2**.

SH1 / Dunns Crossing Road / Walkers Road

69. The traffic capacity assessment of this intersection has assumed that the roundabout will be constructed by the time significant development occurs within these Plan Change sites. It is noted that these sites are already zoned for residential development (albeit at a rural residential density), with the Holmes Block being permitted 97 lots and the Skellerup block 51 lots. As such, there is an element of development and associated traffic effects that could occur 'as of right' at present.
70. The concept arrangement for a roundabout at this location is illustrated in **Figure 11**, although a detailed design will need to be undertaken of this arrangement by the NZTA. It is assumed that the speed limit through this area is reduced to at least 80km/hr to safely accommodate the proposed roundabout.

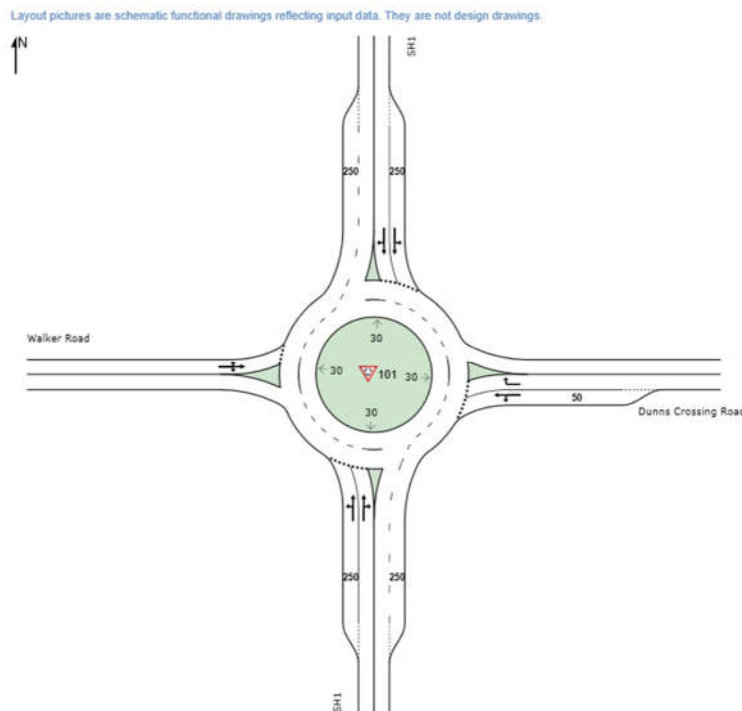


Figure 11: SH1 / Dunns Crossing Rd / Walkers Rd Roundabout Concept

71. The intersection modelling results being included in **Appendix 10**, which are summarised as:
- AM Peak Hour: Overall the intersection is predicted to operate at Level of Service A, with no movement being worse than Level of Service B. The degree of saturations are also lower than the practical threshold for this type of intersection; and
 - PM Peak Hour: Overall the intersection is predicted to operate at Level of Service A, with no movement being worse than Level of Service B. The degree of saturations are also lower than the practical threshold for this type of intersection.
72. Overall, this intersection is predicted to operate satisfactorily in the 2028 peak periods.



Burnham School Road / Dunns Crossing Road

73. An upgrade is understood to be planned for this location leading to a traffic signal controlled intersection. As such, traffic signals are the basis of the modelling undertaken to determine whether the proposed Plan Changes can be accommodated by the surrounding road network. The concept arrangement for traffic signals at this location is illustrated in **Figure 12**, although a detailed design will need to be undertaken of this arrangement by the Council in due course. It is anticipated this intersection would fit within the existing road corridor. A nominal 90 second cycle-time has been adopted for the purpose of this assessment.

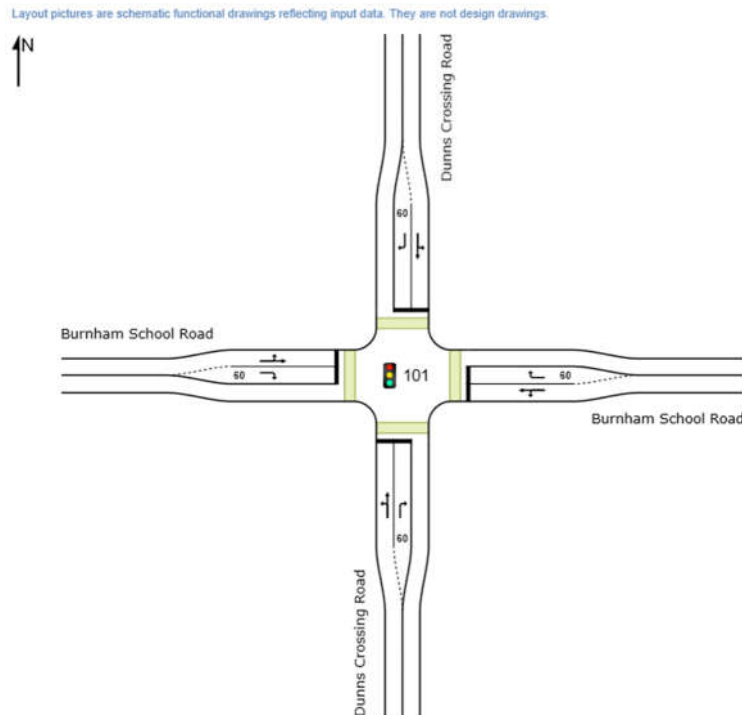


Figure 12: Burnham School Rd / Dunns Crossing Rd Traffic Signal Concept

74. The intersection modelling results being included in **Appendix 11**, which are summarised as:
- i. AM Peak Hour: Overall the intersection is predicted to operate at Level of Service C, with no movement being worse than Level of Service D. The degree of saturations are also lower than the practical threshold of 0.9 for signalised intersections; and
 - ii. PM Peak Hour: Overall the intersection is predicted to operate at Level of Service C, with no movement being worse than Level of Service D. The degree of saturations are again lower than the practical threshold for this type of intersection.
75. Overall, this intersection is predicted to operate satisfactorily in the 2028 peak periods.

Brookside Road / Dunns Crossing Road

76. This intersection is a cross-road, with Dunns Crossing Road having the priority. The existing arrangement as illustrated in **Figure 13** has been used for the traffic model, with the results being included in **Appendix 12**. These results are summarised as:



- i. AM Peak Hour: Overall the intersection is considered to operate satisfactorily, with no movement being worse than Level of Service D. The degree of saturations are also lower than the practical threshold for this type of intersection; and
- ii. PM Peak Hour: Overall the intersection is considered to operate satisfactorily, with no movement being worse than Level of Service D. The degree of saturations are also lower than the practical threshold for this type of intersection.

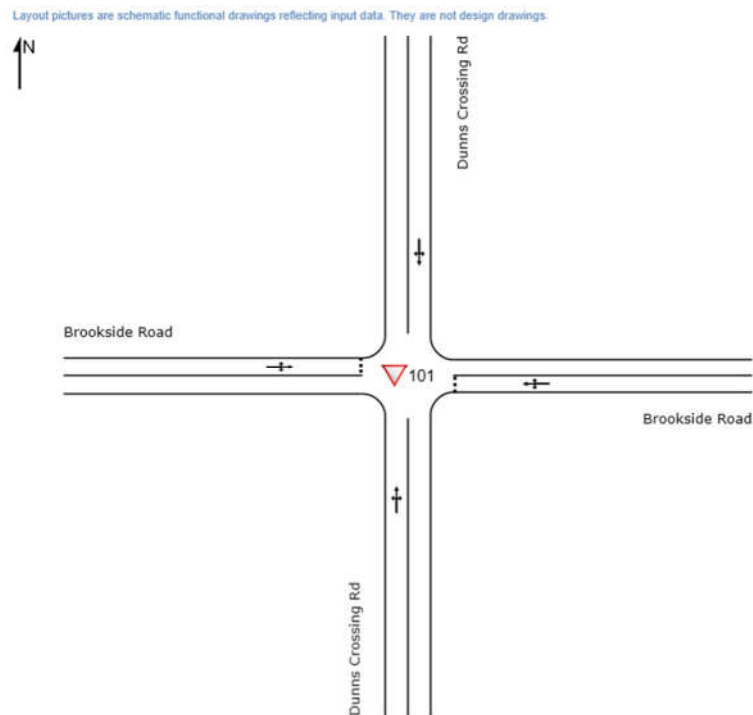


Figure 13: Brookside Rd / Dunns Crossing Rd Intersection Layout

77. Overall, this intersection is predicted to operate satisfactorily in the 2028 peak periods.

Lowes Road / Dunns Crossing Road

78. This intersection is a T-intersection, with Dunns Crossing Road having the priority. The existing arrangement (as illustrated in **Figure 14**) has been used for the traffic model, with the results being included in **Appendix 13**. These results are summarised as:

- i. AM Peak Hour: Overall the intersection is considered to operate satisfactorily, with no movement being worse than Level of Service C. The degree of saturations are also lower than the practical threshold for this type of intersection; and
- ii. PM Peak Hour: Overall the intersection is considered to operate satisfactorily, with no movement being worse than Level of Service E. That said, the degree of saturation for the right turn out of Lowes Road is predicted to be 0.889, which is greater than the practical threshold of 0.85. This indicates that large queues and delays could occur on this approach with small increases in traffic volumes.



Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.

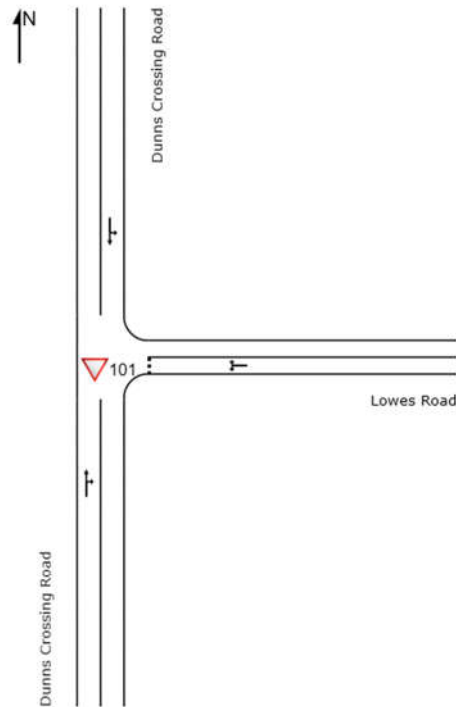


Figure 14: Dunns Crossing Rd / Lowes Rd Intersection Layout

79. Given the predicted operation in the weekday PM peak, a concept arrangement for traffic signals has been tested at this intersection. The concept layout is illustrated in **Figure 15**, which is anticipated to fit within the road corridor. This model assumes a 90 second cycle-time for the purpose of this assessment.
80. The results of this traffic model are contained in **Appendix 14**, which indicate:
- i. AM Peak Hour: Overall the intersection is predicted to operate at Level of Service B, with no movement being worse than Level of Service D. The degree of saturations are also lower than the practical threshold for signalised intersections; and
 - ii. PM Peak Hour: Overall the intersection is predicted to operate at Level of Service B, with no movement being worse than Level of Service D. The degree of saturations are again lower than the practical threshold for this type of intersection.
81. This is considered to be sufficient to confirm that this intersection can be satisfactorily upgraded to accommodate the predicted future traffic volumes at this location.



Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.

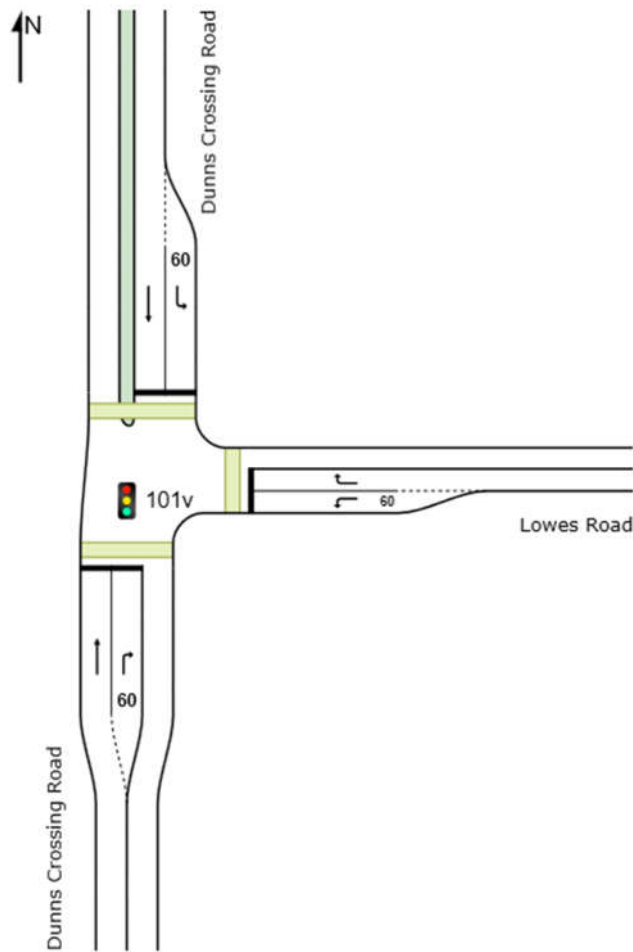


Figure 15: Dunns Crossing Rd / Lowes Rd Traffic Signal Intersection Layout

Dunns Crossing Road / Goulds Road / Selwyn Road

82. The existing arrangement at this intersection is illustrated in **Figure 3**, which indicates it comprises a closely spaced T-intersection (Goulds Road / Dunns Crossing Road) and a cross-road (Goulds Road / Selwyn Road). This intersection arrangement is used as the basis of traffic modelling at this location, with the two intersections being linked in SIDRA.
83. The results of this traffic model are included in **Appendix 15**, which indicate that:
 - i. AM Peak Hour: Overall the intersection is considered to operate satisfactorily, with no movement being worse than Level of Service C. The degree of saturations are also lower than the practical threshold for this type of intersection; and
 - ii. PM Peak Hour: Overall the intersection is considered to operate satisfactorily, with no movement being worse than Level of Service B. The degree of saturations are also lower than the practical threshold for this type of intersection.
84. Overall, this intersection is predicted to operate satisfactorily from a traffic capacity perspective in the 2028 peak periods.



85. The crash review undertaken of this intersection in paragraph 22 indicates there is currently a trend in which drivers exiting the Goulds Road approaches are failing to give-way to traffic on Selwyn Road. It is anticipated that the urbanisation of this area (as the adjacent residential zoned land is developed) would better highlight the intersection and reduce the speed limit on Selwyn Road. This may address the crash record at this location. If crashes continue after this area is urbanised, there would be value in Council rationalising the layout.

Accessibility

86. There is no public transport in the immediate vicinity of the Plan Change sites at present. The closest bus service is the Yellow Line, which undertakes a loop on Brookside Road, a short segment of Dunns Crossing Road and then Lowes Road to head back to Rolleston Town Centre. The Plan Change sites do include road networks that would enable bus services to route through the sites on the Primary Road network, so these could accommodate passenger transport in the future.
87. The proposed site will include pedestrian and cycle links within the Plan Change area, as well as providing small local commercial areas that are intended to provide for everyday shopping and further reduce the need to travel by car for local trips. It is also noted that the Holmes Block has a boundary with the West Rolleston Primary School and there is a pre-school at the Burnham School Road / Dunns Crossing Road intersection. These place education facilities within walking distance of this site.
88. These Plan Change sites are within approximately 4.5km of Rolleston Town Centre¹³, which means residents will be able to comfortably cycle to / from the shopping and employment in that area.
89. The above is considered to be sufficient to confirm that the site has access to a range of everyday facilities without the need to drive.

Summary & Conclusion

Summary

90. The Plan Change proposed would enable the development of up to 1,150 residential Lots plus a small commercial zone at the Holmes Block, plus up to 950 residential Lots plus a small commercial zone at the Skellerup Block.
91. Access to the Holmes Block would be via Dunns Crossing Road and Burnham School Road. The Dunns Crossing Road accesses are anticipated to be cross-road intersections with Newman Road and Granite Drive. Access to the Skellerup Block would be to Dunns Crossing Road, with the southern Primary Access having the potential to link to the road network of any future opposite subdivision.
92. The SH1 / Dunns Crossing Road / Walkers Road is assumed to be upgraded to a roundabout within the next three to four years, as has been advised by the NZTA and Council. This intersection is predicted to operate satisfactorily with the inclusion of Plan Change traffic.
93. It is understood that the Council intend to install traffic signals at the Dunns Crossing Road / Burnham School Road intersection. A concept arrangement has been tested and this layout can accommodate the traffic associated with the proposed Plan Change.

¹³ Measured in a straight line.



94. The Dunns Crossing Road / Lowes Road intersection is predicted to operate over the practical capacity threshold with the Plan Change traffic added to the network. A concept traffic signal scheme has been tested at this location and was found to operate satisfactorily.
95. The traffic capacity of other intersections in the immediate vicinity of the Plan Change sites have been assessed and found to be acceptable.
96. The traffic capacity of the site accesses has been assessed and found to be acceptable. There will also be sufficient sight distance for these intersections to operate safely.

Conclusion

97. Overall and accounting for the off-site improvements outlined in this report, it is considered that the transport effects of the proposed Plan Change will be acceptable on the surrounding transport network.

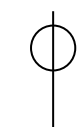


Appendix 1

Outline Development Plans

LEGEND

-  Plan Change Boundary
- Living Z**
-  General Residential Density
(Minimum 12 Households/Ha)
-  Medium Residential Density
(Minimum 15 Households/Ha)
- Business**
-  Commercial / Business
-  Primary Road
-  Secondary Road
-  Possible Future Connection
-  Potential Intersection Upgrade
-  Recreation Reserve
-  Pocket Park
-  Green Link
-  Water Race
-  Water Race Realigned
-  Avoid access onto Burnham School Road from site
-  Odour Treatment Area
-  Acoustic Treatment Area

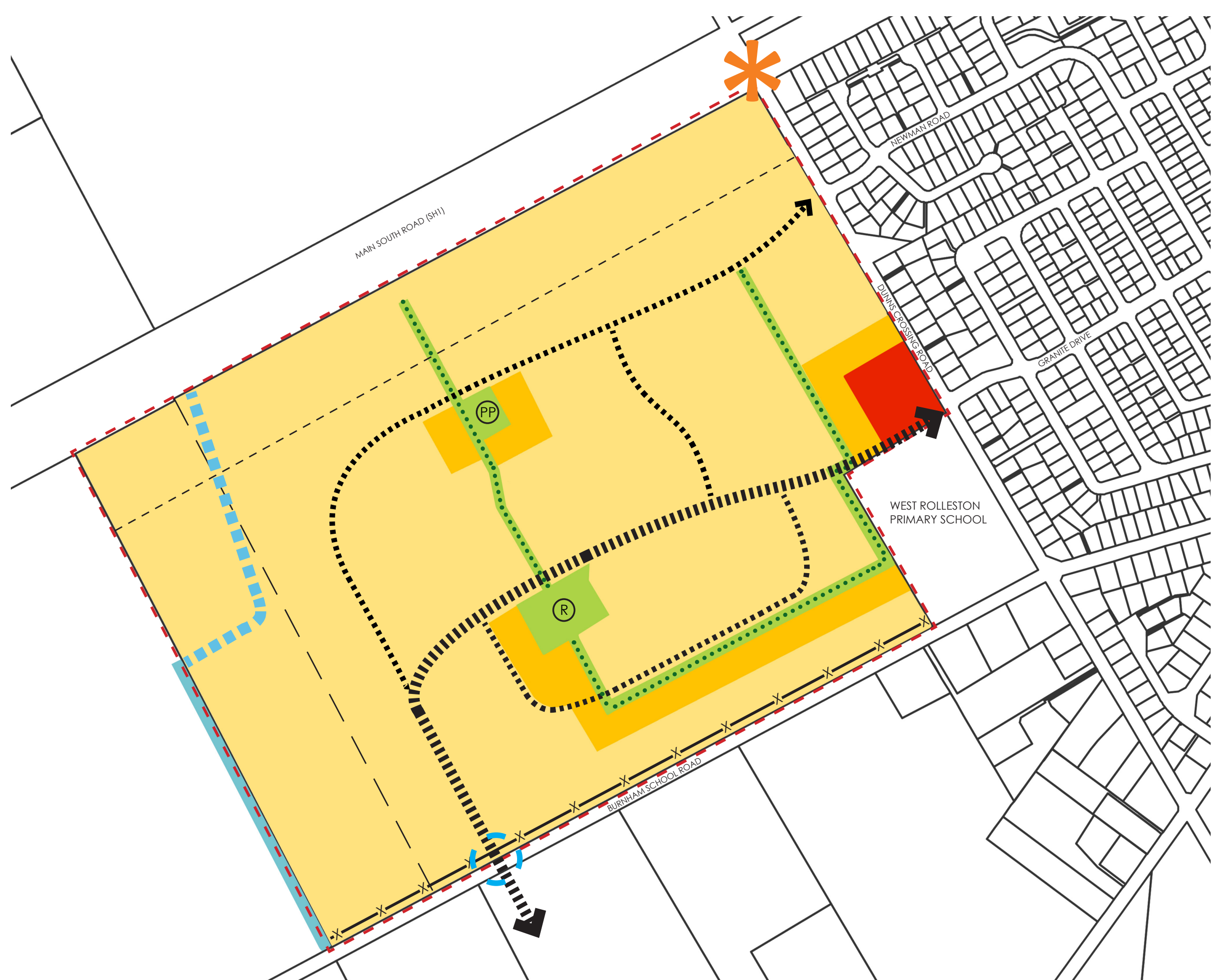


A. OUTLINE DEVELOPMENT PLAN

LANDSCAPE AND VISUAL IMPACT ASSESSMENT

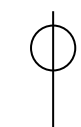
PROPOSAL - HOLMES OUTLINE DEVELOPMENT PLAN

ROLLESTON WEST PLAN CHANGE



LEGEND

-  Plan Change Boundary
- Living Z**
-  General Residential Density
(Minimum 12 Households/Ha)
-  Medium Residential Density
(Minimum 15 Households/Ha)
- Business**
-  Commercial / Business
-  Primary Road
-  Secondary Road
-  Possible Future Connection
-  Recreation Reserve
-  Odour Treatment Area



A. OUTLINE DEVELOPMENT PLAN

LANDSCAPE AND VISUAL IMPACT ASSESSMENT

PROPOSAL - SKELLERUP OUTLINE DEVELOPMENT PLAN

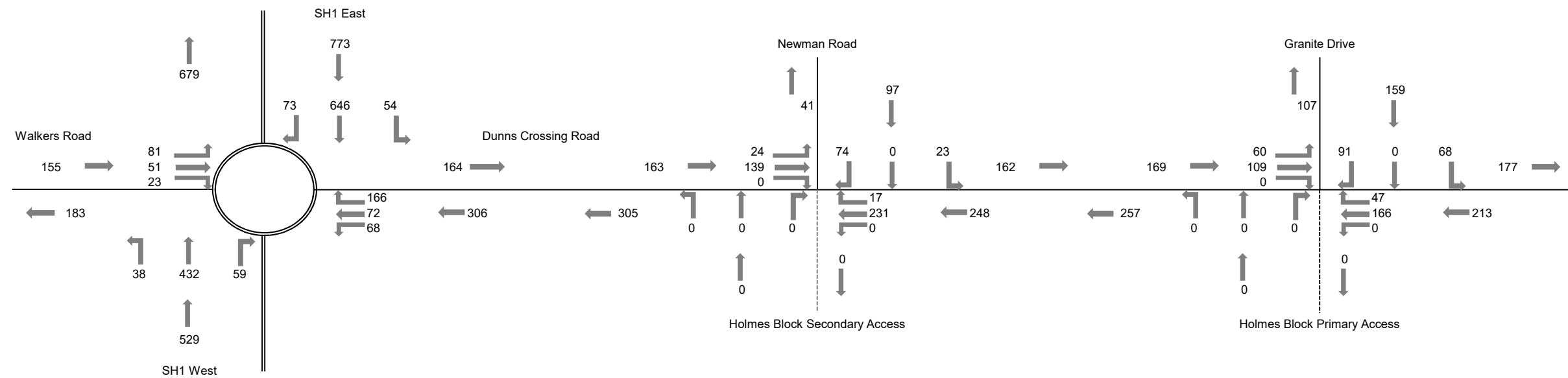
ROLLESTON WEST PLAN CHANGE



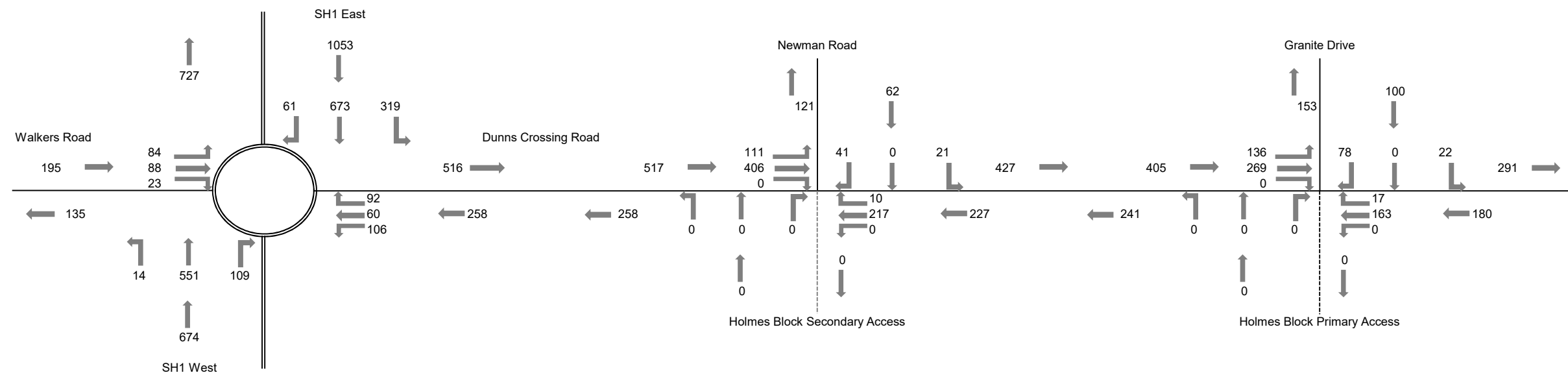


Appendix 2

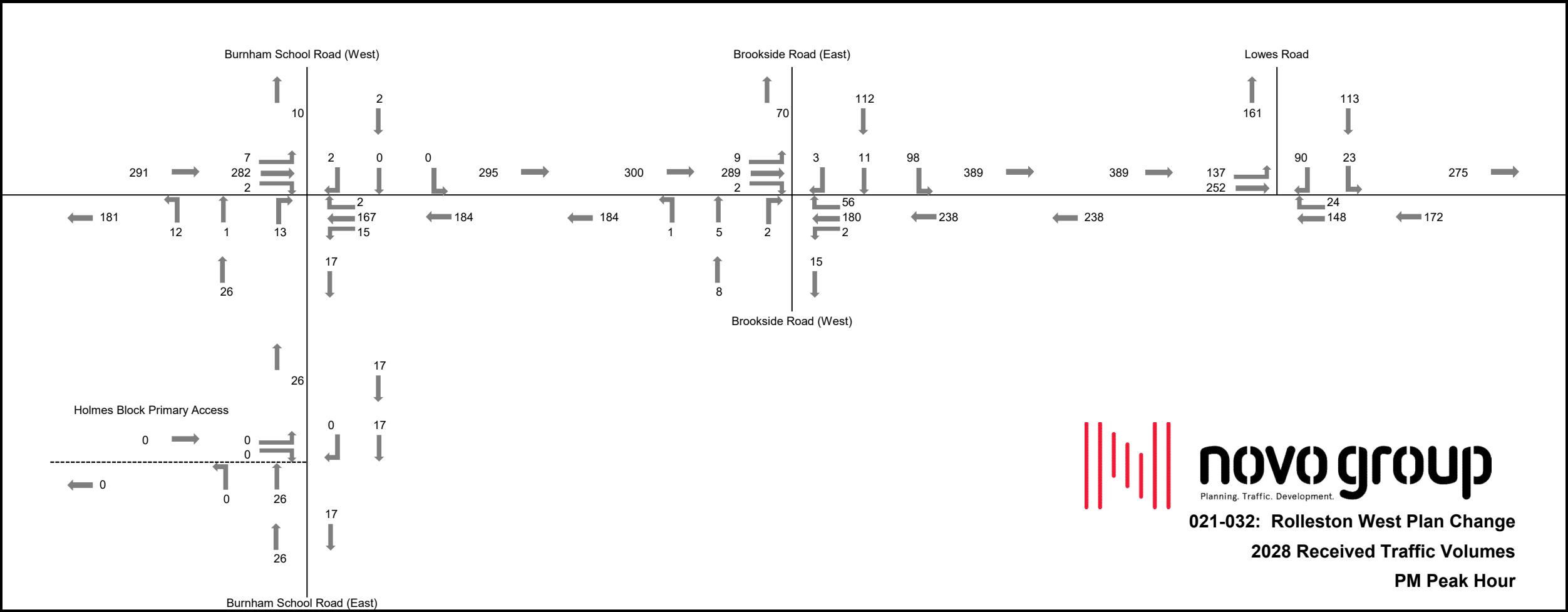
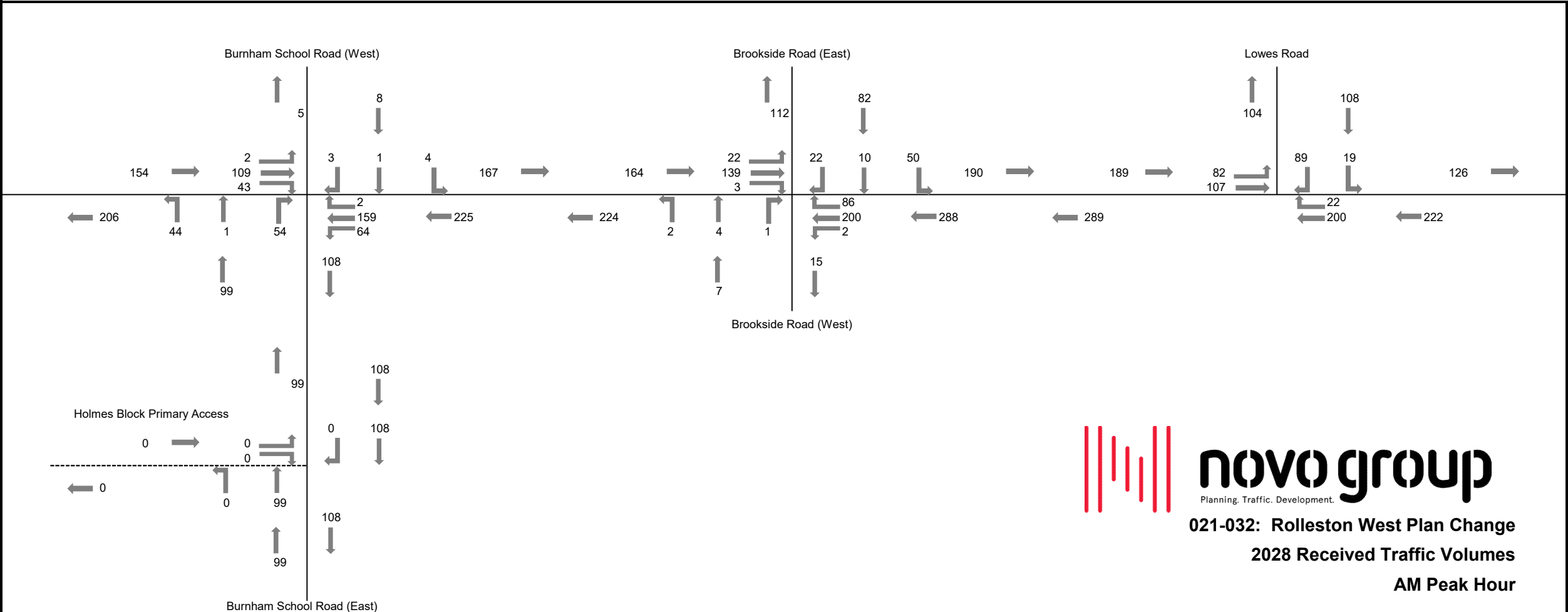
Network Traffic Volumes

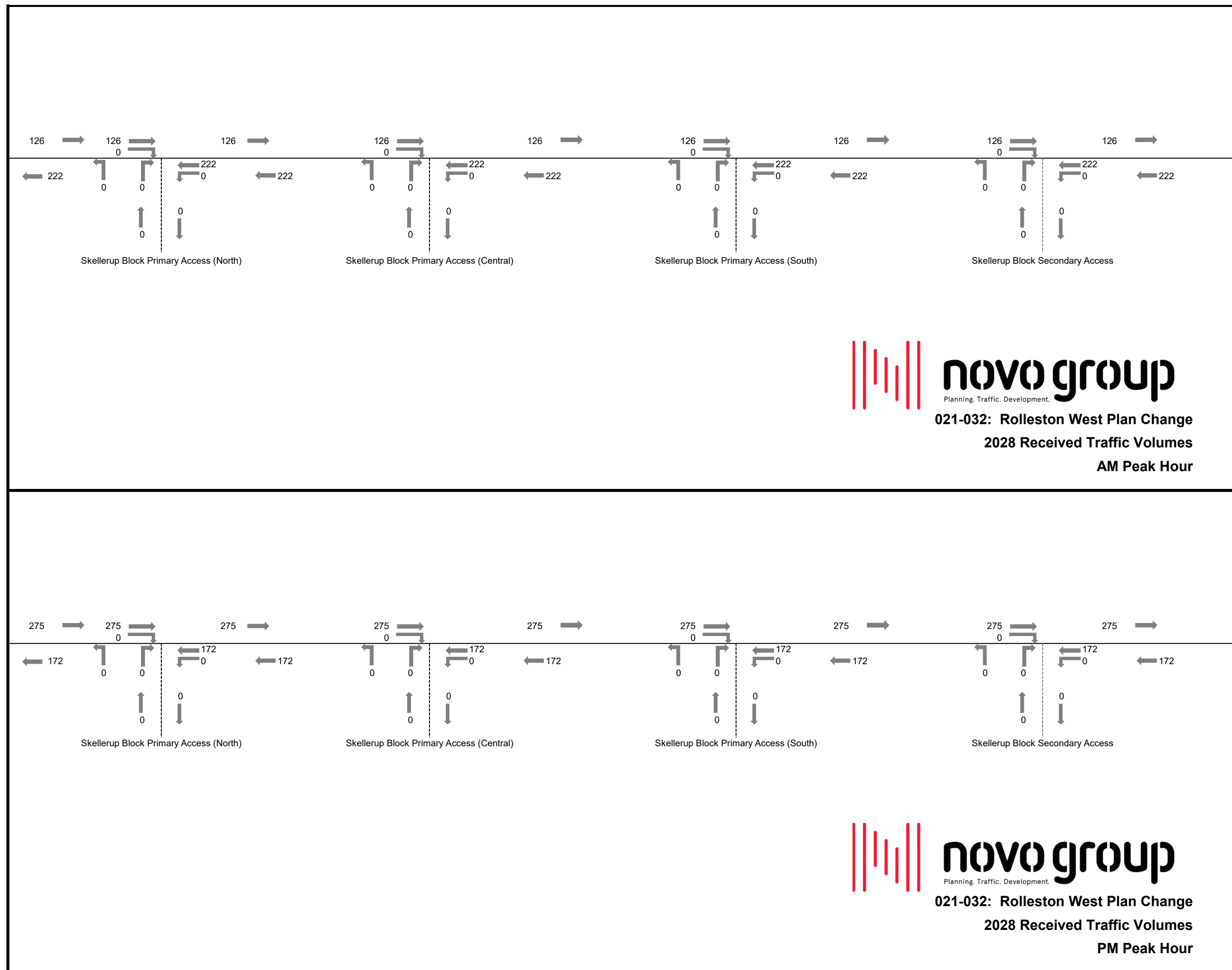


021-032: Rolleston West Plan Change
2028 Received Traffic Volumes
AM Peak Hour

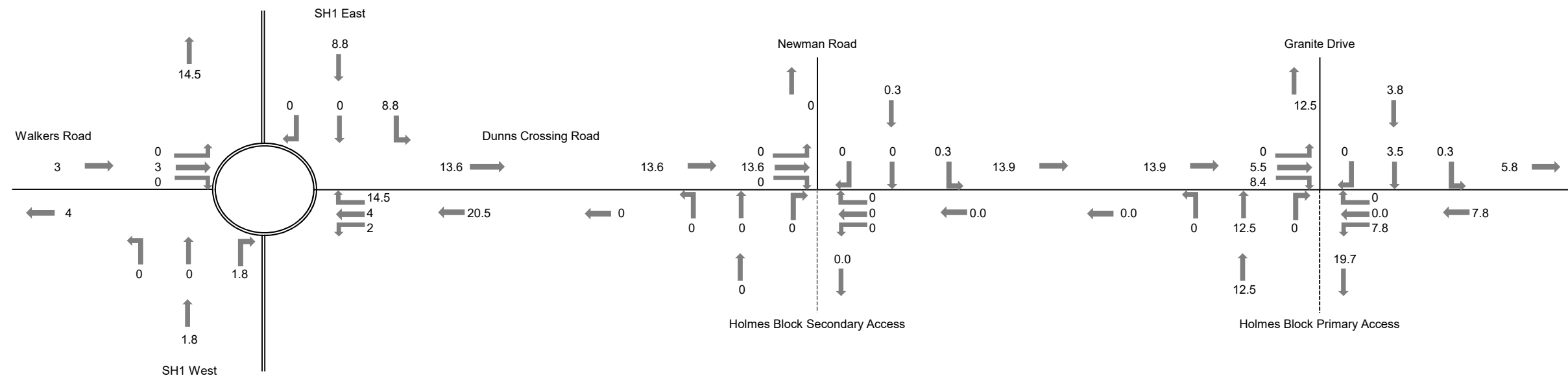


021-032: Rolleston West Plan Change
2028 Received Traffic Volumes
PM Peak Hour

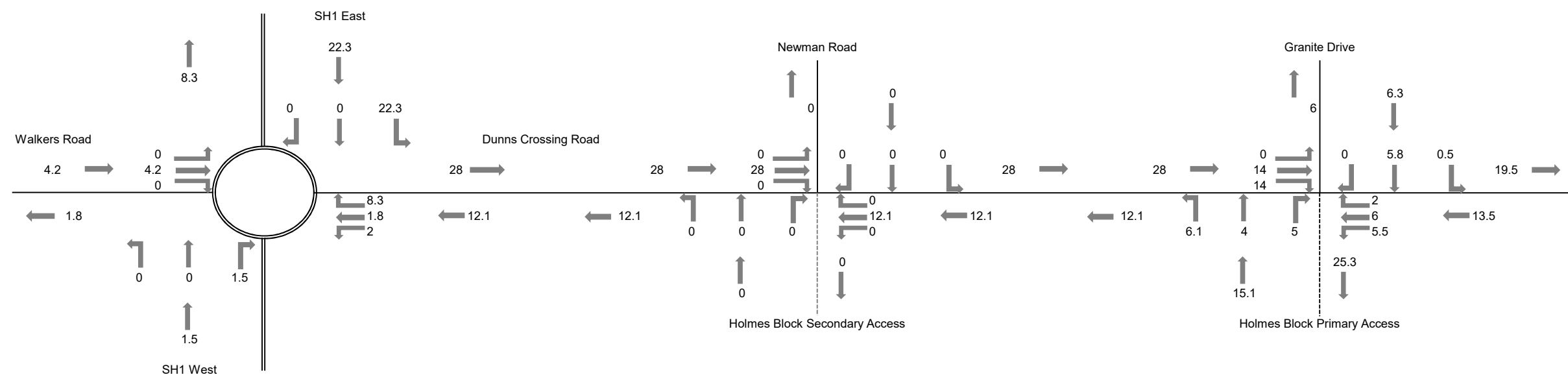




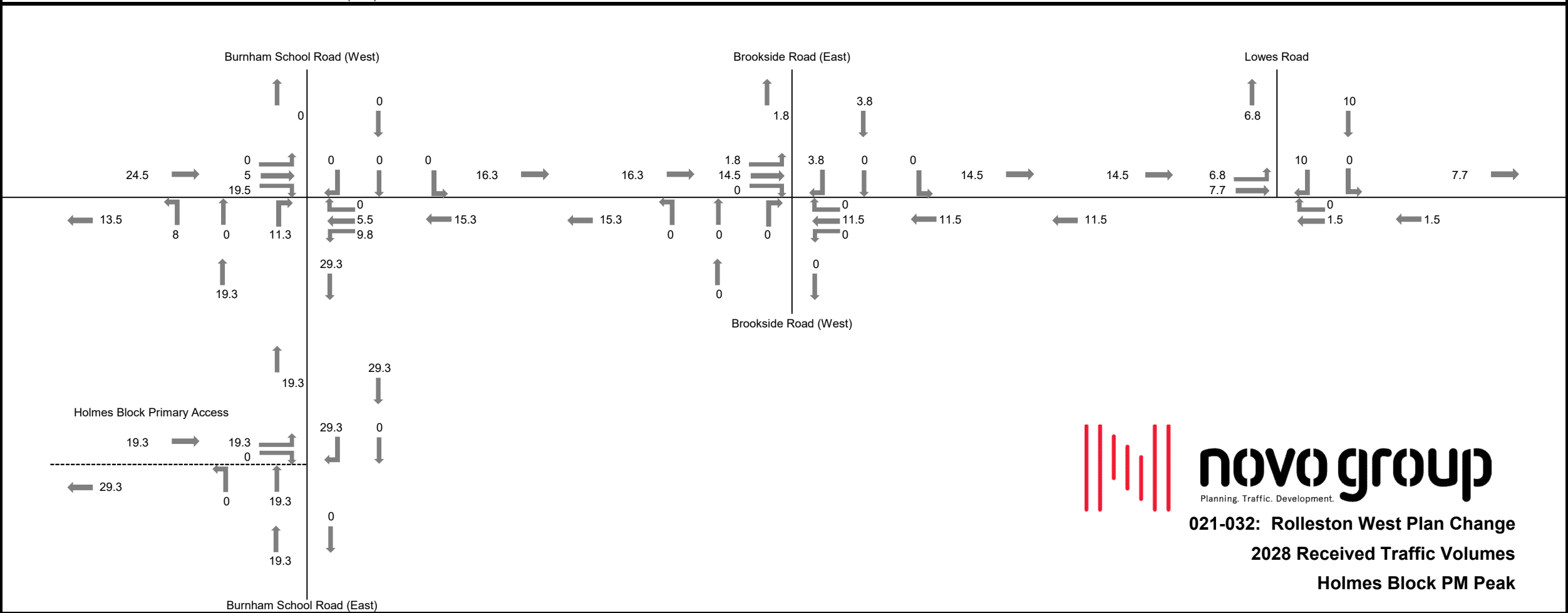
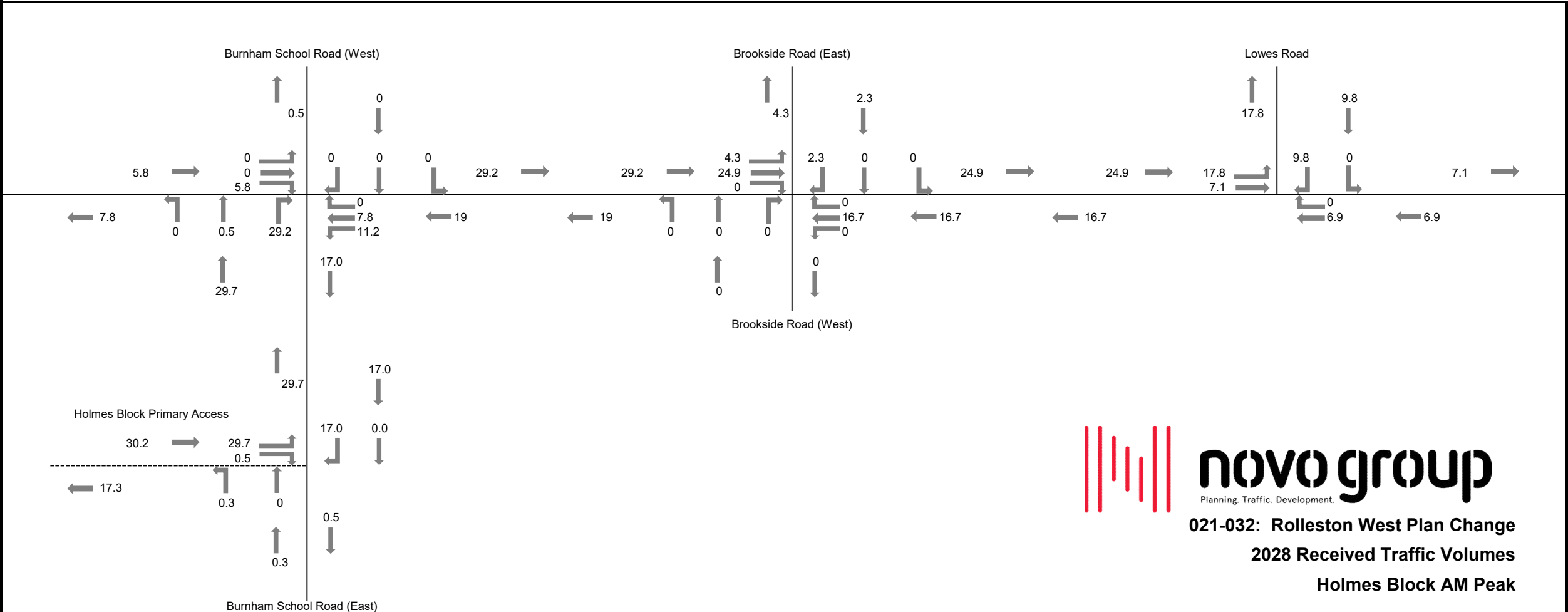


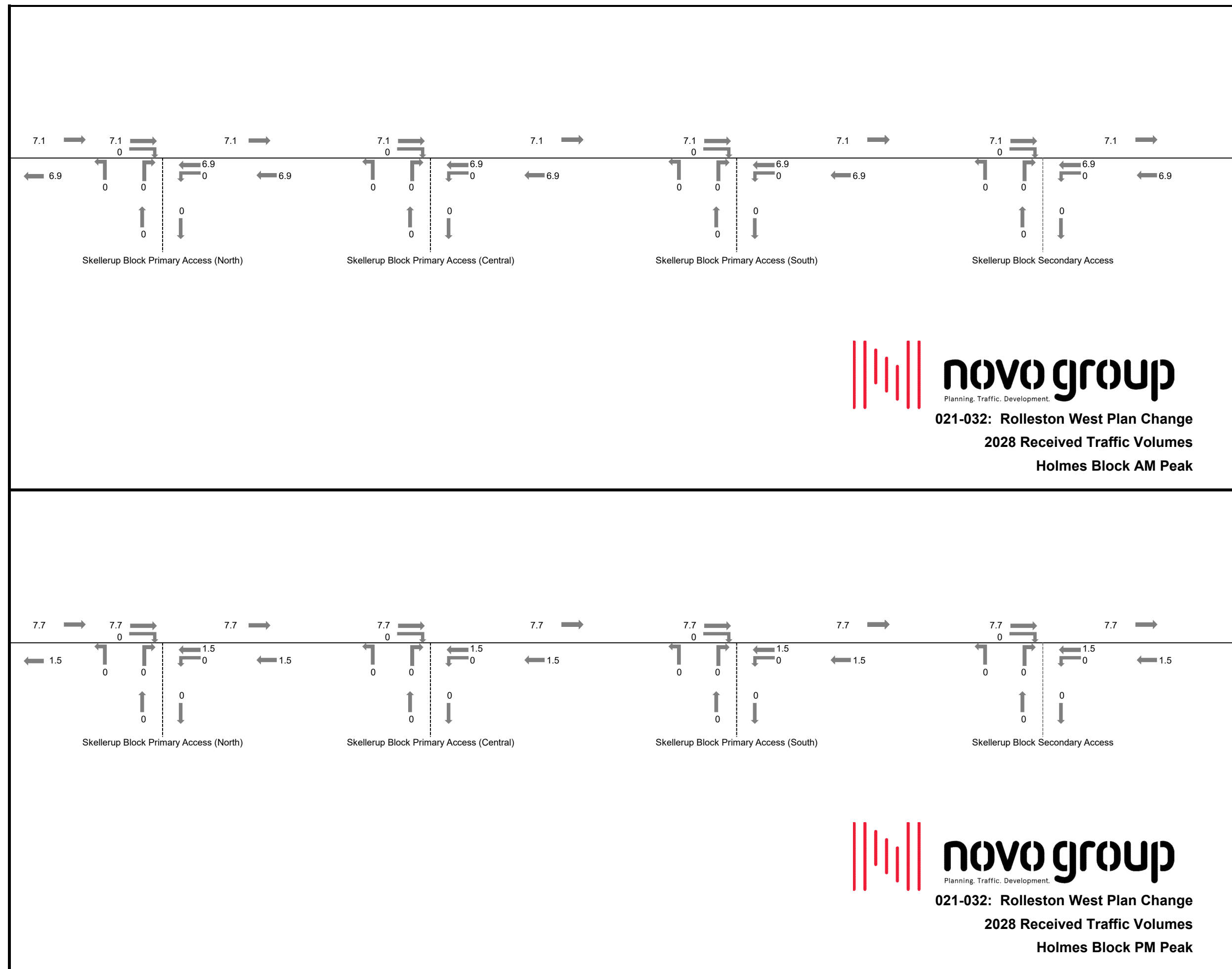


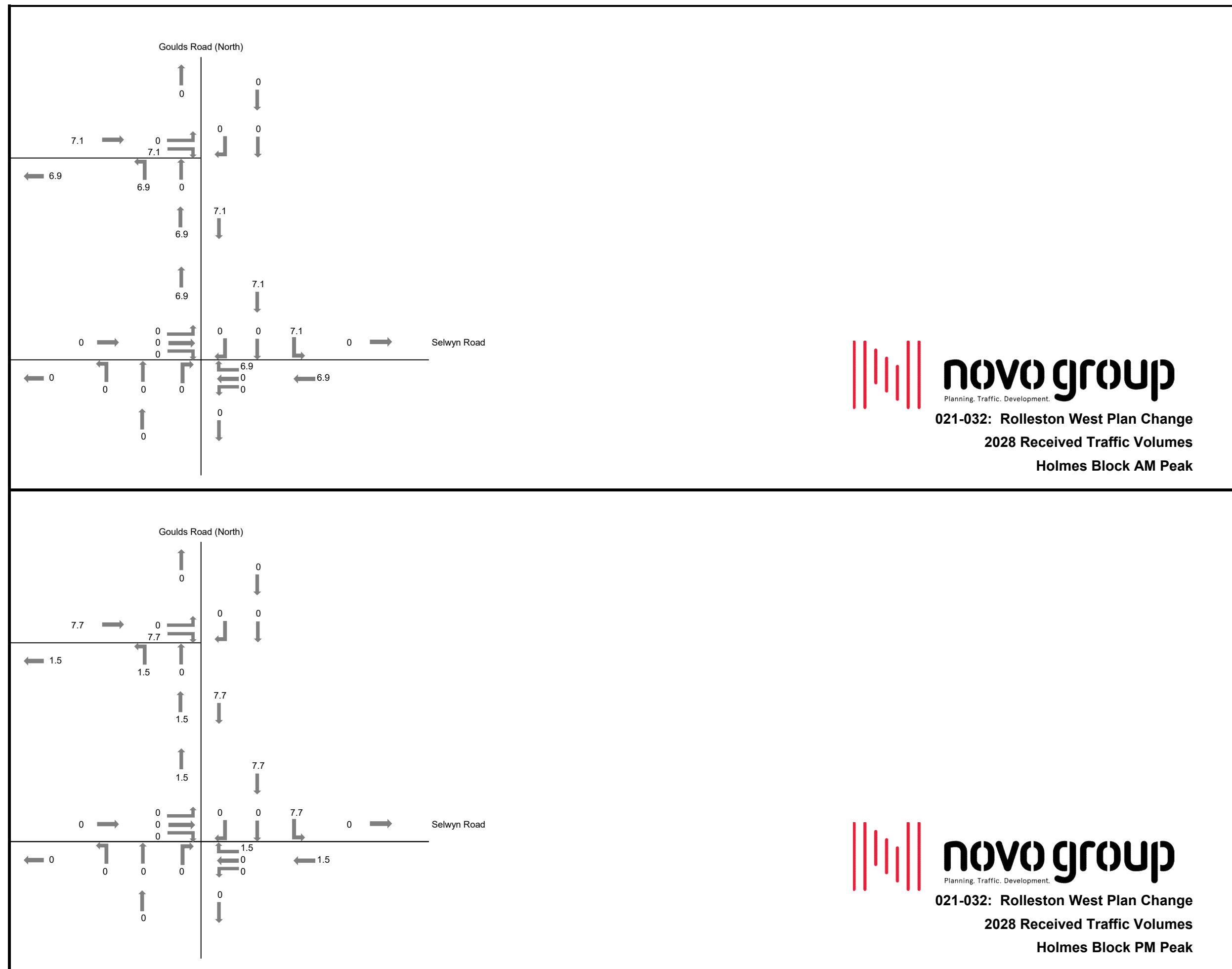
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2028 Received Traffic Volumes
Holmes Block AM Peak

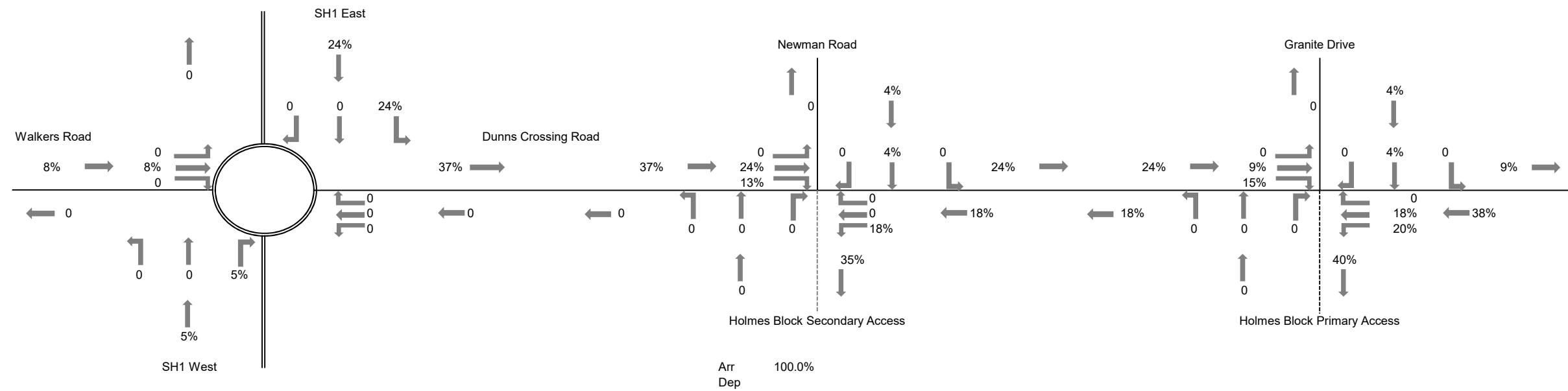


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2028 Received Traffic Volumes
Holmes Block PM Peak

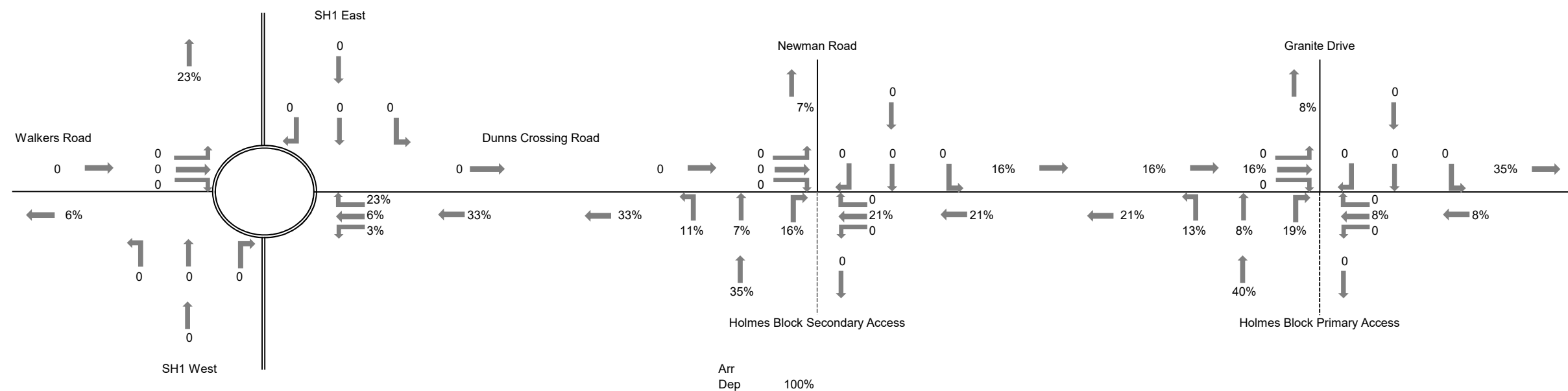




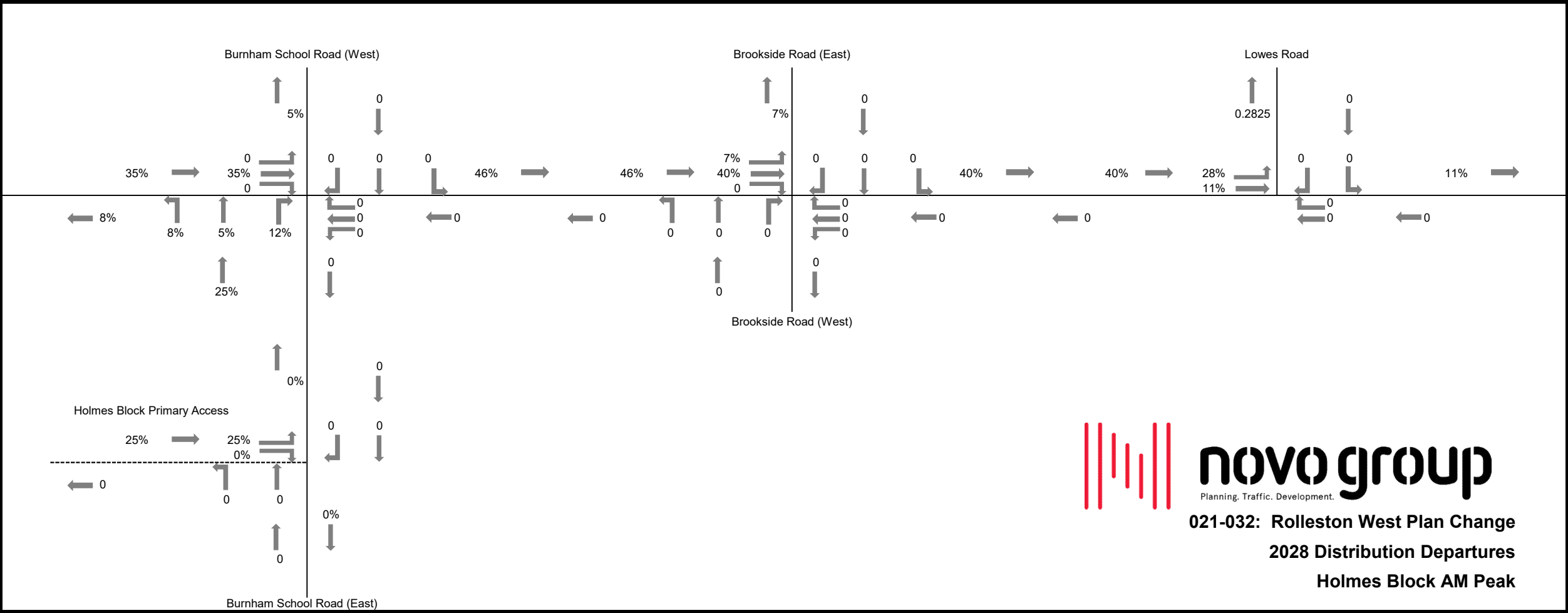
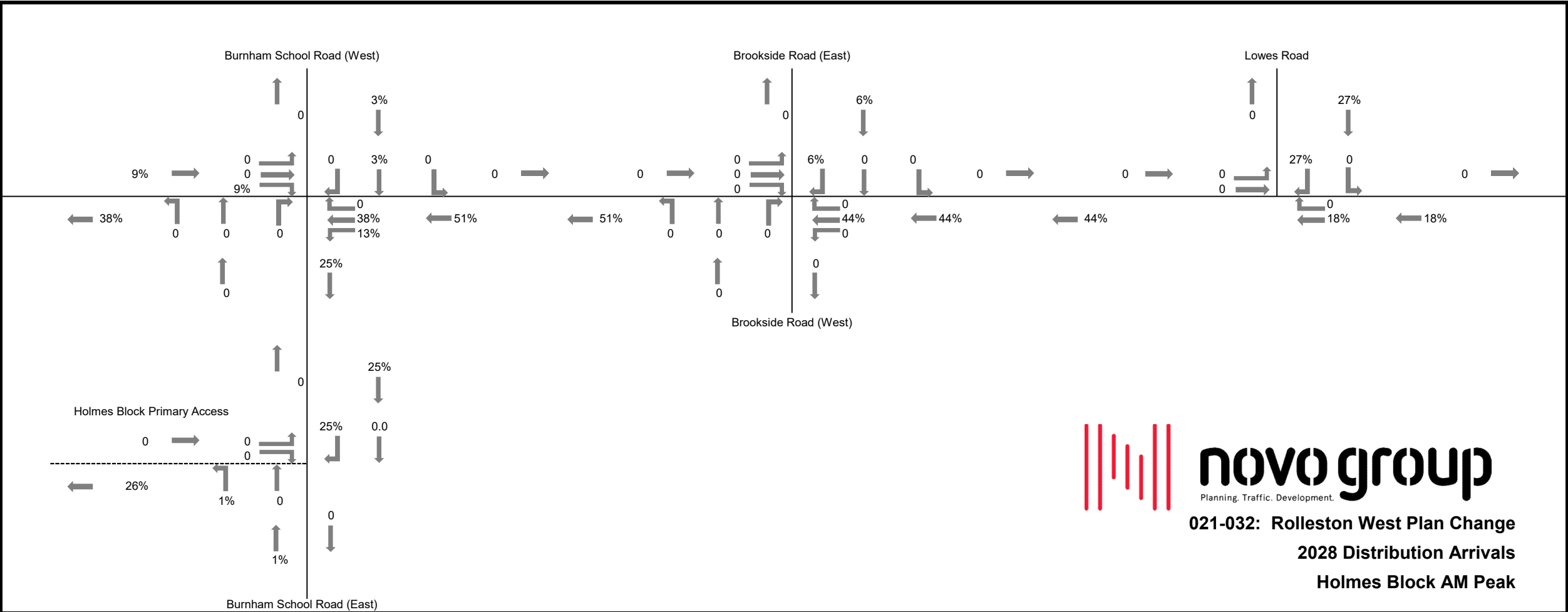


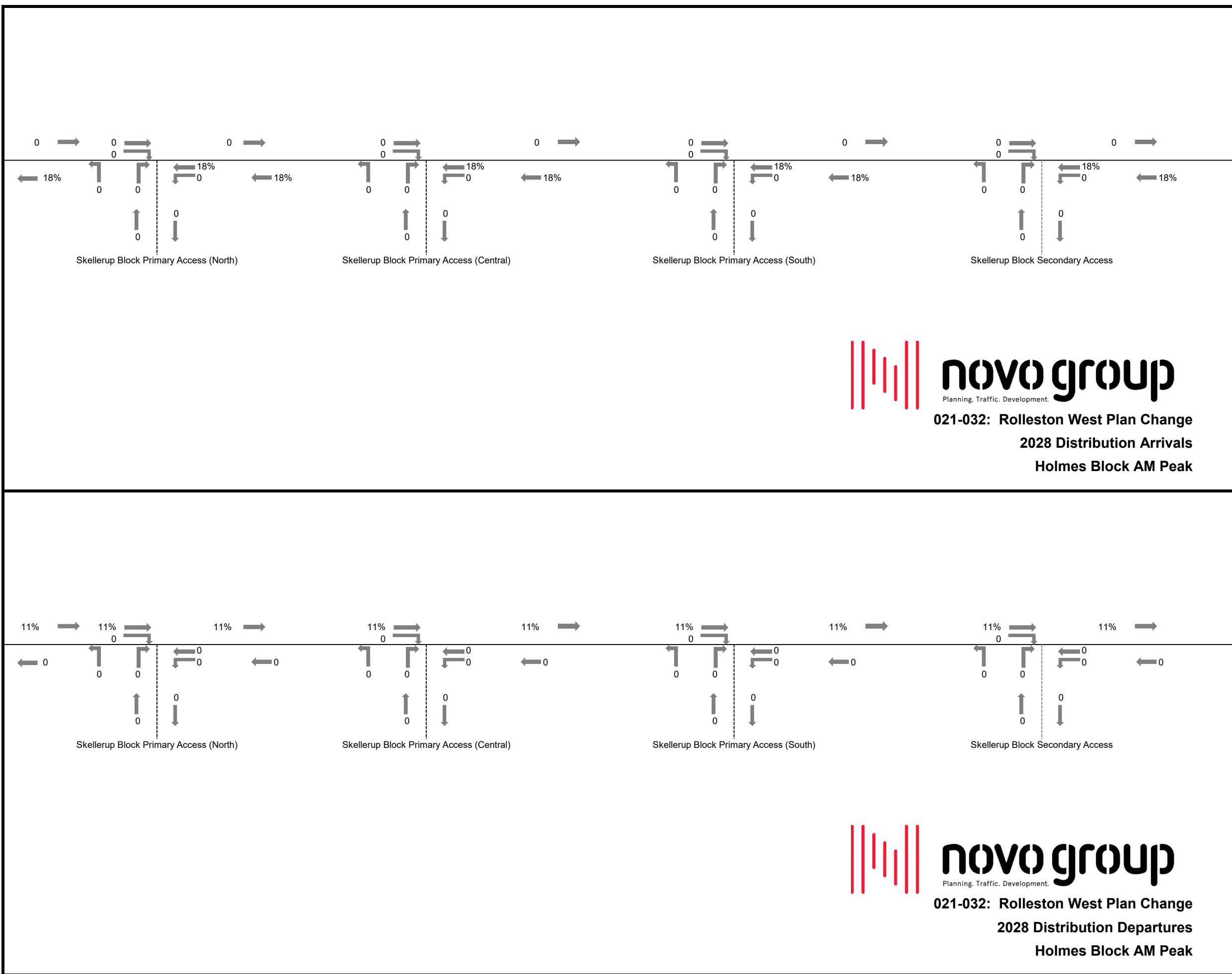


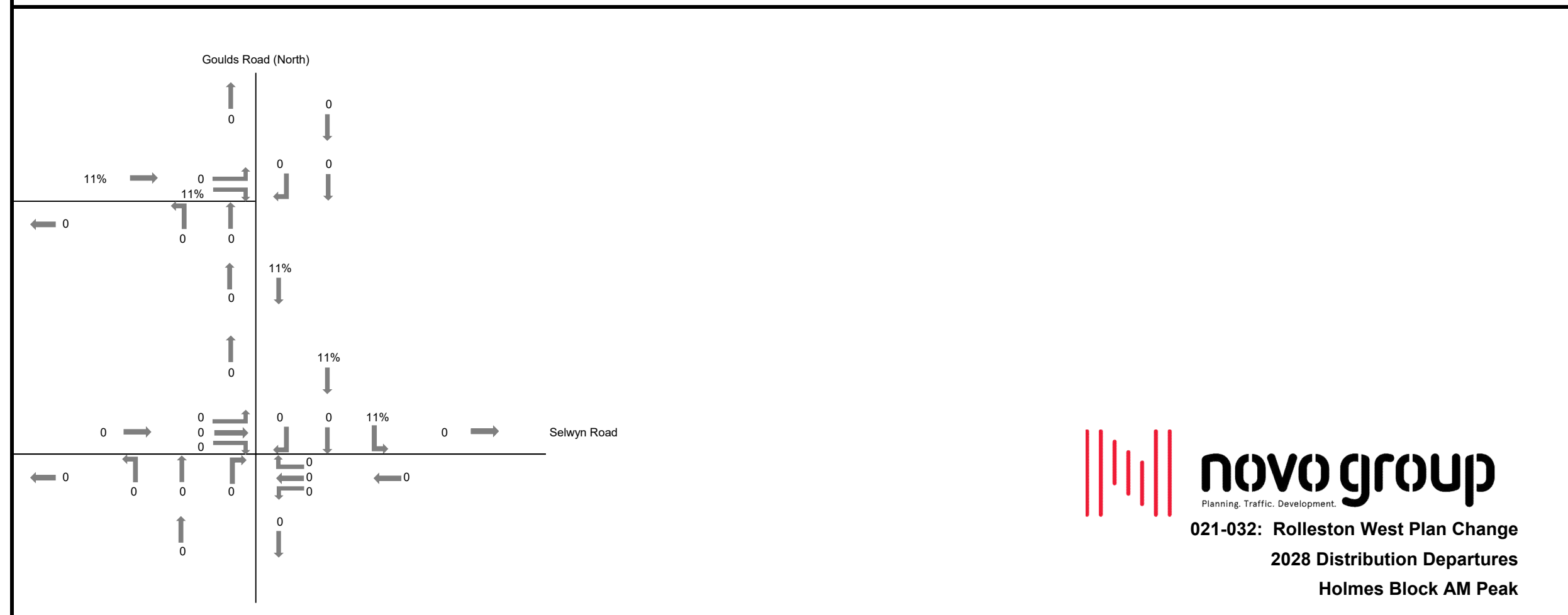
021-032: Rolleston West Plan Change
2028 Distribution Arrivals
Holmes Block AM Peak

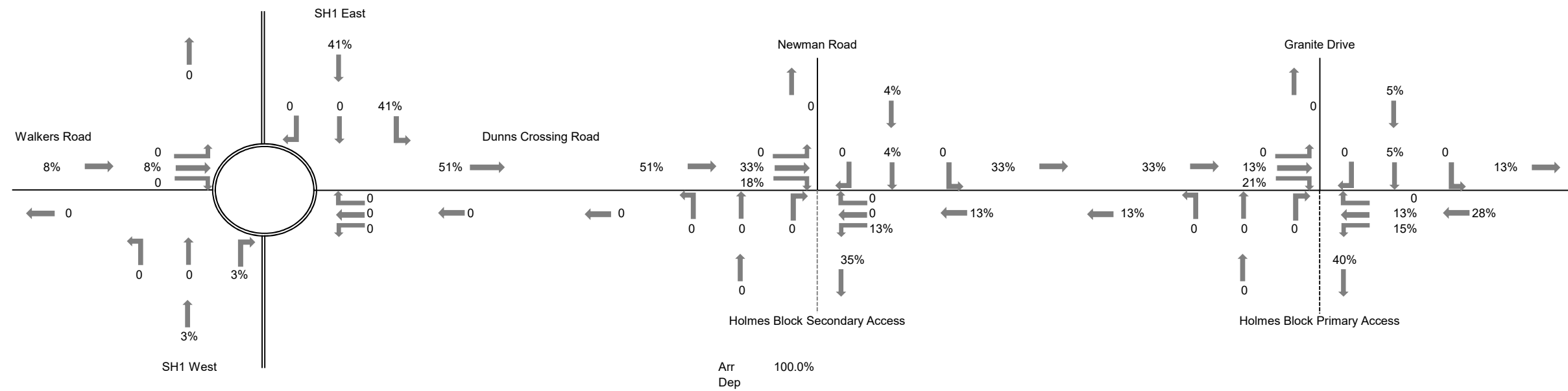


021-032: Rolleston West Plan Change
2028 Distribution Departures
Holmes Block AM Peak

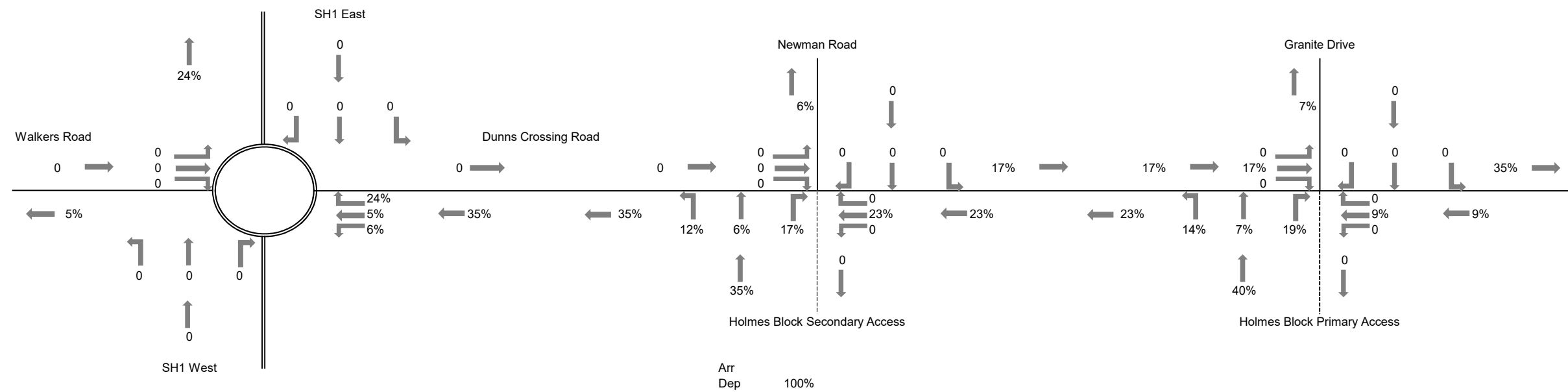




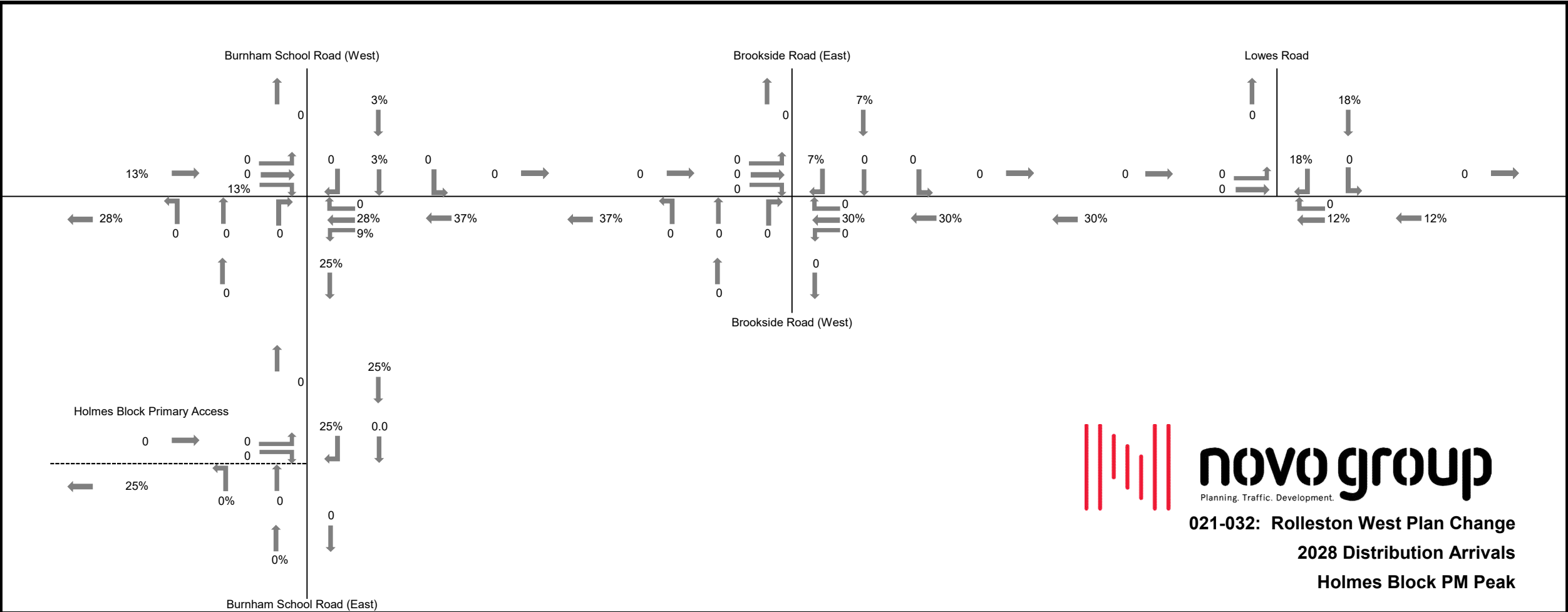




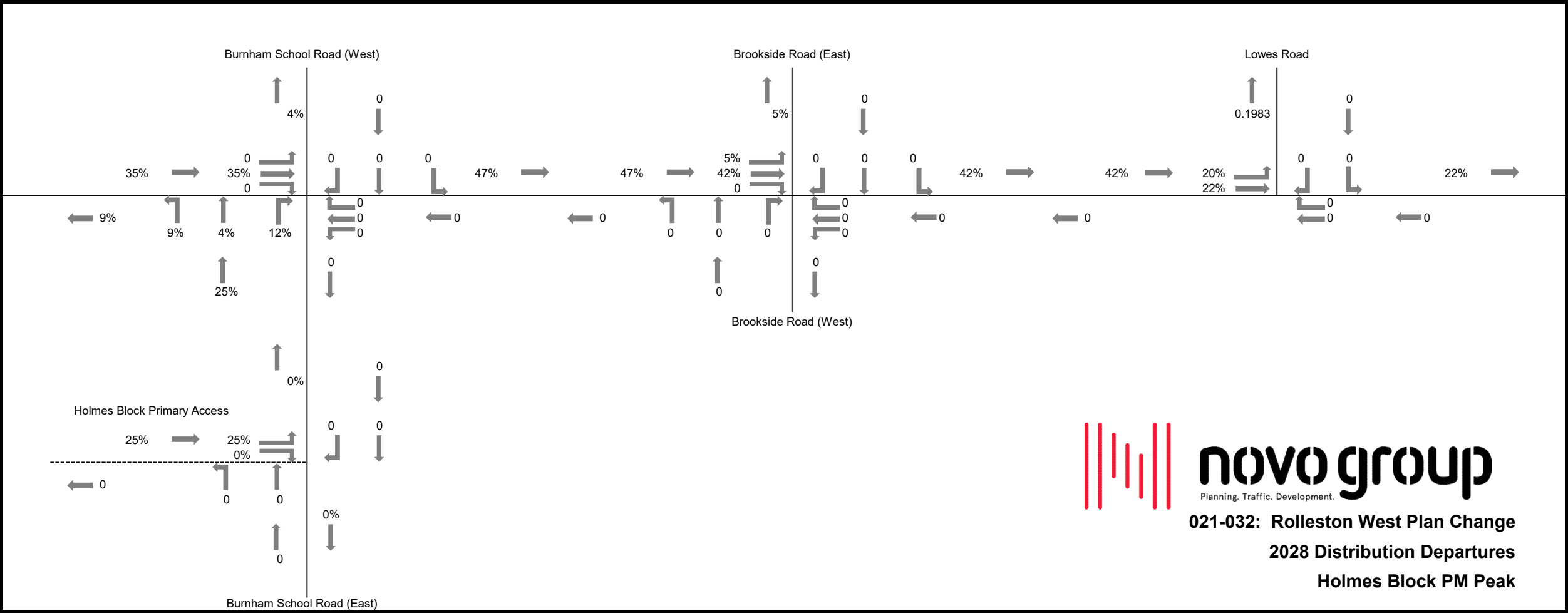
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2028 Distribution Arrivals
Holmes Block PM Peak



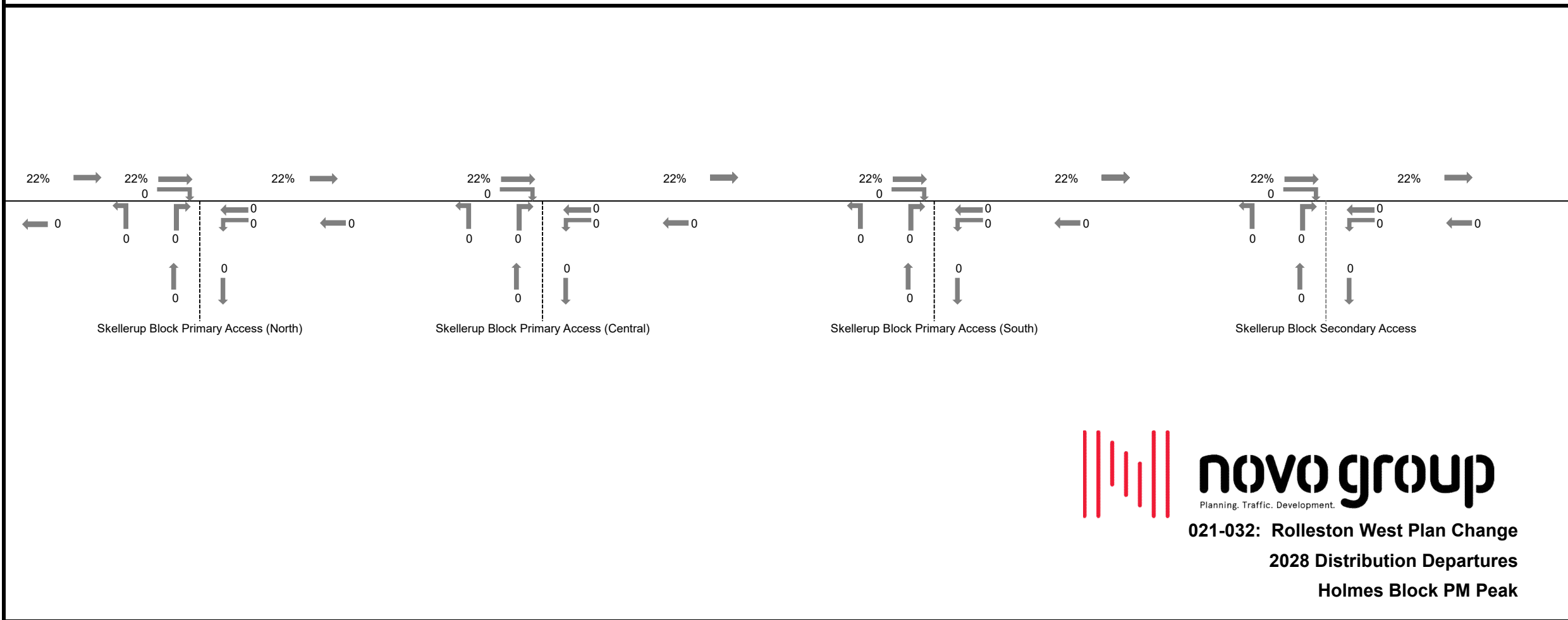
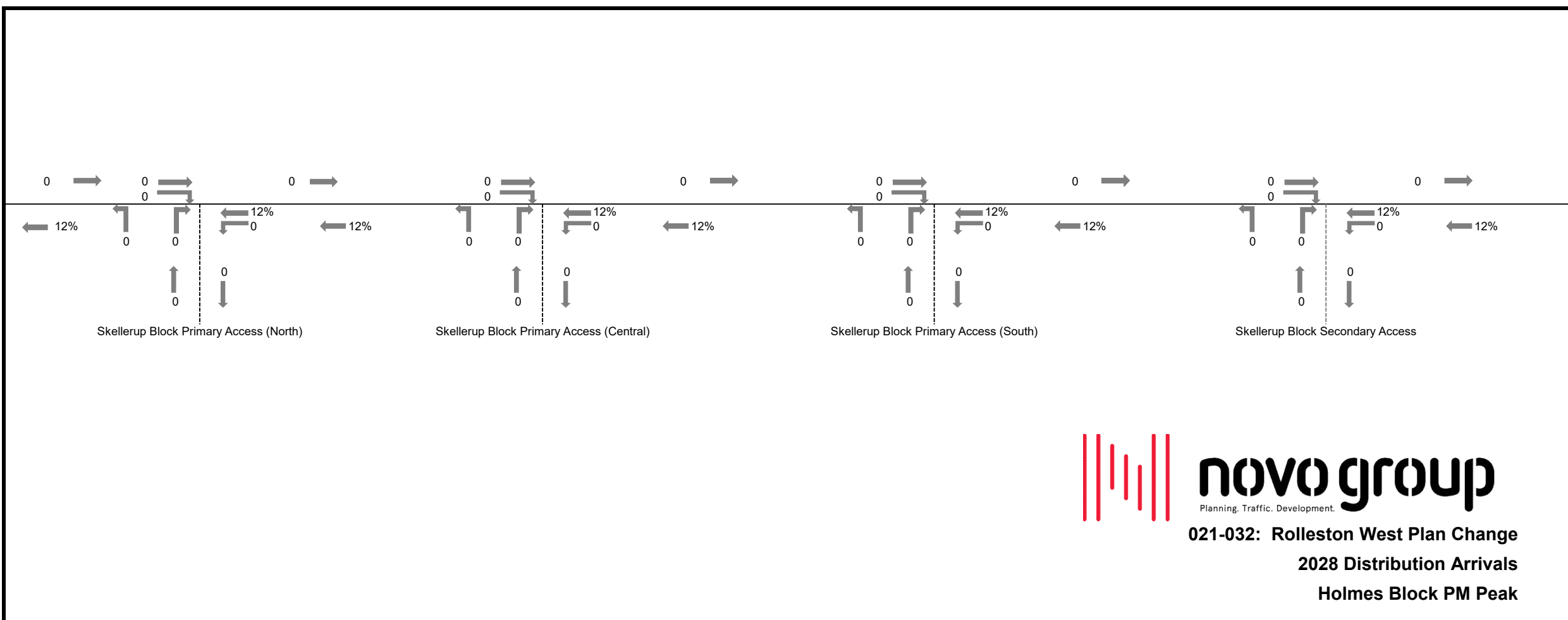
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2028 Distribution Departures
Holmes Block PM Peak

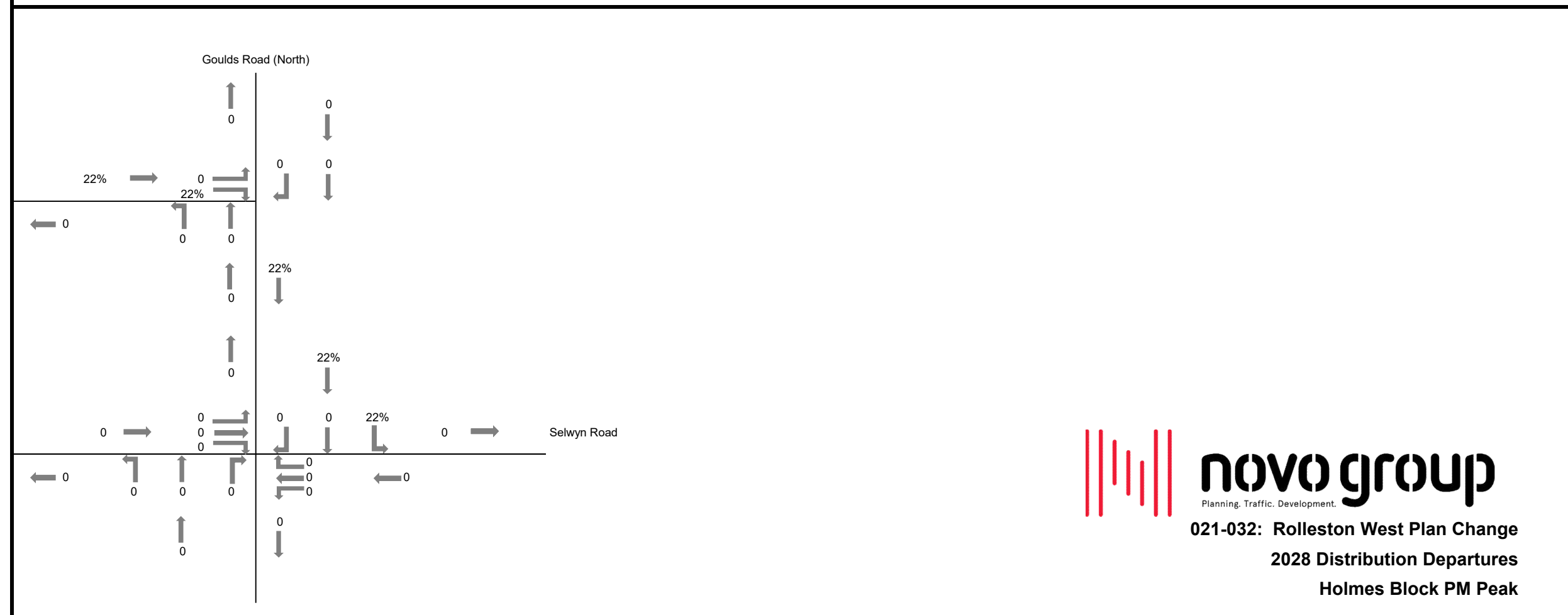


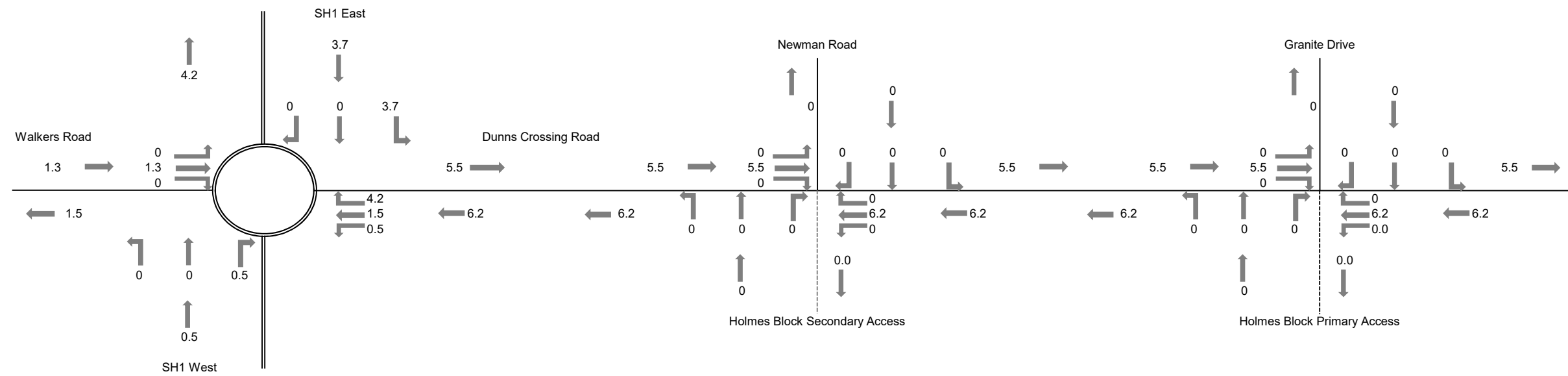
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Holmes Block PM Peak



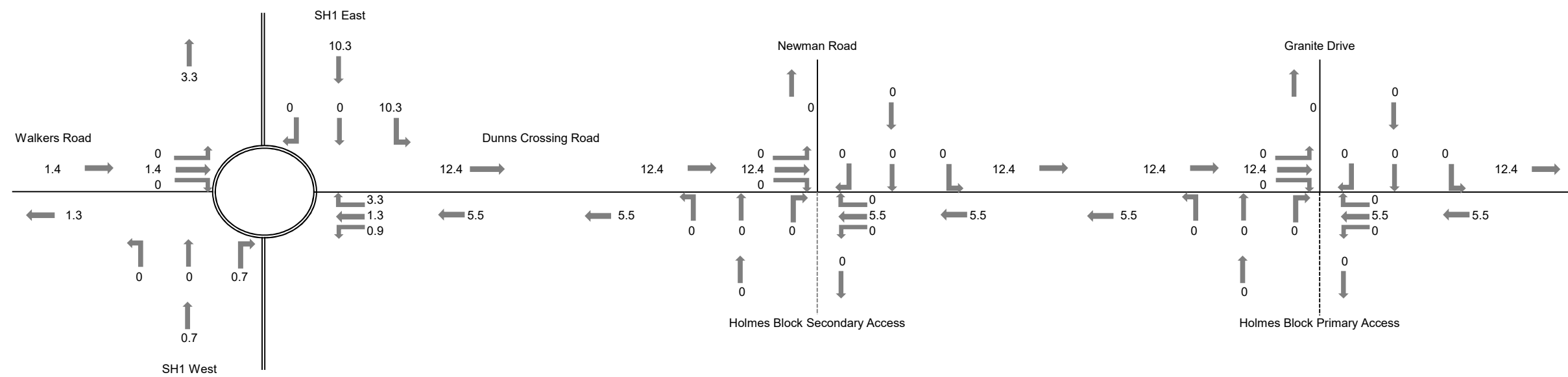
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2028 Distribution Departures
Holmes Block PM Peak



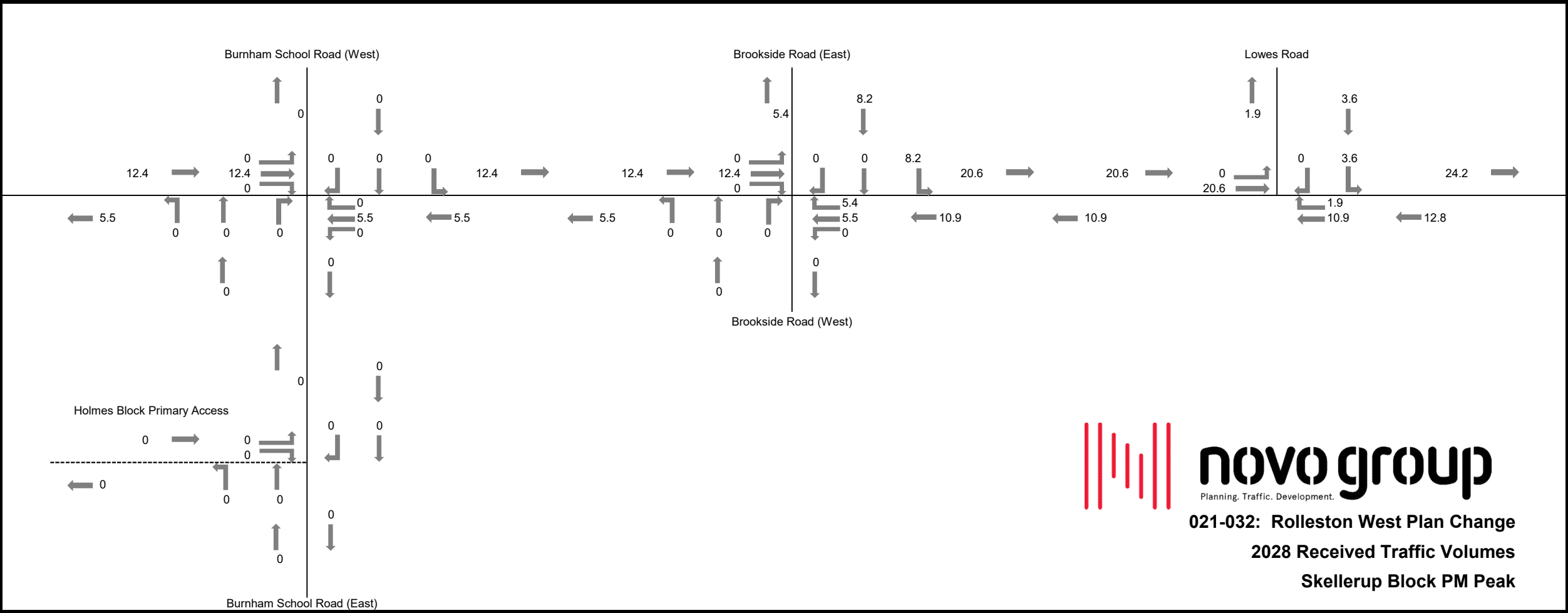
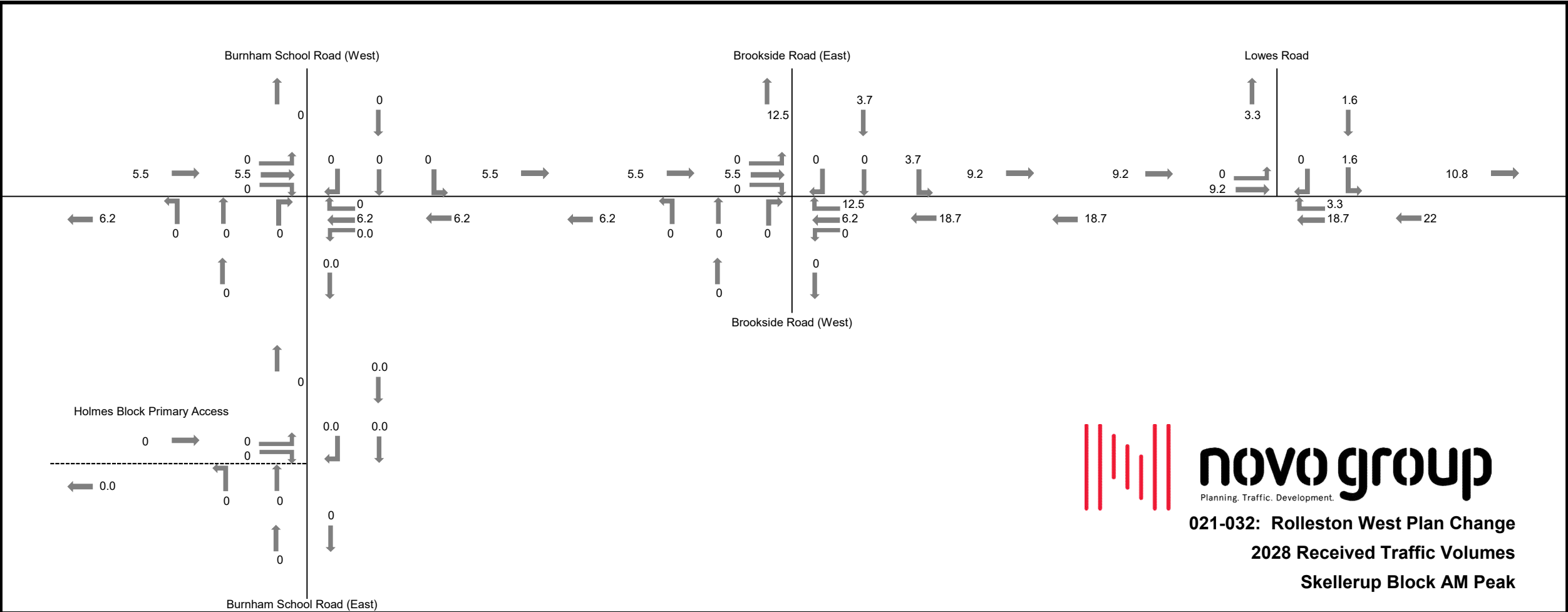


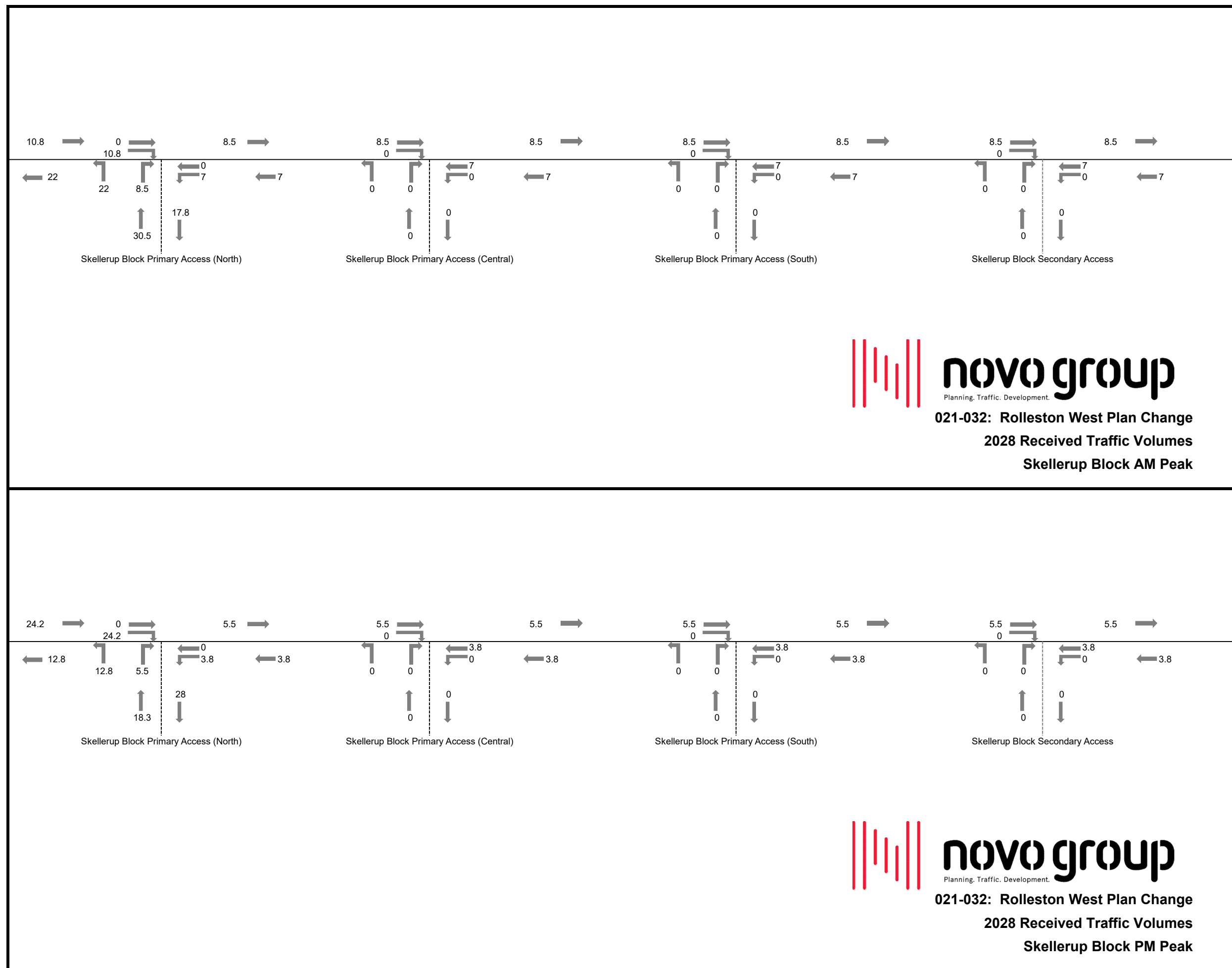


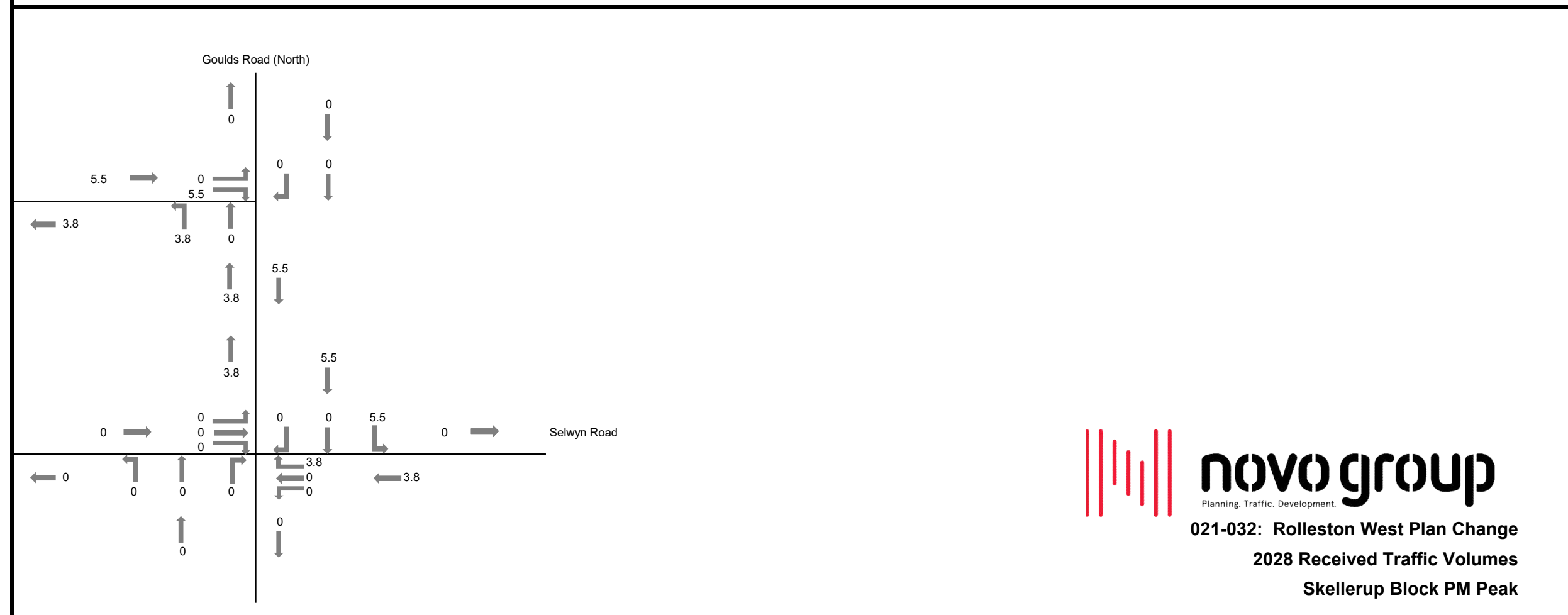
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2028 Received Traffic Volumes
Skellerup Block AM Peak

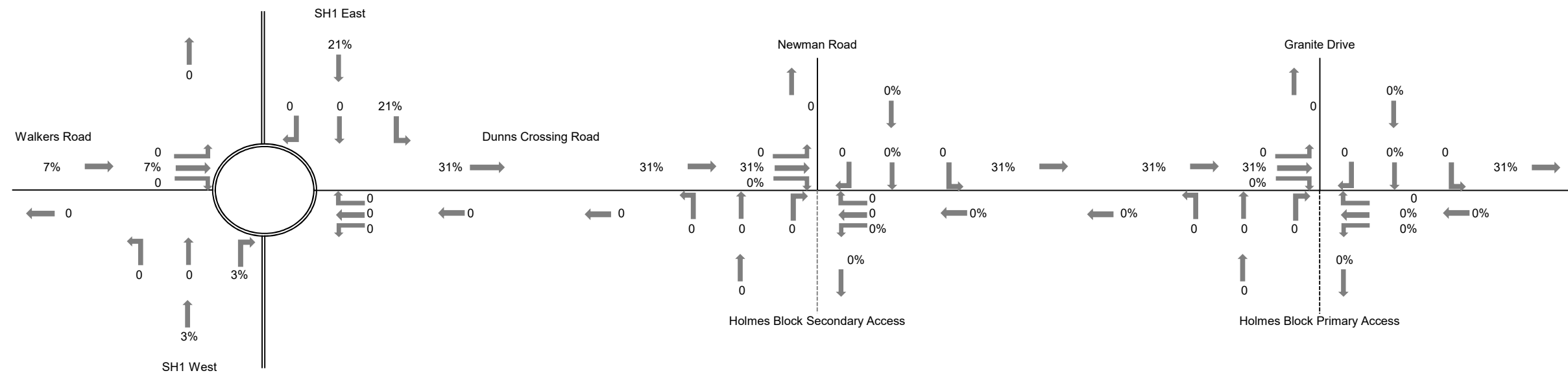


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Skellerup Block PM Peak

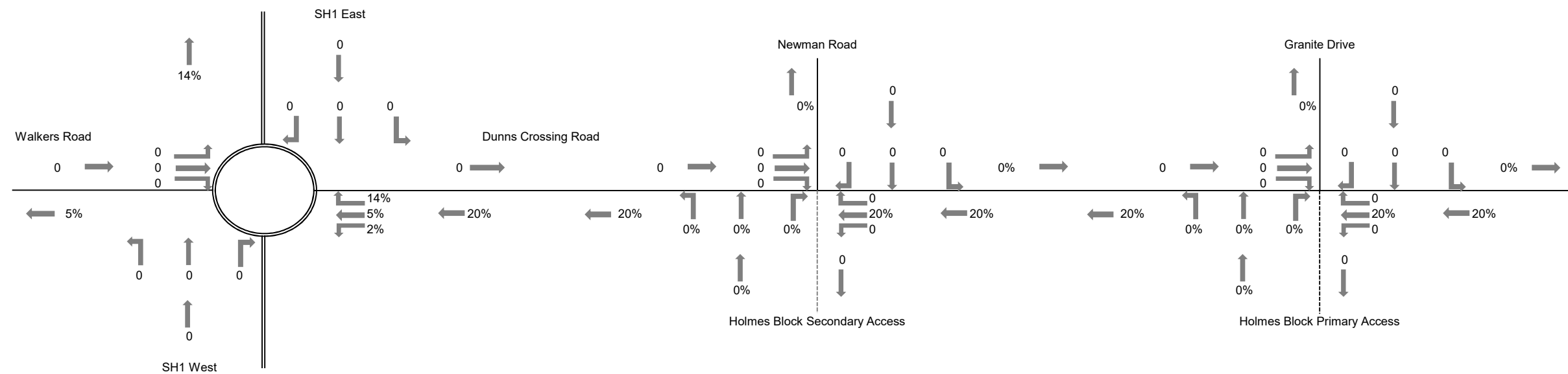




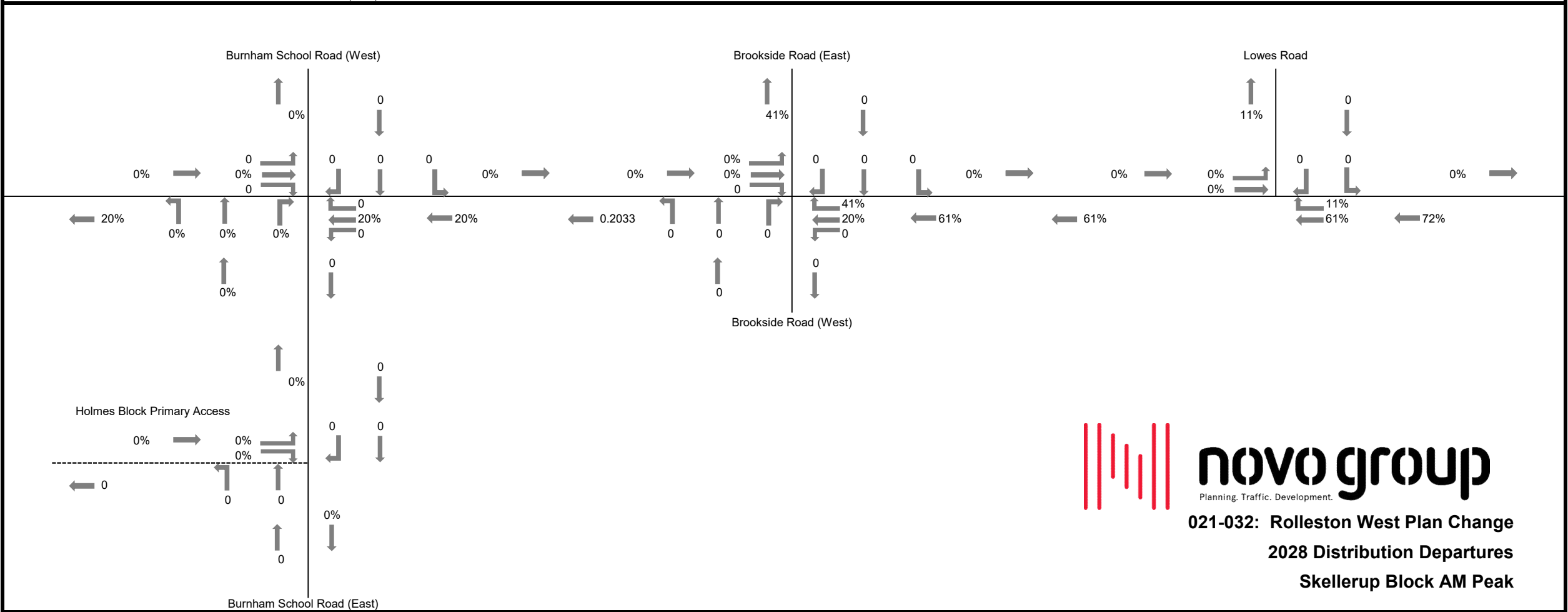
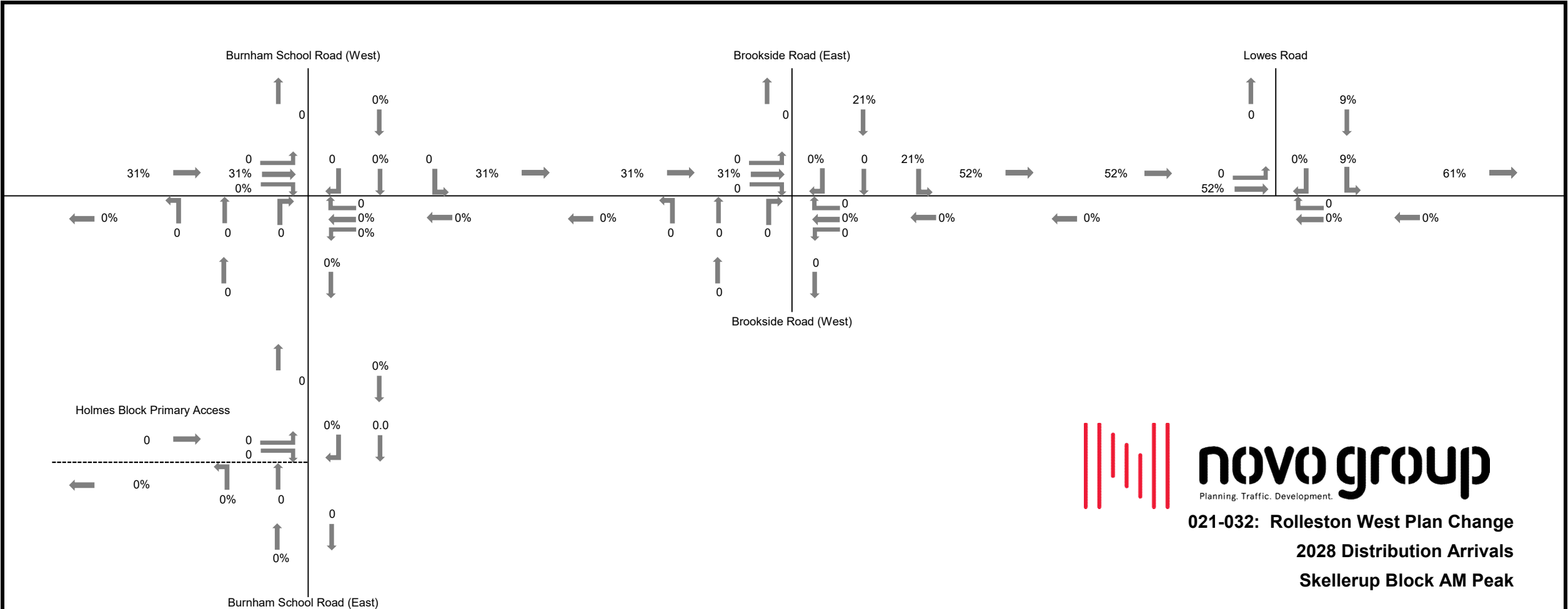


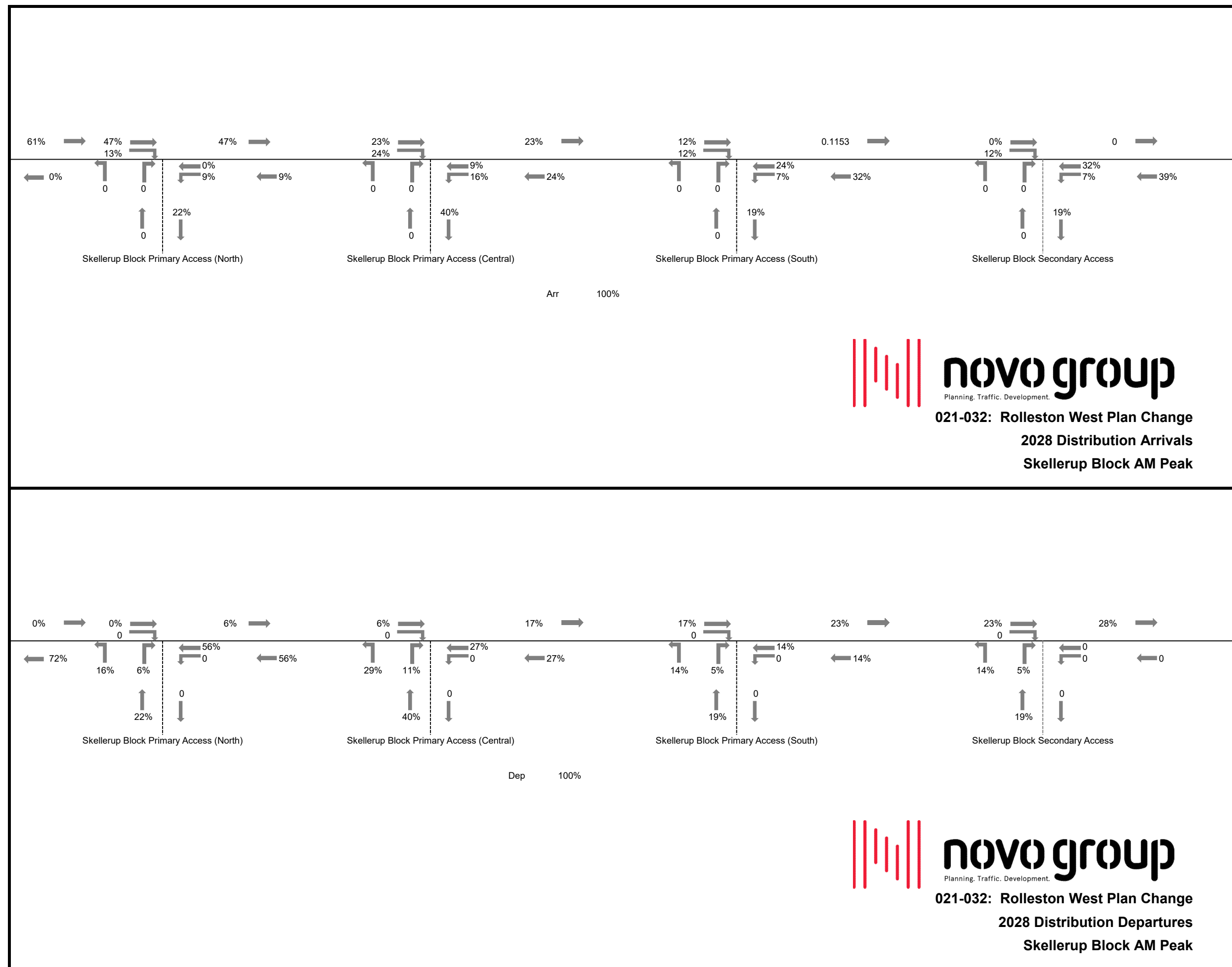


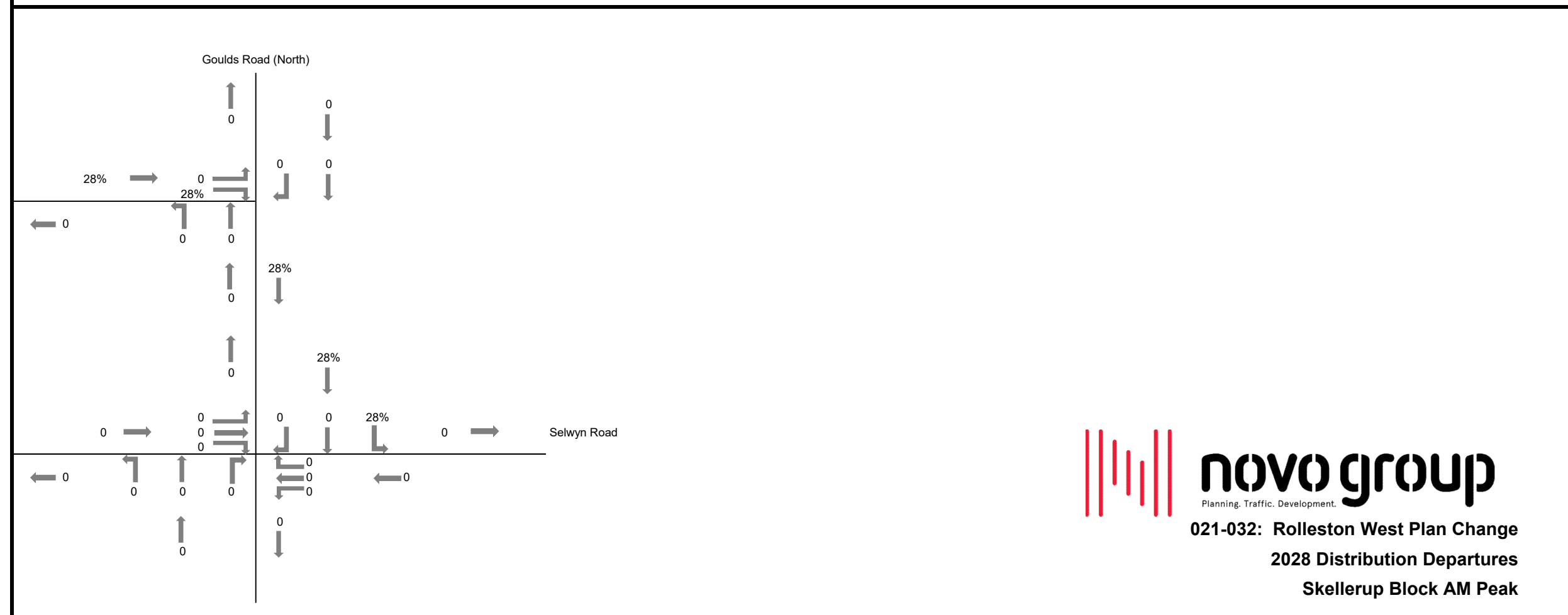
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Skellerup Block AM Peak

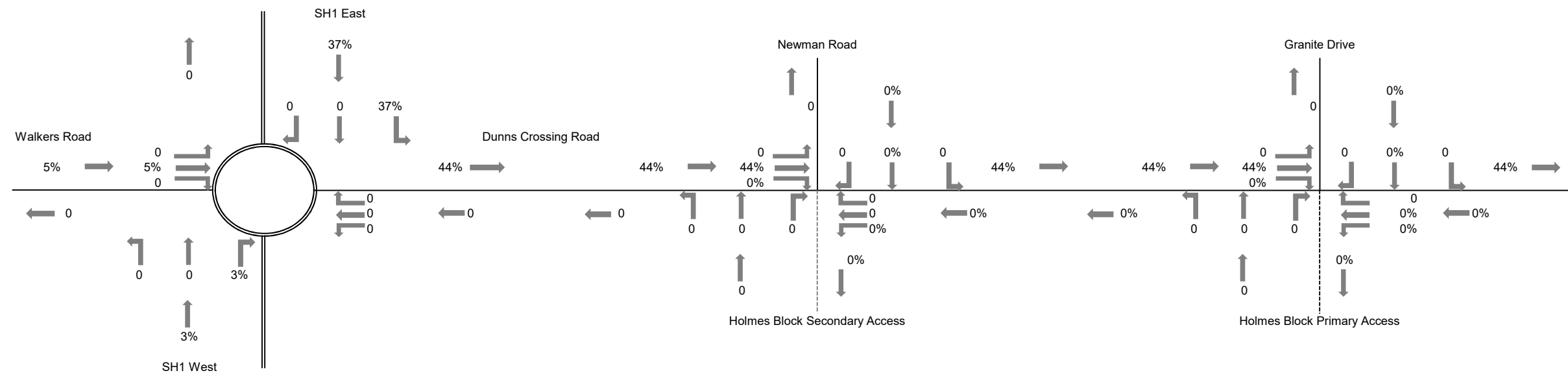


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2028 Distribution Departures
Skellerup Block AM Peak

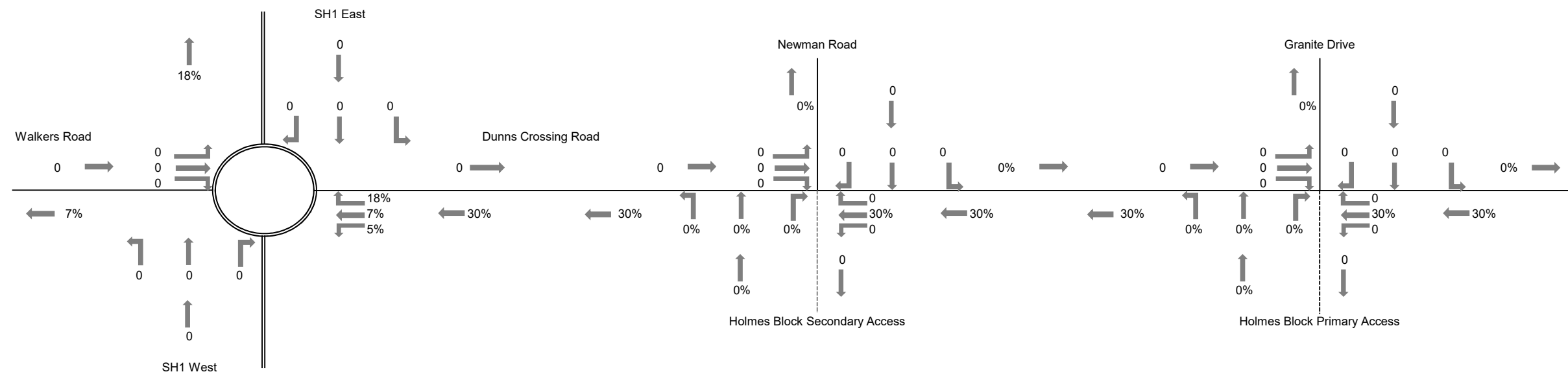




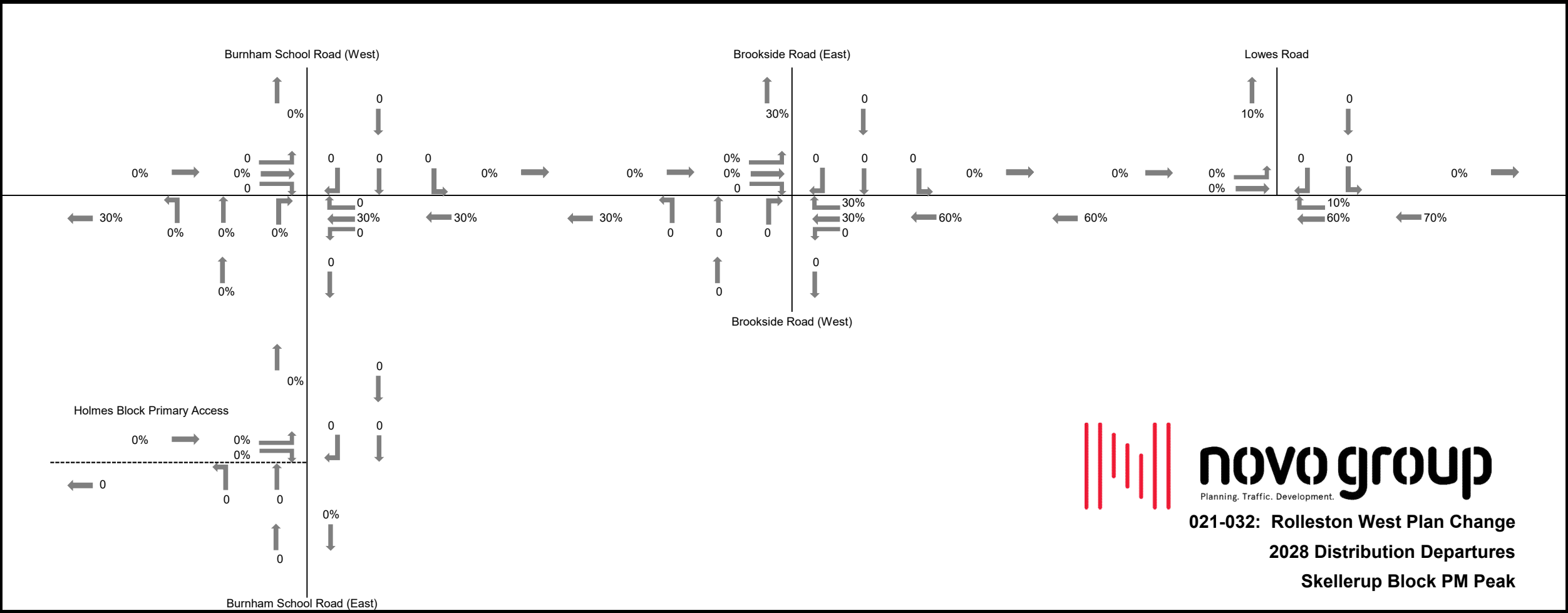
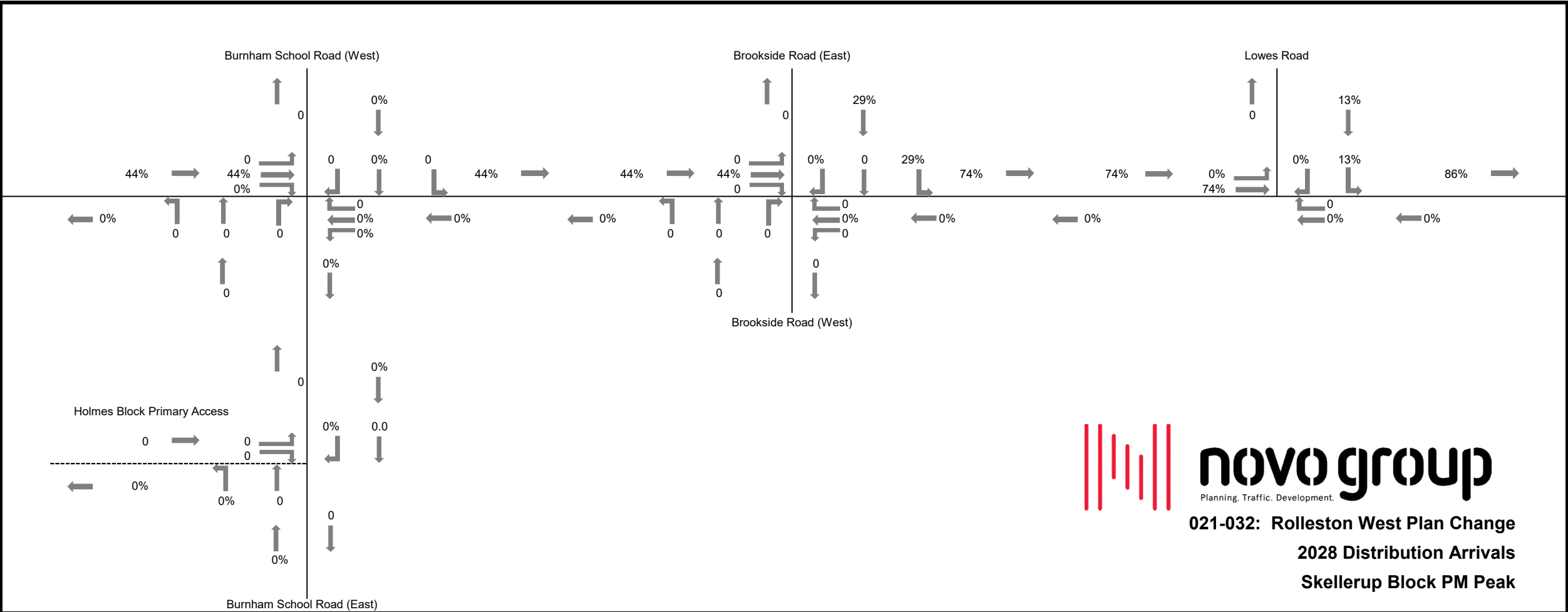


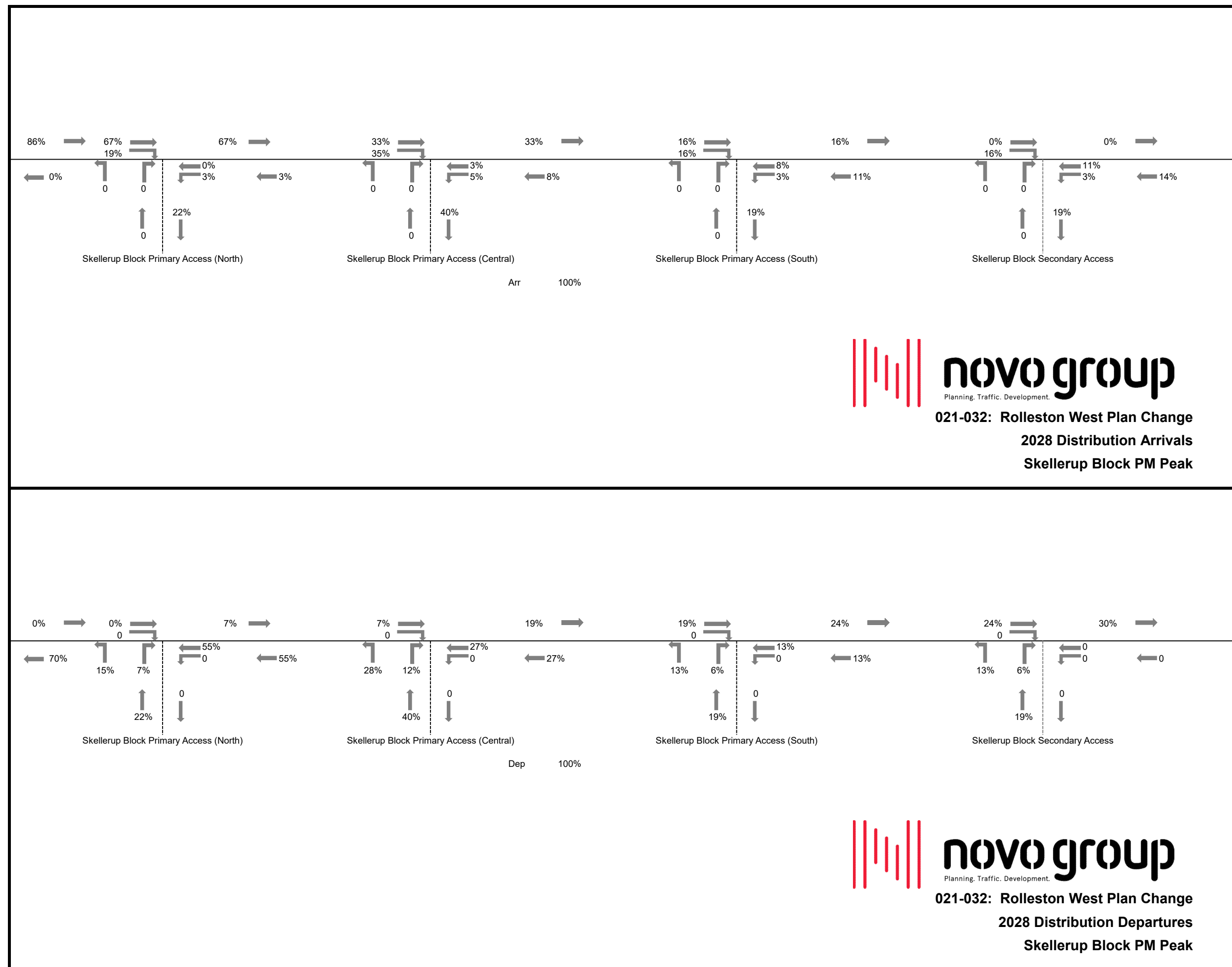


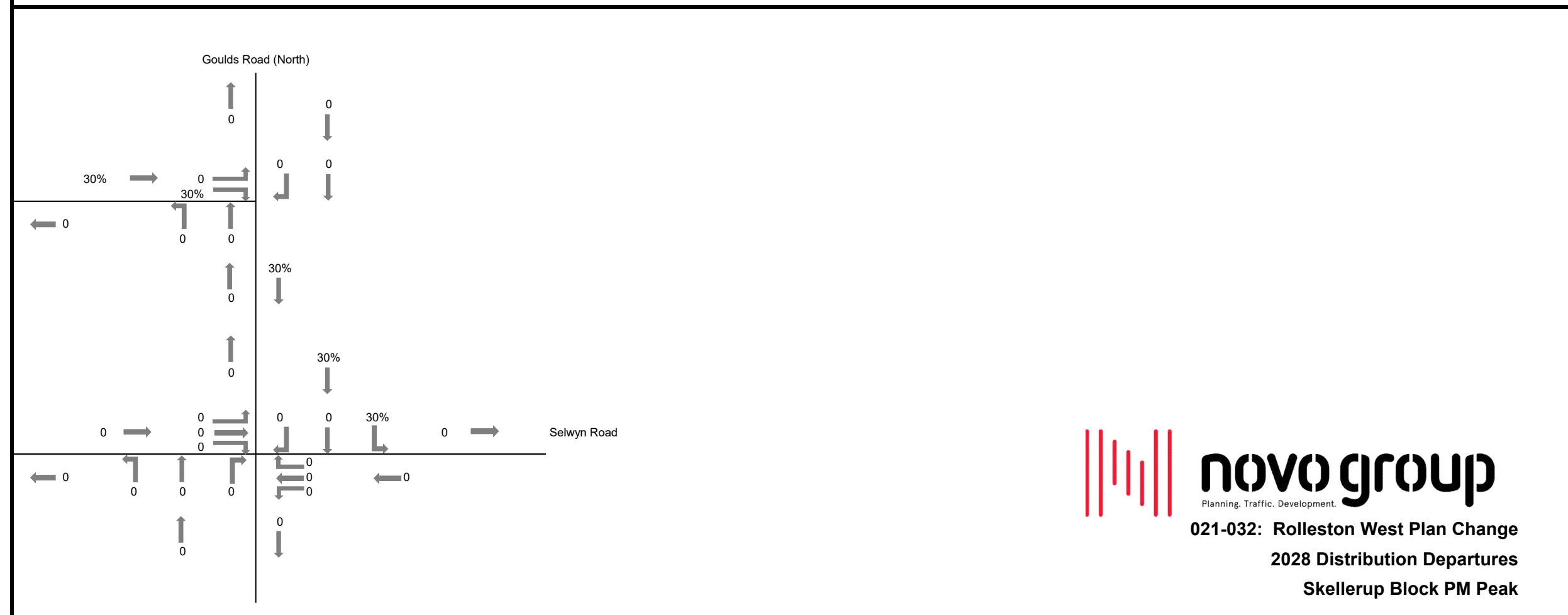
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2028 Distribution Arrivals
Skellerup Block PM Peak

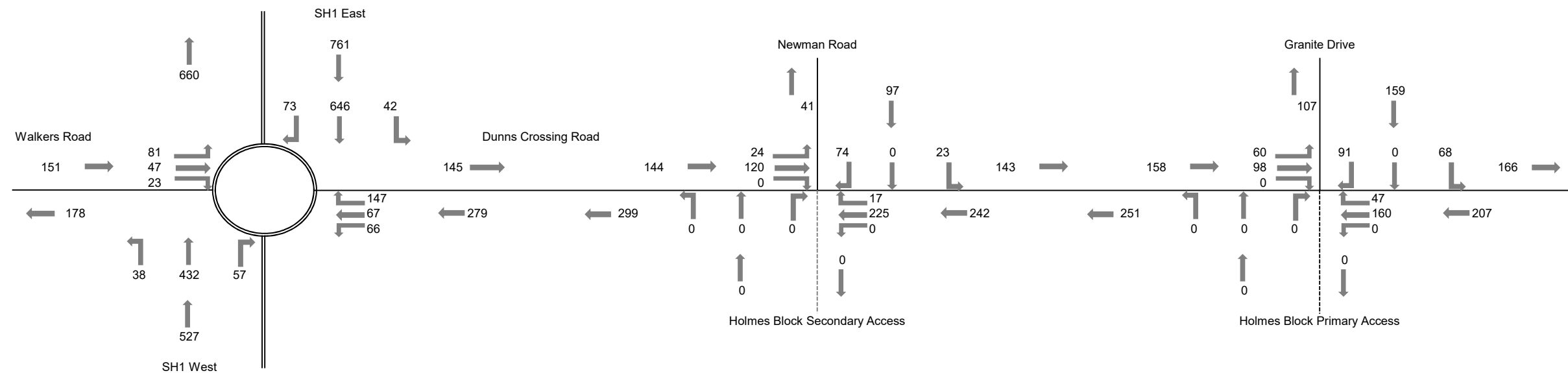


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2028 Distribution Departures
Skellerup Block PM Peak

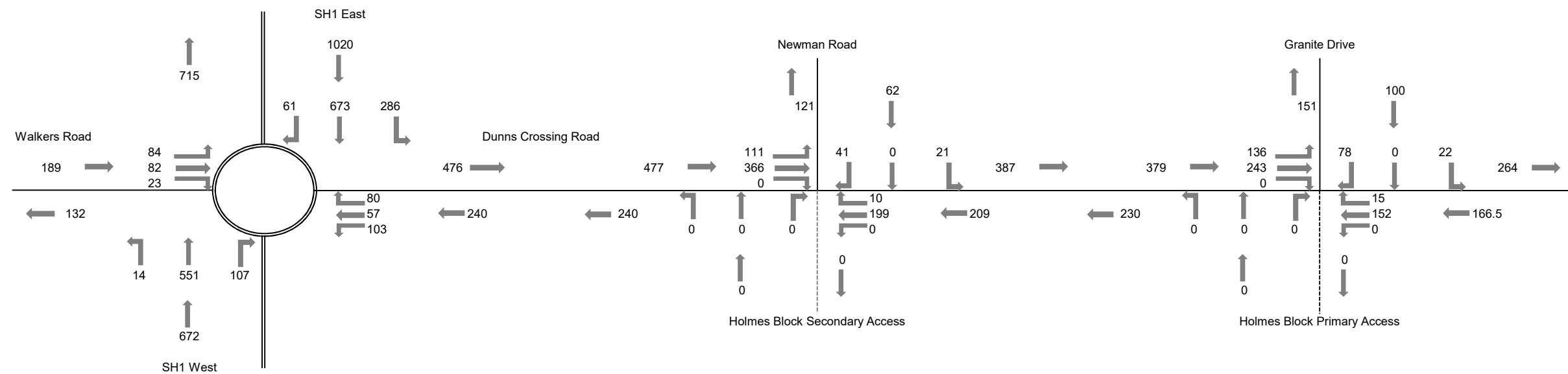




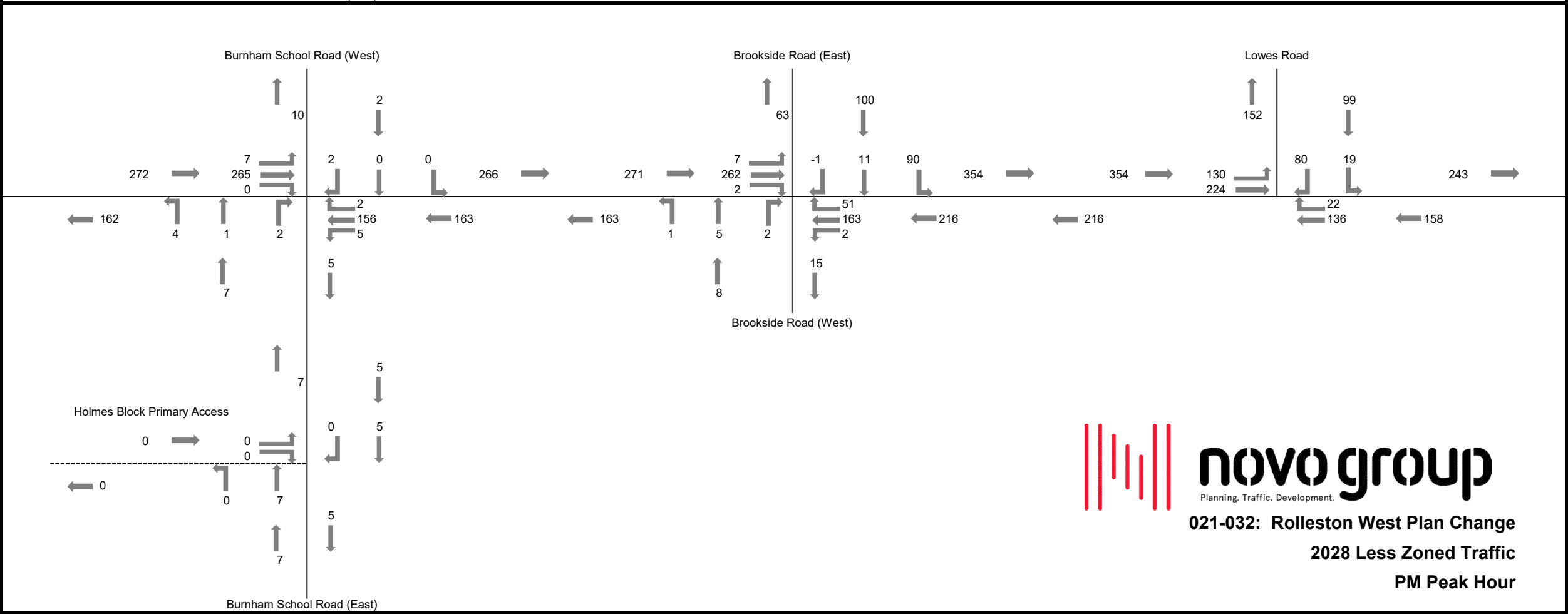
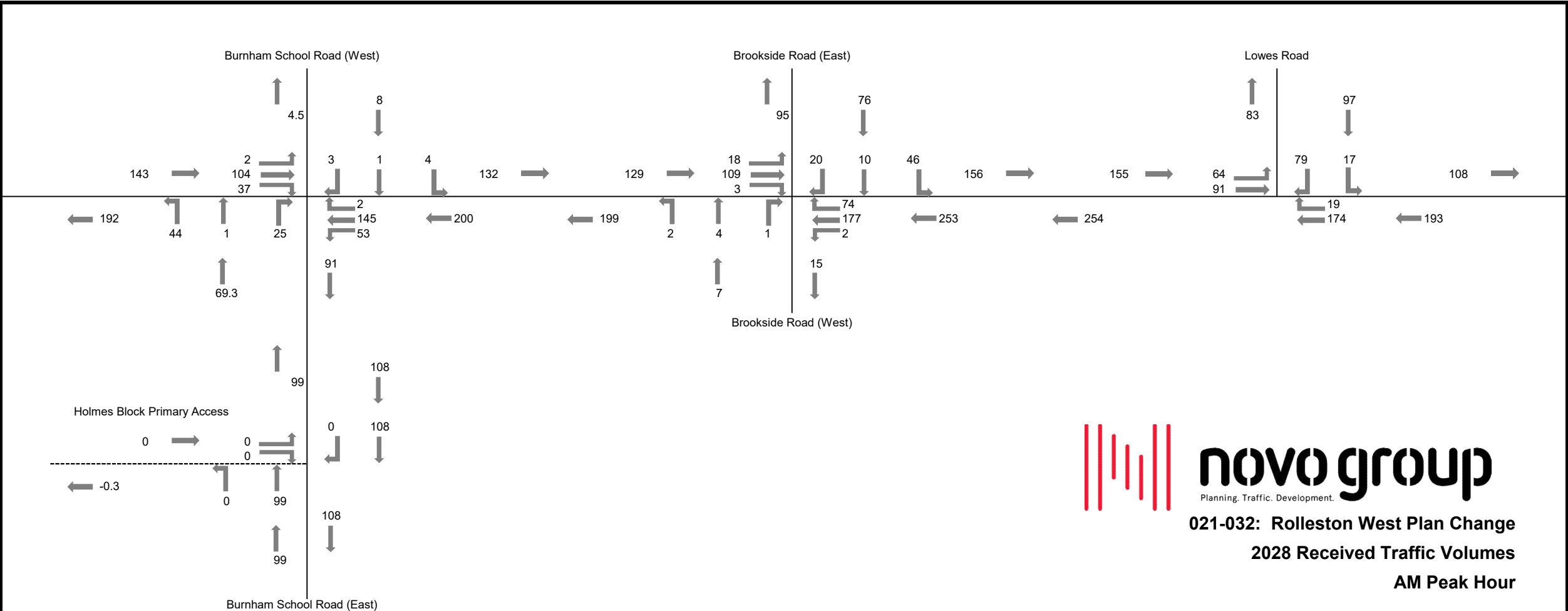


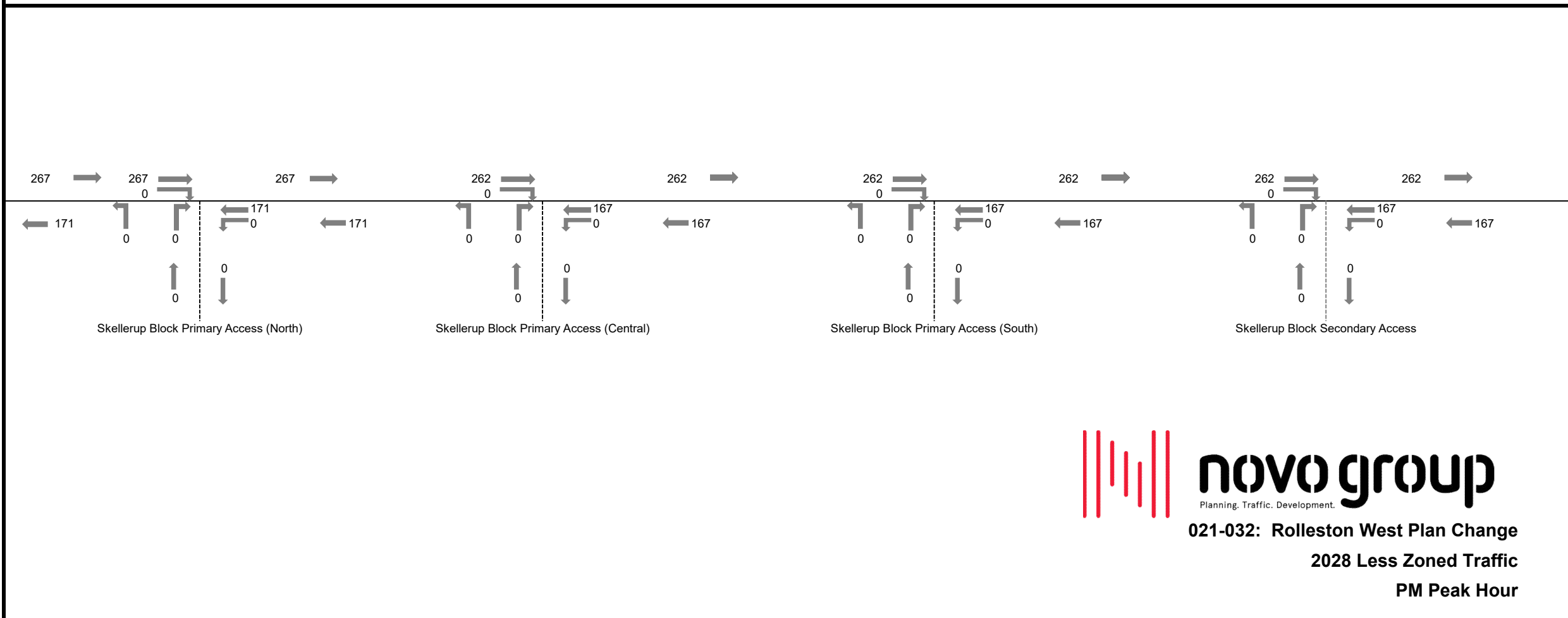
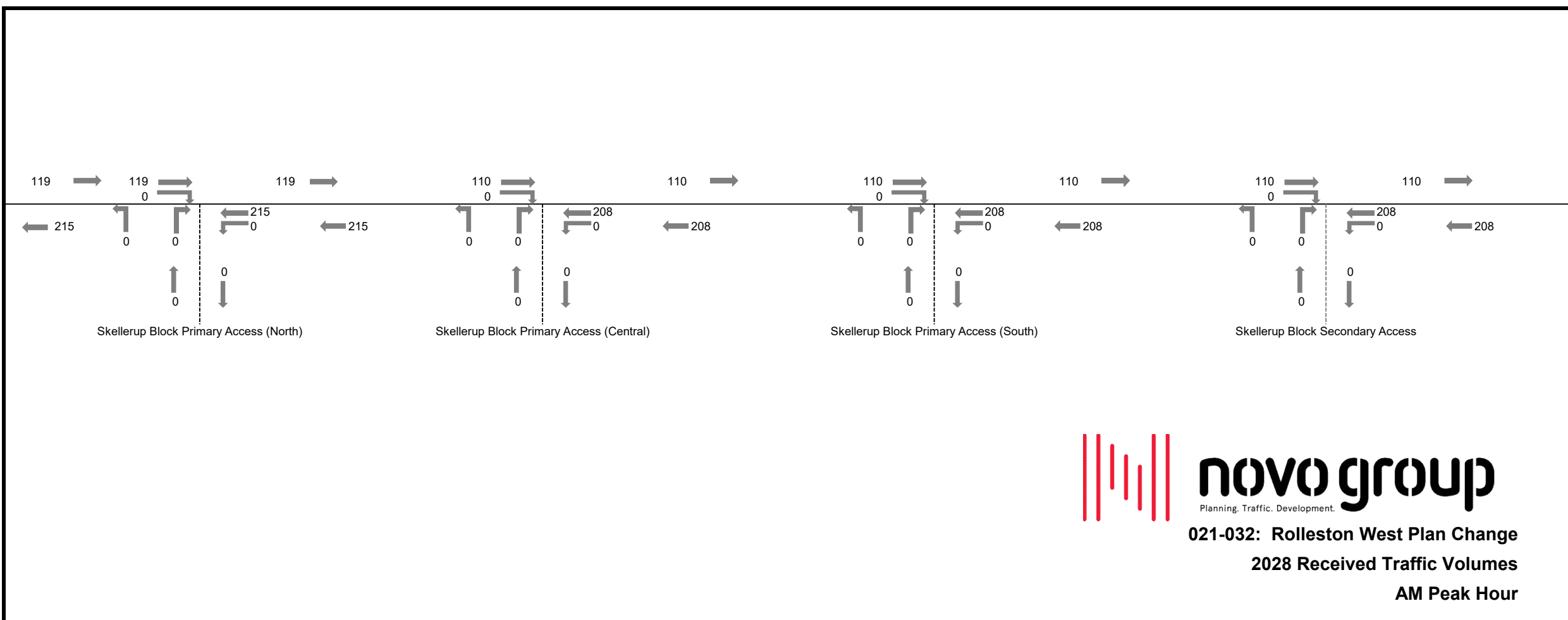


021-032: Rolleston West Plan Change
2028 Less Zoned Traffic
AM Peak Hour



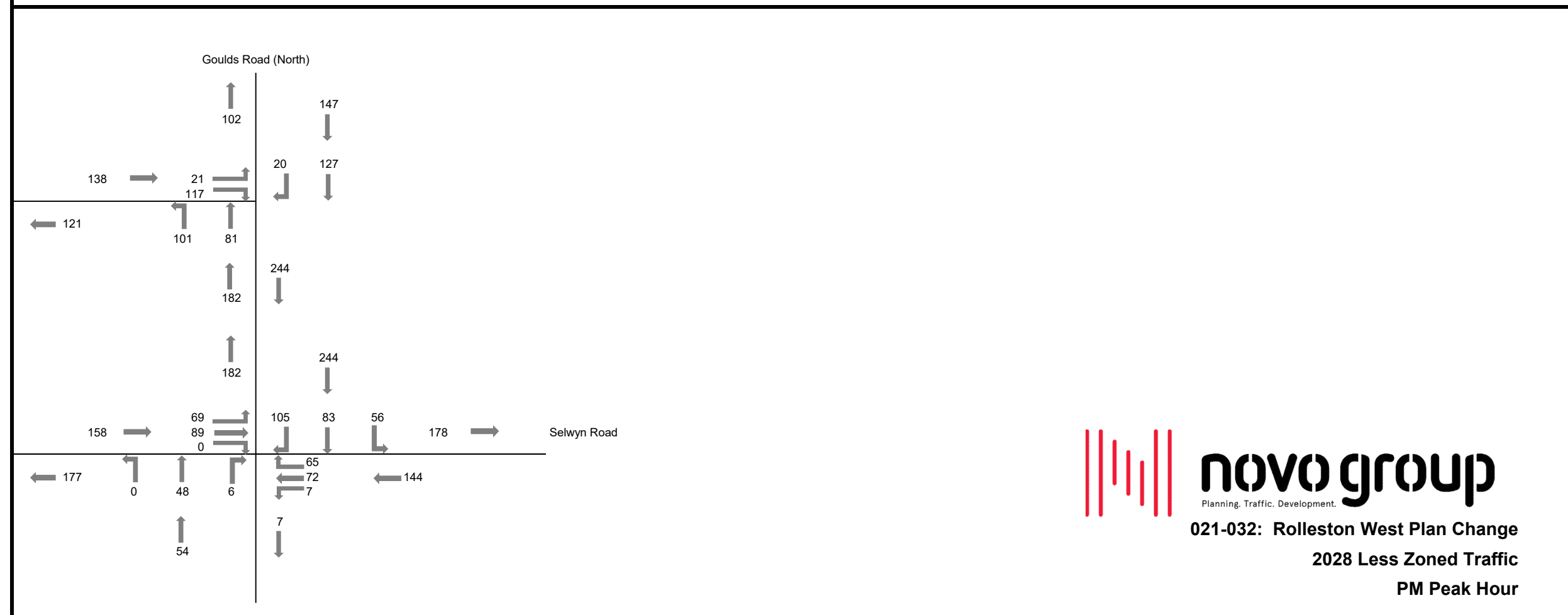
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2028 Less Zoned Traffic
PM Peak Hour



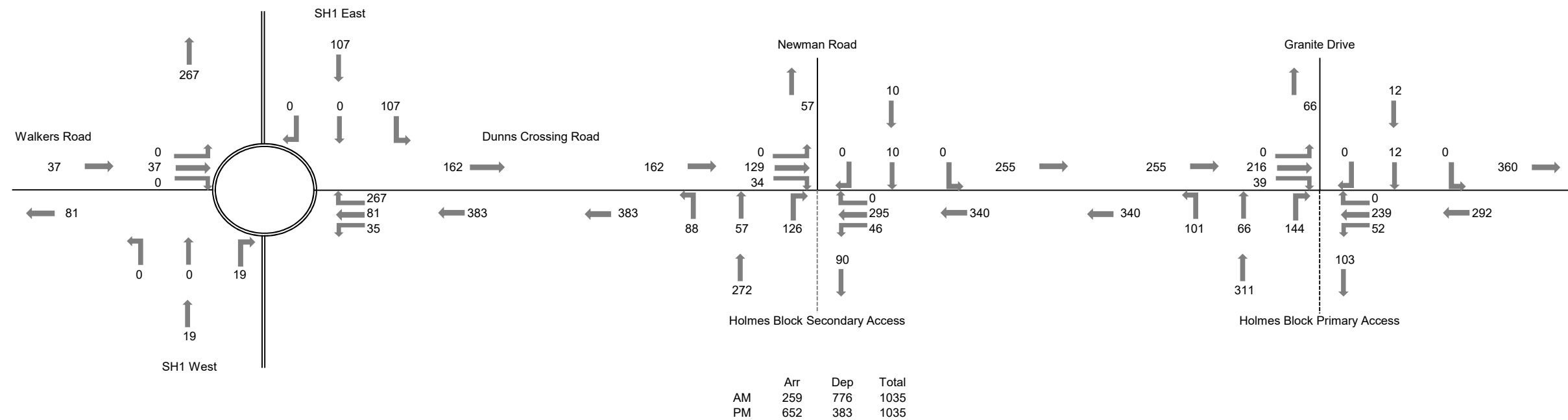




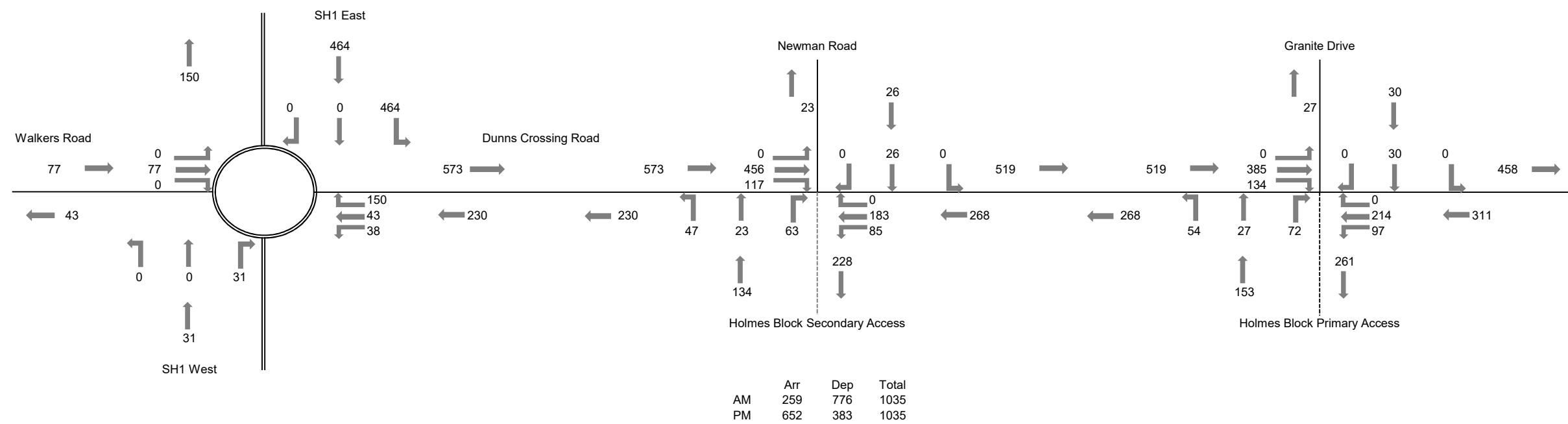
021-032: Rolleston West Plan Change
2028 Received Traffic Volumes
AM Peak Hour



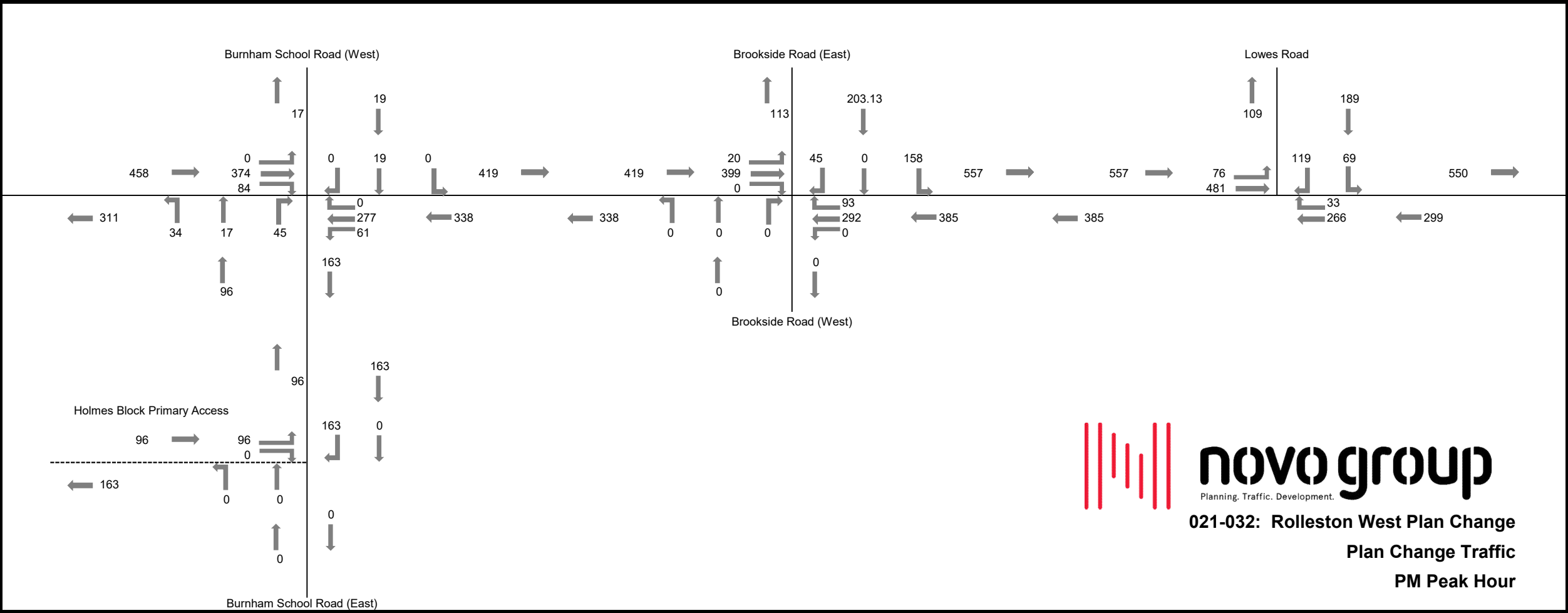
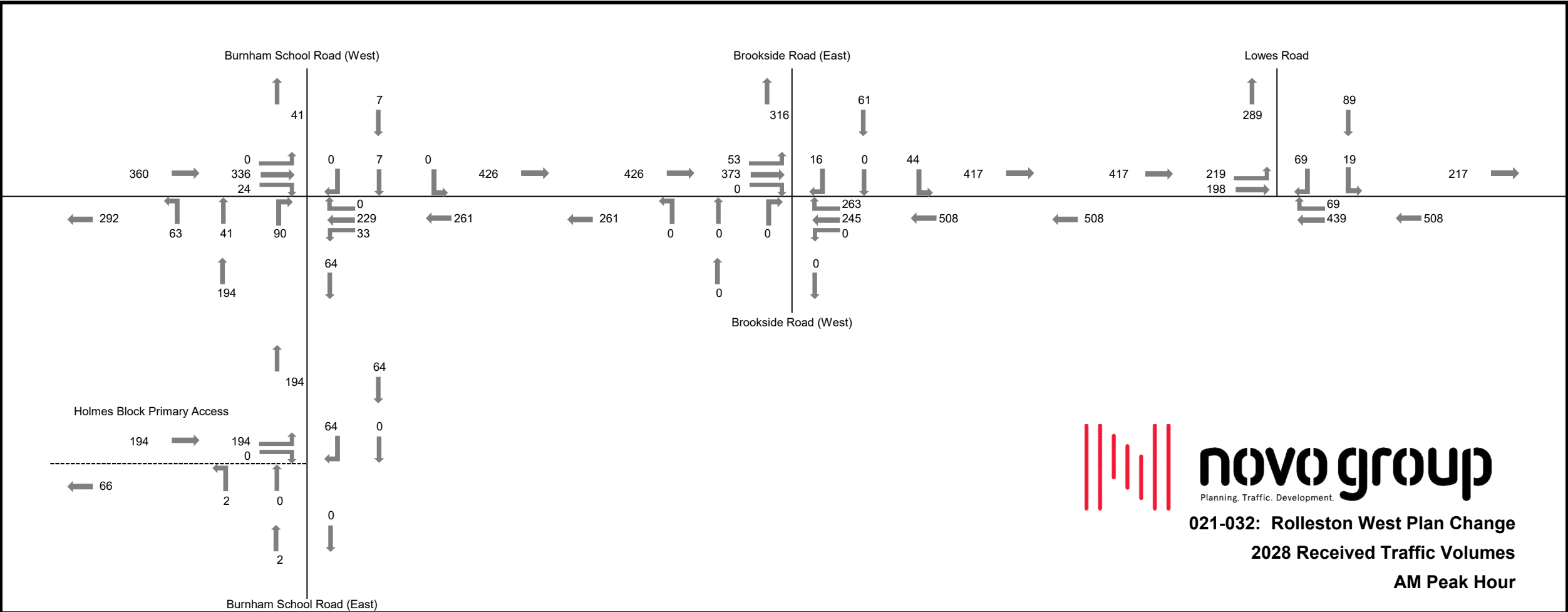
021-032: Rolleston West Plan Change
2028 Less Zoned Traffic
PM Peak Hour




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021-032: Rolleston West Plan Change
Plan Change Traffic
AM Peak Hour

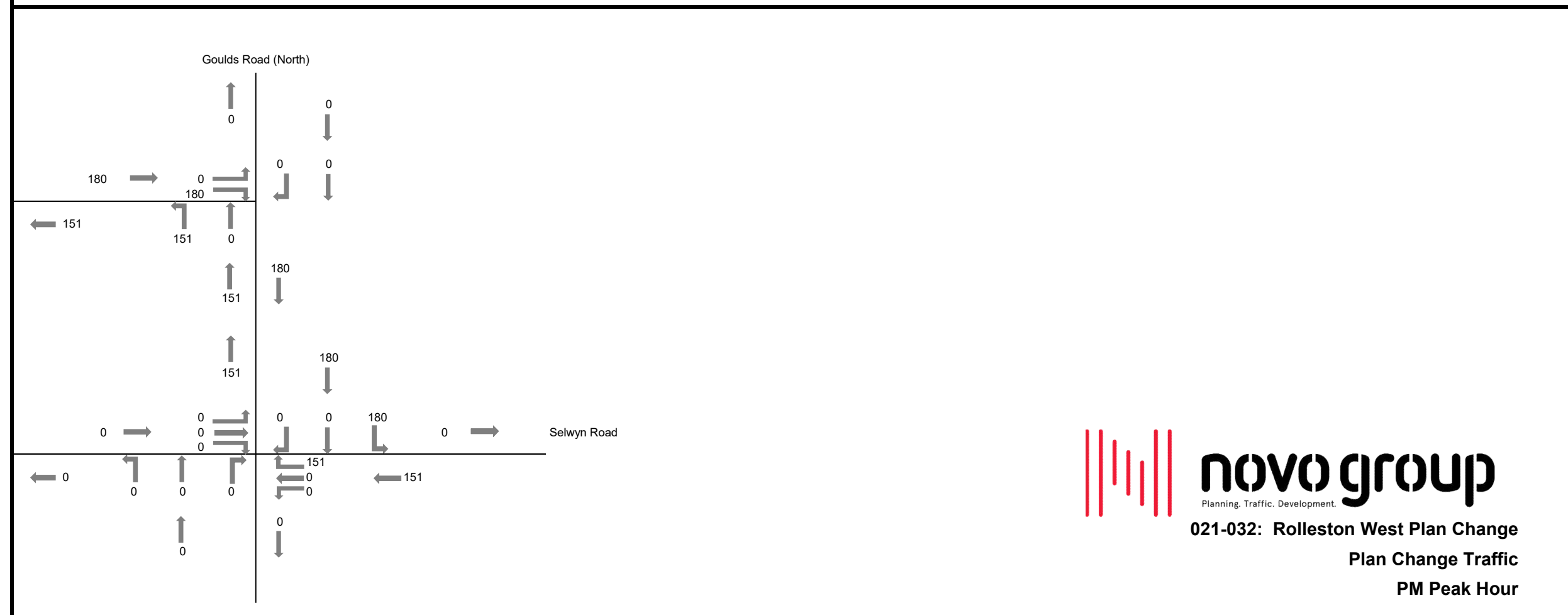



novo group
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021-032: Rolleston West Plan Change
Plan Change Traffic
PM Peak Hour

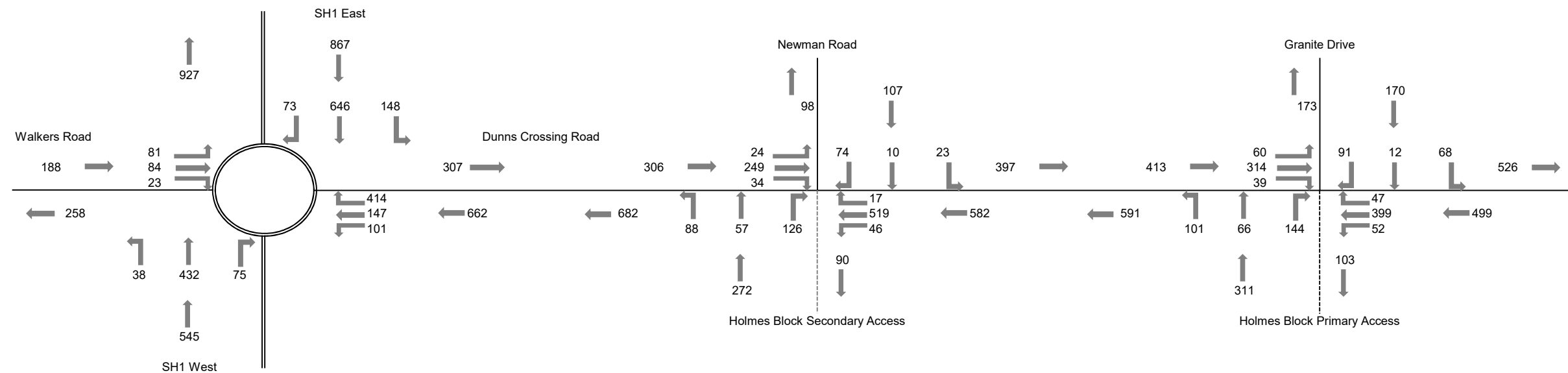




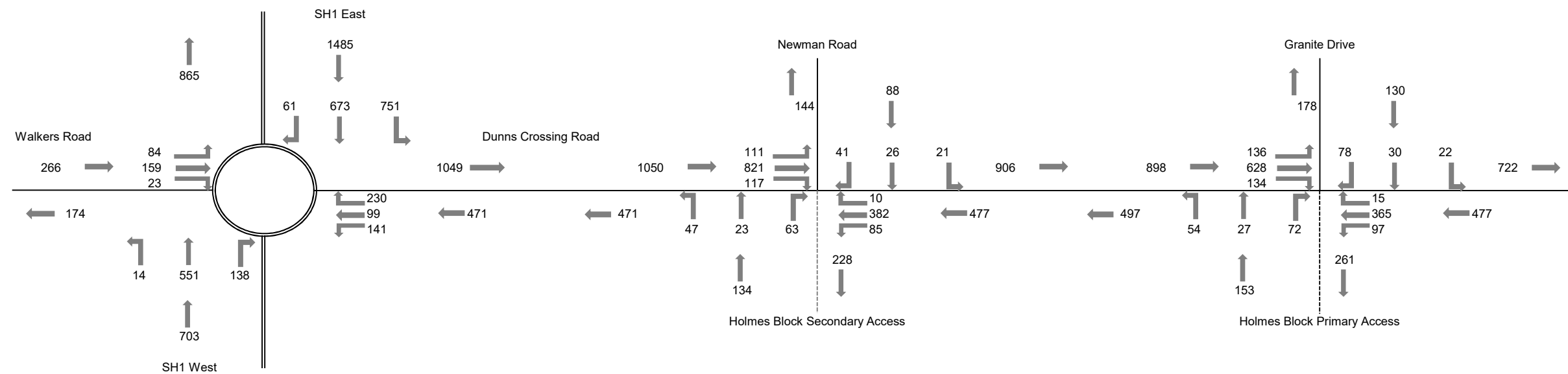
021-032: Rolleston West Plan Change
2028 Received Traffic Volumes
AM Peak Hour



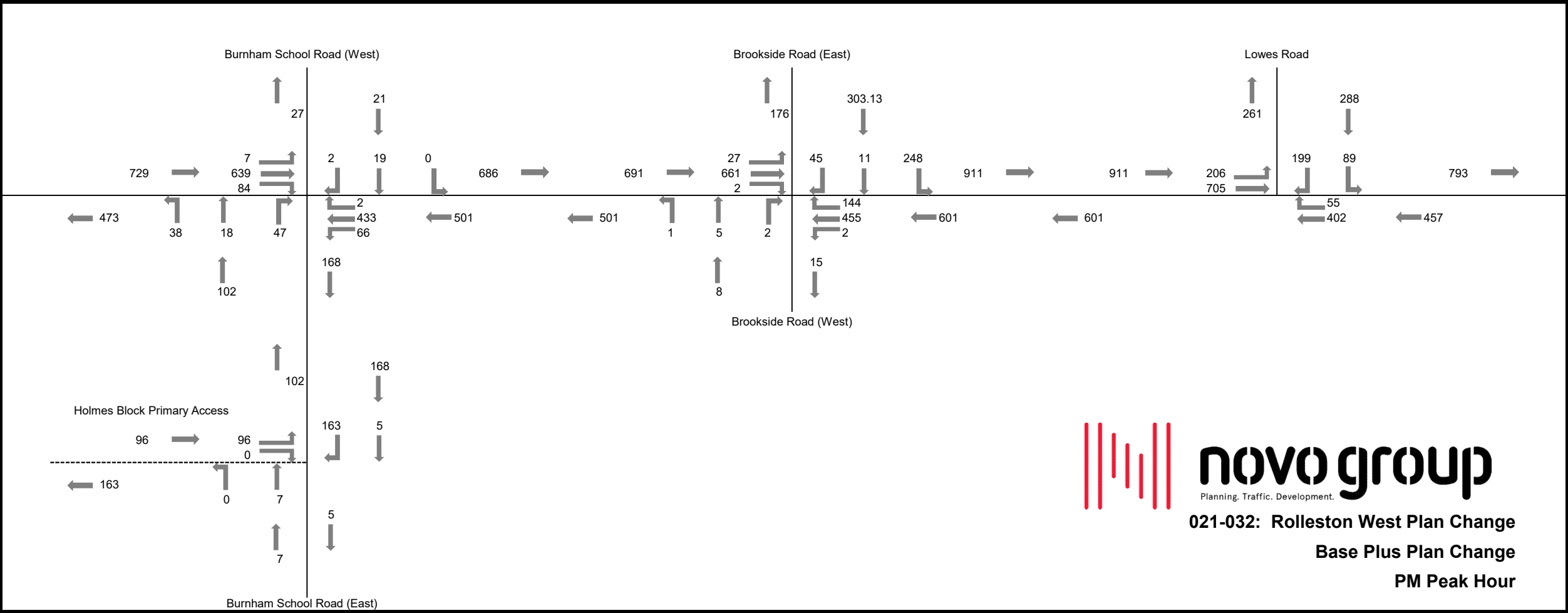
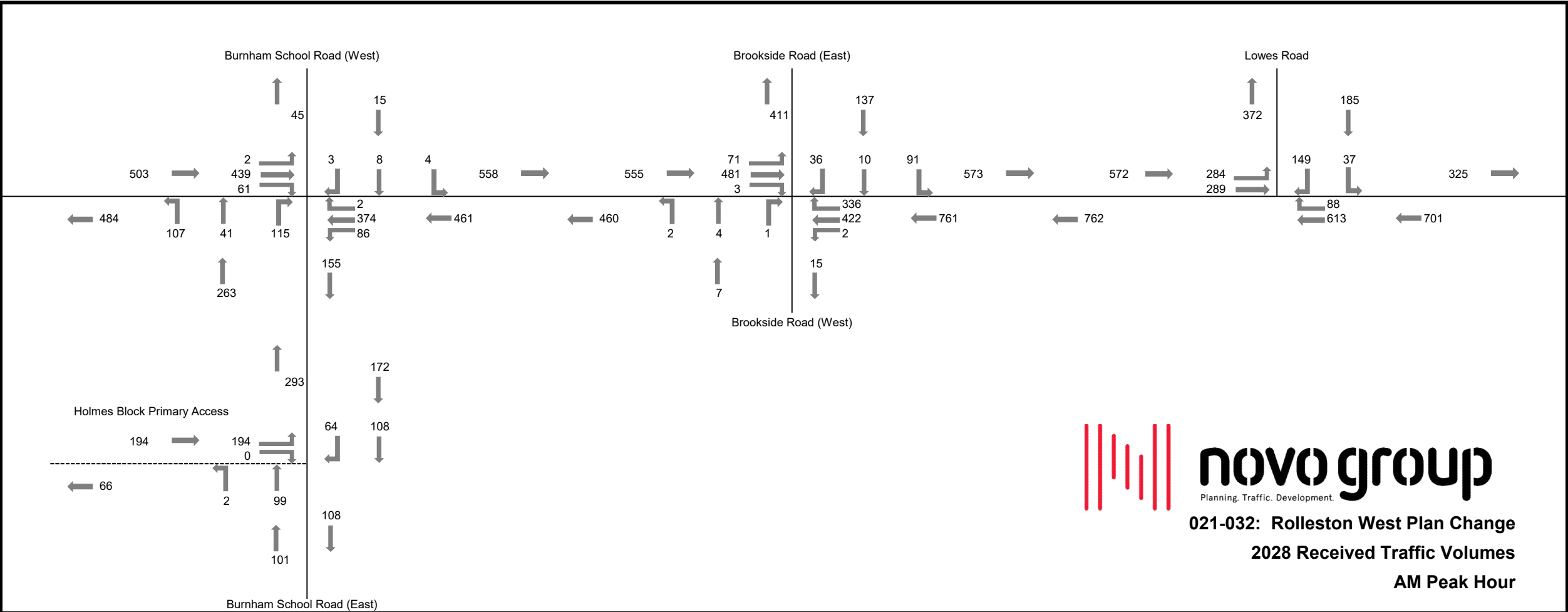
021-032: Rolleston West Plan Change
Plan Change Traffic
PM Peak Hour

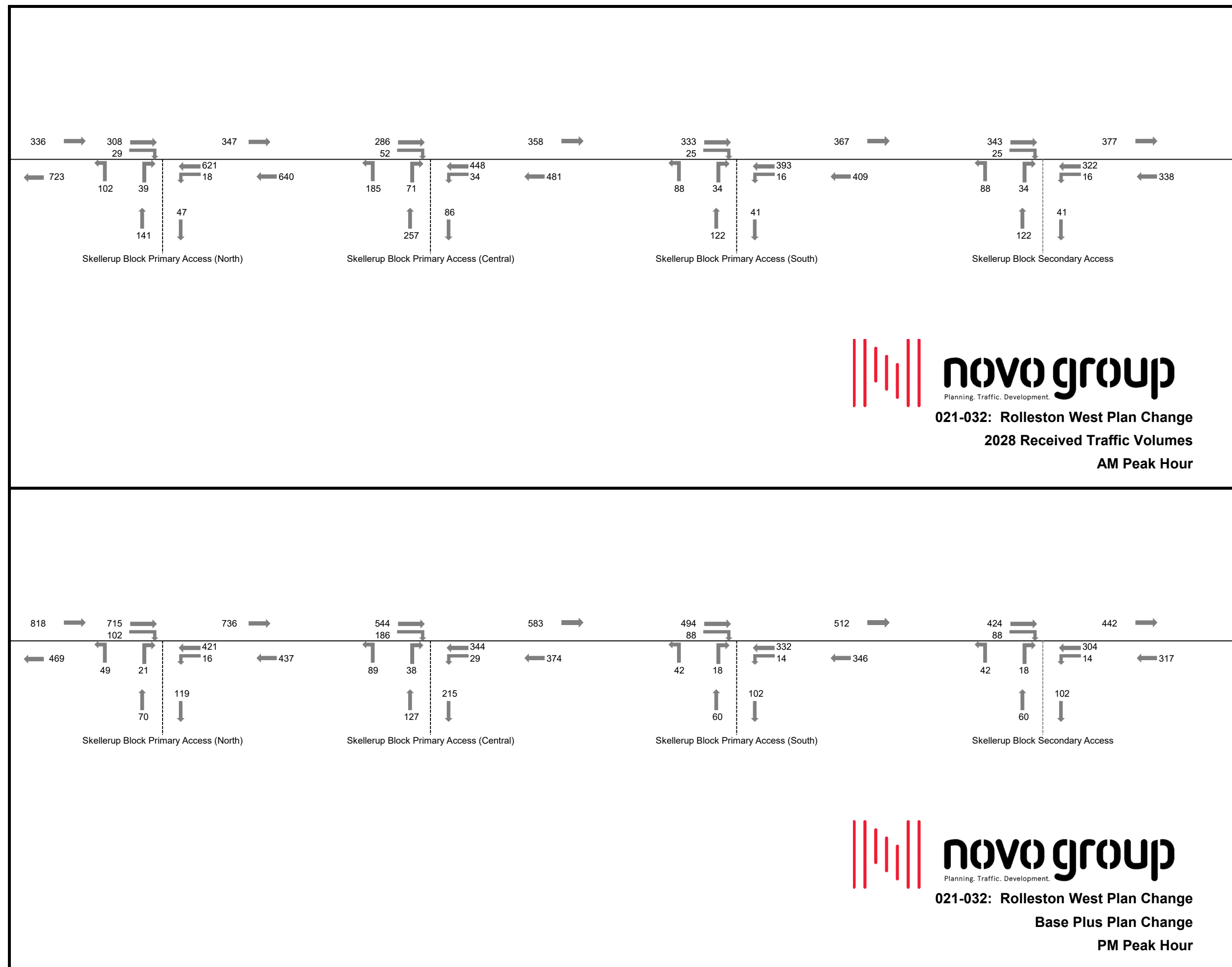


021-032: Rolleston West Plan Change
Base Plus Plan Change
AM Peak Hour



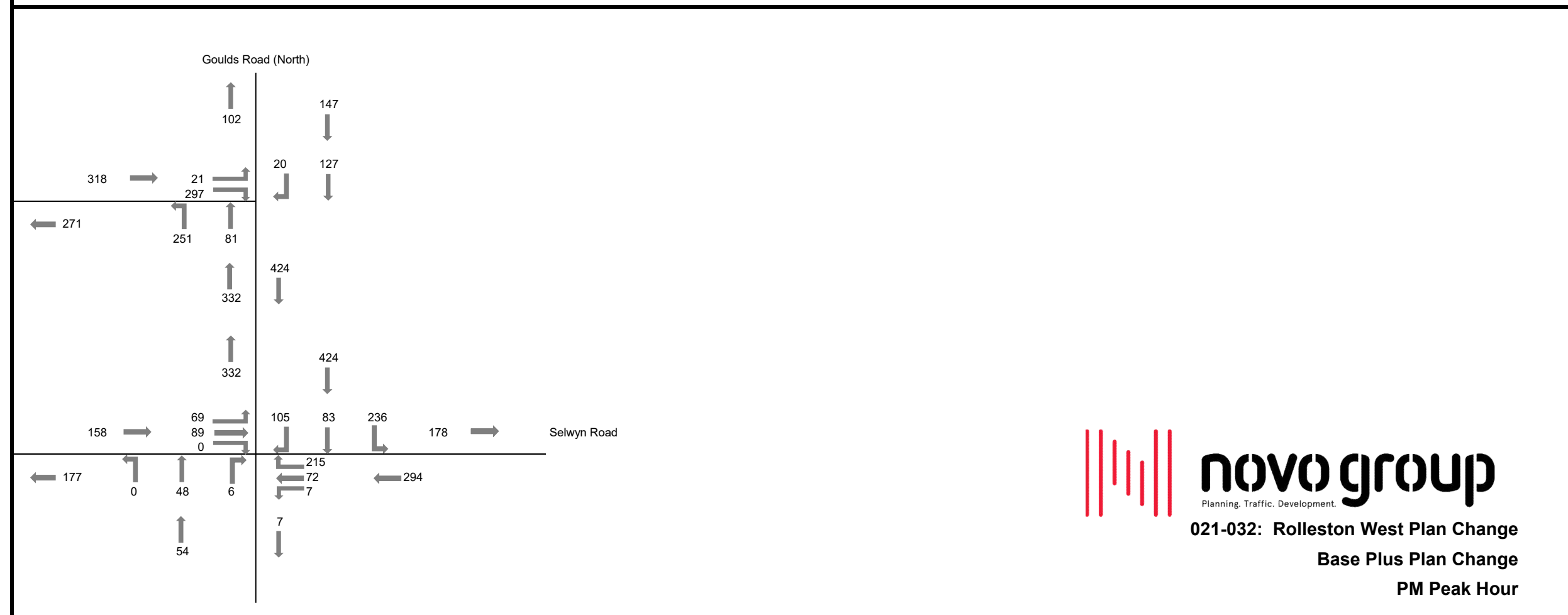
021-032: Rolleston West Plan Change
Base Plus Plan Change
PM Peak Hour







021-032: Rolleston West Plan Change
2028 Received Traffic Volumes
AM Peak Hour



021-032: Rolleston West Plan Change
Base Plus Plan Change
PM Peak Hour



Appendix 3

Dunns Crossing Rd / Newman Rd / Access Traffic Model Results



MOVEMENT SUMMARY

▽ Site: 101 Dunns X-ing / Newman / Access - 2028 AM (Site Folder: Dunns X-ing / Newman)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance													
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Disp. Sat. v/c	Aver. Delay /sec	Level of Service	65% BACK OF QUEUE [New veh]	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
		Total veh/h	HV %	Total veh/h	HV %								
South: Dunns Crossing Rd													
1	L2	46	0.0	46	0.0	0.306	5.0	LOS A	0.2	1.7	0.06	0.05	49.0
2	T1	519	0.0	546	0.0	0.306	0.1	LOS A	0.2	1.7	0.05	0.05	49.5
3	R2	17	0.0	18	0.0	0.306	5.9	LOS A	0.2	1.7	0.06	0.05	49.1
Approach		582	0.0	613	0.0	0.306	0.6	NA	0.2	1.7	0.06	0.05	49.5
East: Neuman Road													
4	L2	23	0.0	24	0.0	0.042	5.4	LOS A	0.1	1.0	0.59	0.40	45.4
5	T1	10	0.0	11	0.0	0.042	9.8	LOS A	0.1	1.0	0.59	0.40	45.5
6	R2	74	0.0	78	0.0	0.249	15.7	LOS C	0.9	6.0	0.93	0.87	40.6
Approach		107	0.0	113	0.0	0.249	12.9	LOS B	0.9	6.0	0.82	0.72	42.0
North: Dunns Crossing Rd													
7	L2	24	0.0	25	0.0	0.180	6.9	LOS A	0.5	3.8	0.10	0.22	48.2
8	T1	249	0.0	262	0.0	0.180	0.7	LOS A	0.5	3.8	0.10	0.22	48.7
9	R2	34	0.0	36	0.0	0.180	7.6	LOS A	0.5	3.8	0.10	0.22	48.3
Approach		307	0.0	323	0.0	0.180	1.9	NA	0.5	3.8	0.10	0.22	48.6
West: Site Access													
10	L2	88	0.0	93	0.0	0.229	7.1	LOS A	0.9	6.1	0.78	0.61	44.4
11	T1	57	0.0	60	0.0	0.229	10.5	LOS B	0.9	6.1	0.78	0.61	44.5
12	R2	126	0.0	133	0.0	0.371	15.5	LOS C	1.5	10.3	0.97	1.00	40.8
Approach		271	0.0	285	0.0	0.371	11.7	LOS B	1.5	10.3	0.87	0.79	42.7
All Vehicles		1267	0.0	1334	0.0	0.371	4.4	NA	1.5	10.3	0.31	0.30	47.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

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.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard (Geometric Delay is included).

Gap-Acceptance Capacity: SIDRA Standard (Alpexik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.



MOVEMENT SUMMARY

Site: 101 Dunns X-ing / Newman / Access - 2028 PM (Site Folder: Dunns X-ing / Newman)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance													
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg Satn	Aver Delay	Level of Service	95% BACK-OF-QUEUE	Prop Que	Effective Stop Rate	Aver No Cycles	Aver Speed
		[Total veh/h]	% HV	[Total veh/h]	% HV	v/c	sec		[Veh. / h]				km/h
South: Dunns Crossing Rd													
1	L2	85	0.0	89	0.0	0.264	6.8	LOS A	0.6	0.12	0.10	0.14	48.2
2	T1	382	0.0	402	0.0	0.264	0.7	LOS A	0.6	0.12	0.10	0.14	48.6
3	R2	10	0.0	11	0.0	0.264	14.0	LOS B	0.6	0.12	0.10	0.14	48.2
Approach		477	0.0	502	0.0	0.264	2.1	NA	0.6	0.12	0.10	0.14	48.5
East: Newman Road													
4	L2	21	0.0	22	0.0	0.257	11.4	LOS B	0.8	0.88	0.97	0.97	37.5
5	T1	26	0.0	27	0.0	0.257	33.5	LOS D	0.8	0.88	0.97	0.97	37.6
6	R2	41	0.0	43	0.0	0.418	46.8	LOS E	1.3	0.94	1.03	1.14	30.2
Approach		88	0.0	93	0.0	0.418	34.4	LOS D	1.3	0.91	0.99	1.05	33.7
North: Dunns Crossing Rd													
7	L2	111	0.0	117	0.0	0.599	8.0	LOS A	4.0	0.31	0.12	0.48	47.6
8	T1	821	0.0	864	0.0	0.599	1.4	LOS A	4.0	0.31	0.12	0.48	48.0
9	R2	117	0.0	123	0.0	0.599	9.5	LOS A	4.0	0.31	0.12	0.48	47.6
Approach		1049	0.0	1104	0.0	0.599	3.0	NA	4.0	0.31	0.12	0.48	47.9
West: Site Access													
10	L2	47	0.0	49	0.0	0.255	7.0	LOS A	0.8	0.68	0.79	0.74	40.5
11	T1	23	0.0	24	0.0	0.255	35.9	LOS E	0.8	0.68	0.79	0.74	40.6
12	R2	63	0.0	66	0.0	0.577	49.6	LOS E	2.0	0.95	1.08	1.33	29.5
Approach		133	0.0	140	0.0	0.577	32.2	LOS D	2.0	0.81	0.93	1.02	34.4
All Vehicles		1747	0.0	1839	0.0	0.599	6.6	NA	4.0	0.33	0.22	0.46	45.7

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



Appendix 4

Dunns Crossing Rd / Granite Dr / Access Traffic Model Results



MOVEMENT SUMMARY

▽ Site: 101 Dunns X-ing / Granite / Access - 2028 AM (Site Folder: Dunns X-ing / Granite)

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance																
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Desp Sat	Aver Delay	Level of Service	95% BACK OF QUEUE	Prop Que	Effective Stop Rate	Aver No Cycles	Aver Speed			
		[Total veh]	% HV	[Total veh]	% HV	v/c	sec		[Veh. m]				km/h			
South: Dunns Crossing Rd																
1	L2	52	0.0	55	0.0	0.275	5.7	LOS A	0.7	0.16	0.10	0.16	48.5			
2	T1	399	0.0	420	0.0	0.275	0.3	LOS A	0.7	0.16	0.10	0.16	48.9			
3	R2	47	0.0	49	0.0	0.275	6.5	LOS A	0.7	0.16	0.10	0.16	48.3			
Approach		498	0.0	524	0.0	0.275	1.5	NA	0.7	0.16	0.10	0.16	48.6			
East: Granite Drive																
4	L2	68	0.0	72	0.0	0.392	7.4	LOS A	1.7	0.63	0.86	0.86	42.0			
5	T1	12	0.0	13	0.0	0.392	12.4	LOS B	1.7	0.63	0.86	0.86	42.1			
6	R2	91	0.0	96	0.0	0.392	17.6	LOS C	1.7	0.63	0.86	0.86	41.9			
Approach		171	0.0	180	0.0	0.392	13.2	LOS B	1.7	0.63	0.86	0.86	41.9			
North: Dunns Crossing Rd																
7	L2	60	0.0	63	0.0	0.232	5.8	LOS A	0.6	0.18	0.12	0.18	48.3			
8	T1	314	0.0	331	0.0	0.232	0.4	LOS A	0.6	0.18	0.12	0.18	48.6			
9	R2	39	0.0	41	0.0	0.232	6.9	LOS A	0.6	0.18	0.12	0.18	48.1			
Approach		413	0.0	435	0.0	0.232	1.8	NA	0.6	0.18	0.12	0.18	48.6			
West: Site Access																
10	L2	101	0.0	106	0.0	0.677	11.5	LOS B	4.5	0.77	1.17	1.57	40.2			
11	T1	66	0.0	69	0.0	0.677	17.0	LOS C	4.5	0.77	1.17	1.57	40.3			
12	R2	144	0.0	152	0.0	0.677	21.0	LOS C	4.5	0.77	1.17	1.57	40.0			
Approach		311	0.0	327	0.0	0.677	17.1	LOS C	4.5	0.77	1.17	1.57	40.1			
All Vehicles		1393	0.0	1466	0.0	0.677	6.5	NA	4.5	0.36	0.44	0.57	45.6			

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



MOVEMENT SUMMARY

▽ Site: 101 Dunns X-ing / Granite / Access - 2028 PM (Site Folder: Dunns X-ing / Granite)

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance													
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Disp. Sain	Aver. Delay	Level of Service	95% BACK OF QUEUE	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
		[Total veh/s]	[HV] %	[Total veh/s]	[HV] %	veh	sec		[Veh. veh]				
South: Dunns Crossing Rd													
1	L2	97	0.0	102	0.0	0.264	6.0	LOS A	0.5	0.12	0.12	0.14	48.2
2	T1	365	0.0	384	0.0	0.264	0.6	LOS A	0.5	0.12	0.12	0.14	48.7
3	R2	15	0.0	16	0.0	0.264	10.6	LOS B	0.5	0.12	0.12	0.14	48.0
Approach		477	0.0	502	0.0	0.264	2.0	NA	0.5	0.12	0.12	0.14	48.6
East: Granite Drive													
4	L2	22	0.0	23	0.0	0.702	21.6	LOS C	3.2	0.93	1.19	1.70	32.8
5	T1	30	0.0	32	0.0	0.702	36.9	LOS E	3.2	0.93	1.19	1.70	32.9
6	R2	78	0.0	82	0.0	0.702	42.3	LOS E	3.2	0.93	1.19	1.70	32.7
Approach		130	0.0	137	0.0	0.702	37.6	LOS E	3.2	0.93	1.19	1.70	32.8
North: Dunns Crossing Rd													
7	L2	136	0.0	143	0.0	0.528	7.5	LOS A	3.8	0.36	0.17	0.52	47.2
8	T1	628	0.0	661	0.0	0.528	1.6	LOS A	3.8	0.36	0.17	0.52	47.7
9	R2	134	0.0	141	0.0	0.528	8.8	LOS A	3.8	0.36	0.17	0.52	47.0
Approach		898	0.0	945	0.0	0.528	3.5	NA	3.8	0.36	0.17	0.52	47.5
West: Site Access													
10	L2	54	0.0	57	0.0	0.627	14.9	LOS B	3.0	0.82	1.10	1.45	36.0
11	T1	27	0.0	28	0.0	0.627	34.3	LOS D	3.0	0.82	1.10	1.45	36.1
12	R2	72	0.0	76	0.0	0.627	34.9	LOS D	3.0	0.82	1.10	1.45	35.9
Approach		153	0.0	161	0.0	0.627	27.7	LOS D	3.0	0.82	1.10	1.45	35.9
All Vehicles		1658	0.0	1745	0.0	0.702	8.0	NA	3.8	0.36	0.32	0.59	44.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

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.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard

Gap-Acceptance Capacity: SIDRA Standard (Alpelli M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.



Appendix 5

Burnham School Rd / Access Traffic Model Results



MOVEMENT SUMMARY

Site: 101 [Burnham School / Access - 2028 AM (Site Folder: Burnham School / Access)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg Satn v/c	Aver Delay sec	Level of Service	95% BACK-OF-QUEUE [Veh. veh	Queue [m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
		[Total veh/h	HV] %	[Total veh/h	HV] %									
East Burnham School Road														
5	T1	108	0.0	114	0.0	0.100	0.2	LOS A	0.4	2.7	0.16	0.20	0.16	48.4
6	R2	64	0.0	67	0.0	0.100	4.9	LOS A	0.4	2.7	0.16	0.20	0.16	47.5
Approach		172	0.0	181	0.0	0.100	1.9	NA	0.4	2.7	0.16	0.20	0.16	48.1
North Access														
7	L2	194	0.0	204	0.0	0.137	4.9	LOS A	0.6	4.2	0.21	0.51	0.21	46.1
9	R2	1	0.0	1	0.0	0.137	5.8	LOS A	0.6	4.2	0.21	0.51	0.21	45.7
Approach		195	0.0	205	0.0	0.137	4.9	LOS A	0.6	4.2	0.21	0.51	0.21	46.1
West Burnham School Road														
10	L2	2	0.0	2	0.0	0.055	4.6	LOS A	0.0	0.0	0.00	0.01	0.00	49.4
11	T1	99	0.0	104	0.0	0.055	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	49.9
Approach		101	0.0	106	0.0	0.055	0.1	NA	0.0	0.0	0.00	0.01	0.00	49.9
All Vehicles		488	0.0	493	0.0	0.137	2.8	NA	0.6	4.2	0.15	0.29	0.15	47.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

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.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

Gap-Acceptance Capacity: SIDRA Standard (Alcock M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Project: S:\New Projects\423-100 Farmland\021 Rolleston West Plan Change\021-032 - Rolleston West Plan Change - 2020-11-09.spp



MOVEMENT SUMMARY

▽ Site: 101 [Burnham School / Access - 2028 PM (Site Folder: Burnham School / Access)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance													
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Disp. Satn. v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
		[Total veh/s	HV] %	[Total veh/s	HV] %								
East Burnham School Road													
5	T1	5	0.0	5	0.0	0.099	0.0	LOS A	0.5	0.05	0.52	0.05	47.0
6	R2	163	0.0	172	0.0	0.099	4.6	LOS A	0.5	0.05	0.52	0.05	46.2
	Approach	168	0.0	177	0.0	0.099	4.4	NA	0.5	0.05	0.52	0.05	46.2
North Access													
7	L2	96	0.0	101	0.0	0.063	4.6	LOS A	0.3	0.04	0.51	0.04	46.5
9	R2	1	0.0	1	0.0	0.063	5.2	LOS A	0.3	0.04	0.51	0.04	46.1
	Approach	97	0.0	102	0.0	0.063	4.6	LOS A	0.3	0.04	0.51	0.04	46.5
West Burnham School Road													
10	L2	1	0.0	1	0.0	0.004	4.6	LOS A	0.0	0.00	0.07	0.00	49.1
11	T1	7	0.0	7	0.0	0.004	0.0	LOS A	0.0	0.00	0.07	0.00	49.6
	Approach	8	0.0	8	0.0	0.004	0.6	NA	0.0	0.00	0.07	0.00	49.5
	All Vehicles	273	0.0	287	0.0	0.099	4.4	NA	0.5	0.04	0.51	0.04	46.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

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.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

Gap-Acceptance Capacity: SIDRA Standard (Alkzeik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Appendix 6

Dunns Crossing Rd / Northern Primary Access Traffic Model Results



MOVEMENT SUMMARY

▽ Site: 101 Dunns X-ing / North Primary - 2028 AM (Site Folder: Dunns X-ing / North Primary)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance																
Mov ID	Turn	INPUT VOLUMES [Total veh/h]		HV %	DEMAND FLOWS [Total veh/h]		HV %	Deg. Sain v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh]	Dist m	Prop. Due	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Dunns Crossing Road																
1	L2	18	0.0	0.0	19	0.0	0.0	0.330	4.7	LOS A	0.0	0.0	0.00	0.02	0.00	49.3
2	T1	621	0.0	0.0	654	0.0	0.0	0.330	0.1	LOS A	0.0	0.0	0.00	0.02	0.00	49.8
Approach		639	0.0	0.0	673	0.0	0.0	0.330	0.2	NA	0.0	0.0	0.00	0.02	0.00	49.7
North: Dunns Crossing Road																
8	T1	308	0.0	0.0	324	0.0	0.0	0.195	0.7	LOS A	0.5	3.2	0.16	0.05	0.16	49.1
9	R2	29	0.0	0.0	31	0.0	0.0	0.195	8.4	LOS A	0.5	3.2	0.16	0.05	0.16	48.4
Approach		337	0.0	0.0	355	0.0	0.0	0.195	1.3	NA	0.5	3.2	0.16	0.05	0.16	49.0
West Access																
10	L2	102	0.0	0.0	107	0.0	0.0	0.233	8.0	LOS A	0.9	6.1	0.62	0.84	0.66	44.0
12	R2	39	0.0	0.0	41	0.0	0.0	0.233	12.6	LOS B	0.9	6.1	0.62	0.84	0.66	43.8
Approach		141	0.0	0.0	148	0.0	0.0	0.233	9.3	LOS A	0.9	6.1	0.62	0.84	0.66	43.9
All Vehicles		1117	0.0	0.0	1176	0.0	0.0	0.330	1.7	NA	0.9	6.1	0.13	0.13	0.13	48.7

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

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MOVEMENT SUMMARY

▽ Site: 101 Dunns X-ing / North Primary - 2025 PM (Site Folder: Dunns X-ing / North Primary)

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance													
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/s]	[HV] %	[Total veh/s]	[HV] %	veh	sec		[Veh. Dist.] m	Que			km/h
South: Dunns Crossing Road													
1	L2	16	0.0	17	0.0	0.226	4.6	LOS A	0.0	0.00	0.02	0.00	49.3
2	T1	421	0.0	443	0.0	0.226	0.1	LOS A	0.0	0.00	0.02	0.00	49.8
Approach		437	0.0	460	0.0	0.226	0.2	NA	0.0	0.00	0.02	0.00	49.8
North: Dunns Crossing Road													
8	T1	715	0.0	753	0.0	0.466	0.9	LOS A	2.0	0.23	0.06	0.30	48.8
9	R2	102	0.0	107	0.0	0.466	7.9	LOS A	2.0	0.23	0.06	0.30	48.1
Approach		817	0.0	860	0.0	0.466	1.8	NA	2.0	0.23	0.06	0.30	48.7
West Access													
10	L2	49	0.0	52	0.0	0.140	6.2	LOS A	0.5	0.56	0.72	0.56	43.7
12	R2	21	0.0	22	0.0	0.140	18.4	LOS C	0.5	0.56	0.72	0.56	43.5
Approach		70	0.0	74	0.0	0.140	9.9	LOS A	0.5	0.56	0.72	0.56	43.6
All Vehicles		1324	0.0	1394	0.0	0.466	1.7	NA	2.0	0.17	0.10	0.21	48.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

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.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard

Gap-Acceptance Capacity: SIDRA Standard (Alcayk M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Appendix 7

Dunns Crossing Rd / Central Primary Access Traffic Model Results



MOVEMENT SUMMARY

▽ Site: 101 Dunns X-ing / Central Primary - 2028 AM (Site Folder: Dunns X-ing / Central Primary)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg Satn	Aver Delay	Level of Service	95% BACK OF QUEUE	Prop. Que	Effective Stop Rate	Aver No. Cycles	Aver Speed	
		[Total veh/h	HV] %	[Total veh/h	HV] %	v/c	sec		veh				km/h	
South: Dunns Crossing Road														
1	L2	34	0.0	36	0.0	0.249	4.6	LOS A	0.0	0.0	0.04	0.00	49.2	
2	T1	448	0.0	472	0.0	0.249	0.1	LOS A	0.0	0.0	0.04	0.00	49.7	
	Approach	482	0.0	507	0.0	0.249	0.4	NA	0.0	0.0	0.04	0.00	49.6	
North: Dunns Crossing Road														
8	T1	286	0.0	301	0.0	0.200	0.7	LOS A	0.6	4.3	0.10	0.22	48.9	
9	R2	52	0.0	55	0.0	0.200	7.0	LOS A	0.6	4.3	0.10	0.22	48.2	
	Approach	338	0.0	356	0.0	0.200	1.7	NA	0.6	4.3	0.10	0.22	48.8	
West Access														
10	L2	185	0.0	195	0.0	0.329	7.1	LOS A	1.5	10.6	0.80	0.66	44.6	
12	R2	71	0.0	75	0.0	0.329	10.9	LOS B	1.5	10.6	0.80	0.66	44.4	
	Approach	256	0.0	269	0.0	0.329	8.2	LOS A	1.5	10.6	0.80	0.66	44.5	
	All Vehicles	1076	0.0	1133	0.0	0.329	2.6	NA	1.5	10.6	0.24	0.23	46.1	

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

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.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

Gap-Acceptance Capacity: SIDRA Standard (Akcelik MTD).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.



MOVEMENT SUMMARY

▽ Site: 101 Dunns X-ing / Central Primary - 2028 PM (Site Folder: Dunns X-ing / Central Primary)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance													
Mov ID	Turn	INPUT VOLUMES [Total veh/h]		DEMAND FLOWS [Total HV %]		Disp. Sain. v/c	Aver. Delay sec	Level of Service	95% BACK-OF-QUEUE [Veh. veh]	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Dunns Crossing Road													
1	L2	29	0.0	31	0.0	0.193	4.6	LOS A	0.0	0.00	0.04	0.00	49.2
2	T1	344	0.0	362	0.0	0.193	0.1	LOS A	0.0	0.00	0.04	0.00	49.7
	Approach	373	0.0	393	0.0	0.193	0.4	NA	0.0	0.00	0.04	0.00	49.6
North: Dunns Crossing Road													
8	T1	544	0.0	573	0.0	0.443	1.3	LOS A	2.9	0.36	0.18	0.45	48.1
9	R2	186	0.0	196	0.0	0.443	7.2	LOS A	2.9	0.36	0.18	0.45	47.5
	Approach	730	0.0	768	0.0	0.443	2.8	NA	2.9	0.36	0.18	0.45	48.0
West Access													
10	L2	89	0.0	94	0.0	0.203	5.9	LOS A	0.7	0.51	0.69	0.51	44.3
12	R2	38	0.0	40	0.0	0.203	14.9	LOS B	0.7	0.51	0.69	0.51	44.1
	Approach	127	0.0	134	0.0	0.203	8.6	LOS A	0.7	0.51	0.69	0.51	44.3
	All Vehicles	1230	0.0	1295	0.0	0.443	2.7	NA	2.9	0.27	0.19	0.32	48.0

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



Appendix 8

Dunns Crossing Rd / Southern Primary Access Traffic Model Results



MOVEMENT SUMMARY

▽ Site: 101 [Dunns X-ing / South Primary - 2028 AM (Site Folder: Dunns X-ing / South Primary)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance													
Mov ID	Turn	INPUT VOLUMES [Total veh/h]		DEMAND FLOWS [Total veh/h] HV %		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh]	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Dunns Crossing Road													
1	L2	16	0.0	17	0.0	0.211	4.6	LOS A	0.0	0.00	0.02	0.00	49.3
2	T1	393	0.0	414	0.0	0.211	0.1	LOS A	0.0	0.00	0.02	0.00	49.8
	Approach	409	0.0	431	0.0	0.211	0.2	NA	0.0	0.00	0.02	0.00	49.8
North: Dunns Crossing Road													
8	T1	333	0.0	351	0.0	0.195	0.2	LOS A	0.3	0.10	0.04	0.10	49.5
9	R2	25	0.0	26	0.0	0.195	6.5	LOS A	0.3	0.10	0.04	0.10	48.8
	Approach	358	0.0	377	0.0	0.195	0.7	NA	0.3	0.10	0.04	0.10	49.5
West Access													
10	L2	88	0.0	93	0.0	0.147	6.2	LOS A	0.5	0.48	0.69	0.48	45.2
12	R2	34	0.0	36	0.0	0.147	9.2	LOS A	0.5	0.48	0.69	0.48	45.0
	Approach	122	0.0	128	0.0	0.147	7.0	LOS A	0.5	0.48	0.69	0.48	45.2
	All Vehicles	889	0.0	936	0.0	0.211	1.3	NA	0.5	0.10	0.12	0.10	49.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

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.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

Queue-Acceptance Capacity: SIDRA Standard (Akcelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

▽ Site: 101 Dunns X-ing / South Primary - 2028 PM (Site Folder: Dunns X-ing / South Primary)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance												
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE	Prop. Que	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %	v/c	sec		[Veh. veh	Dist] m		km/h
South: Dunns Crossing Road												
1	L2	14	0.0	15	0.0	0.179	4.6	LOS A	0.0	0.0	0.00	49.3
2	T1	332	0.0	349	0.0	0.179	0.1	LOS A	0.0	0.0	0.00	49.8
	Approach	346	0.0	364	0.0	0.179	0.2	NA	0.0	0.0	0.00	49.8
North: Dunns Crossing Road												
8	T1	494	0.0	520	0.0	0.328	0.5	LOS A	1.0	6.8	0.20	49.0
9	R2	86	0.0	91	0.0	0.328	6.4	LOS A	1.0	6.8	0.20	48.3
	Approach	580	0.0	611	0.0	0.328	1.4	NA	1.0	6.8	0.20	48.9
West Access												
10	L2	42	0.0	44	0.0	0.080	5.8	LOS A	0.3	1.9	0.45	45.0
12	R2	18	0.0	19	0.0	0.080	11.0	LOS B	0.3	1.9	0.45	44.8
	Approach	60	0.0	63	0.0	0.080	7.3	LOS A	0.3	1.9	0.45	45.0
	All Vehicles	988	0.0	1038	0.0	0.328	1.3	NA	1.0	6.8	0.14	48.9

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



Appendix 9

Dunns Crossing Rd / Southern Secondary Access Traffic Model Results



MOVEMENT SUMMARY

▽ Site: 101 [Dunns X-ing / Secondary - 2028 AM (Site Folder: Dunns X-ing / Secondary)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance																
Mov ID	Turn	INPUT VOLUMES [Total veh/h]		%	DEMAND FLOWS [Total veh/h]		%	Deg. Sat 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
South: Dunns Crossing Road																
1	L2	16	0.0	0.0	17	0.0	0.0	0.175	4.6	LOS A	0.0	0.0	0.00	0.03	0.00	49.3
2	T1	322	0.0	0.0	339	0.0	0.0	0.175	0.0	LOS A	0.0	0.0	0.00	0.03	0.00	49.8
Approach		338	0.0	0.0	356	0.0	0.0	0.175	0.3	NA	0.0	0.0	0.00	0.03	0.00	49.8
North: Dunns Crossing Road																
8	T1	343	0.0	0.0	361	0.0	0.0	0.198	0.2	LOS A	0.3	1.8	0.08	0.04	0.08	49.6
9	R2	25	0.0	0.0	26	0.0	0.0	0.198	6.1	LOS A	0.3	1.8	0.08	0.04	0.08	48.8
Approach		368	0.0	0.0	387	0.0	0.0	0.198	0.6	NA	0.3	1.8	0.08	0.04	0.08	49.5
West Access																
10	L2	88	0.0	0.0	93	0.0	0.0	0.135	5.8	LOS A	0.5	3.5	0.43	0.65	0.43	45.5
12	R2	34	0.0	0.0	36	0.0	0.0	0.135	8.6	LOS A	0.5	3.5	0.43	0.65	0.43	45.2
Approach		122	0.0	0.0	128	0.0	0.0	0.135	6.6	LOS A	0.5	3.5	0.43	0.65	0.43	45.4
All Vehicles		828	0.0	0.0	872	0.0	0.0	0.198	1.3	NA	0.5	3.5	0.10	0.12	0.10	49.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

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.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

Gap-Acceptance Capacity: SIDRA Standard (Alcizik MTD).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

▽ Site: 101 [Dunns X-ing / Secondary - 2028 PM (Site Folder: Dunns X-ing / Secondary)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance																
Mov ID	Turn	INPUT VOLUMES [Total veh/h]		HV %	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
South: Dunns Crossing Road																
1	L2	14	0.0	0.0	15	0.0	0.0	0.164	4.6	LOS A	0.0	0.0	0.00	0.02	0.00	49.3
2	T1	304	0.0	0.0	320	0.0	0.0	0.164	0.0	LOS A	0.0	0.0	0.00	0.02	0.00	49.8
	Approach	318	0.0	0.0	335	0.0	0.0	0.164	0.2	NA	0.0	0.0	0.00	0.02	0.00	49.8
North: Dunns Crossing Road																
8	T1	424	0.0	0.0	446	0.0	0.0	0.291	0.5	LOS A	0.9	6.4	0.20	0.10	0.20	48.9
9	R2	88	0.0	0.0	93	0.0	0.0	0.291	6.2	LOS A	0.9	6.4	0.20	0.10	0.20	48.2
	Approach	512	0.0	0.0	539	0.0	0.0	0.291	1.4	NA	0.9	6.4	0.20	0.10	0.20	48.8
West Access																
10	L2	42	0.0	0.0	44	0.0	0.0	0.073	5.6	LOS A	0.3	1.8	0.42	0.63	0.42	45.3
12	R2	18	0.0	0.0	19	0.0	0.0	0.073	9.8	LOS A	0.3	1.8	0.42	0.63	0.42	45.1
	Approach	60	0.0	0.0	63	0.0	0.0	0.073	6.9	LOS A	0.3	1.8	0.42	0.63	0.42	45.2
	All Vehicles	890	0.0	0.0	937	0.0	0.0	0.291	1.4	NA	0.9	6.4	0.15	0.11	0.15	48.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

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.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

Gap-Acceptance Capacity: SIDRA Standard (Alcayk M30).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Appendix 10

SH1 / Dunns Crossing Rd / Walkers Rd Traffic Model Results



MOVEMENT SUMMARY

Site: 101 [SH1 / Dunns X-ing / Walker - 2028 AM (Site Folder: SH1 / Dunns X-ing)]
New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg Satn	Aver Delay	Level of Service	95% BACK-OF-QUEUE	Prop. Que	Effective Stop Rate	Aver No. Cycles	Aver Speed	
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		[Veh. vch]	Dist. m			km/h	
South: SH1														
1	L2	38	0.0	40	0.0	0.295	7.4	LOS A	1.5	10.6	0.63	0.60	64.1	
2	T1	432	0.0	455	0.0	0.295	9.1	LOS A	1.5	10.6	0.67	0.60	65.6	
3	R2	75	0.0	79	0.0	0.295	14.1	LOS B	1.4	10.1	0.72	0.61	64.5	
Approach		545	0.0	574	0.0	0.295	9.6	LOS A	1.5	10.6	0.68	0.60	65.4	
East: Dunns Crossing Road														
4	L2	101	0.0	106	0.0	0.317	9.3	LOS A	1.4	10.1	0.74	0.62	64.4	
5	T1	147	0.0	155	0.0	0.317	8.7	LOS A	1.4	10.1	0.82	0.62	66.6	
6	R2	414	0.0	436	0.0	0.416	14.2	LOS B	2.2	15.6	0.86	0.64	61.0	
Approach		662	0.0	697	0.0	0.416	12.2	LOS B	2.2	15.6	0.82	0.65	62.6	
North: SH1														
7	L2	148	0.0	156	0.0	0.349	6.3	LOS A	2.0	14.3	0.54	0.38	65.9	
8	T1	646	0.0	680	0.0	0.349	7.2	LOS A	2.0	14.3	0.56	0.39	67.4	
9	R2	73	0.0	77	0.0	0.349	12.6	LOS B	2.0	14.1	0.58	0.39	66.6	
Approach		867	0.0	913	0.0	0.349	7.5	LOS A	2.0	14.3	0.56	0.39	67.1	
West: Walker Road														
10	L2	81	0.0	85	0.0	0.267	10.8	LOS B	1.3	8.9	0.82	0.68	63.5	
11	T1	84	0.0	88	0.0	0.267	9.5	LOS A	1.3	8.9	0.82	0.68	65.4	
12	R2	23	0.0	24	0.0	0.267	15.3	LOS B	1.3	8.9	0.82	0.68	65.3	
Approach		188	0.0	198	0.0	0.267	10.8	LOS B	1.3	8.9	0.82	0.68	64.6	
All Vehicles		2262	0.0	2381	0.0	0.416	9.7	LOS A	2.2	15.6	0.68	0.54	65.1	

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 (Alcelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.



MOVEMENT SUMMARY

Site: 101 [SH1 / Dunns X-ing / Walker - 2028 PM (Site Folder: SH1 / Dunns X-ing)]
New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance													
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Dep Satn	Aver Delay	Level of Service	95% BACK OF QUEUE	Pipe Que	Effective Stop Rate	Aver No Cycles	Aver Speed km/h
		[Total veh/h]	HV %	[Total veh/h]	HV %	v/c	sec		[Veh. veh]				
South: SH1													
1	L2	14	0.0	15	0.0	0.332	6.8	LOS A	1.8	0.51	0.58	0.51	64.6
2	T1	551	0.0	500	0.0	0.332	8.1	LOS A	1.8	0.52	0.61	0.52	66.1
3	R2	138	0.0	145	0.0	0.332	13.3	LOS B	1.7	0.53	0.66	0.53	64.7
Approach		703	0.0	740	0.0	0.332	9.1	LOS A	1.8	0.52	0.63	0.52	65.6
East: Dunns Crossing Road													
4	L2	141	0.0	148	0.0	0.283	10.3	LOS B	1.7	0.73	0.77	0.73	64.0
5	T1	99	0.0	104	0.0	0.283	9.0	LOS A	1.7	0.73	0.77	0.73	66.1
6	R2	230	0.0	242	0.0	0.321	15.4	LOS B	1.9	0.74	0.89	0.74	60.5
Approach		470	0.0	495	0.0	0.321	12.5	LOS B	1.9	0.73	0.83	0.73	62.6
North: SH1													
7	L2	751	0.0	791	0.0	0.662	8.3	LOS A	6.3	0.69	0.73	0.75	64.8
8	T1	673	0.0	708	0.0	0.662	9.3	LOS A	6.3	0.71	0.76	0.80	64.9
9	R2	61	0.0	64	0.0	0.662	15.1	LOS B	6.3	0.71	0.76	0.80	64.6
Approach		1485	0.0	1563	0.0	0.662	9.0	LOS A	6.3	0.70	0.74	0.77	64.9
West: Walker Road													
10	L2	84	0.0	88	0.0	0.372	10.3	LOS B	1.9	0.69	0.82	0.74	63.4
11	T1	159	0.0	167	0.0	0.372	9.6	LOS A	1.9	0.69	0.82	0.74	65.3
12	R2	23	0.0	24	0.0	0.372	15.5	LOS B	1.9	0.69	0.82	0.74	65.2
Approach		266	0.0	280	0.0	0.372	10.4	LOS B	1.9	0.69	0.82	0.74	64.7
All Vehicles		2924	0.0	3076	0.0	0.662	9.7	LOS A	6.3	0.66	0.74	0.70	64.7

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 (Alcelik MSD).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.



Appendix 11

Burnham School Rd / Dunns Crossing Rd Traffic Model Results



MOVEMENT SUMMARY

Site: 101 [Dunns X-ing / Burnham School - 2028 AM (Site Folder: Dunns X-ing / Burnham School)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) isolated Cycle Time = 90 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance													
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
		[Total veh/h]	HV %	[Total veh/h]	HV %	v/c	sec		[Veh. v/h]				
South: Dunns Crossing Road													
1	L2	86	0.0	91	0.0	0.595	26.2	LOS C	16.4	0.83	0.74	0.83	36.0
2	T1	374	0.0	394	0.0	0.595	21.6	LOS C	16.4	0.83	0.74	0.83	36.2
3	R2	2	0.0	2	0.0	0.017	46.3	LOS D	0.1	0.95	0.61	0.95	29.6
Approach		462	0.0	486	0.0	0.595	22.6	LOS C	16.4	0.83	0.74	0.83	36.1
East: Burnham School Road													
4	L2	4	0.0	4	0.0	0.049	41.8	LOS D	0.5	0.90	0.64	0.90	32.4
5	T1	8	0.0	8	0.0	0.049	37.3	LOS D	0.5	0.90	0.64	0.90	32.6
6	R2	3	0.0	3	0.0	0.015	43.5	LOS D	0.1	0.91	0.63	0.91	31.0
Approach		15	0.0	16	0.0	0.049	39.7	LOS D	0.5	0.90	0.64	0.90	32.3
North: Dunns Crossing Road													
7	L2	2	0.0	2	0.0	0.609	25.6	LOS C	15.5	0.81	0.71	0.81	36.4
8	T1	439	0.0	462	0.0	0.609	21.2	LOS C	15.5	0.81	0.71	0.81	36.7
9	R2	61	0.0	64	0.0	0.519	51.8	LOS D	2.9	1.00	0.76	1.01	29.0
Approach		502	0.0	528	0.0	0.609	25.0	LOS C	15.5	0.84	0.72	0.84	37.2
West: Burnham School Road													
10	L2	107	0.0	113	0.0	0.621	46.3	LOS D	6.8	0.99	0.82	1.03	30.7
11	T1	41	0.0	43	0.0	0.621	41.7	LOS D	6.8	0.99	0.82	1.03	30.9
12	R2	115	0.0	121	0.0	0.587	47.9	LOS D	5.3	1.00	0.80	1.02	29.9
Approach		263	0.0	277	0.0	0.621	46.3	LOS D	6.8	0.99	0.81	1.02	30.4
All Vehicles		1242	0.0	1307	0.0	0.621	28.8	LOS C	16.4	0.87	0.75	0.87	35.8

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



MOVEMENT SUMMARY

Site: 101 Dunns X-ing / Burnham School - 2028 PM (Site Folder: Dunns X-ing / Burnham School)]

New Site
Site Category: (None)
Signals - EQU/SAT (Fixed-Time/SCATS) isolated Cycle Time = 90 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance													
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg Satn	Aver Delay	Level of Service	95% BACK OF QUEUE	Prop Que	Effective Stop Rate	Aver No Cycles	Aver Speed km/h
		Total veh/h	% HV	Total veh/h	% HV	v/c	sec		[Veh. /veh				
South: Dunns Crossing Road													
1	L2	66	0.0	69	0.0	0.532	20.4	LOS C	15.4	0.72	0.66	0.72	40.5
2	T1	433	0.0	456	0.0	0.532	15.8	LOS B	15.4	0.72	0.66	0.72	40.8
3	R2	2	0.0	2	0.0	0.017	48.3	LOS D	0.1	0.95	0.61	0.95	29.8
Approach		501	0.0	527	0.0	0.532	16.5	LOS B	15.4	0.72	0.66	0.72	40.7
East: Burnham School Road													
4	L2	1	0.0	1	0.0	0.122	46.9	LOS D	0.9	0.95	0.67	0.95	31.4
5	T1	19	0.0	20	0.0	0.122	42.4	LOS D	0.9	0.95	0.67	0.95	31.6
6	R2	2	0.0	2	0.0	0.017	48.3	LOS D	0.1	0.95	0.61	0.95	29.8
Approach		22	0.0	23	0.0	0.122	43.1	LOS D	0.9	0.95	0.67	0.95	31.4
North: Dunns Crossing Road													
7	L2	7	0.0	7	0.0	0.741	22.3	LOS C	22.3	0.81	0.73	0.81	39.9
8	T1	639	0.0	673	0.0	0.741	17.7	LOS B	22.3	0.81	0.73	0.81	40.2
9	R2	84	0.0	88	0.0	0.714	53.9	LOS D	4.2	1.00	0.86	1.21	28.5
Approach		730	0.0	768	0.0	0.741	21.9	LOS C	22.3	0.83	0.74	0.86	38.4
West: Burnham School Road													
10	L2	38	0.0	40	0.0	0.352	48.5	LOS D	2.6	0.98	0.74	0.98	30.3
11	T1	18	0.0	19	0.0	0.352	43.9	LOS D	2.6	0.98	0.74	0.98	30.4
12	R2	47	0.0	49	0.0	0.400	51.2	LOS D	2.2	1.00	0.74	1.00	29.1
Approach		103	0.0	108	0.0	0.400	48.9	LOS D	2.6	0.99	0.74	0.99	29.8
All Vehicles		1356	0.0	1427	0.0	0.741	22.3	LOS C	22.3	0.80	0.71	0.82	38.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

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.

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.



Appendix 12

Brookside Rd / Dunns Crossing Rd Traffic Model Results



MOVEMENT SUMMARY

▽ Site: 101 Dunns X-ing / Brookside - 2028 AM (Site Folder: Dunns X-ing / Brookside)

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Disp. Sain. v/c	Aver. Delay sec	Level of Service	95% BACK-OF-QUEUE [Veh. vch]	Dist. m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
		Total veh/vch	HV %	Total veh/vch	HV %									
South: Dunns Crossing Rd														
1	L2	2	0.0	2	0.0	0.587	10.3	LOS B	6.7	46.7	0.69	0.47	1.16	45.1
2	T1	422	0.0	444	0.0	0.587	4.7	LOS A	6.7	46.7	0.69	0.47	1.16	45.5
3	R2	336	0.0	354	0.0	0.587	10.3	LOS B	6.7	46.7	0.69	0.47	1.16	44.8
Approach		760	0.0	800	0.0	0.587	7.2	NA	6.7	46.7	0.69	0.47	1.16	45.2
East: Brookside Road														
4	L2	91	0.0	96	0.0	0.375	8.7	LOS A	1.5	10.6	0.70	0.92	0.93	41.1
5	T1	10	0.0	11	0.0	0.375	22.9	LOS C	1.5	10.6	0.70	0.92	0.93	41.2
6	R2	36	0.0	38	0.0	0.375	29.4	LOS D	1.5	10.6	0.70	0.92	0.93	40.8
Approach		137	0.0	144	0.0	0.375	15.2	LOS C	1.5	10.6	0.70	0.92	0.93	41.0
North: Dunns Crossing Rd														
7	L2	71	0.0	75	0.0	0.289	4.7	LOS A	0.1	0.4	0.01	0.07	0.01	49.1
8	T1	481	0.0	506	0.0	0.289	0.0	LOS A	0.1	0.4	0.01	0.07	0.01	49.6
9	R2	3	0.0	3	0.0	0.289	7.0	LOS A	0.1	0.4	0.01	0.07	0.01	48.7
Approach		555	0.0	584	0.0	0.289	0.7	NA	0.1	0.4	0.01	0.07	0.01	49.5
West: Brookside Road														
10	L2	2	0.0	2	0.0	0.029	6.1	LOS A	0.1	0.6	0.76	0.81	0.76	40.5
11	T1	4	0.0	4	0.0	0.029	19.2	LOS C	0.1	0.6	0.76	0.81	0.76	40.6
12	R2	1	0.0	1	0.0	0.029	25.6	LOS D	0.1	0.6	0.76	0.81	0.76	40.3
Approach		7	0.0	7	0.0	0.029	16.3	LOS C	0.1	0.6	0.76	0.81	0.76	40.5
All Vehicles		1459	0.0	1536	0.0	0.587	5.5	NA	6.7	46.7	0.44	0.36	0.70	46.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

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.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

Gap-Acceptance Capacity: SIDRA Standard (Alcock M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Mode Designation.



MOVEMENT SUMMARY

▽ Site: 101 [Dunns X-ing / Brookside - 2028 PM (Site Folder: Dunns X-ing / Brookside)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance												
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg Satn	Aver Delay	Level of Service	95% BACK OF QUEUE	Dist	Prop. Que	Aver. Speed
		[Total veh/h]	HV %	[Total veh/h]	HV %	v/c	sec		[Veh. veh]	m		km/h
South: Dunns Crossing Rd												
1	L2	2	0.0	2	0.0	0.425	10.5	LOS B	3.2	22.7	0.51	46.3
2	T1	445	0.0	468	0.0	0.425	3.2	LOS A	3.2	22.7	0.51	46.8
3	R2	144	0.0	152	0.0	0.425	10.5	LOS B	3.2	22.7	0.51	46.0
Approach		591	0.0	622	0.0	0.425	5.0	NA	3.2	22.7	0.51	46.6
East: Brookside Road												
4	L2	248	0.0	261	0.0	0.656	13.8	LOS B	4.1	28.7	0.80	40.1
5	T1	11	0.0	12	0.0	0.656	27.3	LOS D	4.1	28.7	0.80	40.2
6	R2	45	0.0	47	0.0	0.656	34.3	LOS D	4.1	28.7	0.80	39.9
Approach		304	0.0	320	0.0	0.656	17.3	LOS C	4.1	28.7	0.80	40.1
North: Dunns Crossing Rd												
7	L2	27	0.0	28	0.0	0.357	4.8	LOS A	0.0	0.3	0.01	48.4
8	T1	661	0.0	696	0.0	0.357	0.0	LOS A	0.0	0.3	0.01	49.8
9	R2	2	0.0	2	0.0	0.357	7.5	LOS A	0.0	0.3	0.01	49.0
Approach		690	0.0	726	0.0	0.357	0.2	NA	0.0	0.3	0.01	49.8
West: Brookside Road												
10	L2	1	0.0	1	0.0	0.041	6.2	LOS A	0.1	0.8	0.82	39.2
11	T1	5	0.0	5	0.0	0.041	17.5	LOS C	0.1	0.8	0.82	39.3
12	R2	2	0.0	2	0.0	0.041	31.0	LOS D	0.1	0.8	0.82	39.0
Approach		8	0.0	8	0.0	0.041	19.5	LOS C	0.1	0.8	0.82	39.2
All Vehicles		1593	0.0	1677	0.0	0.656	5.4	NA	4.1	28.7	0.35	46.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

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.

N/A: 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.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard

Gap-Acceptance Capacity: SIDRA Standard (Alpexik MSD).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.



Appendix 13

Lowes Rd / Dunns Crossing Rd Traffic Model Results – Priority Controlled



MOVEMENT SUMMARY

▽ Site: 101 [Dunns X-ing / Lowes - 2028 AM (Site Folder: Dunns X-ing / Lowes)]
New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance																
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		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		
		[Total veh/h	HV] %	[Total veh/h	HV] %											
South: Dunns Crossing Road																
2	T1	613	0.0	645	0.0	0.416	1.2	LOS A	1.9	13.3	0.26	0.09	0.35	48.5		
3	R2	88	0.0	93	0.0	0.416	9.1	LOS A	1.9	13.3	0.26	0.09	0.35	47.7		
Approach		701	0.0	738	0.0	0.416	2.2	NA	1.9	13.3	0.26	0.09	0.35	48.4		
East Lowes Road																
4	L2	37	0.0	39	0.0	0.539	9.2	LOS A	2.4	16.7	0.77	1.00	1.20	39.8		
6	R2	149	0.0	157	0.0	0.539	20.0	LOS C	2.4	16.7	0.77	1.00	1.20	39.6		
Approach		186	0.0	196	0.0	0.539	17.9	LOS C	2.4	16.7	0.77	1.00	1.20	39.6		
North: Dunns Crossing Road																
7	L2	284	0.0	299	0.0	0.303	4.7	LOS A	0.0	0.0	0.00	0.27	0.00	47.9		
8	T1	289	0.0	304	0.0	0.303	0.1	LOS A	0.0	0.0	0.00	0.27	0.00	48.4		
Approach		573	0.0	603	0.0	0.303	2.4	NA	0.0	0.0	0.00	0.27	0.00	48.1		
All Vehicles		1460	0.0	1537	0.0	0.539	4.3	NA	2.4	16.7	0.22	0.28	0.32	47.0		

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akcelik M30).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.



MOVEMENT SUMMARY

▽ Site: 101 [Dunns X-ing / Lowes - 2028 PM (Site Folder: Dunns X-ing / Lowes)]
New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg Satn	Aver Delay	Level of Service	95% BACK OF QUEUE	Dist.]	Prop Que	Effective Stop Rate	Aver No Cycles	Aver Speed km/h
		[Total veh/h	HV] %	[Total veh/h	HV] %	v/c	sec		[Veh. veh	m				
South: Dunns Crossing Road														
2	T1	402	0.0	423	0.0	0.320	3.1	LOS A	1.9	13.3	0.38	0.09	0.48	47.2
	R2	55	0.0	58	0.0	0.320	13.6	LOS B	1.9	13.3	0.38	0.09	0.48	46.6
	Approach	457	0.0	481	0.0	0.320	4.3	NA	1.9	13.3	0.38	0.09	0.48	47.1
East: Lowes Road														
4	L2	89	0.0	94	0.0	0.131	8.4	LOS A	0.5	3.3	0.60	0.81	0.60	44.4
6	R2	199	0.0	209	0.0	0.889	47.2	LOS E	5.8	40.9	0.98	1.53	2.90	30.0
	Approach	288	0.0	303	0.0	0.889	35.2	LOS E	5.8	40.9	0.86	1.31	2.19	33.4
North: Dunns Crossing Road														
7	L2	206	0.0	217	0.0	0.475	4.7	LOS A	0.0	0.0	0.00	0.12	0.00	48.6
8	T1	705	0.0	742	0.0	0.475	0.2	LOS A	0.0	0.0	0.00	0.12	0.00	49.0
	Approach	911	0.0	959	0.0	0.475	1.2	NA	0.0	0.0	0.00	0.12	0.00	48.9
All Vehicles		1656	0.0	1743	0.0	0.889	8.0	NA	5.8	40.9	0.25	0.32	0.51	44.8

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

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Appendix 14

Lowes Rd / Dunns Crossing Rd Traffic Model Results – Signal Controlled



MOVEMENT SUMMARY

New Site
Site: 101v [Dunns X-ing / Lowes - 2028 AM (Site Folder: Dunns X-ing / Lowes)]
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) isolated Cycle Time = 90 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance													
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Dep. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
		[Total veh/h]	% HV	[Total veh/h]	% HV	v/c	sec		[Veh. veh]				
South: Dunns Crossing Road													
2	T1	613	0.0	645	0.0	0.466	7.2	LOS A	13.2	0.51	0.46	0.51	45.5
3	R2	88	0.0	93	0.0	0.206	17.2	LOS B	2.2	0.57	0.70	0.57	40.0
Approach		701	0.0	738	0.0	0.466	8.5	LOS A	13.2	0.52	0.49	0.52	44.7
East: Lowes Road													
4	L2	37	0.0	39	0.0	0.113	37.6	LOS D	1.4	0.86	0.72	0.86	32.8
6	R2	149	0.0	157	0.0	0.454	40.4	LOS D	6.3	0.93	0.79	0.93	32.0
Approach		186	0.0	196	0.0	0.454	39.8	LOS D	6.3	0.92	0.78	0.92	32.2
North: Dunns Crossing Road													
7	L2	284	0.0	299	0.0	0.227	10.4	LOS B	4.9	0.41	0.66	0.41	43.4
8	T1	289	0.0	304	0.0	0.220	5.8	LOS A	5.0	0.40	0.35	0.40	46.3
Approach		573	0.0	603	0.0	0.227	8.1	LOS A	5.0	0.41	0.50	0.41	44.8
All Vehicles		1460	0.0	1537	0.0	0.466	12.3	LOS B	13.2	0.52	0.53	0.52	42.6

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



MOVEMENT SUMMARY

 Site: 101v [Dunns X-ing / Lowes - 2028 PM (Site Folder: Dunns X-ing / Lowes)]
New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 90 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg Satn	Aver Delay	Level of Service	95% BACK OF QUEUE	95% BACK OF QUEUE	Prop Que	Effective Stop Rate	Aver No Cycles	Aver Speed
		[Total veh/h]	[HV] %	[Total veh/h]	[HV] %	v/c	sec		[Veh.]	[Dist.]		km/h		km/h
South: Dunns Crossing Road														
2	T1	402	0.0	423	0.0	0.311	6.7	LOS A	7.7	53.8	0.45	0.40	0.45	45.8
	R2	55	0.0	58	0.0	0.212	19.9	LOS B	1.5	10.8	0.61	0.71	0.61	38.9
	Approach	457	0.0	481	0.0	0.311	8.3	LOS A	7.7	53.8	0.47	0.43	0.47	44.8
East: Lowes Road														
	L2	89	0.0	94	0.0	0.256	37.9	LOS D	3.5	24.8	0.88	0.76	0.88	32.7
6	R2	199	0.0	209	0.0	0.573	40.6	LOS D	8.5	59.8	0.95	0.81	0.95	32.0
	Approach	288	0.0	303	0.0	0.573	39.7	LOS D	8.5	59.8	0.93	0.80	0.93	32.2
North: Dunns Crossing Road														
7	L2	206	0.0	217	0.0	0.167	10.5	LOS B	3.5	24.5	0.40	0.65	0.40	43.3
8	T1	705	0.0	742	0.0	0.569	8.3	LOS A	16.8	117.9	0.57	0.51	0.57	44.9
	Approach	911	0.0	959	0.0	0.569	8.8	LOS A	16.8	117.9	0.53	0.55	0.53	44.5
	All Vehicles	1656	0.0	1743	0.0	0.573	14.1	LOS B	16.8	117.9	0.58	0.56	0.58	41.8

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



Appendix 15

Dunns Crossing Rd / Goulds Rd / Selwyn Rd Traffic Model Results



MOVEMENT SUMMARY

Site: 101 [Dunns X-ing / Goulds - 2028 AM (Site Folder: Dunns X-ing / Gould / Selwyn)]

Network: N101 [Dunns / Goulds / Selwyn - 2028 AM (Network Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance											
Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Sain	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Aver. Speed
		[Tidal veh/h]	HV %	[Tidal veh/h]	HV %	v/c	sec		[Veh. w/h]	Dist. m	km/h
South: Goulds Road											
1	L2	254	0.0	254	0.0	0.173	2.1	LOS A	0.0	0.0	47.0
2	T1	74	0.0	74	0.0	0.173	0.0	LOS A	0.0	0.0	47.9
Approach		327	0.0	327	0.0	0.173	1.6	NA	0.0	0.0	47.2
North: Goulds Road											
8	T1	108	0.0	108	0.0	0.109	0.2	LOS A	0.1	0.4	48.5
9	R2	17	0.0	17	0.0	0.109	5.7	LOS A	0.1	0.4	48.3
Approach		125	0.0	125	0.0	0.109	1.0	NA	0.1	0.4	48.4
West: Dunns Crossing Road											
10	L2	14	0.0	14	0.0	0.665	7.0	LOS A	1.2	8.5	44.4
12	R2	375	0.0	375	0.0	0.665	8.5	LOS A	1.2	8.5	40.7
Approach		388	0.0	388	0.0	0.665	8.4	LOS A	1.2	8.5	40.9
All Vehicles		841	0.0	841	0.0	0.665	4.7	NA	1.2	8.5	44.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).

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.

Delay Model: SIDRA Standard (Geometric Delay is included).

Gap-Acceptance Capacity: SIDRA Standard (Akcelik MTD).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

Site: 101 [Goulds / Selwyn - 2028 AM (Site Folder: Dunns X-ing / Gould / Selwyn)]

Network: N101 [Dunns / Goulds / Selwyn - 2028 AM (Network Folder: General)]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
		[Total veh/h]	HV %	[Total veh/h]	HV %	v/c	sec		[Veh. veh]	[Dist. m]				
South: Goulds Road														
1	L2	1	0.0	1	0.0	0.127	9.3	LOS A	0.2	1.3	0.49	0.95	0.49	61.4
2	T1	76	0.0	76	0.0	0.127	11.1	LOS B	0.2	1.3	0.49	0.95	0.49	55.0
3	R2	8	0.0	8	0.0	0.127	16.0	LOS C	0.2	1.3	0.49	0.95	0.49	61.0
Approach		85	0.0	85	0.0	0.127	11.6	LOS B	0.2	1.3	0.49	0.95	0.49	56.1
East: Selwyn Road														
4	L2	13	0.0	13	0.0	0.193	7.3	LOS A	0.4	2.8	0.23	0.39	0.23	67.4
5	T1	119	0.0	119	0.0	0.193	0.3	LOS A	0.4	2.8	0.23	0.39	0.23	71.8
6	R2	202	0.0	202	0.0	0.193	7.0	LOS A	0.4	2.8	0.23	0.39	0.23	65.2
Approach		334	0.0	334	0.0	0.193	4.6	NA	0.4	2.8	0.23	0.39	0.23	68.5
North: Goulds Road														
7	L2	343	0.0	343	0.0	0.479	5.2	LOS A	1.3	9.1	0.22	0.94	0.25	56.3
8	T1	44	0.0	44	0.0	0.479	8.5	LOS A	1.3	9.1	0.22	0.94	0.25	55.9
9	R2	96	0.0	96	0.0	0.479	10.2	LOS B	1.3	9.1	0.22	0.94	0.25	55.6
Approach		483	0.0	483	0.0	0.479	6.5	LOS A	1.3	9.1	0.22	0.94	0.25	56.1
West: Selwyn Road														
10	L2	49	0.0	49	0.0	0.059	7.0	LOS A	0.0	0.0	0.01	0.29	0.01	70.4
11	T1	62	0.0	62	0.0	0.059	0.0	LOS A	0.0	0.0	0.01	0.29	0.01	74.8
12	R2	1	0.0	1	0.0	0.059	7.0	LOS A	0.0	0.0	0.01	0.29	0.01	69.6
Approach		113	0.0	113	0.0	0.059	3.1	NA	0.0	0.0	0.01	0.29	0.01	73.5
All Vehicles		1015	0.0	1015	0.0	0.479	5.9	NA	1.3	9.1	0.22	0.69	0.24	62.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).

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.

N/A: 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.

Delay Model: SIDRA Standard (Geometric Delay is included).

Gap-Acceptance Capacity: SIDRA Standard (Akcelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.



MOVEMENT SUMMARY

Site: 101 [Dunns X-ing / Goulds - 2028 PM (Site Folder: Dunns X-ing / Gould / Selwyn)]

Network: N101 [Dunns / Goulds / Selwyn - 2028 PM (Network Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg Satn	Aver Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop Que	Effective Stop Rate	Aver No. Cycles	Aver Speed km/h
		[veh/h]	[HV] %	[Total veh/h]	[HV] %	v/c	sec		[Veh. Delay]	[m]				
South: Goulds Road														
1	L2	264	0.0	264	0.0	0.184	2.1	LOS A	0.0	0.0	0.00	0.36	0.00	47.1
2	T1	85	0.0	85	0.0	0.184	0.0	LOS A	0.0	0.0	0.00	0.36	0.00	47.9
Approach		349	0.0	349	0.0	0.184	1.6	NA	0.0	0.0	0.00	0.36	0.00	47.3
North: Goulds Road														
8	T1	134	0.0	134	0.0	0.085	0.3	LOS A	0.1	0.5	0.14	0.08	0.14	48.4
9	R2	21	0.0	21	0.0	0.085	5.8	LOS A	0.1	0.5	0.14	0.08	0.14	48.3
Approach		155	0.0	155	0.0	0.085	1.0	NA	0.1	0.5	0.14	0.08	0.14	48.4
West: Dunns Crossing Road														
10	L2	22	0.0	22	0.0	0.685	7.5	LOS A	1.1	7.4	0.41	0.83	0.71	44.1
12	R2	313	0.0	313	0.0	0.685	9.2	LOS A	1.1	7.4	0.41	0.83	0.71	40.1
Approach		335	0.0	335	0.0	0.685	9.1	LOS A	1.1	7.4	0.41	0.83	0.71	40.5
All Vehicles		839	0.0	839	0.0	0.685	4.5	NA	1.1	7.4	0.19	0.50	0.31	44.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).

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.

Delay Model: SIDRA Standard Geometric Delay is included.

Gap-Acceptance Capacity: SIDRA Standard (Alpexik M30).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

Site: 101 [Goulds / Selwyn - 2028 PM (Site Folder: Dunns X-ing / Gould / Selwyn)]

Network: N101 [Dunns / Goulds / Selwyn - 2028 PM (Network Folder: General)]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS [Total veh/h]		ARRIVAL FLOWS [Total veh/h]		Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh]	Prop. Que	Effective Stop Rate	Aver No. Cycles	Aver Speed km/h	
South: Goulds Road														
1	L2	1	0.0	1	0.0	0.088	9.1	LOS A	0.1	0.9	0.48	0.48	61.4	
2	T1	51	0.0	51	0.0	0.088	11.3	LOS B	0.1	0.9	0.48	0.48	54.8	
3	R2	6	0.0	6	0.0	0.088	15.0	LOS B	0.1	0.9	0.48	0.48	60.9	
Approach		58	0.0	58	0.0	0.088	11.7	LOS B	0.1	0.9	0.48	0.48	56.1	
East: Selwyn Road														
4	L2	7	0.0	7	0.0	0.190	7.5	LOS A	0.4	2.8	0.30	0.30	66.3	
5	T1	76	0.0	76	0.0	0.190	0.6	LOS A	0.4	2.8	0.30	0.30	70.4	
6	R2	226	0.0	226	0.0	0.190	7.2	LOS A	0.4	2.8	0.30	0.30	63.1	
Approach		309	0.0	309	0.0	0.190	5.6	NA	0.4	2.8	0.30	0.30	65.8	
North: Goulds Road														
7	L2	248	0.0	248	0.0	0.500	5.9	LOS A	1.4	10.0	0.33	0.43	54.7	
8	T1	87	0.0	87	0.0	0.500	9.2	LOS A	1.4	10.0	0.33	0.43	54.3	
9	R2	111	0.0	111	0.0	0.500	10.5	LOS B	1.4	10.0	0.33	0.43	54.1	
Approach		446	0.0	446	0.0	0.500	7.7	LOS A	1.4	10.0	0.33	0.43	54.5	
West: Selwyn Road														
10	L2	73	0.0	73	0.0	0.088	6.9	LOS A	0.0	0.0	0.00	0.00	70.6	
11	T1	94	0.0	94	0.0	0.088	0.0	LOS A	0.0	0.0	0.00	0.00	74.9	
12	R2	1	0.0	1	0.0	0.088	6.9	LOS A	0.0	0.0	0.00	0.00	69.7	
Approach		167	0.0	167	0.0	0.088	3.1	NA	0.0	0.0	0.00	0.00	73.6	
All Vehicles		981	0.0	981	0.0	0.500	6.5	NA	1.4	10.0	0.27	0.32	61.7	

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).

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.

Delay Model: SIDRA Standard (Geometric Delay is included).

Gap-Acceptance Capacity: SIDRA Standard (Alcelik M30).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

02 February 2021

Selwyn District Council

Attention: Jocelyn Lewes

Novo Group Limited
Level 1, 279 Montreal Street
PO Box 365, Christchurch 8140
0 - 03 365 5570
info@novogroup.co.nz

By email: Jocelyn.Lewes@selwyn.govt.nz

Dear Jocelyn,

PC200073: ROLLESTON WEST TRANSPORT RESPONSE TO RFI

1. Further to your Request for Further Information (RFI), this letter provides a response to the transport related queries (points 20 to 28 of the RFI). However, prior to providing that response it is worth noting that the Applicant has commissioned additional traffic modelling of the road network by Abley Ltd. This modelling is discussed prior to the RFI responses, to provide context for the responses.

Traffic Modelling

2. The Applicant has commissioned Abley to undertake additional traffic modelling of the road network with the proposed Plan Change traffic. The summary note of the traffic modelling is included in **Attachment 1** and it is noted that this is based on the 2028 forecast volumes and includes the State Highway 1 improvements illustrated in **Figure 1**. We understand that funding has been set aside by Waka Kotahi NZTA for undertaking these works.
3. Furthermore, the following changes to the transport network are included in the with models:

Base Model

- Lincoln Rolleston Road / Selwyn Road 'seagull'-type priority intersection (2028/29);
- Dunns Crossing Road / Burnham School Road signals (2029/30);
- Dunns Crossing Road / Lowes Road roundabout (2029/30);
- Updated lane designations on the SH1 / Dunns Crossing Road / Walkers Road and SH1 / Rolleston Drive roundabouts to reflect increased trip generation in West Rolleston. The lane designations include two right-turn lanes out of Dunns Crossing Road and Rolleston Drive, respectively;
- Roundabout at the intersection of Selwyn Road and Dunns Crossing Road, with Goulds Road realigned to meet Dunns Crossing Road at a priority intersection. This is per the RFI issued by SDC on Plan Change 70 to their District Plan. The roundabout is assumed to be single-lane with an inscribed circle diameter (ICD) of 30 metres; and

- Rural roundabout at the intersection of Selwyn Road and Springston Rolleston Road, assumed to be single-lane with an ICD of 30 metres. This roundabout has been previously identified as a necessary temporary measure to enable development in southwest Rolleston until the CRETS collector road is complete.

With Plan Change Model

- Site access intersections, including dedicated right turn bays from Dunns Crossing Road at the Newman Road intersection;
- Internal ODP network for the Plan Change sites, including an additional access to Burnham School Road compared to the original proposal;
- Traffic signals at the intersection of Dunns Crossing Road and Granite Drive, including right turn bays from Dunns Crossing Road. The signal timings have been assumed to be offset from the Dunns Crossing Road / Burnham School Road signals in order to prioritise northbound traffic in the AM and southbound traffic in the PM; and
- Urban roundabout at the intersection of Lowes Road and East Maddisons Road, assumed to be single-lane with an ICD of 20 metres.

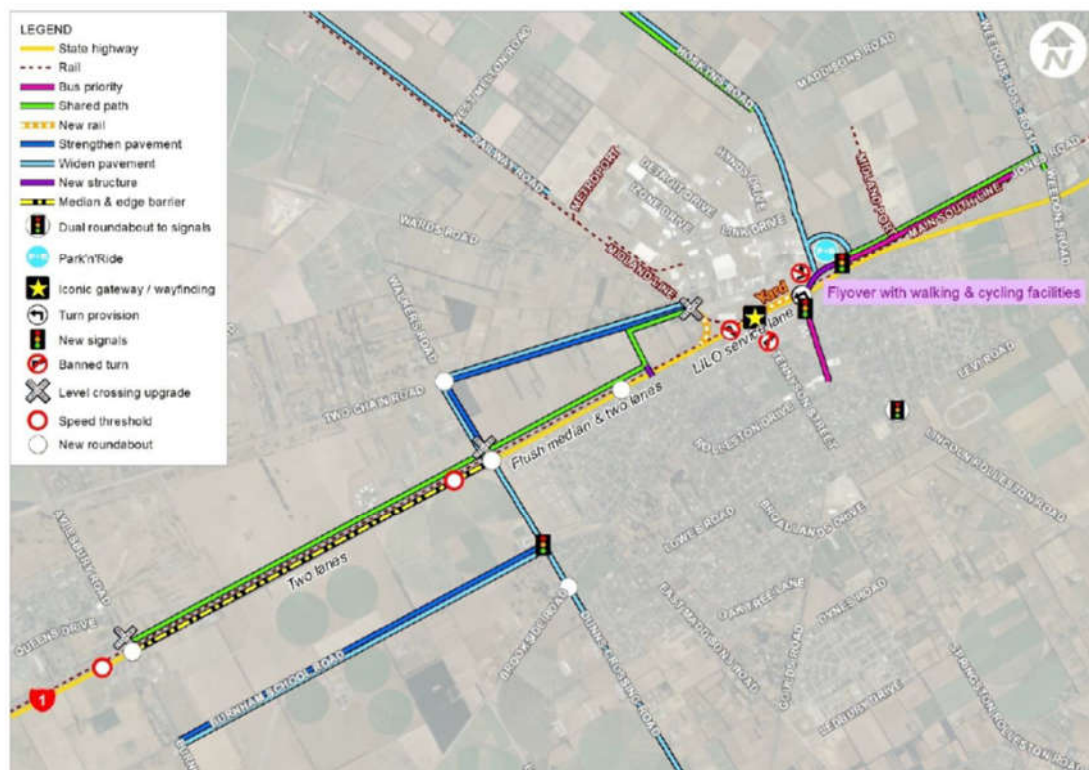


Figure 1: Rolleston Transport Improvements (Source: GETS Tender Documents)

4. The key changes in traffic flows on the model network (between the base model and the with Plan Change model) are illustrated in **Figure 2**. This indicates a focus on traffic associated with the Plan Change sites on Dunns Crossing Road, State Highway 1 and Selwyn Road (in the AM peak).

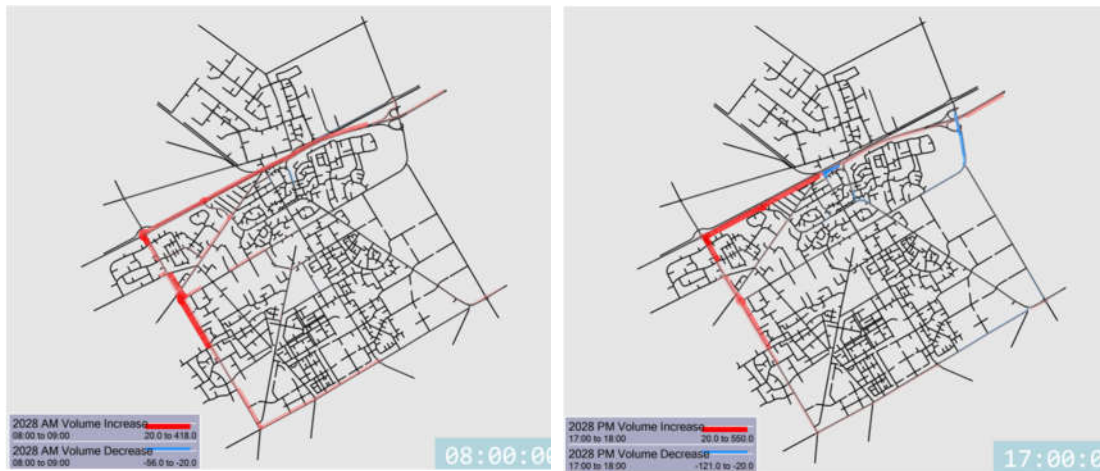


Figure 2: Model Flow Difference Plots

5. The high-level summary of the traffic modelling results indicates that the Plan Change traffic can be accommodated by the road network. The summary results provided in Table 3.3 of **Attachment 1** indicate that no intersection is predicted to operate worse than Level of Service C in the AM peak period.
6. The PM Peak results (Table 3.4 of **Attachment 1**) indicate the SH1 / Tennyson Street / Brookside Road intersection and SH1 / Weedons Ross Road / Weedons Road interchange are predicted to operate at Level of Service E in the base model and the with Plan Change model, so there is no change in high-level operation at those locations as a result of the Plan Change.
7. The modelling results will be discussed in greater detail (where required) in the following response to the RFI queries.

RFI Response

20. As addressed in the request, the key intersection that needs to be upgraded to address current safety issues and to accommodate any sustainable increase in traffic using Dunns Crossing Road and SH1 is the Dunns Crossing/SH1/Walkers Road intersection, and this intersection has been signalled for a major upgrade by the NZTA as part of the NZUP Programme and is represented in the Programme Business Case for SH1/Rolleston Access Upgrades. At this point the upgrade proposed is a roundabout however no design has been developed yet by the NZTA. To address the transport effects, it should be anticipated that Council will seek to include a rule in the Operative District Plan that no subdivision resulting from this PC occurs until this upgrade is completed. Please provide proposed wording for such a provision.

8. As can be seen from the Abley traffic modelling results, the implementation of a roundabout at Dunns Crossing Road / SH1 / Walkers Road intersection provides a LOS of A (for both AM and PM peaks) with the Plan Change traffic added to the road network. However, given the proximity of the Holmes Block to that intersection, the Applicant is willing to limit the development of the Holmes Block to no more than 97 dwellings being occupied prior to the completion of the upgrade to the SH1 / Dunns Crossing Road intersection. This is to allow Waka Kotahi NZTA, SDC and other involved parties the flexibility on the final design development of the space required for such roundabout. This number of dwellings has been selected as it is the currently zoned number of



dwellings for the Holmes Block. This is therefore considered to be a reasonable baseline and also to facilitate the subdivisions progressing, but avoiding traffic effects above that which may currently occur as of right.

9. The wording of this rule is proposed to be as follows.

12.1.3.50

(a) In respect of the land identified at Appendix 39 (Holmes Block), no more than 97 1150 residential allotments may be created and a consent notice or similar mechanism shall be registered on the title of those lots ensuring there is no more than 97 occupied dwellings within the Holmes Block prior to the completion of the upgrade to the SH1 / Dunns Crossing Road intersection and signals upgrade to the Burnham School Road / Dunns Crossing Road intersection.

(b) In respect of the land identified at Appendix 40 (Skellerup Block), no more than 950 residential allotments may be created.

21. Dunns Crossing Road is part of the Rolleston arterial perimeter road route. The Applicant has assessed in the ITA that some intersection movements for the Holmes Block will operate at a LoS of E at peak times. Councils LoS limit is usually D for peak periods. Further assessment as to the type and/or positioning of intersections is required to improve LoS to achieve this, with the emphasis on the ODP Primary road off Dunns Crossing Road.

10. The following provides a discussion on the traffic modelling results provided by Abley and contained in **Attachment 1**. This initially focuses on the Plan Change accesses, then the operation of Dunns Crossing Road. Finally, key intersections on the wider road network are discussed.

Plan Change Accesses

11. The modelling results indicate that the proposed access intersections are predicted to operate with individual movements being no worse than Level of Service D, with the exception of the right turn out of Newman Road, which is a Secondary Road connection.
12. The primary road connection is at the Dunns Crossing Road / Granite Drive intersection, which is now proposed to be traffic signal controlled. This intersection has no movement operating worse than Level of Service D. It is also understood that the traffic signal timings have been set to prioritise traffic on Dunns Crossing Road to discourage rat-running on Granite Drive. As such, the operation of this intersection is considered to be acceptable.
13. The Dunns Crossing Road / Newman Road intersection is predicted to operate at Level of Service C in the AM peak hour and Level of Service D in the PM peak hour. However, the breakdown of specific movements indicates that the right turn from Newman Road is predicted to operate at Level of Service E in the AM peak hour and the through movement from the Holmes Block (to Newman Road) is predicted to operate at Level of Service E in the PM peak hour.
14. The right turn from Newman Road in the AM peak hour is considered acceptable given that it occurs in one hour only and would not affect the through traffic on Dunns Crossing Road. It is also noted that the delay for this approach is 38 seconds, where the threshold of change between Levels of Service D and E is 35 seconds. This means that the movement is at the lower end of the delays encompassed by Level of Service E.



15. The through movement that is predicted to operate at Level of Service E in the PM peak hour is from the Holmes Block northern access through to Newman Road. This is predicted to have a flow of one vehicle per hour and occurs in only one hour. This is considered to be acceptable given the negligible traffic volume it affects.

Dunns Crossing Road

16. The majority of intersections elsewhere on Dunns Crossing Road are also predicted to operate satisfactorily with the Plan Change traffic added to the network and the infrastructure assumptions outlined in paragraphs 2 and 3 in place. The only intersection that has movements predicted to operate worse than Level of Service D is the Dunns Crossing Road / Brookside Road intersection. This is predicted to have the following movements at Level of Service E:
 - Brookside Road East Through Movement: This affects 11 vehicles in the 08:00 to 09:00 period only; and
 - Brookside Road West Right Turn: This affects 3 vehicles in the 17:00 to 18:00 period only.
17. The modelled results described above are considered acceptable given they do not affect movements on Dunns Crossing Road, they affect a low volume of traffic and are only occurring in one hour of the modelled periods.

Wider Road Network

State Highway 1 / Weedons Ross Road Interchange

18. Two areas of capacity constraint have been identified on the wider road network. The first of these is the SH1 / Weedons Ross Road interchange. We understand that traffic signals have been included in the base model to manage the queues on the westbound off-ramp, as the northbound traffic on Weedons Ross Road does not provide sufficient gaps to enable vehicles to satisfactorily exit the off-ramp. Although a roundabout arrangement is retained, the traffic signals create gaps in the northbound traffic to enable the queues on the westbound off-ramp to clear. The operation of this interchange in the base model includes movements that are at Level of Service E and F in the AM and PM peak hours.
19. The inclusion of traffic associated with the proposed Plan Change only slightly exacerbates these existing issues. This is despite the Plan Change sites being at least 5km from the interchange and there being a new roundabout at the SH1 / Dunns Crossing Road intersection. The poor performance of the Weedons Ross Road interchange in the base model indicates that improvements are required regardless of the proposed Plan Change, so the operation of this interchange should not preclude the Plan Change progressing.

Brookside Road / Rolleston Drive Intersection

20. The Brookside Road west approach to the proposed roundabout at the Rolleston Drive / Brookside Road intersection is predicted to operate at Level of Service E during the weekday PM peak with the Plan Change traffic added to the network. This approach was predicted to operate at Level of Service D in the base model.



21. **Table 1** sets out a comparison of the turning volumes at the Rolleston Drive / Brookside Road intersection with and without the Plan Change traffic. The following provides commentary on the changes in traffic volume and how these may affect the capacity of the Brookside Road west approach. In this regard, capacity effects on that approach as a result of increases in volume on the approach itself and increases in the volume of traffic that passes the approach:

- The Brookside Road west approach is predicted to experience a decrease in traffic volumes with the Plan Change added. This is because the increased delay on this approach re-routes traffic away from the intersection;
- The Rolleston Drive northern approach will experience an increase of up to 66 vehicles per hour, although these vehicles will not pass the Brookside Road western approach and should not affect the capacity of that arm;
- The Brookside Road east approach is predicted to experience an increase of up to 101 vehicles per hour. These increases are on the through movement from Brookside Road east to west and would again not pass the Brookside Road west approach, so there should be no effect on the capacity on that arm; and
- The Rolleston Drive southern approach will experience an increase of up to 136 vehicles per hour, which includes an increase of up to 97 vehicles per hour turning through and right and these would reduce the capacity of the Brookside Road west approach.

Table 1: Brookside Rd / Rolleston Dr Traffic Volume Comparison

		16:00 to 17:00			17:00 to 18:00		
		Base Model	With PC	Change	Base Model	With PC	Change
Rolleston Dr North	Left	29	38	9	41	36	-5
	Through	138	154	16	172	182	10
	Right	99	140	41	154	146	-8
Brookside Rd East	Left	105	84	-21	113	107	-6
	Through	344	403	59	302	403	101
	Right	70	70	0	64	65	1
Rolleston Dr South	Left	125	169	44	148	185	36
	Through	99	166	67	108	179	71
	Right	70	95	25	86	112	26
Brookside Rd West	Left	97	97	0	100	103	4
	Through	182	166	-16	190	173	-18
	Right	22	18	-4	20	14	-7

22. From the above, it is considered that the key reason for the reduction in performance on the Brookside Road west approach is the increase in through and right turning traffic from



Rolleston Drive south. These movements do not have an obvious association with the Plan Change sites, as they are neither heading to / from those Plan Changes. The effects are considered to have occurred because of additional Plan Change traffic elsewhere on the network causing this re-routing.

23. It is anticipated that the key location for this traffic re-routing is the SH1 / Weedons Ross Road interchange, given this is the location that has been identified as being capacity constrained. In particular, there is potential that the traffic signals installed on the Weedons Ross Road northbound approach are leading to delays that has the effect of promoting the SH1 / Rolleston Drive intersection for State highway access.
24. Overall, whilst the inclusion of the Plan Change traffic has led to the Brookside Road west approach to operate at Level of Service E, this is considered to be a function of wider road network capacity constraint rather than a direct effect of the Plan Change. This is because the primary reason the intersection is over-capacity is the increase in traffic on Rolleston Drive south that has no immediately apparent link to the Plan Change sites. Resolving that wider issue is anticipated to resolve the constraint at the Rolleston Drive / Brookside Road intersection.

22. Burnham School Road will become over time part of a supplementary arterial local road route from SH1/Burnham to these residential areas of Rolleston as identified in the SH1/Rolleston Access Business Case. It is already used by heavy vehicles accessing the Pines Resource Recovery Park and Pines Waste Water Treatment Plant. Two upgrades are identified in Councils long term planning:

- *Installation of traffic signals Burnham School/Dunns Crossing Road in 2029/30*
- *Widening of Burnham School Road (Burnham Road to Dunns Crossing Road) in 2034/35*

23. Based on the anticipated rate of development of the Holmes Block and traffic volumes generated by this PC, are the timing of these works appropriate in that context and how would any requirements needed to be factored into the design of such? It is noted that the PC is proposing no direct lot access to Burnham School Road. While this is seen as perhaps mitigating some traffic issues relating to Burnham School Road, is this the appropriate urban form response?

25. It is anticipated that the construction of traffic signals at the Burnham School Road / Dunns Crossing Road would be timed to coincide with the occupation of no more than 97 dwellings at the Holmes Block site. The Holmes Block would also provide widening on the northern side of Burnham School Road as the sub-division occurs, but only along the frontage of the Plan Change site. No widening is considered to be required by the Plan Change site to the west of that site.
26. Burnham School Road is a future arterial road and it is considered that this road would best be managed through not providing direct property access. A further urban form response regarding no direct lot access to Burnham School Road will be answered elsewhere by the urban design consultant.

24. Please amend the Holmes Block ODP to show provision of an off road walkway/cycleway along Burnham School Road to Dunns Crossing Road, along with a walk cycle link as below to Burnham School Road.



27. This amendment has been included on the revised ODP, which is included as **Attachment 2**.

25. The ITA refers to a possible upgrade of the Lowes/Dunns Crossing Road intersection with traffic signals suggested by the Applicant. Council's current plans are for a roundabout in 2029/30 as identified in the SH1/Rolleston Business Case. Please review the ITA in light of this advice and consider how this may then influence the current assessment and comments on this intersection?

28. This is assumed to be a roundabout in the updated traffic modelling and has been identified as operating satisfactorily with the Plan Change traffic added to the network.

26. It is noted that there is no ODP roading connection shown to SH1 from the Holmes Block. This likely anticipates the NZTA views, however has this been discussed with them on the basis that even an entry only off SH1 could be beneficial to mitigate traffic issues at the SH1/Dunns Crossing/Walkers Road intersection to service the block?

29. No access to / from SH1 has been proposed as it is anticipated that Waka Kotahi NZTA would not be supportive of this. Furthermore, the proposed roundabout at SH1 / Dunns Crossing Road / Walkers Road is predicted to operate satisfactorily with the Plan Change traffic added to the network, so additional links to SH1 are not considered necessary.

27. In regards to the Skellerup Block the ITA needs to look more carefully at the possible alignment (or otherwise) of the roading and transport connections with the proposed PC70 area opposite and assess intersection type and alignments and LoS to provide confidence on this aspect. This should be coordinated with the PC70 Applicant.

30. The plan included in **Attachment 3** illustrates the alignment of the transport networks for this Plan Change 73 and Plan Change 70. The road alignments are considered to be sufficiently well aligned to enable continuous links to be provided.

31. The traffic modelling undertaken by Abley assumed 25% completion of future development areas and a priority-controlled crossroads on Dunns Crossing Road where the Plan Change 73 road layout meets the Plan Change 70 layout. This indicates that the intersections (including the Primary Access intersection) are predicted to operate at Level of Service A, with low levels of delay.

32. Given the good operation of the priority-controlled intersection and the desire-line for most vehicles heading to / from the east from PC 70 (toward Rolleston town or Christchurch and therefore not toward Dunns Crossing Road) the priority-controlled intersection is considered to be satisfactory in the future.

28. There are concerns with the cumulative traffic effects on the Selwyn Road corridor from growth to the south and south west of Rolleston. The plan change request makes reference to the Selwyn/Goulds/Dunns Crossing intersection and a possible upgrade needed but this is not definitive. In conjunction with PC70 Applicant, please provide an assessment of this intersection and the necessary upgrades required to ensure that it operates efficiently and effectively.

33. A roundabout has been included in the Abley traffic model at this location. The layout of the intersection is consistent with the intersection arrangement illustrated in the RFI for Plan Change 70. Whilst this traffic modelling includes 25% of the Future Growth Areas, it indicates that this revised intersection arrangement is predicted to operate at Level of Service A for all approaches with minimal delay.



34. Whilst we understand that consideration of Plan Change 70 traffic can only be considered when that Plan Change is notified, the initial modelling undertaken indicates that the proposed roundabout should have ample capacity to accommodate that increase in traffic.
35. We trust this letter satisfactorily addresses the transport matters raised in the Council's RFI.

Yours sincerely,

Novo Group Limited

Nick Fuller

Senior Transport Engineer

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021-032-TL001D



Attachment 1: Abley Modelling Note

Holmes and Skellerup Blocks Private Plan Change Modelling

Prepared for: Rolleston Industrial Developments Limited
Job Number: RIDL-J002
Revision: Draft
Issue Date: 26 January 2021
Prepared by: Evan Stranks, Senior Transportation Engineer
Reviewed by: Chris Blackmore, Senior Transportation Engineer

1. Introduction

Abley Limited (Abley) has been commissioned by Rolleston Industrial Developments Ltd (RIDL) to model the inclusion of their Private Plan Change (PPC) in the 2028 Rolleston model which has previously been developed for Selwyn District Council (SDC) using Paramics Discovery. Permission has been granted by SDC to use the model for this work. The model has been used as the basis for developing 'with PPC' and 'without PPC' models to assess the PPC's effect on the Rolleston road network.

The PPC proposes to rezone two blocks of land from their current rural residential L3 zoning to urban residential LZ zoning. The two blocks of land are as follows:

- Holmes Block, located west of Dunns Crossing Road between SH1 and Burnham School Road; and,
- Skellerup Block, located west of Dunns Crossing Road, 1000m south of Brookside Road and 700m north of Selwyn Road.

The PPC proposes the inclusion of 1150 and 950 households in Holmes and Skellerup Blocks, respectively.

The model runs a two-hour morning period from 07:00 to 09:00 and a two-hour evening period from 16:00 to 18:00. From these results are reported for a peak hour in the morning from 08:00 to 09:00 and in the evening from 17:00 to 18:00.

Paramics Discovery microsimulation is a stochastic modelling package, which means there is some inherent variability between modelling runs. To account for this, the results presented are the averages of four model runs. Generally, outlier results are excluded from the analysis however this has not been required for any of the results reported here.

2. Assumptions

2.1 Development areas

The original 2028 model included future development based on SDC estimates of what would be completed by the model year. This includes varying levels of development in existing Outline Development Plan (ODP) areas and Special Housing Areas (SHA) as well as 25% development in identified 'future urban development' areas. These assumptions have been retained in the PPC modelling.

The Holmes and Skellerup blocks were included in the original modelling with their current rural residential zoning amounting to approximately 96 and 53 households, respectively, by 2028. This level of development has been included in the 'Without PPC' model with the same trip generation as in the original model. The 'With PPC' model replaces these with the proposed 1150 and 950 households, respectively, with a trip generation rate of 0.9 trips per household in peak hours as detailed in [Table 2.1](#). Each block includes a 450 square metre local retail centre, which has been assumed to generate 12.5 trips per 100 square metres in peak hours, of which 20% is pass-by and 80% is new trips from the immediate area.

Table 2.1 Trip generation per developed household, supplied by RIDL

Period	Arrivals	Departures	Total
Morning Peak Hour	0.225	0.675	0.9
Evening Peak Hour	0.567	0.333	0.9
Daily	4.1	4.1	8.2

2.2 Road network

The models used in the assessment have been built off the previously developed 2028 Rolleston model. As such, it includes all relevant infrastructure programmed for completion up until 2027/28 in SDC's draft 2021-31 Long Term Plan (LTP). Three infrastructure improvements programmed in the draft LTP for 2028/29 and 2029/30 have been included. These are:

- Lincoln Rolleston Road / Selwyn Road 'seagull'-type priority intersection (2028/29);
- Dunns Crossing Road / Burnham School Road signals (2029/30); and,
- Dunns Crossing Road / Lowes Road roundabout (2029/30).

Both the 'Without PPC' and 'With PPC' models further include the following additional differences from the previously developed 2028 Rolleston model:

- Updated lane designations on the SH1 / Dunns Crossing Road / Walkers Road and SH1 / Rolleston Drive roundabouts to reflect increased trip generation in West Rolleston. The lane designations include two right-turn lanes out of Dunns Crossing Road and Rolleston Drive, respectively.
- Rural roundabout at the intersection of Selwyn Road and Dunns Crossing Road, with Goulds Road realigned to meet Dunns Crossing Road at a priority intersection. This is per the RFI issued by SDC on Plan Change 70 to their District Plan. The roundabout is assumed to be single-lane with an inscribed circle diameter (ICD) of 30 metres.
- Rural roundabout at the intersection of Selwyn Road and Springston Rolleston Road, assumed to be single-lane with an ICD of 30 metres. This roundabout has been previously identified as a necessary temporary measure to enable development in southwest Rolleston until the CRETS collector road is complete.
- Internal ODP network for the PPC including improved accesses on Dunns Crossing Road and Burnham School Road.

The 'With PPC' model includes the following additional pieces of infrastructure as requested by RIDL:

- Urban roundabout at the intersection of Lowes Road and East Maddisons Road, assumed to be single-lane with an ICD of 20 metres.
- Traffic signals at the intersection of Dunns Crossing Road and Granite Drive. The signal timings have been assumed to be offset from the Dunns Crossing Road / Burnham School Road signals in order to prioritise northbound traffic in the AM and southbound traffic in the PM.

The layouts for the 'with PPC' and 'without PPC' models are illustrated in **Figure 2.1** and **Figure 2.2**, respectively.

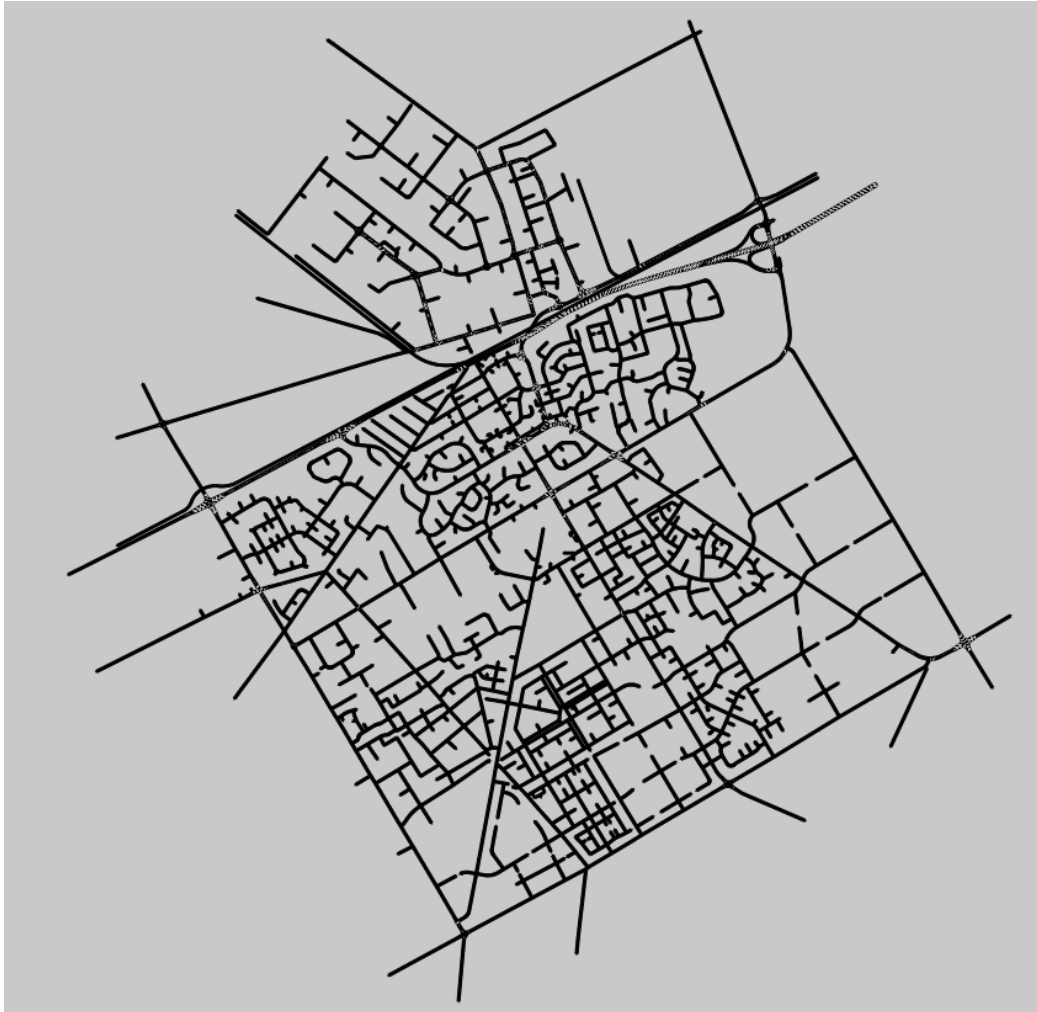


Figure 2.1 'Without PPC' model layout

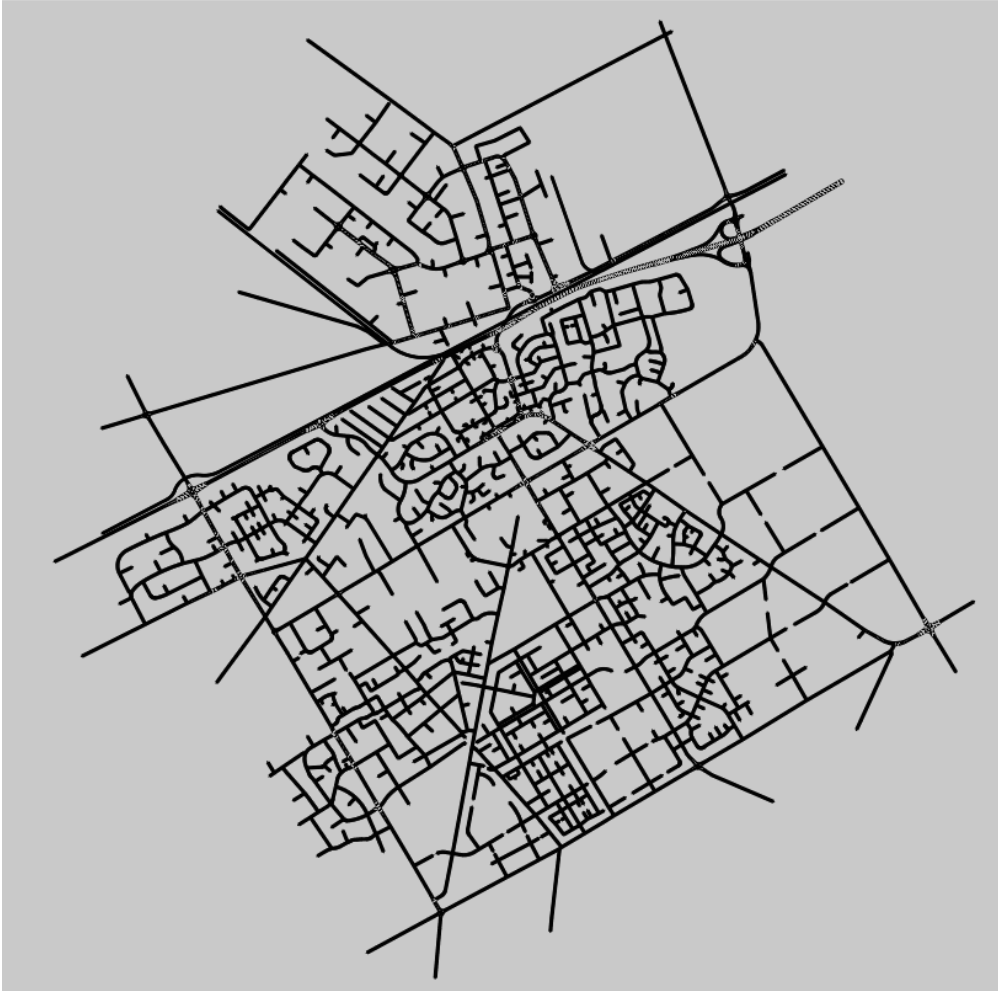


Figure 2.2 'With PPC' model layout

Weedons Road Interchange

In the course of developing the 2028 Rolleston model for SDC, it was found that the SH1 Weedons Road interchange has limited capacity for accommodating future growth in traffic volumes. The westbound exit from SH1 must give way to northbound movements along Weedons Road at the southernmost interchange roundabout. This results in extensive queuing on the SH1 westbound exit in the 2028 model, particularly in the PM where these queues can extend back to the mainline SH1. It was thus assumed that a temporary solution would be required to limit the impact on SH1 in advance of a more extensive future upgrade to the interchange that would be required to enable full development of the Rolleston urban growth area. The temporary solution assumed was metering signals on the Weedons Road approach to the roundabout in order to create additional gaps for traffic coming off SH1.

The roundabout metering signals have been updated and identical timings have been included in both the 'with PPC' and 'without PPC' models to enable direct comparison. As the metering has been assumed as a temporary solution, it must be noted that the timings are not necessarily optimised to get the maximum performance out of the interchange, but rather they have been set to keep the mainline SH1 flowing.

3. Modelling outputs

3.1 Volumes

The 'with PPC' model shows that increases in traffic volumes in both peaks are primarily along Dunns Crossing Road and SH1, with other important arterials and collectors also seeing some increase. Refer to [Table 3.1](#) and [Figure 3.1](#) for the AM peak results and [Table 3.2](#) and [Figure 3.2](#) for PM peak results.

Table 3.1 Two-way volumes on select links in AM peak (08:00-09:00)

Measurement point	Without PPC	With PPC	Change
Dunns Crossing Rd north of Newman Rd	478	940	462
Dunns Crossing Rd south of Burnham School Rd	396	937	541
Dunns Crossing Rd north of Skellerup	293	635	343
Dunns Crossing Rd south of Skellerup	268	586	318
SH1 west of Dunns Crossing Rd	1271	1339	69
SH1 east of Dunn Crossing Rd	1483	1817	334
SH1 east of Rolleston Dr (W)	1514	1838	324
SH1 west of Weedons Rd Interchange	1919	2255	335
SH1 east of Weedons Rd Interchange	3126	3338	212
Brookside Rd SW of Rolleston Dr	609	888	279
Lowes Rd east of East Maddisons Rd	315	531	217
Selwyn Rd east of Goulds Rd	363	631	269
Selwyn Rd east of Weedons Rd	957	1125	167



Figure 3.1 Modelled volume change in AM peak (08:00-09:00)

Table 3.2 Two-way volumes on select links in PM peak (17:00-18:00)

Measurement point	Without PPC	With PPC	Change
Dunns Crossing Rd north of Newman Rd	733	1437	704
Dunns Crossing Rd south of Burnham School Rd	464	1000	537
Dunns Crossing Rd north of Skellerup	356	743	387
Dunns Crossing Rd south of Skellerup	301	593	292
SH1 west of Dunns Crossing Rd	1465	1535	69
SH1 east of Dunn Crossing Rd	1760	2349	588
SH1 east of Rolleston Dr (W)	1999	2608	609
SH1 west of Weedons Rd Interchange	2718	3172	454
SH1 east of Weedons Rd Interchange	4382	4807	426
Brookside Rd SW of Rolleston Dr	902	1132	230
Lowes Rd east of East Maddisons Rd	355	513	159
Selwyn Rd east of Goulds Rd	392	615	223
Selwyn Rd east of Weedons Rd	1209	1362	153



Figure 3.2 Modelled volume change in PM peak (17:00-18:00)

3.2 Intersection performance

The delay and Level of Service (LOS) of key intersections have been evaluated and compared between the 'without PPC' and 'with PPC' models. LOS is calculated for roundabouts and signalised intersections on the basis of average weighted approach while for priority control intersections it is calculated as the worst approach averaged across movements. The performance of key intersections in the AM peak hour is demonstrated in **Table 3.3** and the PM peak hour in **Table 3.4**. Further breakdowns of the individual movements are attached as Appendix A.

Table 3.3 Key intersection performance in AM peak (08:00-09:00)

Intersection	Without PPC			With PPC			Change	
	Volume	Delay	LOS	Volume	Delay	LOS	Volume	Delay
SH1 / Dunns Crossing Road / Walkers Road roundabout	1793	6	A	2277	9	A	484	3
SH1 / Rolleston Drive roundabout	1877	7	A	2271	6	A	394	-1
SH1 / Tennyson Street / Brookside Road	430	5	A	437	3	A	7	-2
SH1 / Weedons Ross Road / Weedons Road interchange (both roundabouts)	1740	23	C	1916	23	C	176	0
Dunns Crossing Road / Newmans Road / Holmes North Secondary Access priority intersection	515	4	A	1048	21	C	533	17
Dunns Crossing Road / Granite Drive / Holmes Central Access priority intersection upgraded to signals	547	5	A	1160	15	B	613	10
Dunns Crossing Road / Burnham School Road signalised intersection	491	10	A	1052	16	B	560	6
Dunns Crossing Road / Brookside Road priority intersection	529	4	A	1246	24	C	717	19
Dunns Crossing Road / Lowes Road roundabout	515	2	A	1267	4	A	752	2
Dunns Crossing Road / Brenley Drive / Skellerup North Primary Access priority intersection	329	2	A	958	9	A	629	7
Dunns Crossing Road / Skellerup Central Primary Access priority intersection	299	2	A	655	4	A	356	2
Dunns Crossing Road / Skellerup South Primary Access priority intersection	305	2	A	714	5	A	409	3
Dunns Crossing Road / Skellerup South Secondary Access priority intersection	280	2	A	645	5	A	365	3
Dunns Crossing Road / Goulds Road priority intersection	434	3	A	758	4	A	324	1
Dunns Crossing Road / Selwyn Road roundabout	600	3	A	916	3	A	316	0
Burnham School Road / Brookside Road priority intersection	504	6	A	759	10	B	255	4
Rolleston Drive / Brookside Road roundabout	1214	7	A	1574	16	B	360	9
East Maddisons Road / Lowes Road priority intersection upgraded to roundabout	595	10	A	904	7	A	309	-3

Table 3.4 Key intersection performance in PM peak (17:00-18:00)

Intersection	Without PPC			With PPC			Change	
	Volume	Delay	LOS	Volume	Delay	LOS	Volume	Delay
SH1 / Dunns Crossing Road / Walkers Road roundabout	2153	6	A	2886	8	A	734	2
SH1 / Rolleston Drive roundabout	2279	5	A	2871	9	A	592	3
SH1 / Tennyson Street / Brookside Road	899	35	E	977	46	E	78	10
SH1 / Weedons Ross Road / Weedons Road interchange (both roundabouts)	1964	69	E	2081	77	E	118	8
Dunns Crossing Road / Newmans Road / Holmes North Secondary Access priority intersection	763	4	A	1526	26	D	763	22
Dunns Crossing Road / Granite Drive / Holmes Central Access priority intersection upgraded to signals	638	5	A	1441	13	B	804	8
Dunns Crossing Road / Burnham School Road signalised intersection	483	8	A	1040	9	A	557	1
Dunns Crossing Road / Brookside Road priority intersection	619	7	A	1300	22	C	681	15
Dunns Crossing Road / Lowes Road roundabout	621	2	A	1358	6	A	738	4
Dunns Crossing Road / Brenley Drive / Skellerup North Primary Access priority intersection	417	3	A	1076	9	A	659	6
Dunns Crossing Road / Skellerup Central Primary Access priority intersection	360	3	A	779	6	A	419	3
Dunns Crossing Road / Skellerup South Primary Access priority intersection	348	2	A	743	5	A	395	3
Dunns Crossing Road / Skellerup South Secondary Access priority intersection	306	3	A	660	6	A	354	3
Dunns Crossing Road / Goulds Road priority intersection	483	3	A	784	3	A	301	-1
Dunns Crossing Road / Selwyn Road roundabout	655	3	A	941	4	A	286	1
Burnham School Road / Brookside Road priority intersection	646	6	A	893	11	B	247	5
Rolleston Drive / Brookside Road roundabout	1497	18	B	1703	29	C	206	11
East Maddisons Road / Lowes Road priority intersection upgraded to roundabout	787	38	E	1064	9	A	277	-29

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Appendix A

Level of Service breakdowns



Without PPC Model

SH1 / Dums Crossing Road / Walkers Road roundabout																			
07:00 to 08:00				08:00 to 09:00				16:00 to 17:00				17:00 to 18:00							
Approach	Movement	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS
Walkers Road North	Left	81	52	12	B			81	42	9	A			89	44	9	A		
Walkers Road North	Through	44	47	12	B	11	B	55	41	9	A	9	A	87	39	10	A	10	A
Walkers Road North	Right	24	35	10	B			21	38	11	B			29	47	13	B		
SH1 East	Left	49	8	3	A			55	8	3	A			216	13	4	A		
SH1 East	Through	673	16	4	A	4	A	658	16	4	A	4	A	599	20	5	A	5	A
SH1 East	Right	70	20	6	A			78	26	6	A			59	21	6	A		
Dums Crossing Road South	Left	70	44	10	B			66	31	8	A			70	30	7	A		
Dums Crossing Road South	Through	64	47	11	B	11	B	72	35	9	A	9	A	65	25	7	A	8	A
Dums Crossing Road South	Right	223	48	11	B			176	38	9	A			91	31	9	A		
SH1 West	Left	38	17	6	A			35	21	6	A			28	15	6	A		
SH1 West	Through	542	30	7	A	7	A	434	25	6	A	6	A	603	24	6	A	6	A
SH1 West	Right	70	28	6	A			60	18	4	A			79	17	4	A		
Intersection Total		1957		7	A	7	A	1793		6	A	6	A	2008		6	A	6	A

SH1 / Rolleston Drive roundabout

SH1 / Rolleston Drive roundabout																			
07:00 to 08:00				08:00 to 09:00				16:00 to 17:00				17:00 to 18:00							
Approach	Movement	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS
SH1 East	Left	13	16	4	A			17	17	4	A	4	A	150	22	3	A		
SH1 East	Through	663	20	4	A	4	A	609	21	4	A	4	A	744	20	4	A		
Rolleston Drive South	Left	140	34	8	B	32	C	177	77	7	A	15	B	142	32	5	A	11	B
Rolleston Drive South	Right	454	138	37	D			374	116	18	B			228	68	14	B		
SH1 West	Left	851	38	4	A	6	A	544	26	4	A	5	A	649	17	3	A	4	A
SH1 West	Right	187	34	8	A			187	38	8	A			125	19	4	A		
Intersection Total		2118		13	B	13	B	1877		7	A	7	A	2086		5	A	5	A

SH1 / Tempony Street / Brookside Road

SH1 / Tempony Street / Brookside Road																			
07:00 to 08:00				08:00 to 09:00				16:00 to 17:00				17:00 to 18:00							
Approach	Movement	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS
SH1 East	Left	405	14	4	A	3	A	363	10	3	A	3	A	653	83	12	B		
SH1 East	Through	13	7	3	A			12	7	2	A			84	78	13	B		
Tempony Street South	Left	86	17	4	A	4	A	55	25	5	A	5	A	82	33	5	A	5	A
Brookside Road South	Left	2	5	3	A	3	A	1	6	3	A	3	A	1	11	11	B	11	B
Intersection Total		506		4	A	4	A	436		5	A	5	A	819		13	B	12	B

SH1 / Woodsons Ross Road / Woodsons Road interchange

SH1 / Woodsons Ross Road / Woodsons Road interchange																			
07:00 to 08:00				08:00 to 09:00				16:00 to 17:00				17:00 to 18:00							
Approach	Movement	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS
Woodsons Ross Road North	West	65	36	3	A	7	A	59	35	3	A	7	A	26	20	2	A		
Woodsons Ross Road North	East	424	23	8	A	7	A	347	21	7	A	7	A	450	17	6	A		
SH1 East	South	179	235	67	E	49	D	190	204	47	D	37	D	834	181	74	E	73	F
SH1 East	North	192	128	32	C			189	106	27	C			145	149	52	D		
SH1 West	South	6	9	5	A	7	A	6	14	6	A	9	A	8	17	10	A	6	A
SH1 West	North	102	24	7	A			114	36	9	A			60	22	5	A		
Woodsons Road South	West	53	181	77	F	83	F	65	73	17	B	26	C	28	223	61	E	64	F
Woodsons Road South	East	843	193	83	F			770	124	27	C			347	259	64	E		
Intersection Total		1862		52	D	52	D	1746		23	C	23	C	1951		51	D	51	D

Dums Crossing Road / Newmans Road priority intersection

Dums Crossing Road / Newmans Road priority intersection																			
07:00 to 08:00				08:00 to 09:00				16:00 to 17:00				17:00 to 18:00							
Approach	Movement	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS
Dums Crossing Road North	Left	23	4	1	A			26	4	1	A			33	7	2	A		
Dums Crossing Road North	Through	339	5	1	A	1	A	143	6	1	A	1	A	286	7	1	A	1	A
Dums Crossing Road North	Right																		
Newmans Road East	Left	16	8	2	A			22	8	2	A			15	12	3	A		
Newmans Road East	Through	0	0	0	A	4	A	0	0	0	A	4	A	0	0	0	A		
Newmans Road East	Right	99	24	5	A			74	24	4	A			45	18	4	A		
Dums Crossing Road South	Left																		
Dums Crossing Road South	Through	264	12	1	A	1	A	235	11	1	A	1	A	183	19	2	A	2	A
Dums Crossing Road South	Right	12	10	3	A			15	12	4	A			10	17	6	A		
Holmes North Secondary Access	Left																		
Holmes North Secondary Access	Through																		
Holmes North Secondary Access	Right																		
Intersection Total		552		5	A	4	A	515		4	A	4	A	632		6	A	4	A

Dums Crossing Road / Granite Drive priority intersection

Dums Crossing Road / Granite Drive priority intersection																			
07:00 to 08:00				08:00 to 09:00				16:00 to 17:00				17:00 to 18:00							
Approach	Movement	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS
Dums Crossing Road North	Left	52	6	2	A			52	7	2	A			100	9	2	A		
Dums Crossing Road North	Through	108	7	1	A	1	A	126	7	2	A	2	A	184	8	2	A	2	A
Dums Crossing Road North	Right																		
Granite Road East	Left	23	11	3	A			67	18	3	A			20	18	4	A		
Granite Road East	Through	0	0	0	A	4	A	0	0	0	A	5	A	0	0	0	A		
Granite Road East	Right	306	27	4	A			91	29	6	A			70	19	4	A		
Dums Crossing Road South	Left																		
Dums Crossing Road South	Through	167	11	1	A	1	A	163	13	2	A	2	A	132	14	1	A	2	A
Dums Crossing Road South	Right	19	11	3	A			48	14	4	A			17	20	6	A		
Homes Central Primary Access W	Left																		
Homes Central Primary Access W	Through																		
Homes Central Primary Access W	Right																		
Intersection Total		474		4	A	4	A	547		6	A	5	A	522		6	A	4	A

Dums Crossing Road / Burnham School Road signalised intersection

		07:00 to 08:00						08:00 to 09:00						16:00 to 17:00						17:00 to 18:00					
Approach	Movement	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS
Dums Crossing Road North	Left	1	7	6	A			1	6	5	A			4	13	5	A			4	8	7	A		
Dums Crossing Road North	Through	111	27	6	A	6	A	124	27	7	A	7	A	192	27	6	A	6	A	278	28	6	A	6	A
Dums Crossing Road North	Right	13	24	9	A			47	30	9	A			3	11	6	A			5	9	3	A		
Burnham School Road East	Left	3	32	21	C			4	40	21	C			2	20	11	B			2	23	12	B		
Burnham School Road East	Through	1	8	8	A	24	C	1	8	8	A	20	C	0	0	0	A	18	B	0	27	27	C	19	B
Burnham School Road East	Right	3	40	30	C			2	39	23	C			2	44	26	C			2	27	25	C		
Dums Crossing Road South	Left	25	22	7	A			64	24	7	A			10	21	6	A			14	22	8	A		
Dums Crossing Road South	Through	159	28	8	A	8	A	162	28	8	A	7	A	140	28	8	A	7	A	155	30	9	A	9	A
Dums Crossing Road South	Right	2	7	4	A			2	2	2	A			2	14	10	A			2	3	3	A		
Burnham School Road West	Left	21	45	18	B			41	46	17	B			8	33	11	B			9	42	19	B		
Burnham School Road West	Through	1	18	16	B	18	B	2	18	16	B	20	C	4	30	10	C	17	B	3	18	16	B	18	B
Burnham School Road West	Right	21	46	19	B			44	55	23	C			10	43	23	C			14	47	18	B		
Intersection Total		360	9	9	A	9	A	491	10	A	10	A	324	9	A	7	A	483	8	A	8	A	8	A	

Dunns Crossing Road / Lowers Road roundabout																									
		07:00 to 08:00						08:00 to 09:00						16:00 to 17:00						17:00 to 18:00					
Approach	Movement	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS
Dunns Crossing Road North	Left	68	8	2	A	2	A	92	10	2	A	2	A	95	9	2	A	2	A	135	12	2	A	2	A
Dunns Crossing Road North	Through	92	10	2	A			106	12	2	A			120	12	2	A			127	13	2	A		
Lowers Road East	Left	13	10	3	A			17	10	3	A			17	9	3	A			23	13	4	A		
Lowers Road East	Right	62	13	3	A	3	A	79	16	3	A	3	A	43	11	3	A	55	14	4	A				
Dunns Crossing Road South	Through	185	10	2	A	2	A	201	10	2	A	2	A	150	8	2	A	2	A	162	7	2	A	2	A
Dunns Crossing Road South	Right	21	7	2	A			21	7	2	A			18	4	2	A			18	8	2	A		
Intersection Total		440		2	A	2	A	515		2	A	2	A	499		2	A	2	A	621		2	A	2	A

Dunns Crossing Road / Brenley Drive / Skellerup North Primary Access priority intersection																															
07:00 to 08:00								08:00 to 09:00								16:00 to 17:00								17:00 to 18:00							
Approach	Movement	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS						
Dunns Crossing Road North	Left	9	3	1	A			8	3	1	A			22	7	3	A			29	7	2	A								
Dunns Crossing Road North	Through	99	4	0	A	0	A	116	4	0	A	0	A	148	5	0	A	0	A	196	6	0	A	0	A						
Dunns Crossing Road North	Right																														
Brenley Drive East	Left	7	5	4	A			8	5	3	A			6	4	2	A			5	5	2	A								
Brenley Drive East	Through					3	A					2	A					2	A					3	A						
Brenley Drive East	Right	29	13	3	A			28	9	2	A			32	11	2	A			33	11	3	A								
Dunns Crossing Road South	Right																	1	A												
Dunns Crossing Road South	Right	158	4	1	A	1	A	165	6	1	A	1	A	139	8	1	A			150	9	1	A	1	A						
Dunns Crossing Road South	Right	4	5	3	A			3	7	4	A			5	5	2	A			6	6	3	A								
Skellerup North Primary Access	Left																														
Skellerup North Primary Access	Through																														
Skellerup North Primary Access	Right																														
Intersection Total		305		4	A	3	A	329		4	A	2	A	352		3	A	2	A	417		3	A	3	A						

Dunns Crossing Road / ODP 12 South Access / Skellerup Central Primary Access priority intersection																									
		07:00 to 08:00						08:00 to 09:00						16:00 to 17:00						17:00 to 18:00					
Approach	Movement	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS
Dunns Crossing Road North	Left	0	0	0	A					0	A			1	1	1	A			1	1	1	A		
Dunns Crossing Road North	Through	96	5	0	A	0	A	112	6	0	A	0	A	139	5	0	A	0	A	176	9	1	A	1	A
Dunns Crossing Road North	Right	10	3	0	A			13	5	1	A			13	3	1	A	0	A	24	6	2	A		
ODP 12 South Access East	Left																								
ODP 12 South Access East	Through					2	A					2	A					2	A					3	A
ODP 12 South Access East	Right	9	5	2	A			6	3	2	A			6	4	2	A			7	6	3	A		
Dunns Crossing Road South	Right	0	0	0	A			0	0	0	A			0	0	0	A	0	A	0	0	0	A	0	A
Dunns Crossing Road South	Right	542	3	0	A	0	A	550	2	0	A	0	A	511	2	0	A	0	A	539	3	0	A	0	A
Dunns Crossing Road South	Right																								
Skellerup Central Primary Access	Left	12	3	0	A			12	2	0	A			8	3	1	A			10	2	1	A		
Skellerup Central Primary Access	Through	0	0	0	A	0	A	0	0	0	A	0	A	0	0	0	A	1	A	1	1	0	A	1	A
Skellerup Central Primary Access	Right	2	3	2	A			6	5	2	A			4	4	2	A			3	12	4	A		
Intersection Total		270		2	A	2	A	299		2	A	2	A	301		2	A	2	A	360		4	A	3	A

Dunns Crossing Road / Future Urban Development Area Access / Skellerup South Primary Access priority intersection																										
		07:00 to 08:00						08:00 to 09:00						16:00 to 17:00						17:00 to 18:00						
Approach	Movement	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	
Dunns Crossing Road North	Left	12	1	0	A			16	2	0	A			30	2	0	A			36	1	0	A			
Dunns Crossing Road North	Through	86	5	1	A	1	A	102	4	1	A	1	A	112	7	1	A	1	A	143	7	1	A	1	A	
Dunns Crossing Road North	Right							20	6	1	A			11	5	1	A	1	A	13	9	2	A	2	A	
Future Urban Development Area	Left	13	6	1	A			20	6	1	A	2	A	11	5	1	A			13	9	2	A	2	A	
Future Urban Development Area	Through					1	A							17	11	2	A			17	15	2	A			
Future Urban Development Area	Right	21	7	1	A			21	15	2	A			17	11	2	A			17	15	2	A			
Dunns Crossing Road South	Right																									
Dunns Crossing Road South	Right	122	7	2	A	2	A	130	8	2	A	2	A	116	9	1	A	1	A	121	7	1	A	1	A	
Dunns Crossing Road South	Right	10	4	2	A			17	6	2	A			19	8	2	A			18	10	3	A			
Skellerup South Primary Access	Left																									
Skellerup South Primary Access	Through																									
Skellerup South Primary Access	Right																									
Intersection Total		263			2	A	2	A	305		2	A	2	A	304		2	A	1	A	348		3	A	2	A

Dunns Crossing Road / Skellerup South Secondary Access priority intersection																									
		07:00 to 08:00						08:00 to 09:00						16:00 to 17:00						17:00 to 18:00					
Approach	Movement	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS
Dunns Crossing Road North	Through	97	7	2	A	2	A	120	8	2	A	2	A	122	7	2	A	2	A	155	9	3	A	3	A
Dunns Crossing Road North	Right	1	0	0	A			3	1	1	A			0	0	0	A			1	0	0	A		
Dunns Crossing Road South	Through	122	9	3	A	2	A	136	8	2	A	2	A	129	8	3	A	2	A	134	8	2	A	2	A
Dunns Crossing Road South	Left	4	3	2	A			6	3	2	A			7	2	1	A			8	3	1	A		
Skellerup South Secondary Access	Left	10	3	1	A	1	A	11	6	2	A	2	A	5	4	1	A	1	A	6	2	0	A	1	A
Skellerup South Secondary Access	Right	6	4	2	A			6	5	3	A			2	1	1	A			3	5	3	A		
Intersection Total		240		3	A	2	A	280		3	A	2	A	285		3	A	2	A	306		3	A	3	A

Dunns Crossing Road / Goulds Road priority intersection																									
		07:00 to 08:00						08:00 to 09:00						16:00 to 17:00						17:00 to 18:00					
Approach	Movement	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS
Goulds Road North	Through	15		3	A	2	A	21		4	A	2	A	14		3	A	2	A	18		4	A	2	A
Goulds Road North	Right	100	11	2	A			123	11	2	A			109	10	2	A			132	10	2	A		
Goulds Road South	Left	82	9	3	A	3	A	97	8	3	A	3	A	80	8	3	A	3	A	90	9	3	A	3	A
Goulds Road South	Through	18		5	A			15		4	A			21		8	3	A		23		8	3	A	
Dunns Crossing Road West	Left	302	3	0	A	0	A	322	3	0	A	0	A	322	3	0	A	0	A	329	4	0	A	0	A
Dunns Crossing Road West	Right	57	5	1	A			57	5	1	A			84	7	1	A			93	7	1	A		
Intersection Total		373		5	A	3	A	434		4	A	3	A	429		3	A	3	A	483		4	A	3	A

Dunns Crossing Road / Selwyn Road / Goulds Road roundabout																										
		07:00 to 08:00						08:00 to 09:00						16:00 to 17:00						17:00 to 18:00						
Approach	Movement	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	
Goulds Road North	Left	72	8	2	A			92	9	2	A			55	8	2	A			72	9	2	A			
Goulds Road North	Through	34	6	1	A	3	A	42	9	2	A	3	A	70	9	2	A	2	A	78	9	2	A			
Goulds Road North	Right	75	9	4	A			86	9	4	A			63	9	4	A			70	10	4	A		2	A
Selwyn Road East	Left	11	11	4	A			11	7	3	A			8	7	3	A			10	8	4	A			
Selwyn Road East	Through	105	13	4	A	4	A	117	14	4	A	4	A	94	10	3	A	3	A	126	12	3	A	4	A	
Selwyn Road East	Right	48	11	4	A			70	13	5	A			92	13	4	A			100	15	5	A			
Goulds Road South	Left	0	0	0	A			0	0	0	A			0	0	0	A			0	0	0	A			
Goulds Road South	Through	72	21	3	A	3	A	70	15	3	A	3	A	50	16	2	A	2	A	51	17	2	A	2	A	
Goulds Road South	Right	8	11	3	A			8	12	3	A			6	9	3	A			6	5	2	A			
Selwyn Road West	Left	27	8	2	A			38	8	2	A			64	10	2	A			68	10	2	A			
Selwyn Road West	Through	62	9	3	A	3	A	66	10	3	A	2	A	80	10	3	A	3	A	94	11	3	A	3	A	
Selwyn Road West	Right	0	0	0	A			0	0	0	A			0	0	0	A			0	0	0	A			
Intersection Total		523		3	A	3	A	600		3	A	3	A	590		3	A	3	A	655		3	A	3	A	

Rolliston Drive / Brookside Road Roundabout																									
		07:00 to 08:00						08:00 to 09:00						16:00 to 17:00						17:00 to 18:00					
Approach	Movement	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS
Rolliston Drive North	Left	63	21	4	A	4	A	54	22	5	A	5	A	29	24	5	A	7	A	41	34	29	C	30	C
Rolliston Drive North	Through	136	20	5	A			150	24	5	A			138	42	7	A			172	102	29	C		
Rolliston Drive North	Right	14	19	6	A			18	18	6	A			99	42	8	A			154	98	32	C		
Brookside Road East	Left	44	14	2	A	2	A	58	10	3	A	2	A	105	30	6	A	6	A	113	41	8	A	8	A
Brookside Road East	Through	87	12	2	A			96	13	2	A			344	39	6	A			302	46	7	A		
Brookside Road East	Right	65	16	3	A			55	14	4	A			70	37	8	A			64	43	11	B		
Rolliston Drive South	Left	252	70	15	B	14	B	195	32	7	A	6	A	125	15	3	A	3	A	148	15	3	A	3	A
Rolliston Drive South	Through	135	66	13	B			148	30	5	A			99	12	3	A			108	13	3	A		
Rolliston Drive South	Right	86	64	14	B			108	25	6	A			70	12	3	A			86	12	3	A		
Brookside Road West	Left	29	65	16	B	19	B	46	43	12	B	12	B	187	153	41	D	38	D	100	137	37	D	36	D
Brookside Road West	Through	265	89	19	B			261	48	12	B			182	149	38	D			190	143	35	D		
Brookside Road West	Right	18	61	17	B			27	38	12	B			22	111	31	C			20	109	31	C		
Intersection Total		1213		12	B	12	B	1214		7	A	7	A	1379		13	B	13	B	1497		18	B	18	B

Lowes Road / East Maddisons Road priority intersection																									
Approach	Movement	07:00 to 08:00						08:00 to 09:00						16:00 to 17:00						17:00 to 18:00					
		Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS
East Maddisons Road North	Left	41	17	4	A	6	A	59	19	5	A	7	A	31	48	11	B	21	C	27	79	20	C	38	F
East Maddisons Road North	Through	64	29	8	A			73	34	9	A			167	88	23	C			170	150	41	E		
East Maddisons Road North	Right	6	16	8	A			6	21	9	A			17	73	25	D			14	119	36	E		
Lowes Road East	Left	22	8	2	A	4	A	23	6	3	A	4	A	38	11	4	A	4	A	74	13	4	A	4	A
Lowes Road East	Through	39	9	4	A			62	11	4	A			49	14	5	A			65	15	4	A		
Lowes Road East	Right	37	15	5	A			60	16	4	A			76	15	4	A								
East Maddisons Road South	Left	29	26	5	A	11	B	30	23	6	A	10	A	37	38	4	A	13	B	29	58	12	B	17	C
East Maddisons Road South	Through	128	53	12	B			114	51	11	B			137	69	15	B			158	104	19	C		
East Maddisons Road South	Right	21	43	11	B			22	39	11	B			19	44	11	B			15	64	16	C		
Lowes Road West	Left	28	9	4	A	4	A	22	6	3	A	4	A	16	8	3	A	5	A	14	12	4	A	6	A
Lowes Road West	Through	68	11	4	A			82	14	4	A			42	16	5	A			70	28	5	A		
Lowes Road West	Right	40	12	3	A			51	13	3	A			70	21	6	A			79	31	7	A		
Intersection Total		521		12	B	11	B	595		11	B	10	A	672		25	D	21	C	787		41	E	38	E

Rolliston Drive / Brookside Road Roundabout																									
		07:00 to 08:00						08:00 to 09:00						16:00 to 17:00						17:00 to 18:00					
Approach	Movement	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS
Rolliston Drive North	Left	79	30	7	A	7	A	77	32	8	A	9	A	38	77	16	B	21	C	36	113	50	D	52	D
Rolliston Drive North	Through	167	31	7	A			170	38	9	A			154	92	21	C			182	118	51	D		
Rolliston Drive North	Right	21	21	7	A			21	31	12	B			140	91	23	C			146	116	55	F		
Brookside Road East	Left	46	16	3	A	3	A	54	14	3	A	3	A	84	51	12	B	11	B	107	55	13	B	13	B
Brookside Road East	Through	121	18	3	A			140	15	3	A			403	57	11	B			403	56	14	B		
Brookside Road East	Right	82	17	4	A			63	14	4	A			70	51	12	B			65	54	14	B		
Rolliston Drive South	Left	285	105	40	D	39	D	254	82	25	C	23	C	169	20	4	A	4	A	185	21	4	A	3	A
Rolliston Drive South	Through	215	99	39	D			286	90	22	C			166	15	3	A			179	20	3	A		
Rolliston Drive South	Right	96	98	39	D			131	85	24	C			95	18	4	A			112	22	4	A		
Brookside Road West	Left	38	101	30	C	32	C	58	55	15	B	18	B	187	184	56	F	56	F	193	229	76	F	75	F
Brookside Road West	Through	323	112	31	C			294	67	18	B			166	183	57	F			173	233	75	F		
Brookside Road West	Right	16	79	27	C			28	54	15	B			18	161	58	F			14	203	72	F		
Intersection Total		1483		26	C	26	C	1574		16	B	16	B	1599		38	B	19	B	1793		29	C	29	C

Lowes Road / East Maddisons Road roundabout																									
		07:00 to 08:00						08:00 to 09:00						16:00 to 17:00						17:00 to 18:00					
Approach	Movement	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS	Flow	Max Delay	Avg Delay	LOS	Approach delay	Approach LOS
East Maddisons Road North	Left	74	23	6	A	6	A	102	35	7	A	7	A	39	26	6	A	7	A	51	43	9	A	9	A
East Maddisons Road North	Through	77	24	6	A			84	34	7	A			175	27	7	A			206	43	9	A		
East Maddisons Road North	Right	6	14	6	A			5	14	6	A			14	16	7	A			14	21	7	A		
Lowes Road East	Left	18	10	4	A	4	A	29	15	5	A	5	A	40	23	6	A	7	A	59	28	8	A	8	A
Lowes Road East	Through	64	14	5	A			90	18	5	A			139	26	7	A			171	34	9	A		
Lowes Road East	Right	38	13	5	A			42	14	5	A			84	25	8	A			82	27	8	A		
East Maddisons Road South	Left	38	19	6	A	6	A	52	17	5	A	5	A	47	29	6	A	7	A	53	29	7	A	7	A
East Maddisons Road South	Through	109	21	6	A			112	18	5	A			151	32	7	A			181	29	8	A		
East Maddisons Road South	Right	25	18	5	A			21	15	7	A			51	16	7	A			17	24	8	A		
Lowes Road West	Left	37	16	5	A	6	A	40	17	7	A	7	A	58	13	5	A	6	A	22	18	6	A	6	A
Lowes Road West	Through	198	26	7	A			237	27	8	A			330	25	6	A			116	23	6	A		
Lowes Road West	Right	66	22	6	A			91	25	6	A			81	27	6	A			94	23	6	A		
Intersection Total		733		8	A	6	A	904		8	A	7	A	884		8	A	7	A	1064		9	A	9	A



Attachment 2: Updated Holmes Block ODP

OUTLINE DEVELOPMENT PLAN 39 - HOLMES BLOCK

LEGEND

Outline Development Plan Area

Living Z Zone

Business 1 Zone

Indicative Road

Indicative Cycle/Pedestrian Route

Reserve Location (size to be determined at time of subdivision)

Setback

Boundary Treatment

Noise Control Boundary

The map displays the Holmes Block, an irregularly shaped area outlined in red with a dashed line. The block is primarily colored yellow, indicating a Living Z Zone. A portion of the block, located near the intersection of Burnham School Road and Newman Road, is colored red, indicating a Business 1 Zone. The block is bounded by Main South Road (SH1) to the north, Burnham School Road to the south, and Newman Road to the east. Granite Drive is visible to the east of the block. West Rolleston Primary School is located to the southeast of the block. The map includes several features: a thick black dashed line indicating a road layout; a red dotted line indicating a cycle/pedestrian route; a green shaded area indicating a reserve location; red hatched areas indicating setbacks; and blue hatched areas indicating noise control boundaries. Arrows point to specific locations on the map, including the intersection of Main South Road and Burnham School Road, the intersection of Burnham School Road and Newman Road, and the intersection of Newman Road and Granite Drive.

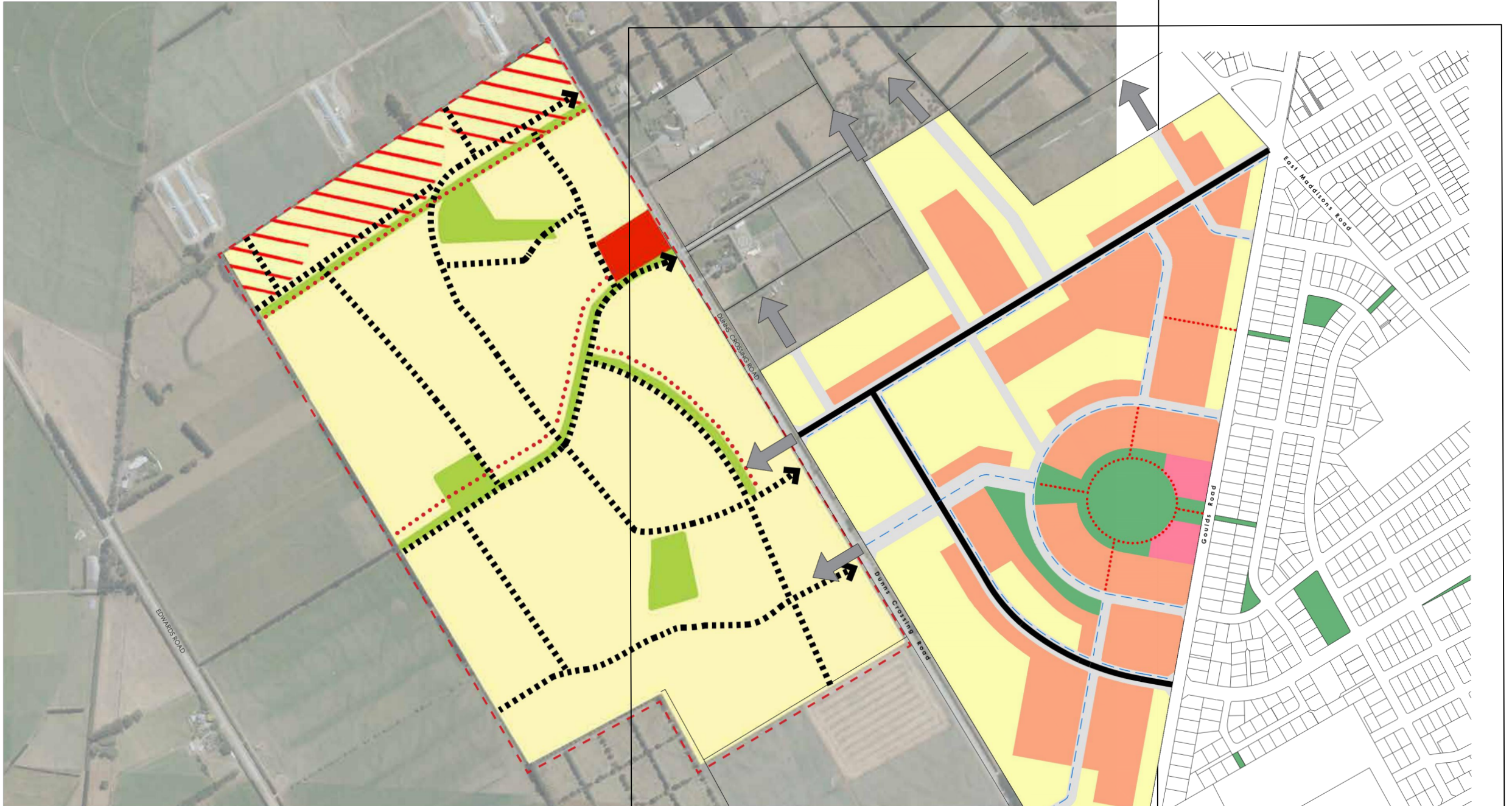
A simple north arrow symbol consisting of a circle with a vertical line passing through it, and a horizontal line at the top of the circle.



Attachment 3: ODP Alignment

LEGEND

- Outline Development Plan Area
- Living Zone Z
- Business 1 zone
- Indicative Road
- Indicative Cycle/Pedestrian Route
- Reserve Location (size to be determined at time of subdivision)
- Setback



LEGEND

- | | |
|----------------------|---|
| Medium Density | Primary Road |
| Low Density | Secondary Road |
| Neighbourhood Centre | Possible Future Road Connection |
| Reserves | Shared Pedestrian / Cycle Lane (off road) |
| | Shared Pedestrian / Cycle Lane (on road) |

ODP - Faringdon Far West

Not to Scale