Traffic Assessment for the proposed Metals Industrial Cluster on Portion 6253 of Erf 1, near Kuruman, Northern Cape Province

November 2016

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Summary Sheet

Report Type:	Traffic Impact Assessment (TIA)
Title:	Traffic Assessment for the proposed Metals Industrial Cluster on Portion 6253 of Erf 1, near Kuruman, Northern Cape Province
Location:	The site is located approximately 2km south east from the town of Kuruman
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Contact Details:	084 300 7722
Date:	2 November 2016
Report Status:	FINAL
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This Traffic Assessment Report has been prepared in accordance with the Committee of Transport Officials (COTO) TMH 16 Volume 1 and 2 by a suitably qualified and registered professional traffic engineering technologist. Details of any of the calculations on which the results in this report are based will be made available on request.

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1 PROJECT DESCRIPTION

The Northern Cape Department of Economic Development and Tourism propose the construction of a Metals Industrial Cluster (hereafter referred to as the Cluster) on Portion 6253 of ERF 1 located approximately 2km south east from the town of Kuruman.

The Cluster is planned as an industrial park anchored around steel and metals manufacturing while allowing for other related industries to be located and operate within the Cluster.

The Cluster is expected to be developed and transition through four phases as follows: i) Phase 1 which is considered to be short term; ii) Phase 2 which is considered to be medium term; iii) Phase 3 which is considered to be long term; and iv) Phase 4 which is intended to cater to the expansion of the Cluster beyond a 20-year timeframe planned for the 3 phases.

The establishment of the Metals Industrial Cluster forms part of a drive for industrial and economic development and growth within the Northern Cape Province. The proposed site, Portion 6253 of Erf 1 with an extent of 47ha, has been identified by the developer as a suitable site which has the potential for the development of a Metals Industrial Cluster.

For the development to be successful and thrive, not only as an industrial Cluster but as a successful business venture, sufficient space is required for the development to be constructed and operated on. The development footprint of the Cluster will occupy an area of 47ha, thus resulting in the entire affected property being developed.

The property proposed for the development is owned by the Ga-Segonyana Local Municipality, which is the associated local municipality of the area within which the site is located.

The Cluster will include basic infrastructure that will be required for the operation of the development. The basic infrastructure to be constructed includes:

- Buildings (warehousing, administrative buildings, skills development centre etc.);
- Landscaping;
- Parking;
- Fencing;
- Connectivity infrastructure;
- Bulk services;
- Utility; and
- Security.

Any entity or company (CMF) planning to be located within the Metals Industrial Cluster will have to make provision for the specific infrastructure that would be required for the operation of the specific entity and would require the undertaking of its own permits and authorisations in terms of the legal requirements.

2 PURPOSE OF REPORT

This Traffic Assessment (TA) Report ascertains the extent of the Cluster development and associated traffic that can be accommodated at the N14/R31 intersection in Kuruman CBD beyond which alternative road network links are required to enable further development. This report does not consider other intersections in Kuruman and these would require a separate TA to be initiated by the Municipality. Consideration of new road infrastructure/links supporting such development also falls outside the scope of this report.

3 DEVELOPMENT LOCATION

The Cluster project site is located approximately 2km south east from the town of Kuruman. The proposed site falls under the jurisdiction of the Ga-Segonyana Local Municipality and is within the greater John Taolo Gaetsewe District Municipality in the Northern Cape Province (see Figure 1 below).

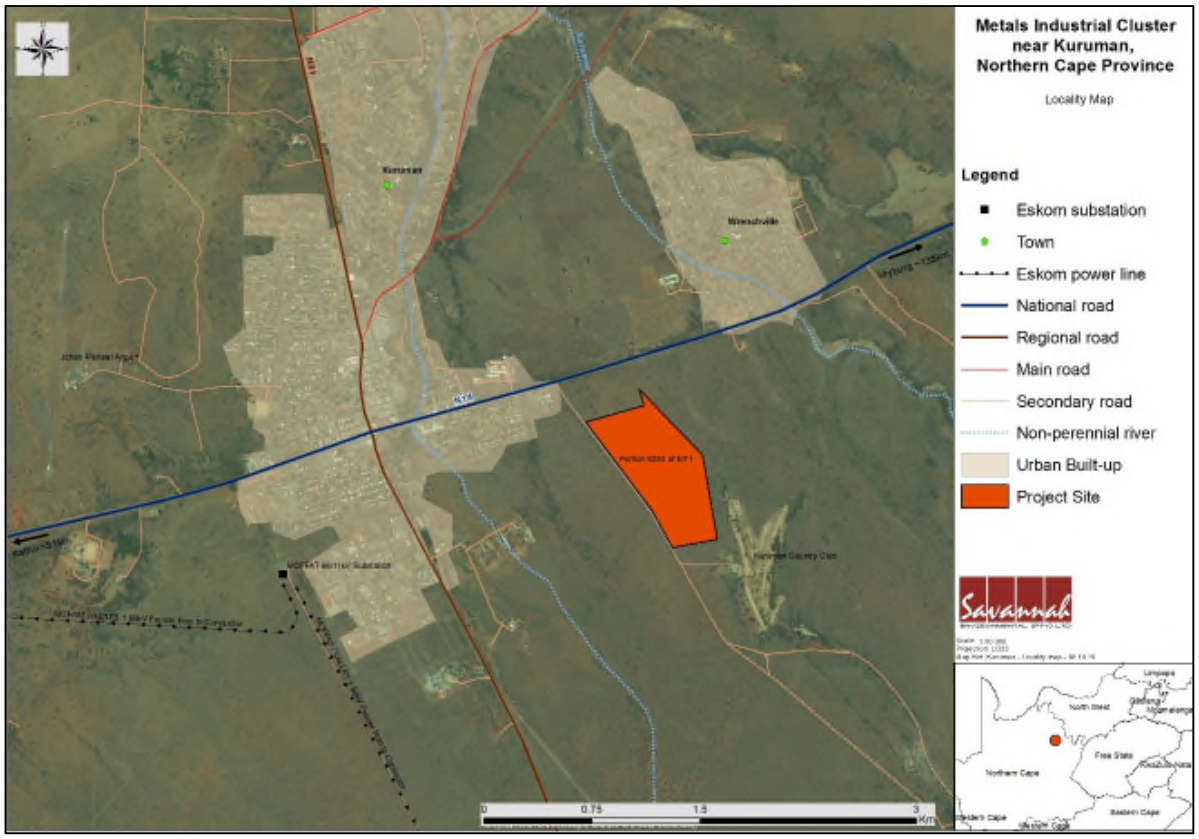


Figure 1 – Locality Map

4 SITE ACCESS

Access to the site is attained via the national road (N14), which is located approximately 300m to the north of the site, and an unnamed secondary surfaced road which connects to the N14 and is located along the western boundary of the project site (see Figure 1).

The unnamed secondary surfaced road will need to be upgraded and hard surfaced to provide acceptable access to the development via the N14. The site access road junction with the N14 will require upgrading to accommodate development traffic.

5 METHODOLOGY

The following methodology was applied:

1. Peak Hour Classified Traffic Counts were obtained for the critical N14/R31 intersection (and also at the intersection of the N14/site access road);
2. Traffic counts were balanced between the R31 and the development access road;
3. AM and PM peak traffic patterns were used to determine the development trip distribution;
4. Possible Gross Lettable Area (GLA) was determined for the development, in 4 possible phases;
5. Trip Generation was determined for the 4 development phases;
6. A 3% compounded traffic growth was applied to the background traffic for a 6 year period (civil works and Phase 1 development take-up) and an 11 year period (Phase 1 occupancy plus 5 year horizon);
7. Phase 1 development trips were assigned to the road network;
8. The N14/R31 intersection was analysed using Signalised and Unsignalised Intersection Design Research Aid (SIDRA) 6.1 Plus analysis software for;
    - » The status quo;
    - » Background traffic plus traffic growth rate of 3% compounded per annum for a 6 year (year 2022) and an 11 year horizon (year 2027)
    - » Phase 1 with 6 and 11 year background traffic growth;
    - » Phase 1 with 6 and 11 year background traffic growth with geometric improvements;
    - » Phase 1 with 6 and 11 year background traffic growth with intersection upgrading and new traffic signal phasing as proposed to attain acceptable Levels of Service;
    - » 30%, 33% and 35% development scenarios were analysed with 11 year background traffic growth (2027), to determine the development threshold that can be supported by the N14/R31 intersection (upgraded geometry with new signal phasing) beyond which additional road links would be required. In this instance the N14/R31 intersection road reserve restricts extensive upgrading and effectively inhibits the full-scale development of the subject property.
9. The N14 / Development Access Road Intersection, with proposed development threshold traffic and background traffic growth to year 2027, was also analysed to identify required road infrastructure upgrading.
10.

6 TRAFFIC IMPACT

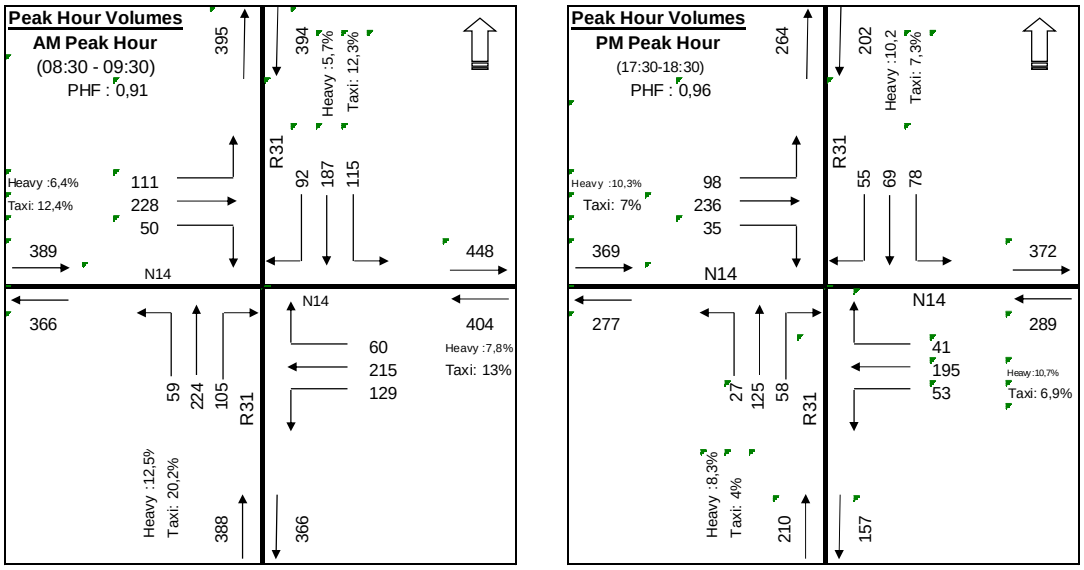
Background/base traffic data, development phasing, development trips, trip distribution, trip assignment, software employed and analysis results are detailed below:

6.1 TRAFFIC COUNTS

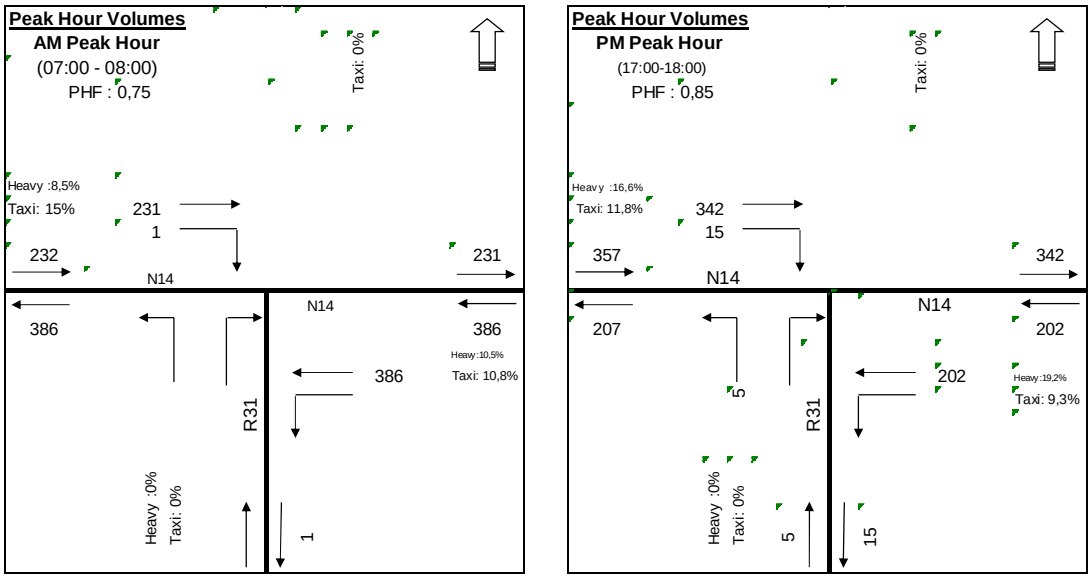
AM and PM Peak Hour Classified Traffic Counts were undertaken at the N14/R31 and N14/Cluster Access road on 20th and 21st October 2016 (see Table 1 below and Annexure B).

Table 1 – Traffic Counts (AM & PM Peak)

N14/R31



N14/The Cluster Access Road



6.2 DEVELOPMENT ASSUMPTIONS, PHASING AND TRIP GENERATION

The following assumptions are made for the proposed development:

- 15% of the erf is allocated to road infrastructure/road reserve
- 30% of each industrial stand/site should remain open for vehicle loading, parking and on-site manoeuvrability, leaving 70% available for erection of buildings.
- Buildings should not exceed 2 storeys.
- A 1.2 bulk factor is assumed.
- Trip generation and directional split is in accordance with the COTO Trip Generation Rates

» The site will be developed in four equal sized portions.

The phased development trip generation assumptions and determination as based on the above criteria is as set out Tables 2 and 3 below:

Table 2 – Development Trip Generation Determination

DEVELOPMENT TRIP DETERMINATION			
Item	**Ratio**	**Unit**	**Area**
Industrial Site - Erf Size	1	m^2	470 000
Allocate to Roads	15	%	70 500
Allocate to subdivision	85	%	399 500
Developable Area (GLA)	1,2	Bulk Factor	479 400
Industrial Area Trip Ratio	0,9	Trips / 100m^2GLA	4 315
Directional Split	75%	In AM / Out PM	3 236
	25%	Out AM / In PM	1 079

Table 3 –Development Trips per Phase

DEVELOPMENT TRIPS PER PHASE					
Phase	**% Developed**	**GLA (m^2)**	**Trips**	**In (AM)**	**Out (AM)**
1	25%	119 850	1 079	809	270
2	50%	239 700	2 157	1 618	539
3	75%	359 550	3 236	2 427	809
4	100%	479 400	4 315	3 236	1 079
Proposed	30%	143 820	1 294	971	324
Tested	33%	158 202	1 424	1 068	356
Tested	35%	167 790	1 510	1 133	378

6.3 DEVELOPMENT TRIP DISTRIBUTION AND ASSIGNMENT

The Cluster development trip distribution is largely in accordance with background AM and PM traffic patterns (see Figure 2 and Figure 3 below*). [Discrepancies in figures below due to number rounding]*:

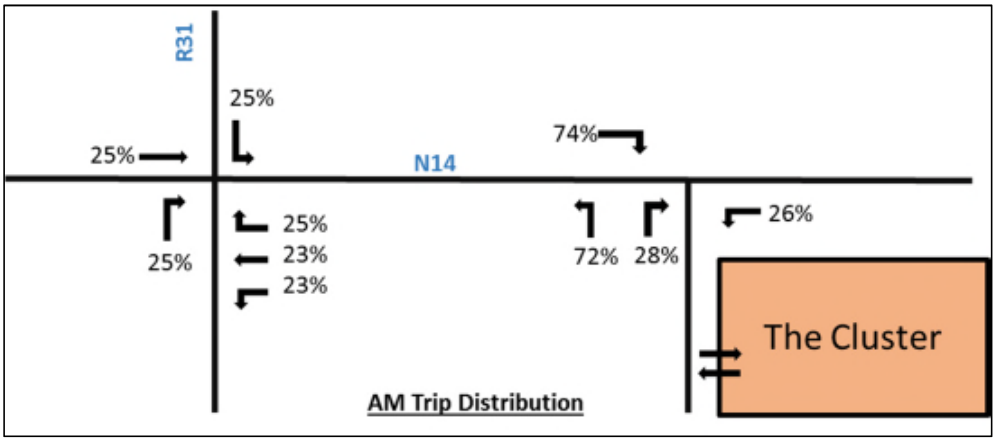


Figure 2 – Trip Distribution AM

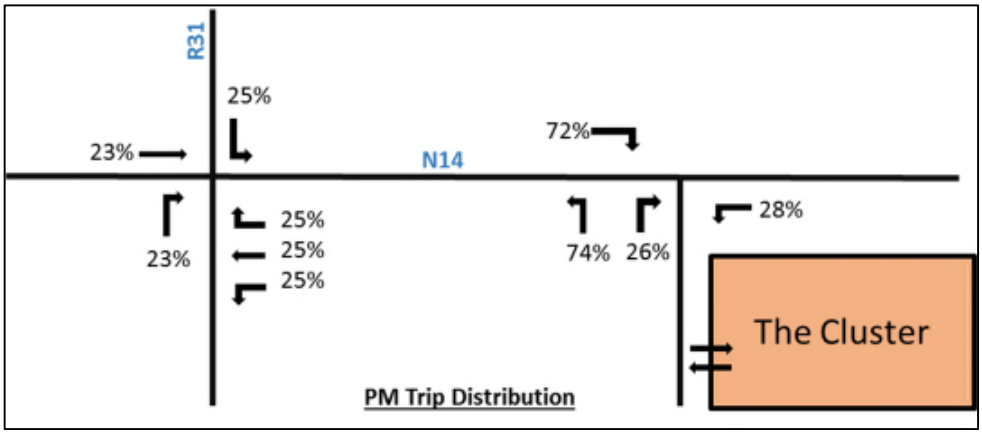


Figure 3 – Trip Distribution PM

The Cluster development trips assigned to the road network for the various development scenarios, with background traffic growth, are shown in Annexure C.

6.4 INTERSECTION ANALYSIS SOFTWARE

Analysis of the critical N14/R31 intersection as well as the N14/Cluster Access Road intersection was undertaken using the Signalised and Unsignalised Intersection Design Research Aid (SIDRA) analysis software program, for the current scenario and for the future envisaged development scenarios (limited to the identified development threshold based on the potential traffic capacity of an upgraded N14/R31 intersection). SIDRA default settings were used in the analysis.

Level of Service (LOS) definitions are shown in Table 4 below:

Table 4 – LOS Definitions

LOS	Signalised Intersection and Traffic Roundabouts	Unsignalised Intersections
A	≤ 10 sec	≤ 10 sec
B	10-20 sec	10-15 sec
C	20-35 sec	15-25 sec
D	35-55 sec	25-35 sec
E	55-80 sec	35-50 sec
F	≥80 sec	≥50 sec

6.5 N14/R31 INTERSECTION ANALYSIS

The N14/R31 intersection was analysed for development and traffic growth scenarios as listed below (see analysis results in Annexure F):

» **SCENARIOS ANALYSED**

EXISTING LAYOUT:
F1 - Status Quo
F2 - 5 Year Growth
F3 - 11 Year Growth

PHASE 1 (25% Development)
F4 - Phase 1 - Existing geometry and phasing
F5 - Phase 1 - Upgraded geometry
F6 – Phase 1 - Upgraded geometry and new phasing
F7 – Phase 1 - Upgraded geometry and new phasing in year 2027

DEVELOPMENT THRESHOLD
F8 – 30% development - Upgraded geometry and new phasing in year 2027
F9 – 33% development - Upgraded geometry and new phasing in year 2027
F10 – 35% development - Upgraded geometry and new phasing in year 2027

» **ANALYSES OUTCOME**

- EXISTING AND WITH TRAFFIC GROWTH:

  Analysis of the N14/R31 intersection shows it operating at a good Level of Service (LOS) B for both the AM and PM peak periods, for years 2016, 2022 and 2027, with a 3% per annum compounded traffic growth added (see Annexure F: F1 to F3).

- PHASE 1

  Phase 1 (25% of the site developed) will require geometric upgrading and appropriate signal phasing to accommodate development traffic and background traffic growth to year 2027 (see Annexure F: F4 to F7).

- DEVELOPMENT THRESHOLD:

  For this report the development threshold is based on the traffic capacity of a possible upgraded N14/R31 intersection with traffic growth up to year 2027.

  The N14/R31 intersection was analysed for various development and background traffic growth scenarios to determine the development threshold. Where a LOS F is found on any intersection approach movement it is highlighted in red text in Table 6 and also in the SIDRA Analysis Results contained in Annexure F.

  At 33% development the east approach right-turn manoeuvre deteriorates to an unacceptable LOS F (see Annexure F - F9). At 35% development various other intersection approaches also deteriorate to an unacceptable LOS F (see Annexure F - F10).

  The analysis shows that an upgraded N14/R31 intersection could accommodate traffic generated by 143 820 m^2 Gross Lettable Area (equals 30% of the development potential Gross Lettable Area as considered in this report) with some intersection approach movements operating at LOS E in year 2027 (see Table 5 below and Annexure F - F8).

  The development threshold is therefore determined as 143 820 m^2 GLA and the corresponding (adjusted) intersection design and analysis is shown in Annexure H.

  The development threshold herein only refers to what the N14/R31 intersection with the proposed upgrading can accommodate. Consideration of other possible traffic constraints on the N14 and R31 in Kuruman fall outside the scope of this report, and should be considered separately.

- SUMMARY OF ANALYSIS RESULTS:

  A condensed summary of the analysis outcomes/results is shown in Table 5 below:

  Based on the intersection analysis, an upgraded N14/R31 intersection could accommodate Year 2027 background traffic growth and development related traffic generated by 143 820 m^2 Gross Lettable Area (30% "development threshold").

Table 5 – Condensed Summary of N14/R31 intersection Analysis Results

CONDENSED SUMMARY OF N14/R31 INTERSECTION ANALYSIS RESULTS												
Scenario	Geometry	Signals Phasing	Year 2016			Year 2022			Year 2027			
			AM	PM	REF	AM	PM		AM	PM	REF	
Existing	Current	Current	ok	ok	F1	ok	ok	F2	ok	ok	F3	
Phase 1	Current	Current	na	na		not ok	ok	F4	not ok	ok	Excluded	
	Upgraded	Current	na	na		not ok	ok	F5	not ok	ok	Excluded	
		Upgraded	na	na		ok	ok	F6	ok	ok	F7	
30% developed			na	na		na	na		ok	ok	F8	
33% developed			na	na		na	na		not ok	ok	F9	
35% developed			na	na		na	na		not ok	ok	F10	

6.6 N14/DEVELOPMENT ACCESS ROAD INTERSECTION ANALYSIS

NOTE: Consideration of the intersection of the N14/Development Access Road falls outside the scope of this report. It is nonetheless assessed and included for information purposes.

Analysis of the existing intersection (currently operating at LOS A with virtually no traffic on the minor priority controlled approach) shows that extensive upgrading is required to accommodate development traffic. Loading the Cluster 30% development scenario traffic onto the intersection sees the intersection deteriorate to a LOS F (see Annexure G1).

It will therefore be necessary to upgrade the intersection, to achieve acceptable LOS (see Annexure G2).

At 30% development the N14/Development Access Road intersection requires the following improvements:

- Traffic Signals (3 phase)
- Dualling of Development Access Road in each direction with a Left-Turn lane and a shared Left-Turn/Right-Turn lane on the approach to the N14
- West approach - a Through lane and a double Right-Turn lane
- East approach - a Through and a shared Through/Left-Turn lane and two Exit lanes;

Alternatively, a traffic roundabout could be considered (see Annexure G3). The use of traffic roundabouts on high order roads, including National Roads, has gained favour with road authorities over recent years. It is also noticeably used on the outskirts of towns (i.e. George on the N2 and more recently proposed on the N1 outside Plettenberg Bay).

Care needs to be exercised to reducing vehicle travel speeds on the approach to a traffic roundabout and further design assessment is required.

The possible traffic roundabout needs to be considered in terms of the broader town planning and road network expansion and also for the proposed Cluster development, where additional road capacity will be required for more extensive development.

7 CONCLUSIONS AND RECOMMENDATIONS

It is concluded that;

1. The N14/R31 intersection, the Cluster Development Access Road and the N14/Cluster Development Access Road intersection would need to be suitably upgraded to accommodate development of some 143 820 m^2 GLA (30% development) of The Cluster;
2. Due to the size of the development and the number of expected trips generated a more detailed TA will be required considering other intersections in Kuruman as they may also require upgrading in support of the 30% development scenario, and further envisaged development;
3. Additional road network links would be required to accommodate further development of the Cluster beyond 30%; and
4. More extensive town and road network planning is required to unlock the potential of the envisaged development.

It is recommended that;

1. The Cluster development parameters, such as development model, permissible floor area, permissible bulk, Public Open Space (POS), parking requirements, loading bays, site access, security requirement, public transport facilities, development phasing, financial feasibility, etc. be cognisant of the traffic implications highlighted in this report (i.e. limitations and future road network planning);
2. The Cluster development be restricted to some 143 800 m^2 GLA (30% of the overall development GLA considered in this report) for the intersections considered;
3. Necessary road infrastructure upgrading at the intersections analysed and as outlined in this report be considered for the Cluster development threshold (see Annexure G and Annexure H);
4. A TA be undertaken for other intersections in Kuruman to determine the impact of the 30% development scenario (preferably a traffic model) and to make provision for capacity improvements as required to support the development;
5. Further town-and road network planning (preferably a traffic model) be undertaken to enable more extensive development if required; and
6. The Cluster trip generation and trip distribution patterns be confirmed once a significant portion of the development is operational, to determine whether the development threshold could be adjusted and also to inform future development and infrastructure planning.

8 REFERENCES

1. Committee of Transport Officials (COTO) TMH 16 Vol 1 and 2
2. COTO TMH 17 South African Trip Generation Data
3. Institute of Transport Engineers Trip Generation Manual 8th Edition
4. Environmental Impact Assessment Process; Background Information Document: Construction of the Metals Industrial Cluster and Associated Infrastructure Near Kuruman Northern Cape Province, Dated March 2016: by Savannah Environmental

ANNEXURE INDEX

Annexure A - Site Development Plan/Layout

Annexure B1 - 2016 Traffic Counts / Background Traffic
Annexure B2 - Background Traffic plus 6 Year Growth
Annexure B3 - Background Traffic plus 11 Year Growth

Annexure C - Phase 1 Trip Distribution and Assignment

Annexure D1 - Year 2016 Traffic – 25% Development
Annexure D2 - Year 2022 Traffic – 25% Development
Annexure D3 - Year 2027 Traffic – 25% Development

Annexure E1 - Year 2027 Traffic - 30% Development
Annexure E2 - Year 2027 Traffic - 33% Development
Annexure E3 - Year 2027 Traffic - 35% Development

Annexure F - N14/R31 Intersection Analysis (AM)

CURRENT:
- F1 – Status Quo
- F2 - 5 Year Growth
- F3 - 11 Year Growth

PHASE 1
- F4 - Phase 1 - Existing geometry and phasing
- F5 - Phase 1 - Upgraded geometry in year 2022
- F6 - Phase 1 - Upgraded geometry and new phasing in year 2022
- F7 - Phase 1 - Upgraded geometry and new phasing in year 2027

DEVELOPMENT THRESHOLD
- F8 - 30% development - Upgraded geometry and new phasing in year 2027
- F9 - 33% development - Upgraded geometry and new phasing in year 2027
- F10 - 35% development - Upgraded geometry and new phasing in year 2027

Annexure G - N14/Development Access Road Intersection Analysis

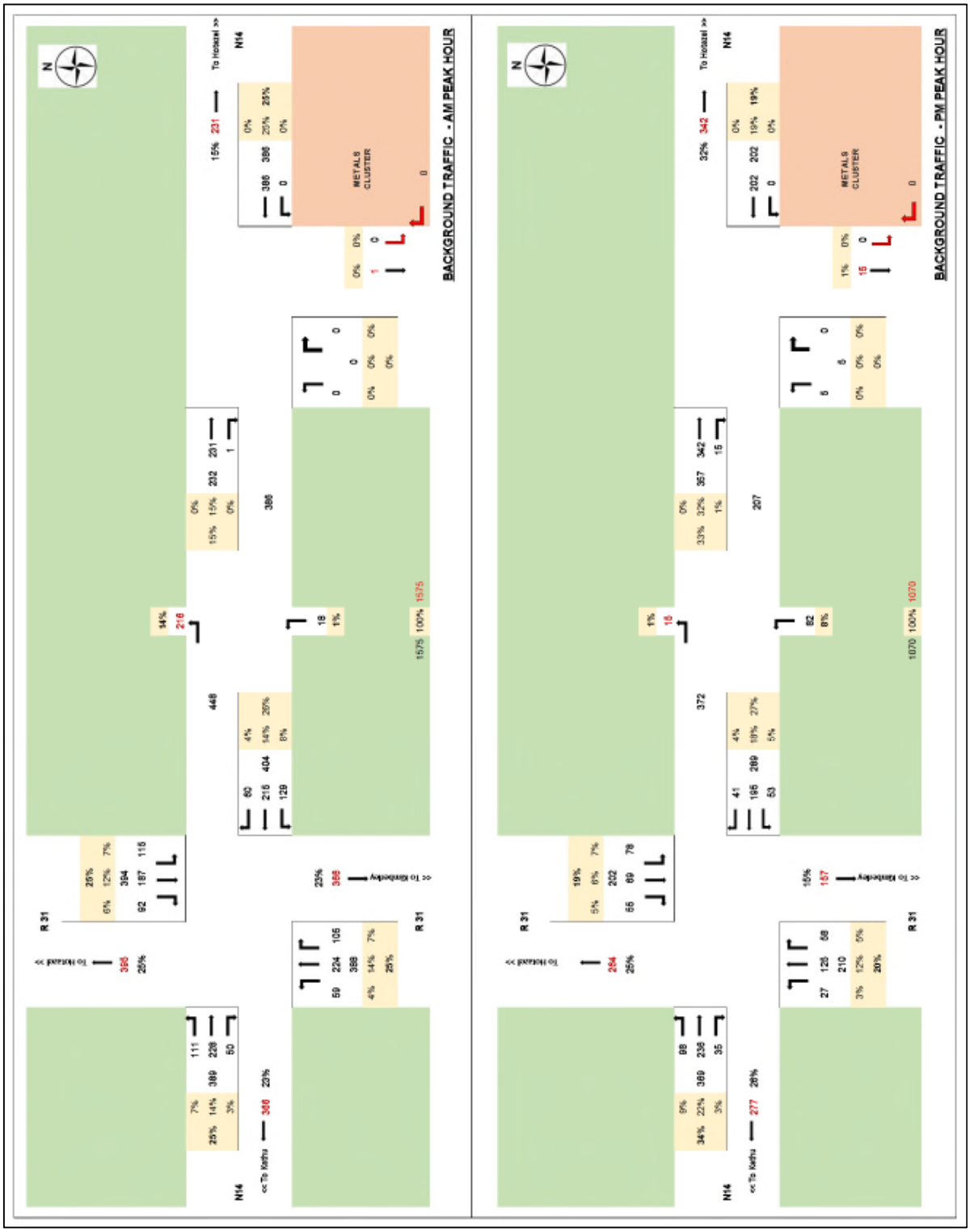
- G1 - 30% development – Existing Layout in year 2027
- G2 – 30% development – Upgraded geometry and signals in year 2027 – Proposed
- G3 – 30% development – Traffic Roundabout in year 2027 – Proposed Alternative

Annexure H - N14/R31 Proposed Intersection Layout and Signal Timing

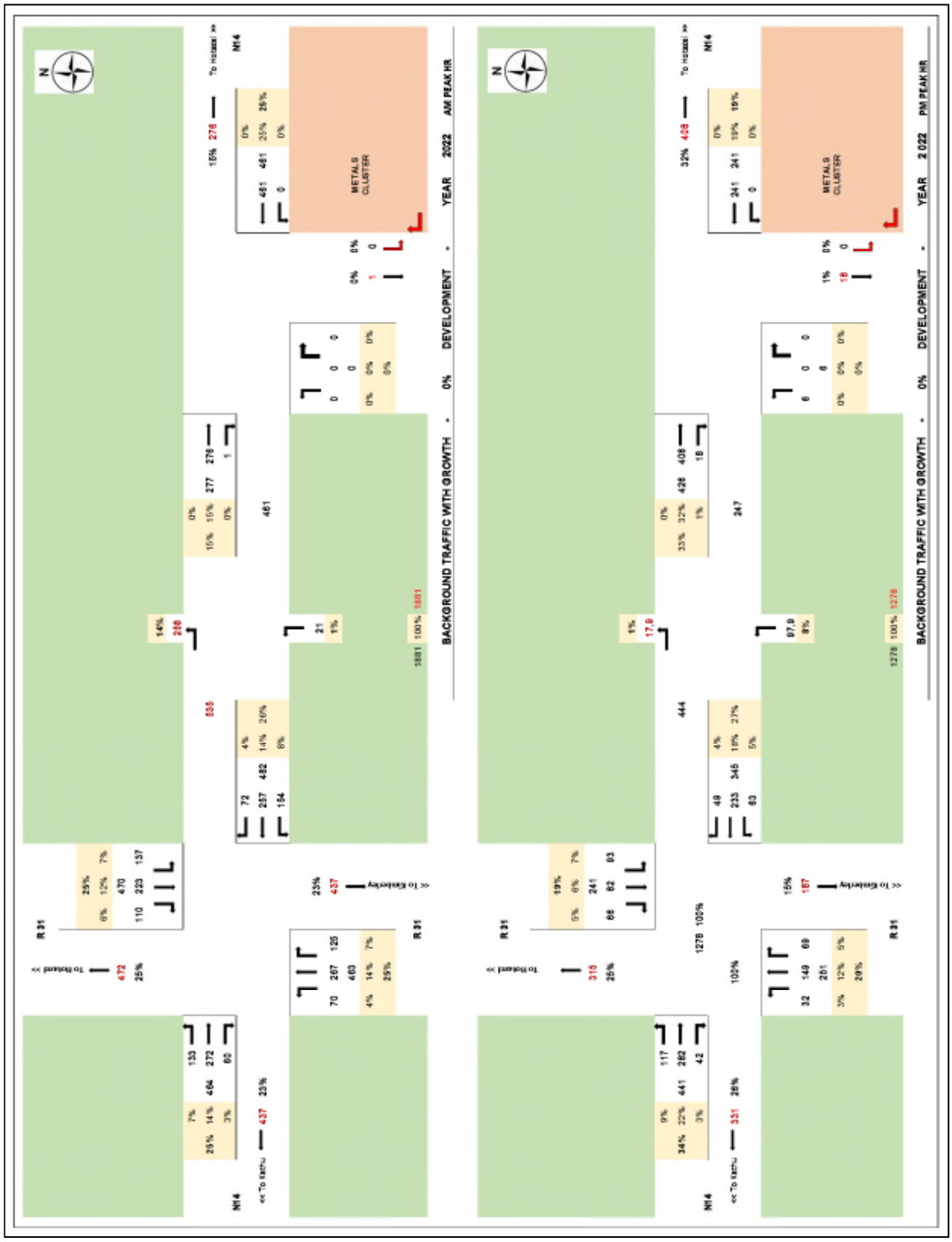
ANNEXURE A – SITE DRAWING

NOT AVAILABLE AT TIME OF THIS REPORT

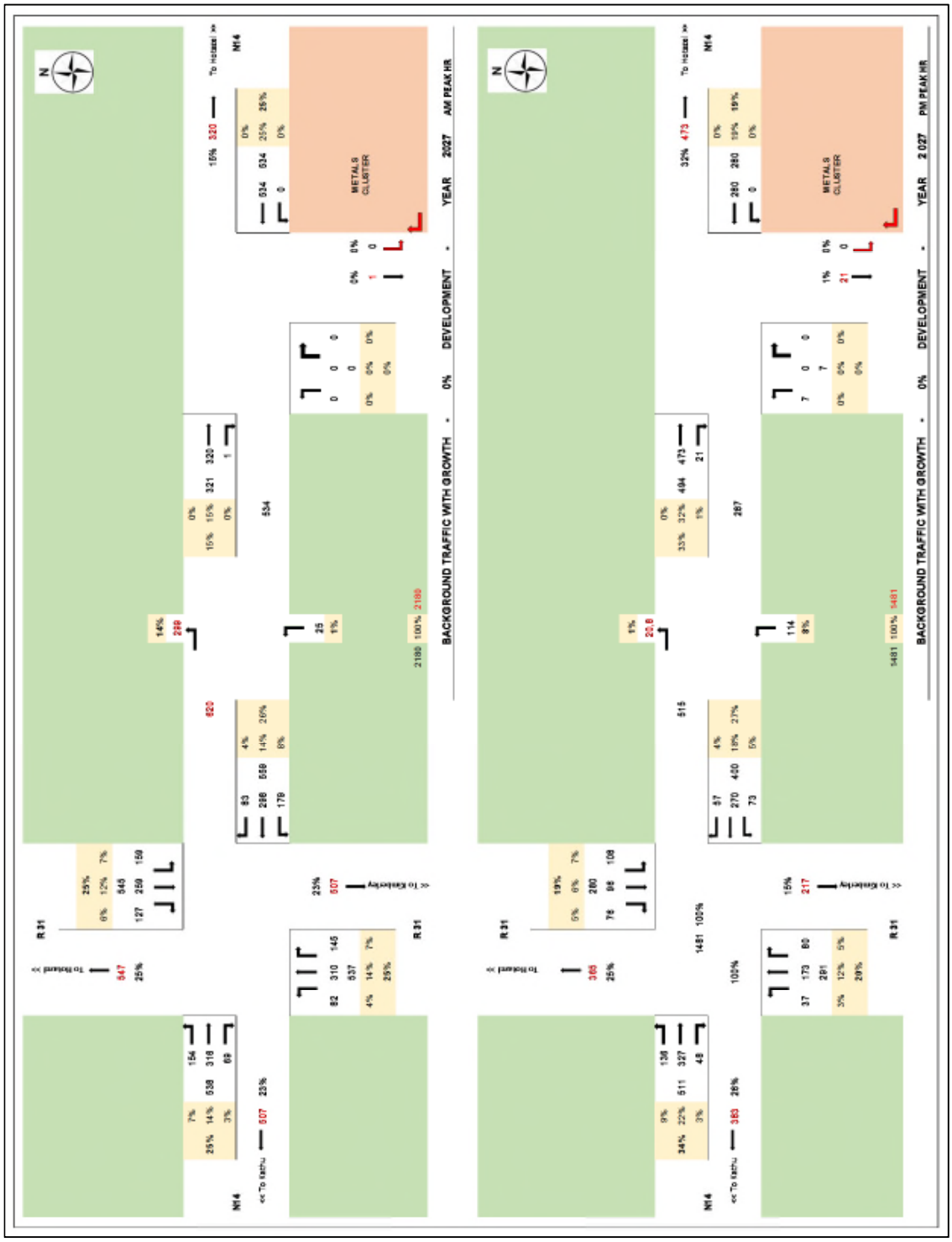
ANNEXURE B1 – 2016 Traffic Counts / Background Traffic



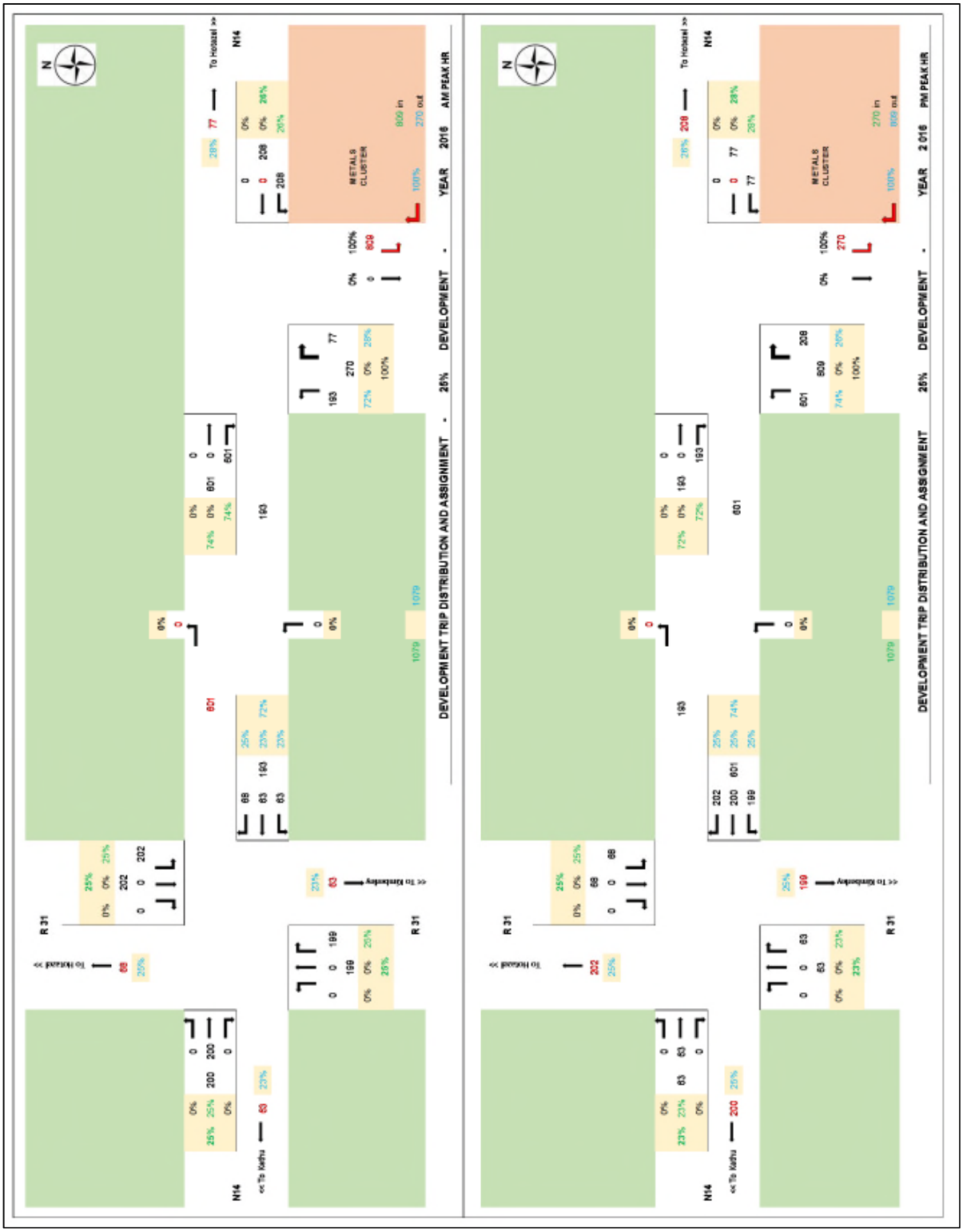
ANNEXURE B2 – Background Traffic plus 6 Year Growth



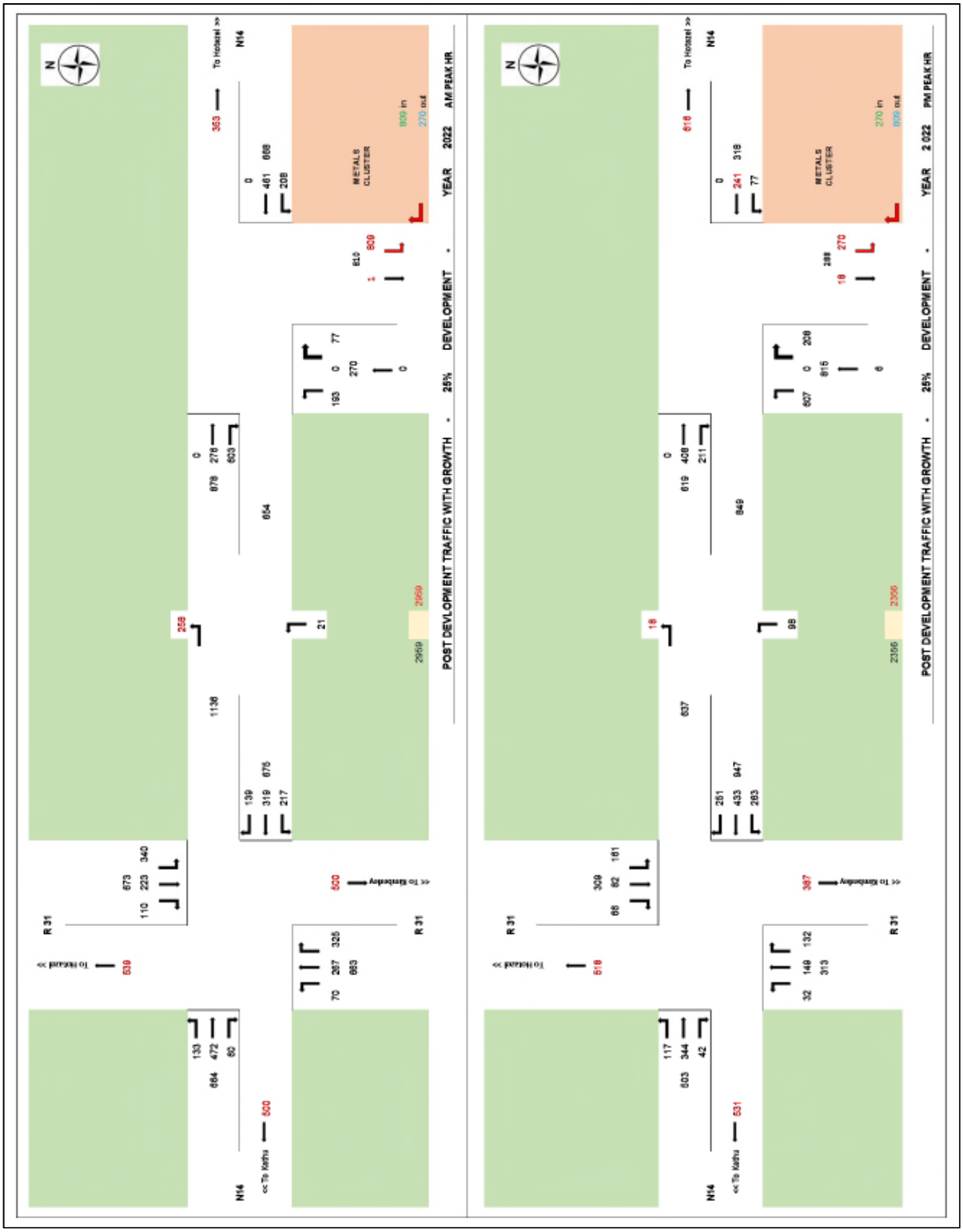
ANNEXURE B3 – Background Traffic plus 11 Year Growth



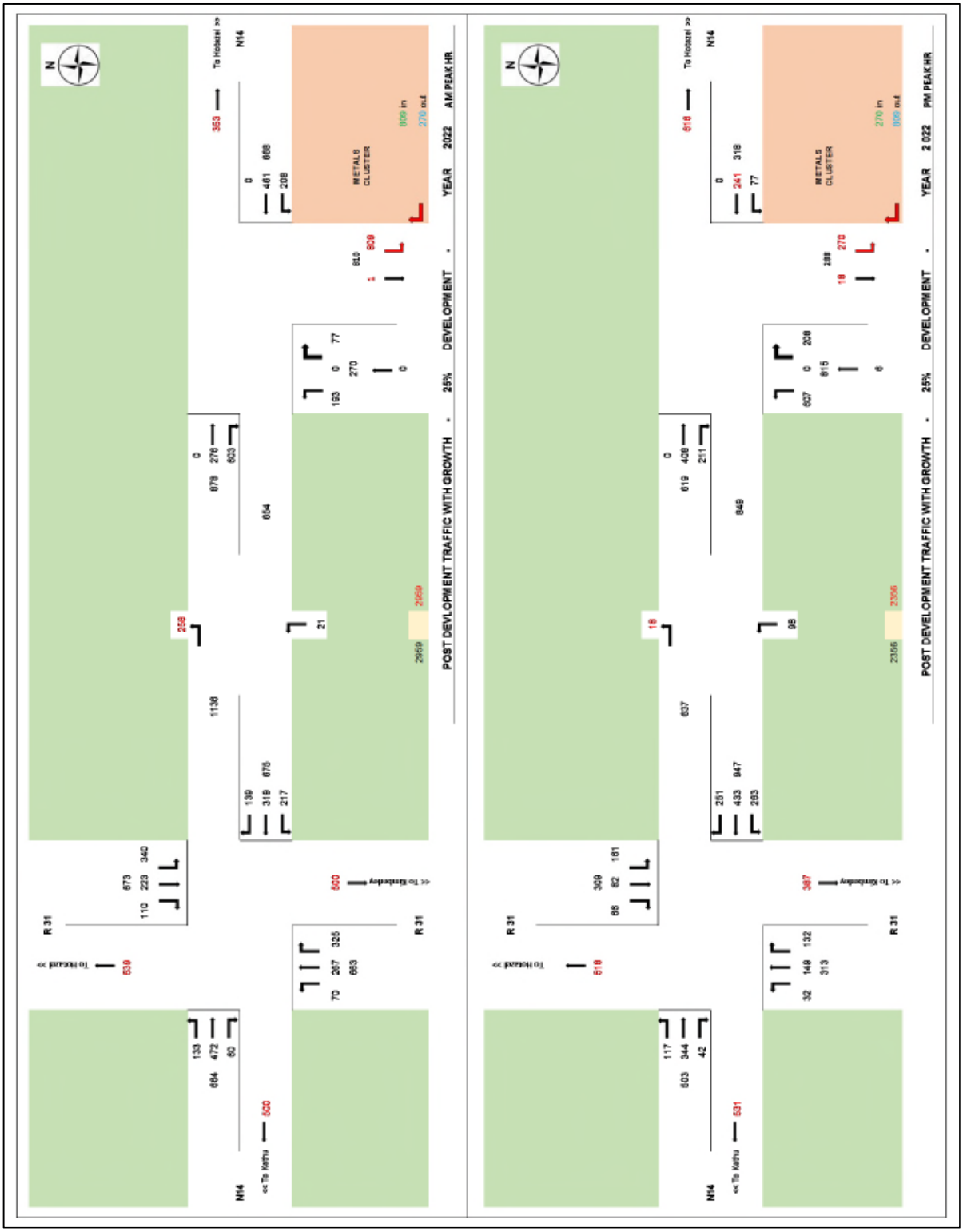
ANNEXURE C – PHASE 1: Trip Distribution and Trip Assignment



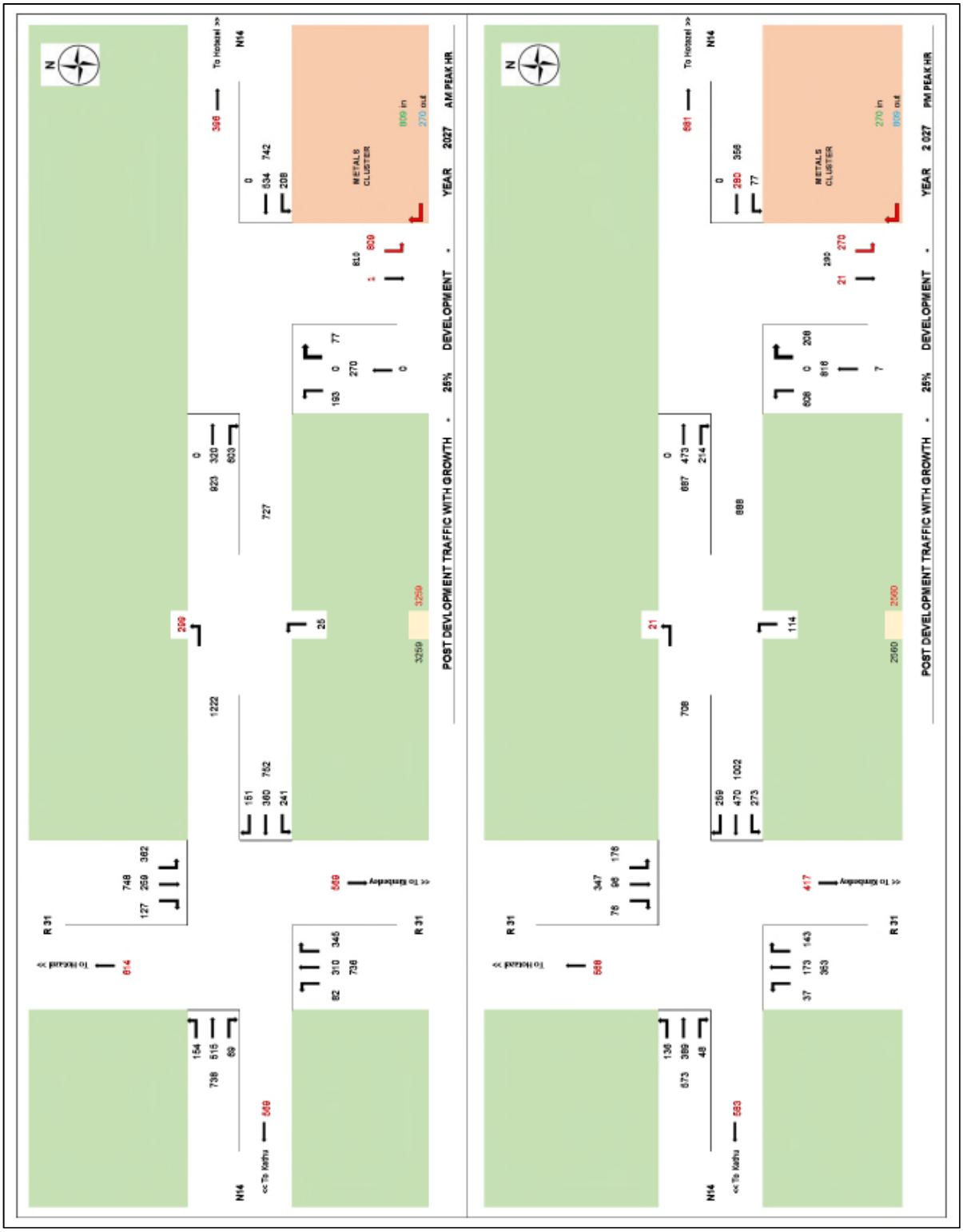
ANNEXURE D1 – Year 2016 Traffic – 25% Development



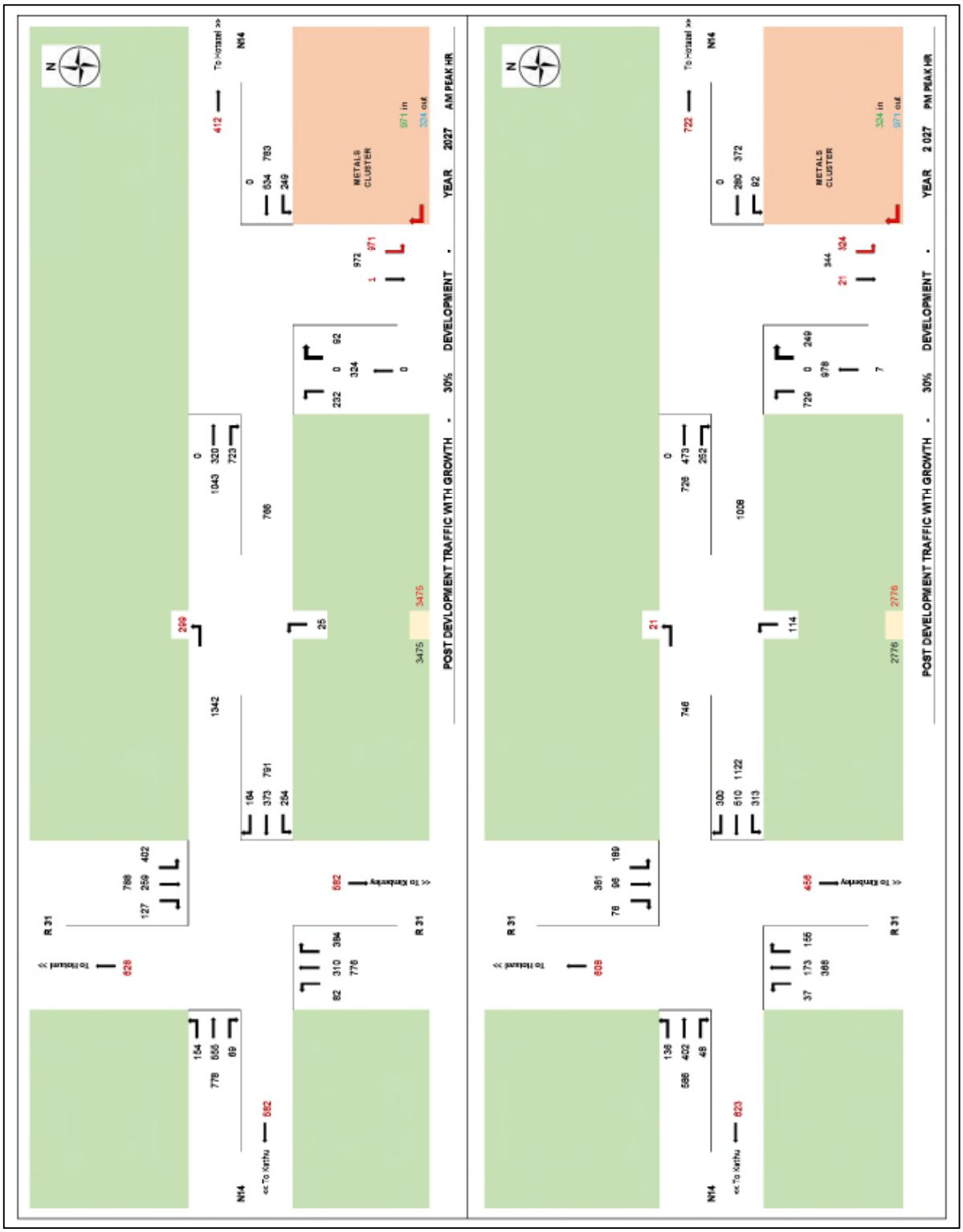
ANNEXURE D2 – Year 2022 Traffic – 25% Development



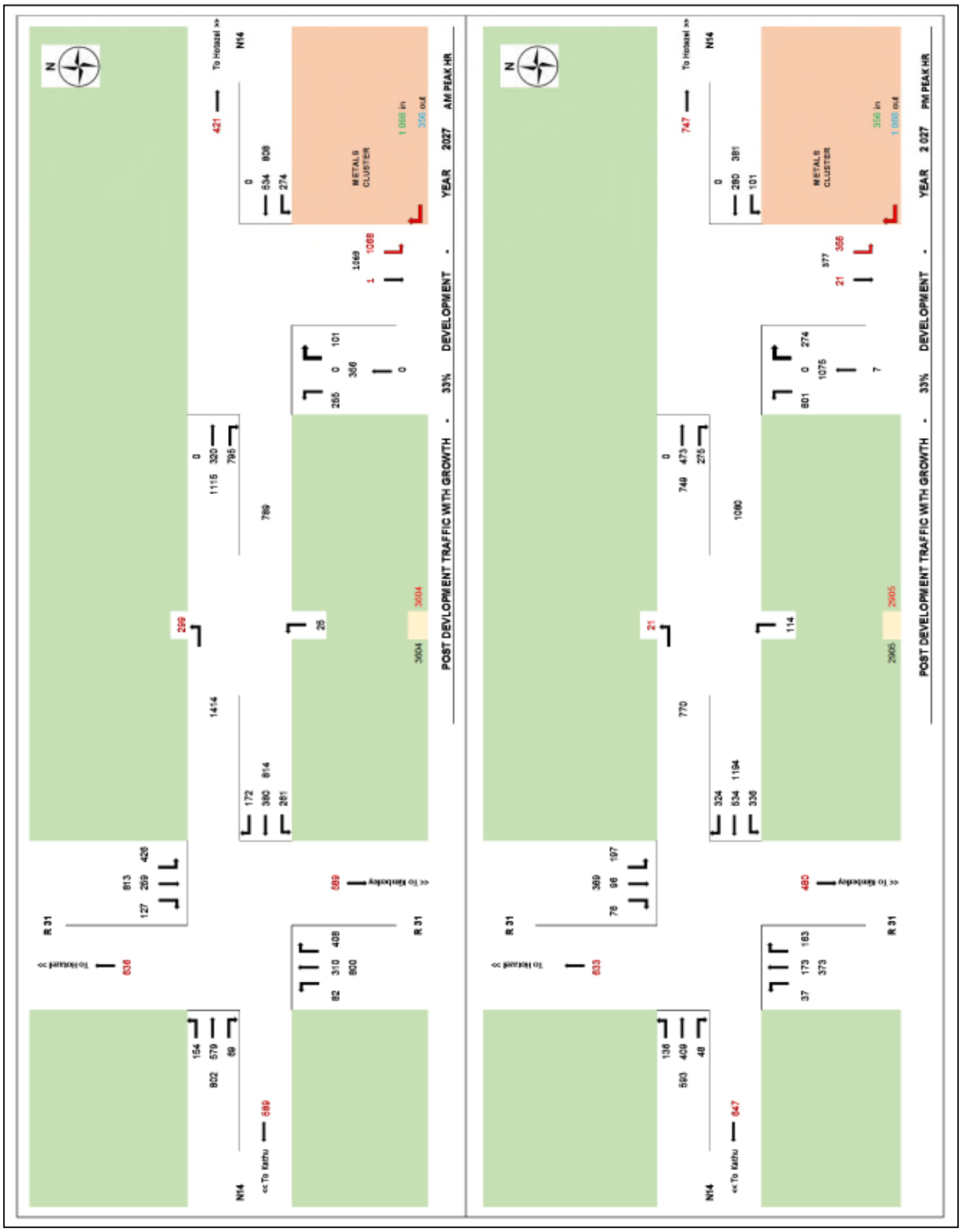
ANNEXURE D3 – Year 2027 Traffic – 25% Development



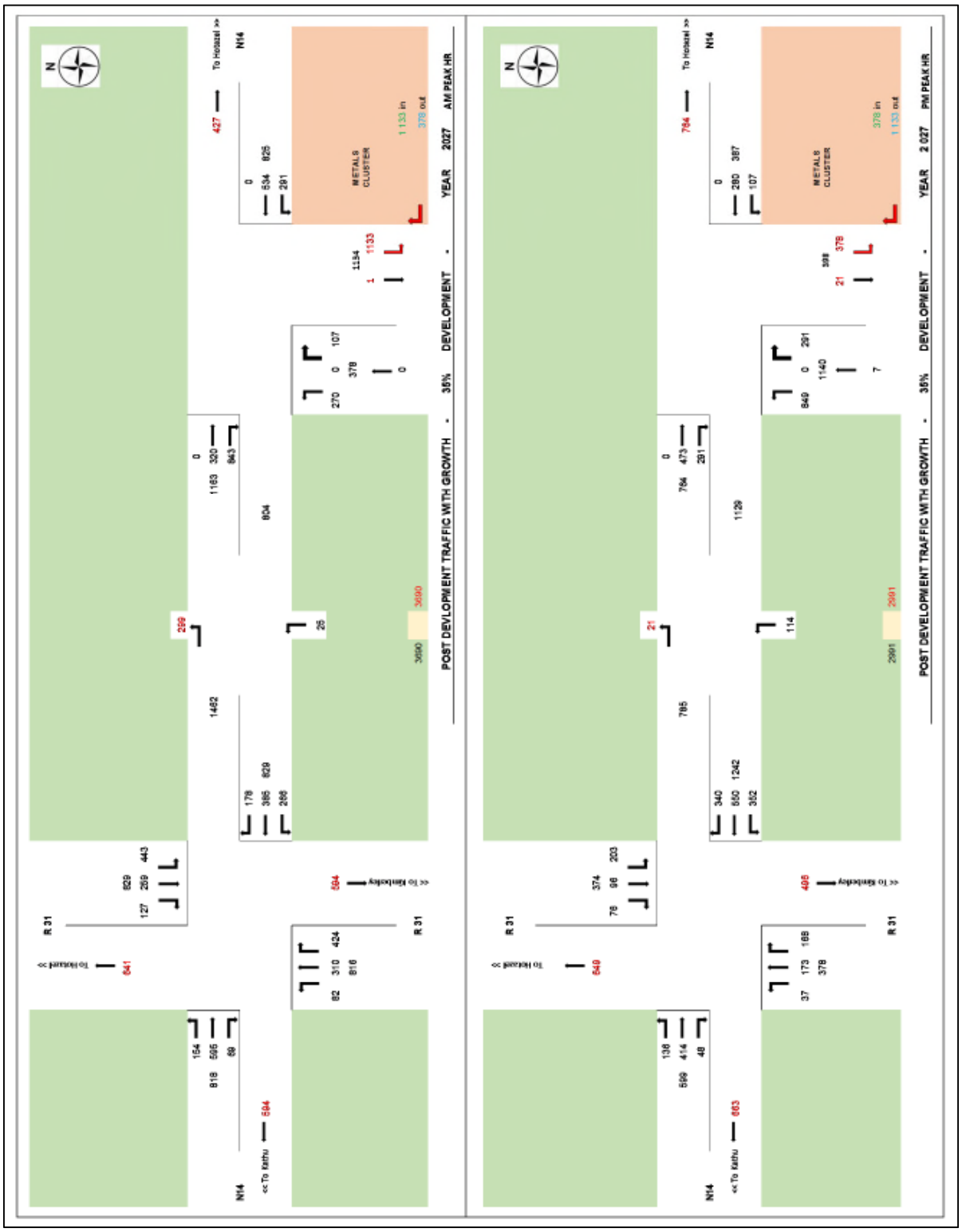
ANNEXURE E1 – Year 2027 Traffic - 30% Development



ANNEXURE E2 – Year 2027 Traffic - 33% Development



ANNEXURE E3 – Year 2027 Traffic - 35% Development



Annexure F - INDEX:

CURRENT:
F1 - Status Quo
F2 - 6 Year Growth
F3 - 11 Year Growth

PHASE 1 (25% Development)
F4 - Phase 1 - Existing geometry and phasing in year 2022
F5 - Phase 1 - Upgraded geometry in Year 2022
F6 – Phase 1 - Upgraded geometry and new phasing in Year 2022
F7 – Phase 1 - Upgraded geometry and new phasing in year 2027

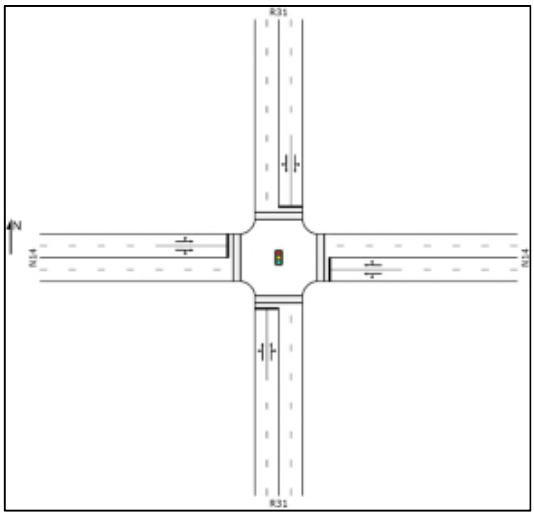
DEVELOPMENT THRESHOLD
F8 – 30% development - Upgraded geometry and new phasing in year 2027
F9 – 33% development - Upgraded geometry and new phasing in year 2027
F10 – 35% development - Upgraded geometry and new phasing in year 2027

F1- Status Quo

SITE LAYOUT

Site: Existing AM

Kuruman Metals Cluster
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: Existing AM

Kuruman Metals Cluster
Signals - Fixed Time Isolated Cycle Time = 60 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: R31											
1	L2	65	13,0	0,391	19,7	LOS B	5,9	45,8	0,76	0,67	46,5
2	T1	246	13,0	0,391	14,6	LOS B	5,9	45,8	0,76	0,68	47,3
3	R2	115	13,0	0,391	23,7	LOS C	3,6	27,8	0,82	0,76	42,7
Approach		426	13,0	0,391	17,8	LOS B	5,9	45,8	0,78	0,70	45,9
East: N14											
4	L2	142	8,0	0,358	19,4	LOS B	5,4	40,2	0,74	0,71	45,7
5	T1	236	8,0	0,358	14,6	LOS B	5,4	40,2	0,76	0,70	46,9
6	R2	66	8,0	0,358	21,0	LOS C	4,1	30,7	0,77	0,69	45,5
Approach		444	8,0	0,358	17,1	LOS B	5,4	40,2	0,75	0,70	46,3
North: R31											
7	L2	126	6,0	0,375	19,5	LOS B	5,8	42,4	0,75	0,70	46,0
8	T1	205	6,0	0,375	14,8	LOS B	5,8	42,4	0,76	0,71	46,5
9	R2	101	6,0	0,375	22,7	LOS C	3,7	27,1	0,80	0,74	43,7
Approach		433	6,0	0,375	18,0	LOS B	5,8	42,4	0,77	0,71	45,7
West: N14											
10	L2	122	7,0	0,338	19,3	LOS B	5,1	37,6	0,74	0,69	46,0
11	T1	251	7,0	0,338	14,5	LOS B	5,1	37,6	0,75	0,69	47,1
12	R2	55	7,0	0,338	20,8	LOS C	4,0	29,4	0,76	0,68	45,7
Approach		427	7,0	0,338	16,7	LOS B	5,1	37,6	0,75	0,69	46,6
All Vehicles		1731	8,5	0,391	17,4	LOS B	5,9	45,8	0,76	0,70	46,1

MOVEMENT SUMMARY

Site: Existing PM

Kuruman Metals Cluster
Signals - Fixed Time Isolated Cycle Time = 60 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: R31											
1	L2	28	8,0	0,233	23,0	LOS C	2,9	21,6	0,79	0,66	44,8
2	T1	130	8,0	0,233	17,8	LOS B	2,9	21,6	0,80	0,67	45,4
3	R2	60	8,0	0,233	24,9	LOS C	2,2	16,2	0,82	0,72	42,5
Approach		219	8,0	0,233	20,4	LOS C	2,9	21,6	0,80	0,69	44,5
East: N14											
4	L2	55	11,0	0,191	14,6	LOS B	2,8	21,2	0,58	0,56	49,4
5	T1	203	11,0	0,191	9,3	LOS A	2,8	21,2	0,59	0,56	50,8
6	R2	43	11,0	0,191	15,3	LOS B	2,2	16,9	0,60	0,57	48,9
Approach		301	11,0	0,191	11,1	LOS B	2,8	21,2	0,59	0,56	50,3
North: R31											
7	L2	81	11,0	0,230	23,1	LOS C	2,7	21,0	0,79	0,71	43,3
8	T1	72	11,0	0,230	18,2	LOS B	2,7	21,0	0,80	0,72	44,2
9	R2	57	11,0	0,230	24,9	LOS C	2,1	16,3	0,82	0,72	42,5
Approach		210	11,0	0,230	21,9	LOS C	2,7	21,0	0,80	0,72	43,4
West: N14											
10	L2	102	11,0	0,231	14,9	LOS B	3,4	26,1	0,60	0,62	48,6
11	T1	246	11,0	0,231	9,2	LOS A	3,4	26,1	0,60	0,58	50,8
12	R2	36	11,0	0,231	14,9	LOS B	3,0	23,1	0,60	0,55	49,7
Approach		384	11,0	0,231	11,3	LOS B	3,4	26,1	0,60	0,58	50,1
All Vehicles		1115	10,4	0,233	15,0	LOS B	3,4	26,1	0,68	0,62	47,6

F2 - 6 Year Growth

MOVEMENT SUMMARY

Site: Existing AM - 6 yr Growth

Kuruman Metals Cluster
Signals - Fixed Time Isolated Cycle Time = 60 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: R31											
1	L2	77	13,0	0,474	19,6	LOS B	7,6	59,2	0,77	0,69	46,6
2	T1	296	13,0	0,474	14,4	LOS B	7,6	59,2	0,78	0,70	47,6
3	R2	137	13,0	0,474	25,2	LOS C	4,0	31,3	0,86	0,78	41,7
Approach		510	13,0	0,474	18,1	LOS B	7,6	59,2	0,80	0,72	45,7
East: N14											
4	L2	169	8,0	0,468	20,9	LOS C	7,3	54,3	0,80	0,74	45,0
5	T1	282	8,0	0,468	16,7	LOS B	7,3	54,3	0,82	0,74	45,6
6	R2	79	8,0	0,468	24,1	LOS C	5,1	38,0	0,85	0,74	43,7
Approach		531	8,0	0,468	19,2	LOS B	7,3	54,3	0,82	0,74	45,1
North: R31											
7	L2	151	6,0	0,455	19,4	LOS B	7,4	54,8	0,77	0,72	46,2
8	T1	245	6,0	0,455	14,9	LOS B	7,4	54,8	0,78	0,73	46,6
9	R2	121	6,0	0,455	24,9	LOS C	4,2	31,1	0,86	0,77	42,4
Approach		516	6,0	0,455	18,5	LOS B	7,4	54,8	0,80	0,73	45,4
West: N14											
10	L2	146	7,0	0,442	20,7	LOS C	6,8	50,7	0,79	0,73	45,3
11	T1	299	7,0	0,442	16,5	LOS B	6,8	50,7	0,81	0,73	45,9
12	R2	66	7,0	0,442	23,8	LOS C	4,9	36,4	0,84	0,73	44,0
Approach		511	7,0	0,442	18,7	LOS B	6,8	50,7	0,81	0,73	45,5
All Vehicles		2068	8,5	0,474	18,6	LOS B	7,6	59,2	0,81	0,73	45,4

MOVEMENT SUMMARY

Site: Existing PM - 6 yr Growth

Kuruman Metals Cluster
Signals - Fixed Time Isolated Cycle Time = 60 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: R31											
1	L2	33	8,0	0,283	23,4	LOS C	3,6	26,7	0,81	0,68	44,6
2	T1	155	8,0	0,283	18,1	LOS B	3,6	26,7	0,81	0,69	45,3
3	R2	72	8,0	0,283	25,3	LOS C	2,5	19,0	0,83	0,73	42,3
Approach		260	8,0	0,283	20,8	LOS C	3,6	26,7	0,82	0,70	44,3
East: N14											
4	L2	66	11,0	0,233	14,9	LOS B	3,5	26,6	0,60	0,58	49,3
5	T1	243	11,0	0,233	9,5	LOS A	3,5	26,6	0,61	0,58	50,6
6	R2	51	11,0	0,233	15,6	LOS B	2,6	20,1	0,62	0,59	48,7
Approach		359	11,0	0,233	11,3	LOS B	3,5	26,6	0,61	0,58	50,1
North: R31											
7	L2	97	11,0	0,281	23,4	LOS C	3,4	26,1	0,81	0,73	43,2
8	T1	85	11,0	0,281	18,5	LOS B	3,4	26,1	0,82	0,73	44,0
9	R2	69	11,0	0,281	25,3	LOS C	2,5	19,1	0,83	0,73	42,2
Approach		251	11,0	0,281	22,3	LOS C	3,4	26,1	0,82	0,73	43,2
West: N14											
10	L2	122	11,0	0,279	15,1	LOS B	4,2	32,5	0,62	0,63	48,5
11	T1	294	11,0	0,279	9,5	LOS A	4,2	32,5	0,62	0,59	50,6
12	R2	44	11,0	0,279	15,2	LOS B	3,7	28,1	0,62	0,57	49,5
Approach		459	11,0	0,279	11,5	LOS B	4,2	32,5	0,62	0,60	49,9
All Vehicles		1330	10,4	0,283	15,3	LOS B	4,2	32,5	0,69	0,64	47,4

F3 - 11 Year Growth

MOVEMENT SUMMARY

Site: Existing AM - 11 yr Growth

Kuruman Metals Cluster
Signals - Fixed Time Isolated Cycle Time = 60 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: R31											
1	L2	90	13,0	0,386	19,0	LOS B	5,9	45,7	0,74	0,68	46,6
2	T1	341	13,0	0,386	14,9	LOS B	5,9	45,7	0,77	0,69	47,2
3	R2	47	13,0	0,386	22,7	LOS C	4,5	35,0	0,81	0,70	44,7
Approach		478	13,0	0,386	16,5	LOS B	5,9	45,7	0,77	0,68	46,9
East: N14											
4	L2	197	8,0	0,550	21,5	LOS C	8,9	66,5	0,83	0,77	44,7
5	T1	327	8,0	0,550	17,6	LOS B	8,9	66,5	0,86	0,77	45,1
6	R2	91	8,0	0,550	25,4	LOS C	6,0	45,2	0,89	0,77	43,0
Approach		615	8,0	0,550	20,0	LOS C	8,9	66,5	0,85	0,77	44,6
North: R31											
7	L2	140	6,0	0,552	20,1	LOS C	9,6	70,5	0,81	0,74	46,1
8	T1	285	6,0	0,552	14,5	LOS B	9,6	70,5	0,81	0,74	47,3
9	R2	175	6,0	0,556	26,6	LOS C	4,6	34,1	0,90	0,81	40,9
Approach		599	6,0	0,556	19,4	LOS B	9,6	70,5	0,84	0,76	45,0
West: N14											
10	L2	146	7,0	0,460	20,8	LOS C	7,2	53,3	0,80	0,73	45,3
11	T1	299	7,0	0,460	16,9	LOS B	7,2	53,3	0,82	0,74	45,7
12	R2	66	7,0	0,460	24,8	LOS C	4,7	35,0	0,86	0,74	43,5
Approach		511	7,0	0,460	19,0	LOS B	7,2	53,3	0,82	0,74	45,3
All Vehicles		2203	8,3	0,556	18,8	LOS B	9,6	70,5	0,82	0,74	45,3

MOVEMENT SUMMARY

Site: Existing PM - 11 yr Growth

Kuruman Metals Cluster
Signals - Fixed Time Isolated Cycle Time = 60 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: R31											
1	L2	39	8,0	0,338	23,7	LOS C	4,4	32,6	0,82	0,70	44,4
2	T1	180	8,0	0,338	18,6	LOS B	4,4	32,6	0,83	0,71	45,0
3	R2	83	8,0	0,338	26,5	LOS C	2,9	21,9	0,86	0,75	41,6
Approach		302	8,0	0,338	21,4	LOS C	4,4	32,6	0,84	0,72	44,0
East: N14											
4	L2	76	11,0	0,277	15,1	LOS B	4,2	32,5	0,62	0,59	49,2
5	T1	281	11,0	0,277	10,0	LOS A	4,2	32,5	0,63	0,60	50,3
6	R2	59	11,0	0,277	16,5	LOS B	3,1	23,8	0,65	0,61	48,1
Approach		417	11,0	0,277	11,8	LOS B	4,2	32,5	0,63	0,60	49,8
North: R31											
7	L2	113	11,0	0,336	23,8	LOS C	4,2	31,8	0,82	0,74	43,1
8	T1	100	11,0	0,336	19,1	LOS B	4,2	31,8	0,84	0,74	43,7
9	R2	79	11,0	0,336	26,5	LOS C	2,9	22,1	0,86	0,75	41,6
Approach		292	11,0	0,336	22,9	LOS C	4,2	31,8	0,84	0,74	42,9
West: N14											
10	L2	142	11,0	0,327	15,4	LOS B	5,1	39,2	0,64	0,65	48,3
11	T1	341	11,0	0,327	10,1	LOS B	5,1	39,2	0,64	0,62	50,2
12	R2	50	11,0	0,327	16,1	LOS B	4,4	34,0	0,65	0,59	48,9
Approach		532	11,0	0,327	12,1	LOS B	5,1	39,2	0,64	0,62	49,5
All Vehicles		1543	10,4	0,338	15,9	LOS B	5,1	39,2	0,71	0,66	47,0

F4 - Phase 1 - Existing geometry and phasing in year 2022

MOVEMENT SUMMARY

Site: Post Dev Year 2022 - AM

Kuruman Metals Cluster
Signals - Fixed Time Isolated Cycle Time = 60 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: R31											
1	L2	77	13,0	0,463	18,2	LOS B	7,7	59,6	0,74	0,67	47,5
2	T1	293	13,0	0,463	12,5	LOS B	7,7	59,6	0,74	0,67	49,0
3	R2	357	13,0	1,386	222,3	LOS F	34,1	265,2	1,00	1,87	12,8
Approach		727	13,0	1,386	116,1	LOS F	34,1	265,2	0,87	1,26	20,5
East: N14											
4	L2	238	8,0	0,928	42,4	LOS D	23,1	172,5	1,00	1,17	35,8
5	T1	351	8,0	0,928	36,7	LOS D	23,1	172,5	1,00	1,17	36,6
6	R2	153	8,0	1,201	136,0	LOS F	10,6	79,1	1,00	1,35	18,4
Approach		742	8,0	1,201	59,0	LOS E	23,1	172,5	1,00	1,21	30,2
North: R31											
7	L2	374	6,0	0,564	18,9	LOS B	10,0	73,7	0,79	0,79	45,2
8	T1	245	6,0	0,564	15,7	LOS B	10,0	73,7	0,83	0,77	45,8
9	R2	121	6,0	0,564	22,6	LOS C	6,9	50,6	0,85	0,76	44,4
Approach		740	6,0	0,564	18,5	LOS B	10,0	73,7	0,81	0,78	45,3
West: N14											
10	L2	146	7,0	0,907	38,8	LOS D	21,7	160,8	1,00	1,13	37,5
11	T1	519	7,0	0,907	34,4	LOS C	21,7	160,8	1,00	1,11	37,8
12	R2	66	7,0	0,907	46,2	LOS D	5,4	40,3	1,00	1,03	34,5
Approach		731	7,0	0,907	36,3	LOS D	21,7	160,8	1,00	1,11	37,4
All Vehicles		2940	8,5	1,386	57,3	LOS E	34,1	265,2	0,92	1,09	30,6

MOVEMENT SUMMARY

Site: Post Dev Year 2022 - PM

Kuruman Metals Cluster
Signals - Fixed Time Isolated Cycle Time = 60 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

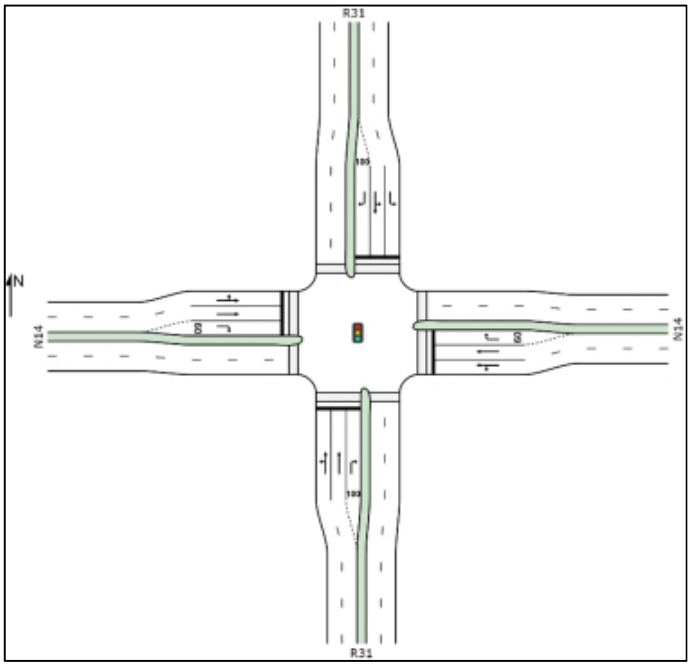
Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: R31											
1	L2	33	8,0	0,474	28,7	LOS C	5,0	37,6	0,92	0,76	42,0
2	T1	155	8,0	0,474	23,1	LOS C	5,0	37,6	0,92	0,76	43,0
3	R2	138	8,0	0,696	36,2	LOS D	4,3	32,5	1,00	0,88	36,9
Approach		326	8,0	0,696	29,2	LOS C	5,0	37,6	0,95	0,81	40,1
East: N14											
4	L2	274	11,0	0,698	15,2	LOS B	15,1	115,4	0,76	0,74	48,8
5	T1	451	11,0	0,698	9,6	LOS A	15,1	115,4	0,76	0,74	50,4
6	R2	261	11,0	0,739	28,1	LOS C	7,8	59,9	0,92	0,92	40,1
Approach		986	11,0	0,739	16,1	LOS B	15,1	115,4	0,80	0,78	46,8
North: R31											
7	L2	168	11,0	0,516	29,1	LOS C	5,2	40,2	0,93	0,80	40,0
8	T1	85	11,0	0,516	25,4	LOS C	5,2	40,2	0,95	0,78	40,7
9	R2	69	11,0	0,516	32,0	LOS C	3,7	28,0	0,96	0,78	39,5
Approach		322	11,0	0,516	28,7	LOS C	5,2	40,2	0,94	0,79	40,1
West: N14											
10	L2	122	11,0	0,330	12,6	LOS B	5,2	39,9	0,55	0,57	50,7
11	T1	358	11,0	0,330	9,6	LOS A	5,2	39,9	0,62	0,60	50,6
12	R2	44	11,0	0,330	19,5	LOS B	3,8	28,8	0,73	0,65	46,6
Approach		524	11,0	0,330	11,1	LOS B	5,2	39,9	0,61	0,60	50,3
All Vehicles		2158	10,5	0,739	18,7	LOS B	15,1	115,4	0,80	0,74	45,3

F5 - Phase 1 - Upgraded geometry in year 2022

SITE LAYOUT

Site: Post Dev Year 2022 - AM - Upgraded

Kuruman Metals Cluster
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: Post Dev Year 2022 - AM - Upgraded

Kuruman Metals Cluster
Signals - Fixed Time Isolated Cycle Time = 70 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: R31											
1	L2	77	13,0	0,178	12,9	LOS B	2,9	22,4	0,49	0,54	50,2
2	T1	293	13,0	0,178	7,2	LOS A	2,9	22,9	0,49	0,45	53,0
3	R2	357	13,0	0,895	43,7	LOS D	16,3	126,5	0,97	1,07	34,3
Approach		727	13,0	0,895	25,7	LOS C	16,3	126,5	0,72	0,77	41,7
East: N14											
4	L2	238	8,0	0,669	33,0	LOS C	9,4	70,2	0,96	0,85	38,5
5	T1	351	8,0	0,669	27,2	LOS C	9,8	73,1	0,96	0,83	41,2
6	R2	153	8,0	1,168	130,5	LOS F	11,0	82,4	1,00	1,32	19,0
Approach		742	8,0	1,168	50,3	LOS D	11,0	82,4	0,97	0,94	32,6
North: R31											
7	L2	374	6,0	0,291	13,4	LOS B	5,4	39,5	0,53	0,69	48,5
8	T1	245	6,0	0,291	7,8	LOS A	5,4	39,5	0,53	0,52	52,3
9	R2	121	6,0	0,217	14,7	LOS B	2,2	16,1	0,55	0,71	47,3
Approach		740	6,0	0,291	11,7	LOS B	5,4	39,5	0,54	0,64	49,5
West: N14											
10	L2	146	7,0	0,743	34,9	LOS C	11,3	83,7	0,98	0,90	38,6
11	T1	519	7,0	0,743	29,2	LOS C	11,5	85,5	0,98	0,90	40,2
12	R2	66	7,0	0,448	40,5	LOS D	2,3	17,2	0,98	0,76	35,5
Approach		731	7,0	0,743	31,4	LOS C	11,5	85,5	0,98	0,89	39,4
All Vehicles		2940	8,5	1,168	29,8	LOS C	16,3	126,5	0,80	0,81	39,9

MOVEMENT SUMMARY

Site: Post Dev Year 2022 - PM - Upgraded

Kuruman Metals Cluster
Signals - Fixed Time Isolated Cycle Time = 70 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

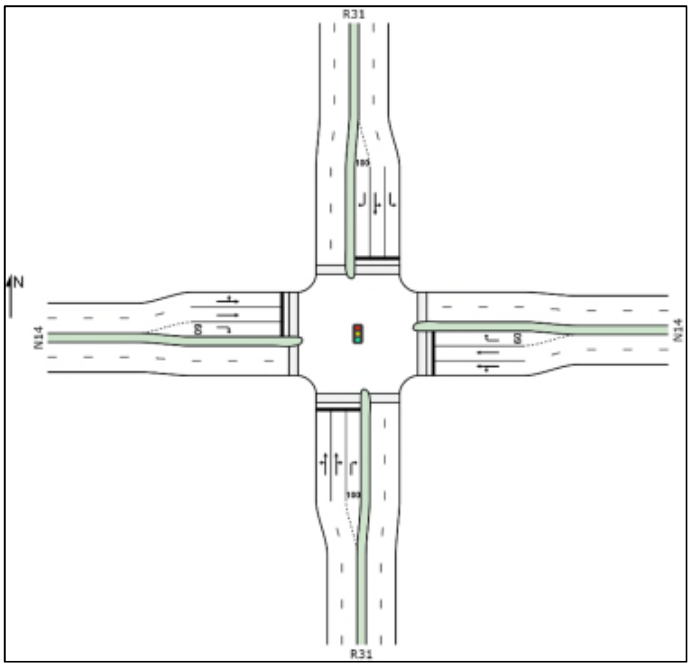
Mov ID	ODMov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: R31											
1	L2	33	8,0	0,211	28,9	LOS C	2,6	19,5	0,84	0,69	41,4
2	T1	155	8,0	0,211	23,3	LOS C	2,7	19,8	0,84	0,67	43,1
3	R2	138	8,0	0,541	35,1	LOS D	4,5	33,8	0,95	0,80	37,4
Approach		326	8,0	0,541	28,9	LOS C	4,5	33,8	0,89	0,73	40,3
East: N14											
4	L2	274	11,0	0,347	13,8	LOS B	6,3	48,3	0,56	0,68	48,3
5	T1	451	11,0	0,347	8,1	LOS A	6,6	50,3	0,56	0,52	52,4
6	R2	261	11,0	0,552	18,0	LOS B	6,2	47,2	0,71	0,78	45,3
Approach		986	11,0	0,552	12,3	LOS B	6,6	50,3	0,60	0,63	49,2
North: R31											
7	L2	168	11,0	0,297	29,6	LOS C	3,7	28,3	0,86	0,76	39,8
8	T1	85	11,0	0,297	23,9	LOS C	3,7	28,3	0,86	0,72	42,2
9	R2	69	11,0	0,245	31,4	LOS C	2,0	15,6	0,87	0,75	38,8
Approach		322	11,0	0,297	28,5	LOS C	3,7	28,3	0,86	0,74	40,2
West: N14											
10	L2	122	11,0	0,228	13,1	LOS B	3,9	29,5	0,51	0,58	49,7
11	T1	358	11,0	0,228	7,4	LOS A	4,0	30,4	0,51	0,48	52,8
12	R2	44	11,0	0,126	16,7	LOS B	0,8	6,5	0,57	0,69	46,0
Approach		524	11,0	0,228	9,5	LOS A	4,0	30,4	0,51	0,52	51,4
All Vehicles		2158	10,5	0,552	16,5	LOS B	6,6	50,3	0,66	0,64	46,6

F6 – Phase 1 - Upgraded geometry and new phasing in year 2022

SITE LAYOUT

Site: Post Dev Year 2022 - AM – Upgraded Phasing

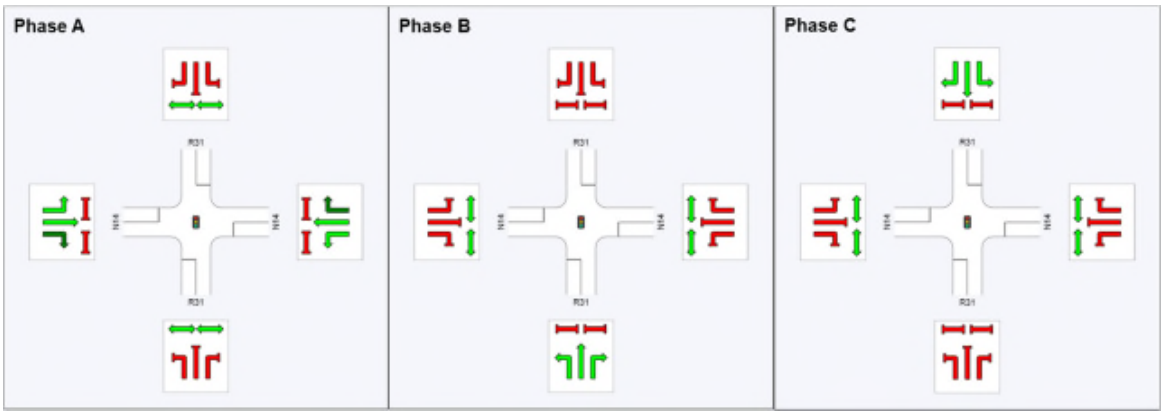
Kuruman Metals Cluster
Signals - Fixed Time Isolated



PHASING SUMMARY

Site: Post Dev Year 2022 - AM - Upgraded Phasing

Kuruman Metals Cluster
Signals - Fixed Time Isolated Cycle Time = 100 seconds (User-Given Cycle Time)



MOVEMENT SUMMARY

Site: Post Dev Year 2022 - AM - Upgraded Phasing

Kuruman Metals Cluster
Signals - Fixed Time Isolated Cycle Time = 100 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: R31											
1	L2	77	13,0	0,698	47,7	LOS D	11,7	90,9	0,98	0,86	34,2
2	T1	293	13,0	0,698	42,0	LOS D	11,7	90,9	0,98	0,86	34,8
3	R2	357	13,0	0,698	47,9	LOS D	11,6	90,1	0,98	0,86	33,3
Approach		727	13,0	0,698	45,5	LOS D	11,7	90,9	0,98	0,86	34,0
East: N14											
4	L2	238	8,0	0,427	30,4	LOS C	10,4	77,8	0,79	0,78	39,6
5	T1	351	8,0	0,427	24,7	LOS C	10,9	81,3	0,79	0,69	42,4
6	R2	153	8,0	0,730	48,6	LOS D	7,7	57,6	0,97	0,90	32,9
Approach		742	8,0	0,730	31,4	LOS C	10,9	81,3	0,83	0,76	39,2
North: R31											
7	L2	374	6,0	0,709	44,7	LOS D	14,6	107,4	0,97	0,86	34,3
8	T1	245	6,0	0,709	38,9	LOS D	14,6	107,4	0,97	0,86	36,2
9	R2	121	6,0	0,283	39,4	LOS D	4,9	35,8	0,86	0,77	35,9
Approach		740	6,0	0,709	41,9	LOS D	14,6	107,4	0,95	0,84	35,1
West: N14											
10	L2	146	7,0	0,475	30,9	LOS C	12,1	90,0	0,81	0,75	40,3
11	T1	519	7,0	0,475	25,2	LOS C	12,4	92,1	0,81	0,71	42,0
12	R2	66	7,0	0,280	38,7	LOS D	2,7	19,8	0,84	0,76	36,1
Approach		731	7,0	0,475	27,6	LOS C	12,4	92,1	0,81	0,72	41,1
All Vehicles		2940	8,5	0,730	36,6	LOS D	14,6	107,4	0,89	0,80	37,1

MOVEMENT SUMMARY

Site: Post Dev Year 2022 - PM - Upgraded Phasing

Kuruman Metals Cluster
Signals - Fixed Time Isolated Cycle Time = 100 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: R31											
1	L2	33	8,0	0,548	53,2	LOS D	5,3	39,8	0,99	0,78	32,6
2	T1	155	8,0	0,548	47,5	LOS D	5,3	39,9	0,99	0,78	33,3
3	R2	138	8,0	0,548	53,3	LOS D	5,3	39,9	0,99	0,78	31,8
Approach		326	8,0	0,548	50,5	LOS D	5,3	39,9	0,99	0,78	32,6
East: N14											
4	L2	274	11,0	0,351	17,5	LOS B	9,0	69,1	0,56	0,69	46,1
5	T1	451	11,0	0,351	11,8	LOS B	9,4	72,1	0,56	0,53	49,8
6	R2	261	11,0	0,586	23,9	LOS C	9,0	69,0	0,74	0,80	42,2
Approach		986	11,0	0,586	16,6	LOS B	9,4	72,1	0,61	0,65	46,5
North: R31											
7	L2	168	11,0	0,555	51,5	LOS D	6,1	47,0	0,98	0,79	32,2
8	T1	85	11,0	0,555	45,7	LOS D	6,1	47,0	0,98	0,79	33,7
9	R2	69	11,0	0,307	49,7	LOS D	3,2	24,1	0,95	0,76	32,5
Approach		322	11,0	0,555	49,6	LOS D	6,1	47,0	0,98	0,78	32,7
West: N14											
10	L2	122	11,0	0,231	16,5	LOS B	5,5	42,3	0,52	0,59	47,6
11	T1	358	11,0	0,231	10,8	LOS B	5,7	43,5	0,52	0,49	50,4
12	R2	44	11,0	0,138	21,7	LOS C	1,2	9,3	0,59	0,70	43,3
Approach		524	11,0	0,231	13,0	LOS B	5,7	43,5	0,52	0,53	49,0
All Vehicles		2158	10,5	0,586	25,8	LOS C	9,4	72,1	0,70	0,66	41,7

F7 – Phase 1 - Upgraded geometry and new phasing in year 2027

MOVEMENT SUMMARY

Site: Post Dev Year 2027 - AM - Upgraded Phasing + 5yr growth

Kuruman Metals Cluster
Signals - Fixed Time Isolated Cycle Time = 100 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: R31											
1	L2	90	13,0	0,817	53,6	LOS D	14,2	110,5	1,00	0,95	32,4
2	T1	341	13,0	0,817	47,9	LOS D	14,2	110,5	1,00	0,95	33,0
3	R2	379	13,0	0,817	53,8	LOS D	14,1	109,9	1,00	0,93	31,7
Approach		810	13,0	0,817	51,3	LOS D	14,2	110,5	1,00	0,94	32,3
East: N14											
4	L2	265	8,0	0,455	29,3	LOS C	11,6	86,4	0,78	0,78	40,1
5	T1	396	8,0	0,455	23,6	LOS C	12,1	90,2	0,78	0,69	42,9
6	R2	166	8,0	0,827	55,9	LOS E	9,3	69,5	1,00	0,98	30,9
Approach		826	8,0	0,827	31,9	LOS C	12,1	90,2	0,83	0,78	39,0
North: R31											
7	L2	398	6,0	0,815	50,4	LOS D	17,7	130,2	1,00	0,92	32,5
8	T1	285	6,0	0,815	44,6	LOS D	17,7	130,2	1,00	0,95	34,4
9	R2	140	6,0	0,341	40,8	LOS D	5,8	42,5	0,88	0,78	35,4
Approach		822	6,0	0,815	46,8	LOS D	17,7	130,2	0,98	0,91	33,6
West: N14											
10	L2	169	7,0	0,499	29,8	LOS C	13,3	98,4	0,80	0,75	40,7
11	T1	566	7,0	0,499	24,2	LOS C	13,6	100,9	0,80	0,71	42,6
12	R2	76	7,0	0,337	38,6	LOS D	3,1	23,1	0,84	0,77	36,1
Approach		811	7,0	0,499	26,7	LOS C	13,6	100,9	0,81	0,73	41,5
All Vehicles		3269	8,5	0,827	39,2	LOS D	17,7	130,2	0,90	0,84	36,2

MOVEMENT SUMMARY

Site: Post Dev Year 2027 - PM - Upgraded Phasing + 5yr growth

Kuruman Metals Cluster
Signals - Fixed Time Isolated Cycle Time = 100 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: R31											
1	L2	39	8,0	0,618	54,0	LOS D	6,1	45,6	1,00	0,81	32,4
2	T1	180	8,0	0,618	48,3	LOS D	6,1	45,8	1,00	0,81	33,1
3	R2	149	8,0	0,618	54,1	LOS D	6,1	45,8	1,00	0,81	31,6
Approach		368	8,0	0,618	51,3	LOS D	6,1	45,8	1,00	0,81	32,4
East: N14											
4	L2	284	11,0	0,374	17,7	LOS B	9,8	75,2	0,58	0,69	46,1
5	T1	490	11,0	0,374	12,0	LOS B	10,2	78,3	0,58	0,54	49,6
6	R2	270	11,0	0,662	26,1	LOS C	10,1	77,5	0,79	0,82	41,2
Approach		1044	11,0	0,662	17,2	LOS B	10,2	78,3	0,63	0,65	46,2
North: R31											
7	L2	183	11,0	0,621	52,3	LOS D	7,0	53,6	0,99	0,81	32,0
8	T1	100	11,0	0,621	46,5	LOS D	7,0	53,6	0,99	0,82	33,5
9	R2	79	11,0	0,354	50,0	LOS D	3,7	28,0	0,95	0,77	32,4
Approach		362	11,0	0,621	50,2	LOS D	7,0	53,6	0,99	0,80	32,5
West: N14											
10	L2	142	11,0	0,263	16,7	LOS B	6,4	49,2	0,53	0,60	47,4
11	T1	405	11,0	0,263	11,0	LOS B	6,6	50,7	0,53	0,50	50,2
12	R2	50	11,0	0,170	22,6	LOS C	1,4	11,1	0,61	0,71	42,8
Approach		597	11,0	0,263	13,4	LOS B	6,6	50,7	0,54	0,54	48,8
All Vehicles		2371	10,5	0,662	26,6	LOS C	10,2	78,3	0,72	0,67	41,3

F8 – 30% development - Upgraded geometry and new phasing in year 2027

MOVEMENT SUMMARY

Site: Post Dev Year 2022 - AM - Upgraded Phasing - 30%

Kuruman Metals Cluster
Signals - Fixed Time Isolated Cycle Time = 100 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: R31											
1	L2	90	13,0	0,909	63,1	LOS E	16,7	129,6	1,00	1,05	29,9
2	T1	341	13,0	0,909	57,4	LOS E	16,7	129,6	1,00	1,05	30,4
3	R2	422	13,0	0,909	63,4	LOS E	16,5	128,3	1,00	1,01	29,2
Approach		853	13,0	0,909	61,0	LOS E	16,7	129,6	1,00	1,03	29,7
East: N14											
4	L2	279	8,0	0,452	27,9	LOS C	11,7	87,9	0,76	0,78	40,6
5	T1	410	8,0	0,452	22,3	LOS C	12,3	91,7	0,76	0,68	43,6
6	R2	180	8,0	0,899	66,0	LOS E	11,2	84,0	1,00	1,05	28,5
Approach		869	8,0	0,899	33,2	LOS C	12,3	91,7	0,81	0,79	38,5
North: R31											
7	L2	442	6,0	0,908	60,7	LOS E	21,2	156,0	1,00	1,00	29,8
8	T1	285	6,0	0,908	54,7	LOS D	21,2	156,0	1,00	1,06	31,3
9	R2	140	6,0	0,356	41,7	LOS D	5,9	43,1	0,89	0,78	35,1
Approach		866	6,0	0,908	55,7	LOS E	21,2	156,0	0,98	0,98	31,0
West: N14											
10	L2	169	7,0	0,503	28,5	LOS C	13,8	102,3	0,79	0,74	41,4
11	T1	610	7,0	0,503	22,9	LOS C	14,1	104,7	0,79	0,71	43,2
12	R2	76	7,0	0,330	37,0	LOS D	3,0	22,5	0,83	0,77	36,7
Approach		855	7,0	0,503	25,3	LOS C	14,1	104,7	0,79	0,72	42,2
All Vehicles		3443	8,5	0,909	43,8	LOS D	21,2	156,0	0,90	0,88	34,6

MOVEMENT SUMMARY

Site: Post Dev Year 2027 - PM - Upgraded Phasing - 30%

Kuruman Metals Cluster
Signals - Fixed Time Isolated Cycle Time = 100 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: R31											
1	L2	39	8,0	0,704	56,4	LOS E	6,5	48,9	1,00	0,85	31,7
2	T1	180	8,0	0,704	50,8	LOS D	6,5	48,9	1,00	0,85	32,3
3	R2	161	8,0	0,704	56,6	LOS E	6,5	48,9	1,00	0,85	30,9
Approach		380	8,0	0,704	53,8	LOS D	6,5	48,9	1,00	0,85	31,6
East: N14											
4	L2	326	11,0	0,401	16,9	LOS B	10,7	81,6	0,57	0,70	46,4
5	T1	531	11,0	0,401	11,2	LOS B	11,1	85,1	0,57	0,53	50,2
6	R2	313	11,0	0,751	30,5	LOS C	13,5	103,1	0,84	0,88	39,2
Approach		1170	11,0	0,751	17,9	LOS B	13,5	103,1	0,64	0,67	45,7
North: R31											
7	L2	197	11,0	0,705	54,8	LOS D	7,6	58,2	1,00	0,85	31,3
8	T1	100	11,0	0,705	49,1	LOS D	7,6	58,2	1,00	0,86	32,7
9	R2	79	11,0	0,383	51,3	LOS D	3,7	28,5	0,96	0,77	32,1
Approach		376	11,0	0,705	52,5	LOS D	7,6	58,2	0,99	0,84	31,8
West: N14											
10	L2	142	11,0	0,260	15,7	LOS B	6,3	48,2	0,51	0,58	48,0
11	T1	419	11,0	0,260	10,1	LOS B	6,5	49,6	0,51	0,48	50,9
12	R2	50	11,0	0,184	22,2	LOS C	1,4	11,0	0,60	0,71	43,0
Approach		610	11,0	0,260	12,4	LOS B	6,5	49,6	0,51	0,53	49,5
All Vehicles		2536	10,6	0,751	27,1	LOS C	13,5	103,1	0,72	0,69	41,1

F9 – 33% development - Upgraded geometry and new phasing in year 2027

MOVEMENT SUMMARY

Site: Post Dev Year 2027 - AM - Upgraded Phasing 33%

Kuruman Metals Cluster
Signals - Fixed Time Isolated Cycle Time = 100 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: R31											
1	L2	90	13,0	0,938	67,8	LOS E	17,9	139,6	1,00	1,09	28,8
2	T1	341	13,0	0,938	62,2	LOS E	17,9	139,6	1,00	1,09	29,2
3	R2	448	13,0	0,938	68,1	LOS E	17,7	137,9	1,00	1,05	28,1
Approach		879	13,0	0,938	65,8	LOS E	17,9	139,6	1,00	1,07	28,6
East: N14											
4	L2	287	8,0	0,463	28,1	LOS C	12,1	90,3	0,77	0,78	40,6
5	T1	418	8,0	0,463	22,4	LOS C	12,6	94,3	0,77	0,68	43,6
6	R2	189	8,0	0,988	87,9	LOS F	13,8	103,0	1,00	1,14	24,3
Approach		893	8,0	0,988	38,1	LOS D	13,8	103,0	0,82	0,81	36,6
North: R31											
7	L2	468	6,0	0,942	66,6	LOS E	23,2	170,9	1,00	1,03	28,4
8	T1	285	6,0	0,942	60,7	LOS E	23,2	170,9	1,00	1,11	29,8
9	R2	140	6,0	0,356	41,7	LOS D	5,9	43,1	0,89	0,78	35,1
Approach		892	6,0	0,942	60,8	LOS E	23,2	170,9	0,98	1,02	29,7
West: N14											
10	L2	169	7,0	0,525	28,8	LOS C	14,6	108,0	0,80	0,75	41,3
11	T1	636	7,0	0,525	23,1	LOS C	14,6	108,0	0,79	0,71	43,1
12	R2	76	7,0	0,338	37,1	LOS D	3,0	22,6	0,83	0,77	36,7
Approach		881	7,0	0,525	25,4	LOS C	14,6	108,0	0,80	0,72	42,1
All Vehicles		3546	8,5	0,988	47,5	LOS D	23,2	170,9	0,90	0,90	33,4

MOVEMENT SUMMARY

Site: Post Dev Year 2027 - PM - Upgraded Phasing - 33%

Kuruman Metals Cluster
Signals - Fixed Time Isolated Cycle Time = 100 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: R31											
1	L2	39	8,0	0,799	60,0	LOS E	7,0	52,2	1,00	0,91	30,7
2	T1	180	8,0	0,799	54,4	LOS D	7,0	52,2	1,00	0,91	31,3
3	R2	170	8,0	0,799	60,2	LOS E	7,0	52,1	1,00	0,90	30,0
Approach		389	8,0	0,799	57,5	LOS E	7,0	52,2	1,00	0,91	30,7
East: N14											
4	L2	350	11,0	0,410	16,0	LOS B	10,9	83,4	0,55	0,69	46,9
5	T1	556	11,0	0,410	10,3	LOS B	11,4	87,1	0,55	0,52	50,8
6	R2	337	11,0	0,788	32,9	LOS C	15,5	118,6	0,85	0,91	38,2
Approach		1244	11,0	0,788	18,0	LOS B	15,5	118,6	0,63	0,67	45,7
North: R31											
7	L2	205	11,0	0,791	58,3	LOS E	8,2	62,5	1,00	0,90	30,4
8	T1	100	11,0	0,791	52,5	LOS D	8,2	62,5	1,00	0,91	31,7
9	R2	79	11,0	0,418	52,5	LOS D	3,8	28,9	0,97	0,77	31,7
Approach		384	11,0	0,791	55,6	LOS E	8,2	62,5	0,99	0,88	31,0
West: N14											
10	L2	142	11,0	0,255	14,8	LOS B	6,1	46,5	0,48	0,57	48,7
11	T1	426	11,0	0,255	9,1	LOS A	6,2	47,8	0,48	0,47	51,6
12	R2	50	11,0	0,189	21,1	LOS C	1,4	10,7	0,58	0,71	43,6
Approach		618	11,0	0,255	11,4	LOS B	6,2	47,8	0,49	0,51	50,1
All Vehicles		2634	10,6	0,799	27,8	LOS C	15,5	118,6	0,71	0,70	40,8

F10 – 35% development - Upgraded geometry and new phasing in year 2027

MOVEMENT SUMMARY

Site: Post Dev Year 2027 - AM - Upgraded Phasing 35%

Kuruman Metals Cluster
Signals - Fixed Time Isolated Cycle Time = 100 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: R31											
1	L2	90	13,0	1,013	86,8	LOS F	20,9	162,5	1,00	1,19	25,1
2	T1	341	13,0	1,013	81,2	LOS F	20,9	162,5	1,00	1,19	25,4
3	R2	466	13,0	1,013	87,2	LOS F	20,6	160,1	1,00	1,14	24,6
Approach		897	13,0	1,013	84,8	LOS F	20,9	162,5	1,00	1,16	24,9
East: N14											
4	L2	292	8,0	0,448	26,6	LOS C	11,9	88,8	0,75	0,77	41,2
5	T1	423	8,0	0,448	20,9	LOS C	12,4	92,7	0,75	0,66	44,4
6	R2	196	8,0	0,981	85,7	LOS F	14,2	106,0	1,00	1,13	24,7
Approach		911	8,0	0,981	36,7	LOS D	14,2	106,0	0,80	0,80	37,1
North: R31											
7	L2	487	6,0	1,012	85,0	LOS F	27,0	199,0	1,00	1,12	24,9
8	T1	285	6,0	1,012	79,1	LOS F	27,0	199,0	1,00	1,21	25,9
9	R2	140	6,0	0,373	42,8	LOS D	5,9	43,8	0,90	0,79	34,7
Approach		911	6,0	1,012	76,7	LOS E	27,0	199,0	0,99	1,10	26,3
West: N14											
10	L2	169	7,0	0,512	27,3	LOS C	14,4	107,1	0,77	0,73	42,0
11	T1	654	7,0	0,512	21,6	LOS C	14,4	107,1	0,77	0,70	43,9
12	R2	76	7,0	0,323	35,4	LOS D	3,0	22,0	0,81	0,77	37,3
Approach		899	7,0	0,512	23,9	LOS C	14,4	107,1	0,77	0,71	42,9
All Vehicles		3618	8,5	1,013	55,5	LOS E	27,0	199,0	0,89	0,94	31,2

MOVEMENT SUMMARY

Site: Post Dev Year 2027 - PM - Upgraded Phasing - 35%

Kuruman Metals Cluster
Signals - Fixed Time Isolated Cycle Time = 100 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

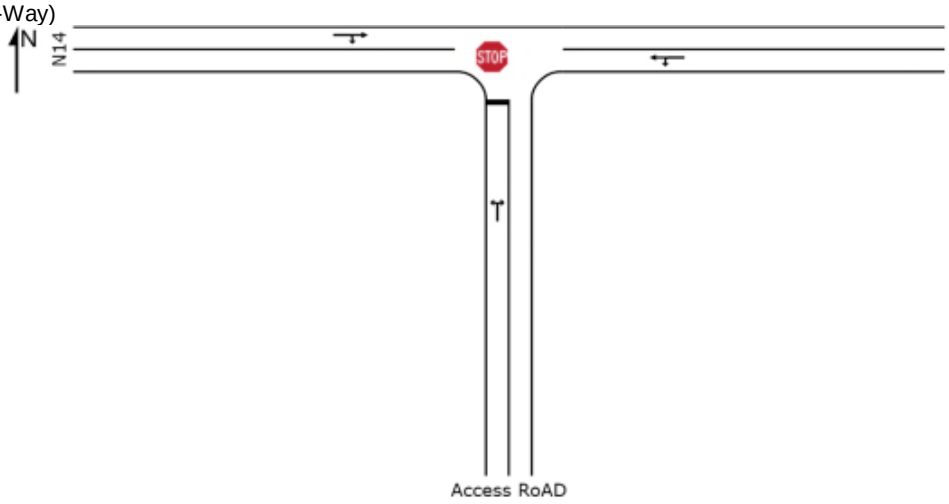
Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: R31											
1	L2	39	8,0	0,810	60,5	LOS E	7,1	53,2	1,00	0,91	30,6
2	T1	180	8,0	0,810	54,8	LOS D	7,1	53,2	1,00	0,91	31,2
3	R2	175	8,0	0,810	60,6	LOS E	7,1	53,1	1,00	0,91	29,9
Approach		394	8,0	0,810	58,0	LOS E	7,1	53,2	1,00	0,91	30,5
East: N14											
4	L2	367	11,0	0,426	16,1	LOS B	11,4	87,6	0,56	0,70	46,8
5	T1	573	11,0	0,426	10,4	LOS B	11,9	91,5	0,56	0,53	50,8
6	R2	354	11,0	0,881	47,0	LOS D	19,7	151,1	0,89	0,99	33,3
Approach		1294	11,0	0,881	22,0	LOS C	19,7	151,1	0,65	0,70	43,5
North: R31											
7	L2	211	11,0	0,808	59,1	LOS E	8,4	64,4	1,00	0,91	30,2
8	T1	100	11,0	0,808	53,2	LOS D	8,4	64,4	1,00	0,92	31,5
9	R2	79	11,0	0,418	52,5	LOS D	3,8	28,9	0,97	0,77	31,7
Approach		391	11,0	0,808	56,2	LOS E	8,4	64,4	0,99	0,89	30,8
West: N14											
10	L2	142	11,0	0,257	14,8	LOS B	6,1	47,0	0,48	0,57	48,7
11	T1	431	11,0	0,257	9,1	LOS A	6,3	48,3	0,48	0,47	51,6
12	R2	50	11,0	0,199	21,8	LOS C	1,4	11,0	0,60	0,71	43,2
Approach		623	11,0	0,257	11,4	LOS B	6,3	48,3	0,49	0,51	50,1
All Vehicles		2701	10,6	0,881	29,8	LOS C	19,7	151,1	0,71	0,72	39,9

G1 – 30% development – Existing Layout in year 2027

SITE LAYOUT

Site: Post Dev Year 2027 - AM - 30% - N14 - Access Road - Existing Layout

Kuruman Metals Cluster
Stop (Two-Way)



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MOVEMENT SUMMARY

Site: Post Dev Year 2027 - AM - 30% - N14 - Access Road - Existing Layout

Kuruman Metals Cluster
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Access RoAD											
1	L2	255	13,0	4,824	1757,4	LOS F	102,0	793,7	1,00	3,43	1,9
3	R2	101	13,0	4,824	2002,3	LOS F	102,0	793,7	1,00	3,43	1,9
Approach		356	13,0	4,824	1826,9	LOS F	102,0	793,7	1,00	3,43	1,9
East: N14											
4	L2	274	8,0	0,472	5,7	LOS A	0,0	0,0	0,00	0,19	56,3
5	T1	587	8,0	0,472	0,1	LOS A	0,0	0,0	0,00	0,19	58,2
Approach		860	8,0	0,472	1,9	NA	0,0	0,0	0,00	0,19	57,5
West: N14											
11	T1	352	7,0	1,656	306,2	LOS F	155,2	1151,8	1,00	4,02	9,8
12	R2	795	7,0	1,656	311,9	LOS F	155,2	1151,8	1,00	4,02	9,7
Approach		1146	7,0	1,656	310,2	NA	155,2	1151,8	1,00	4,02	9,8
All Vehicles		2363	8,3	4,824	426,5	NA	155,2	1151,8	0,64	2,54	7,5

MOVEMENT SUMMARY

Site: Post Dev Year 2027 - PM - 30% - N14 - Access Road - Existing Layout

Kuruman Metals Cluster
Stop (Two-Way)

Movement Performance - Vehicles

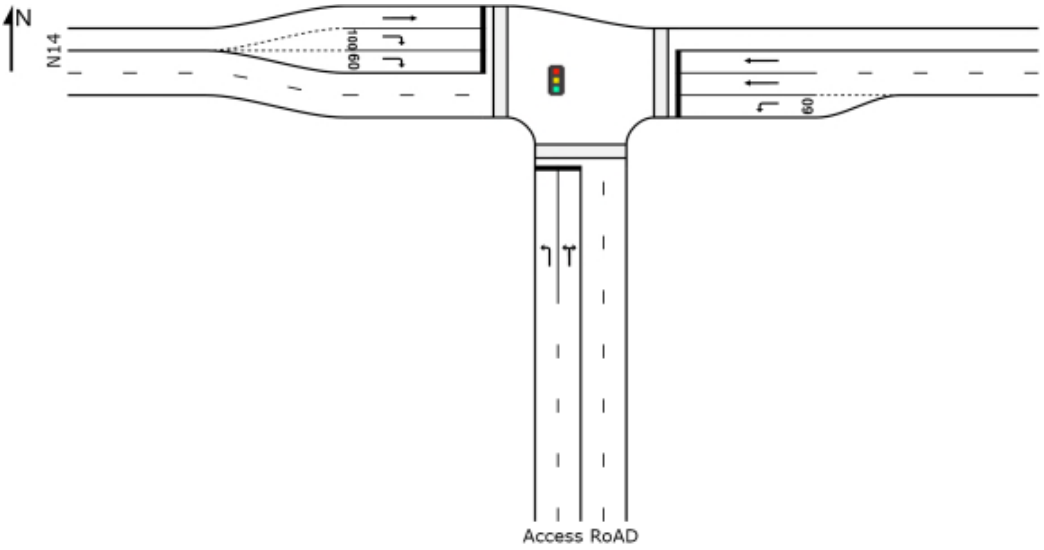
Mov ID	ODMov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Access RoAD											
1	L2	801	13,0	2,352	625,0	LOS F	210,7	1639,1	1,00	6,43	5,2
3	R2	274	13,0	2,352	665,9	LOS F	210,7	1639,1	1,00	6,43	5,2
Approach		1075	13,0	2,352	635,4	LOS F	210,7	1639,1	1,00	6,43	5,2
East: N14											
4	L2	101	8,0	0,224	5,7	LOS A	0,0	0,0	0,00	0,15	56,7
5	T1	308	8,0	0,224	0,0	LOS A	0,0	0,0	0,00	0,15	58,6
Approach		409	8,0	0,224	1,4	NA	0,0	0,0	0,00	0,15	58,1
West: N14											
11	T1	520	7,0	0,530	2,5	LOS A	4,9	36,7	0,53	0,30	55,5
12	R2	277	7,0	0,530	9,4	LOS A	4,9	36,7	0,53	0,30	53,2
Approach		797	7,0	0,530	4,9	NA	4,9	36,7	0,53	0,30	54,7
All Vehicles		2280	10,0	2,352	301,5	NA	210,7	1639,1	0,66	3,16	10,0

G2 – 30% development – Upgraded geometry and signals in year 2027 - Proposed

SITE LAYOUT

Site: Post Dev Year 2027 - AM - 30% - N14 - Access Road - Proposed Upgrade and Signals

Kuruman Metals Cluster
Signals - Fixed Time Isolated



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MOVEMENT SUMMARY

Site: Post Dev Year 2027 - AM - 30% - N14 - Access Road - Proposed Upgrade and Signals

Kuruman Metals Cluster
Signals - Fixed Time Isolated Cycle Time = 50 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Access RoAD											
1	L2	255	13,0	0,748	32,0	LOS C	4,8	37,5	1,00	0,92	38,4
3	R2	101	13,0	0,748	32,0	LOS C	4,8	37,5	1,00	0,92	38,6
Approach		356	13,0	0,748	32,0	LOS C	4,8	37,5	1,00	0,92	38,5
East: N14											
4	L2	274	8,0	0,779	30,3	LOS C	7,3	54,9	1,00	0,94	39,2
5	T1	587	8,0	0,791	25,0	LOS C	7,9	59,3	1,00	0,96	42,6
Approach		860	8,0	0,791	26,7	LOS C	7,9	59,3	1,00	0,96	41,4
West: N14											
11	T1	352	7,0	0,304	4,8	LOS A	4,0	30,0	0,50	0,43	55,6
12	R2	795	7,0	0,749	25,6	LOS C	9,9	73,3	0,96	0,91	41,3
Approach		1146	7,0	0,749	19,3	LOS B	9,9	73,3	0,82	0,76	44,8
All Vehicles		2363	8,3	0,791	23,9	LOS C	9,9	73,3	0,91	0,86	42,5

PHASING SUMMARY

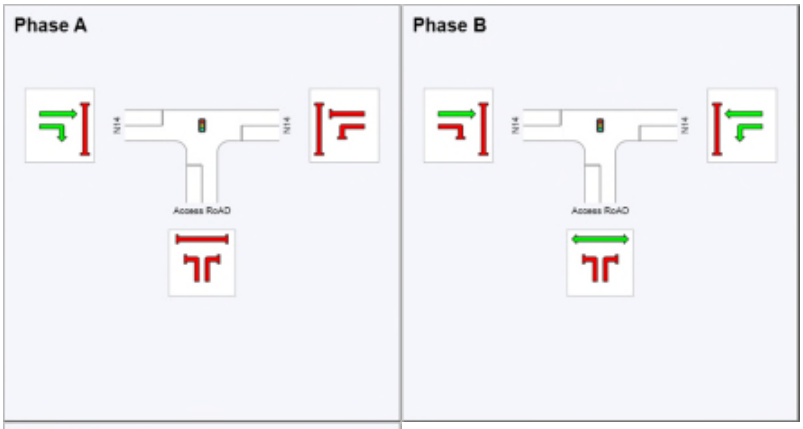
Site: Post Dev Year 2027 - AM - 30% - N14 - Access Road - Proposed Upgrade and Signals

Kuruman Metals Cluster
Signals - Fixed Time Isolated Cycle Time = 50 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Sequence2
Movement Class: All Movement Classes
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Reference Phase	Yes	No	No
Phase Change Time (sec)	0	21	37
Green Time (sec)	15	10	7
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	21	16	13
Phase Split	42%	32%	26%



	Normal Movement		Permitted/Opposed
	Slip/Bypass-Lane Movement		Opposed Slip/Bypass-Lane
	Stopped Movement		Turn On Red
	Other Movement Class Running		Other Movement Class Stopped
	Mixed Running & Stopped Movement Classes		
	Undetected Movement		Phase Transition Applied

MOVEMENT SUMMARY

Site: Post Dev Year 2027 - PM - 30% - N14 - Access Road - Proposed Upgrade and Signals

Kuruman Metals Cluster
Signals - Fixed Time Isolated Cycle Time = 50 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Access RoAD											
1	L2	801	13,0	0,790	24,1	LOS C	13,5	105,1	0,94	0,93	41,9
3	R2	274	13,0	0,790	24,1	LOS C	13,5	105,1	0,94	0,93	42,0
Approach		1075	13,0	0,790	24,1	LOS C	13,5	105,1	0,94	0,93	41,9
East: N14											
4	L2	101	8,0	0,480	29,8	LOS C	2,5	18,8	0,97	0,77	39,4
5	T1	308	8,0	0,692	25,9	LOS C	4,1	30,4	1,00	0,87	42,1
Approach		409	8,0	0,692	26,9	LOS C	4,1	30,4	0,99	0,84	41,4
West: N14											
11	T1	520	7,0	0,774	18,6	LOS B	12,8	95,3	0,95	0,92	46,0
12	R2	277	7,0	0,652	31,2	LOS C	3,6	26,9	1,00	0,85	38,8
Approach		797	7,0	0,774	23,0	LOS C	12,8	95,3	0,97	0,89	43,2
All Vehicles		2280	10,0	0,790	24,2	LOS C	13,5	105,1	0,96	0,90	42,3

PHASING SUMMARY

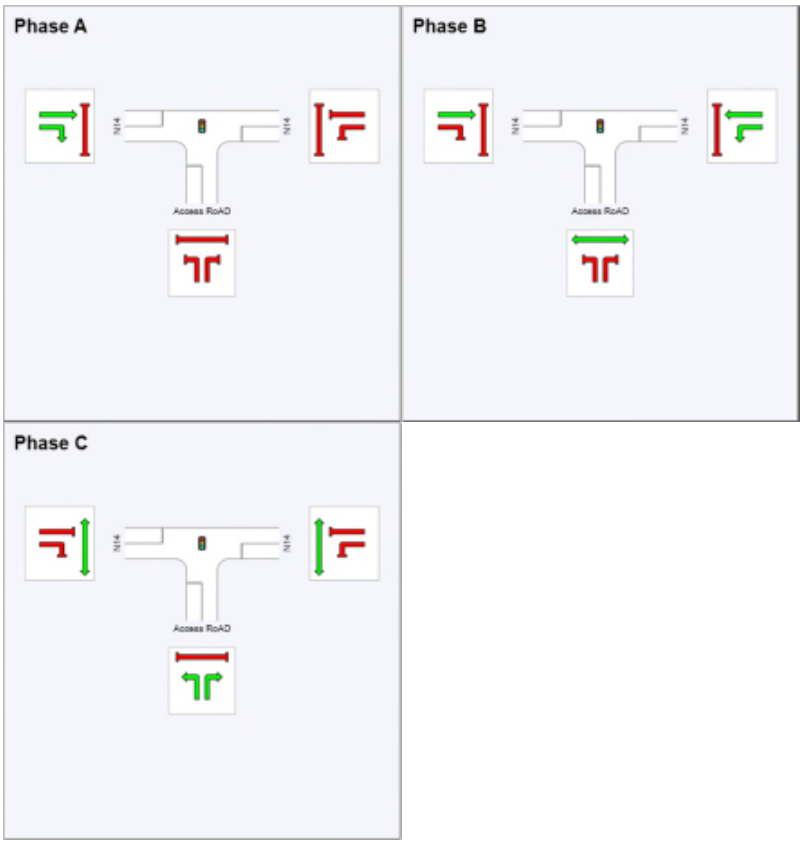
Site: Post Dev Year 2027 - PM - 30% - N14 - Access Road - Proposed Upgrade and Signals

Kuruman Metals Cluster
Signals - Fixed Time Isolated Cycle Time = 50 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Sequence2
Movement Class: All Movement Classes
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Reference Phase	Yes	No	No
Phase Change Time (sec)	0	12	24
Green Time (sec)	6	6	20
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	12	12	26
Phase Split	24%	24%	52%



	Normal Movement		Permitted/Opposed
	Slip/Bypass-Lane Movement		Opposed Slip/Bypass-Lane
	Stopped Movement		Turn On Red
	Other Movement Class Running		Other Movement Class Stopped
	Mixed Running & Stopped Movement Classes		
	Undetected Movement		Phase Transition Applied

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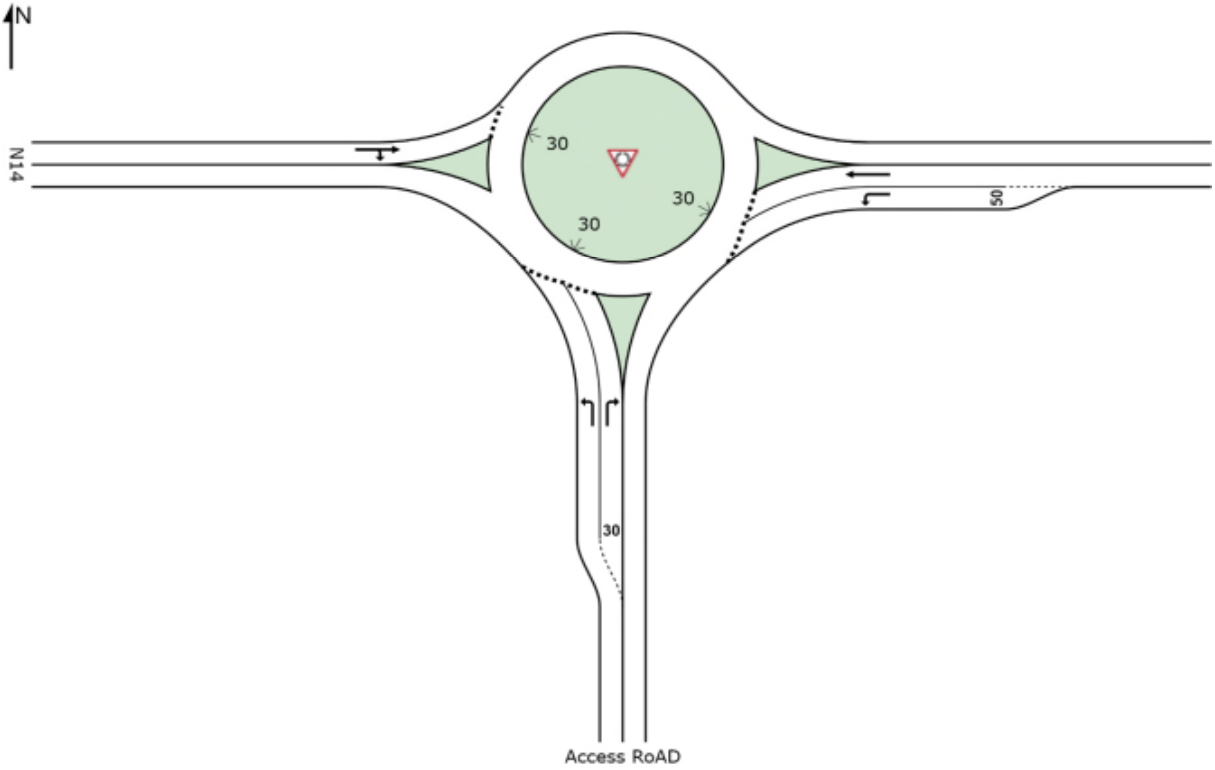
G3 – 30% development – Traffic Roundabout in year 2027 – Proposed Alternative

SITE LAYOUT

Site: Post Dev Year 2027 - AM - 30% - N14 - Access Road - Roundabout

Kuruman Metals Cluster
Roundabout



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MOVEMENT SUMMARY

Site: Post Dev Year 2027 - AM - 30% - N14 - Access Road - Roundabout

Kuruman Metals Cluster
Roundabout

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Access RoAD											
1	L2	255	13,0	0,306	7,3	LOS A	2,5	19,6	0,86	0,78	52,9
3	R2	101	13,0	0,171	14,0	LOS B	1,2	9,0	0,81	0,81	50,1
Approach		356	13,0	0,306	9,2	LOS A	2,5	19,6	0,84	0,79	52,1
East: N14											
4	L2	274	8,0	0,574	16,5	LOS B	5,6	41,6	1,00	1,11	46,8
5	T1	587	8,0	0,884	31,5	LOS C	18,3	137,2	1,00	1,44	40,5
Approach		860	8,0	0,884	26,7	LOS C	18,3	137,2	1,00	1,34	42,3
West: N14											
11	T1	352	7,0	0,846	5,1	LOS A	16,6	122,9	0,92	0,56	51,9
12	R2	795	7,0	0,846	11,1	LOS B	16,6	122,9	0,92	0,56	52,0
Approach		1146	7,0	0,846	9,3	LOS A	16,6	122,9	0,92	0,56	52,0
All Vehicles		2363	8,3	0,884	15,6	LOS B	18,3	137,2	0,94	0,88	48,0

MOVEMENT SUMMARY

Site: Post Dev Year 2027 - PM - 30% - N14 - Access Road - Roundabout

Kuruman Metals Cluster
Roundabout

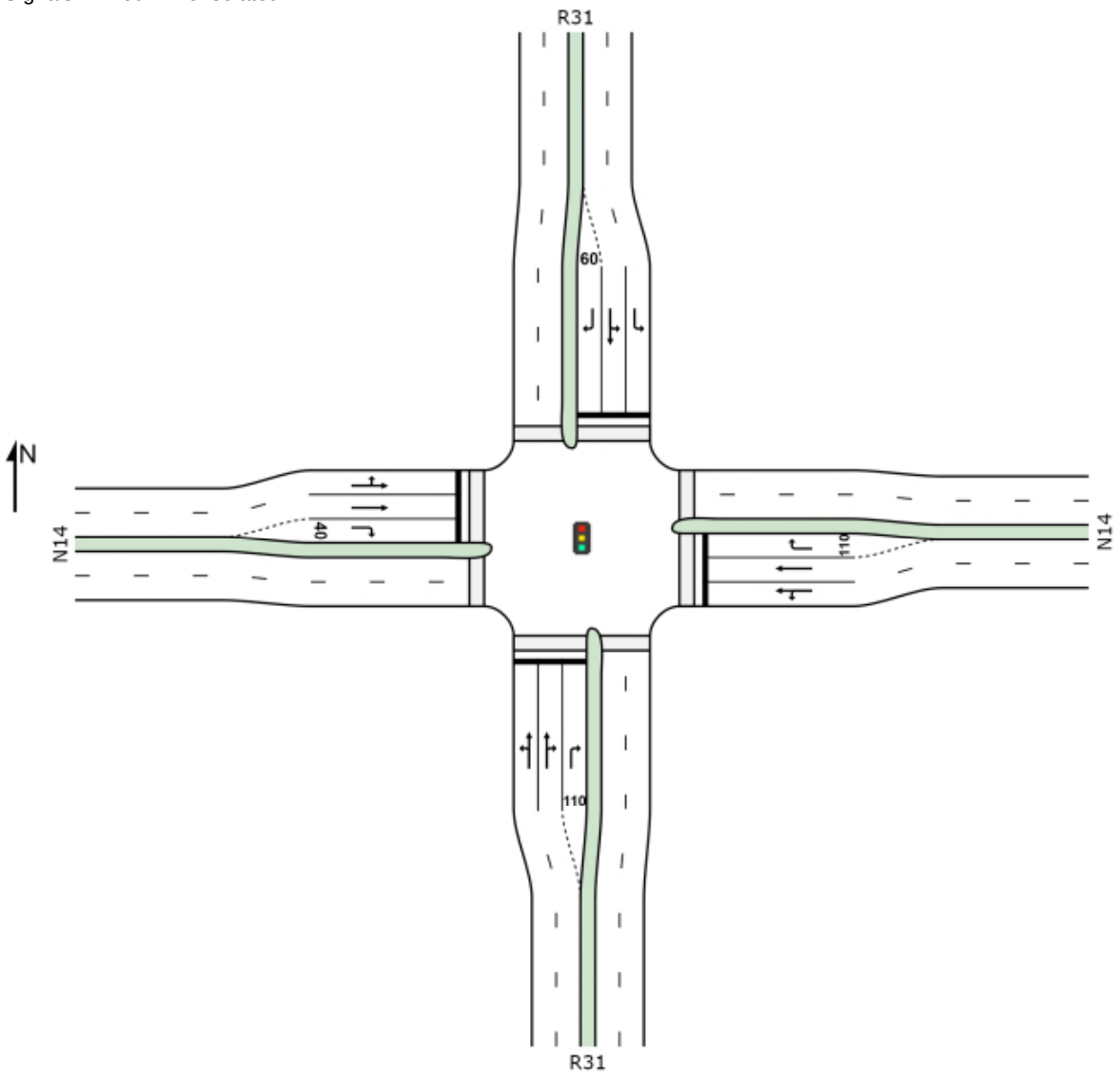
Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Access RoAD											
1	L2	801	13,0	0,703	7,9	LOS A	8,5	66,4	0,83	0,77	52,5
3	R2	274	13,0	0,343	12,2	LOS B	2,3	17,6	0,66	0,74	51,3
Approach		1075	13,0	0,703	9,0	LOS A	8,5	66,4	0,79	0,77	52,2
East: N14											
4	L2	101	8,0	0,123	5,7	LOS A	0,7	5,6	0,57	0,59	54,0
5	T1	308	8,0	0,266	4,7	LOS A	1,9	14,6	0,59	0,50	55,3
Approach		409	8,0	0,266	4,9	LOS A	1,9	14,6	0,59	0,52	54,9
West: N14											
11	T1	520	7,0	0,762	9,5	LOS A	11,6	85,9	0,93	0,87	51,7
12	R2	277	7,0	0,762	15,4	LOS B	11,6	85,9	0,93	0,87	51,8
Approach		797	7,0	0,762	11,5	LOS B	11,6	85,9	0,93	0,87	51,7
All Vehicles		2280	10,0	0,762	9,1	LOS A	11,6	85,9	0,80	0,76	52,5

SITE LAYOUT

Site: Post Dev Year 2027 - AM - Upgraded 30% - Proposed

Kuruman Metals Cluster
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: Post Dev Year 2027 - AM - Upgraded Phasing 30% - Proposed

Kuruman Metals Cluster
Signals - Fixed Time Isolated Cycle Time = 100 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: R31											
1	L2	90	13,0	0,909	63,1	LOS E	16,7	129,6	1,00	1,05	29,9
2	T1	341	13,0	0,909	57,4	LOS E	16,7	129,6	1,00	1,05	30,4
3	R2	422	13,0	0,909	63,4	LOS E	16,5	128,3	1,00	1,01	29,2
Approach		853	13,0	0,909	61,0	LOS E	16,7	129,6	1,00	1,03	29,7
East: N14											
4	L2	279	8,0	0,452	27,9	LOS C	11,7	87,9	0,76	0,78	40,6
5	T1	410	8,0	0,452	22,3	LOS C	12,3	91,7	0,76	0,68	43,6
6	R2	180	8,0	0,943	75,6	LOS E	12,0	90,0	1,00	1,09	26,5
Approach		869	8,0	0,943	35,2	LOS D	12,3	91,7	0,81	0,79	37,7
North: R31											
7	L2	442	6,0	0,938	65,8	LOS E	22,2	163,3	1,00	1,03	28,6
8	T1	285	6,0	0,938	59,7	LOS E	21,4	157,2	1,00	1,10	30,1
9	R2	140	6,0	0,356	41,7	LOS D	5,9	43,1	0,89	0,78	35,1
Approach		866	6,0	0,938	59,9	LOS E	22,2	163,3	0,98	1,01	30,0
West: N14											
10	L2	169	7,0	0,544	29,1	LOS C	15,3	113,3	0,80	0,75	41,3
11	T1	610	7,0	0,544	22,8	LOS C	15,3	113,3	0,78	0,70	43,2
12	R2	76	7,0	0,330	37,0	LOS D	3,0	22,5	0,83	0,77	36,7
Approach		855	7,0	0,544	25,3	LOS C	15,3	113,3	0,79	0,72	42,2
All Vehicles		3443	8,5	0,943	45,3	LOS D	22,2	163,3	0,90	0,89	34,1

PHASING SUMMARY

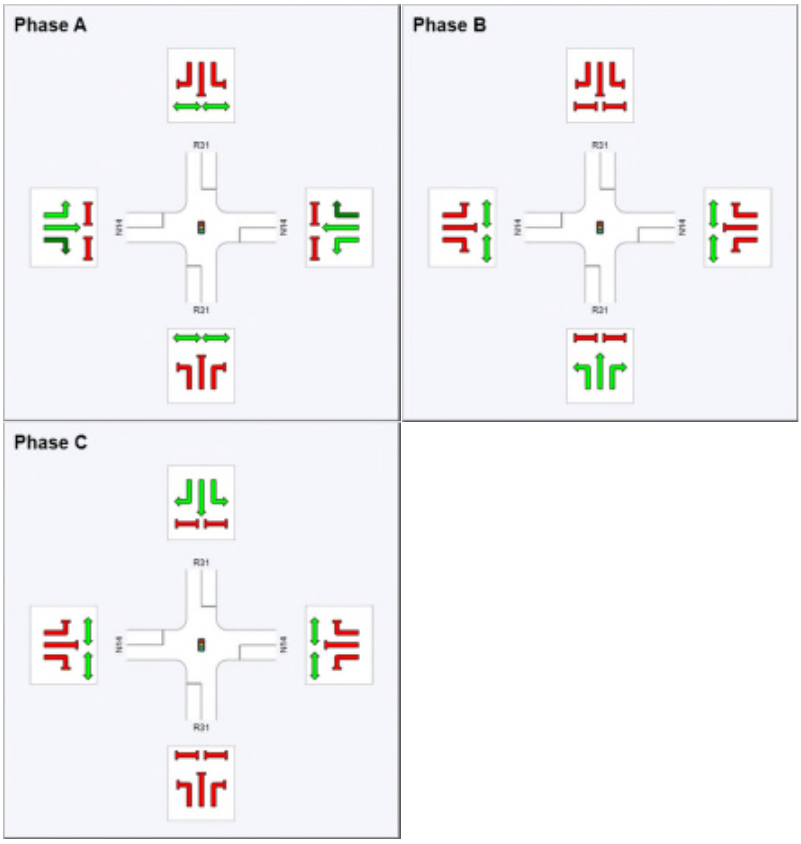
Site: Post Dev Year 2027 - AM - Upgraded Phasing 30% - Proposed

Kuruman Metals Cluster
Signals - Fixed Time Isolated Cycle Time = 100 seconds (User-Given Cycle Time)

Phase times determined by the program
Sequence: Sequence5
Movement Class: All Movement Classes
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Reference Phase	Yes	No	No
Phase Change Time (sec)	0	48	72
Green Time (sec)	42	18	22
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	48	24	28
Phase Split	48%	24%	28%



	Normal Movement		Permitted/Opposed
	Slip/Bypass-Lane Movement		Opposed Slip/Bypass-Lane
	Stopped Movement		Turn On Red
	Other Movement Class Running		Other Movement Class Stopped
	Mixed Running & Stopped Movement Classes		
	Undetected Movement		Phase Transition Applied

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MOVEMENT SUMMARY

Site: Post Dev Year 2027 - PM - Upgraded Phasing - 30% - Proposed

Kuruman Metals Cluster
Signals - Fixed Time Isolated Cycle Time = 100 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: R31											
1	L2	39	8,0	0,704	56,4	LOS E	6,5	48,9	1,00	0,85	31,7
2	T1	180	8,0	0,704	50,8	LOS D	6,5	48,9	1,00	0,85	32,3
3	R2	161	8,0	0,704	56,6	LOS E	6,5	48,9	1,00	0,85	30,9
Approach		380	8,0	0,704	53,8	LOS D	6,5	48,9	1,00	0,85	31,6
East: N14											
4	L2	326	11,0	0,401	16,9	LOS B	10,7	81,6	0,57	0,70	46,4
5	T1	531	11,0	0,401	11,2	LOS B	11,1	85,1	0,57	0,53	50,2
6	R2	313	11,0	0,751	30,5	LOS C	13,5	103,1	0,84	0,88	39,2
Approach		1170	11,0	0,751	17,9	LOS B	13,5	103,1	0,64	0,67	45,7
North: R31											
7	L2	197	11,0	0,705	54,8	LOS D	7,6	58,2	1,00	0,85	31,3
8	T1	100	11,0	0,705	49,1	LOS D	7,6	58,2	1,00	0,86	32,7
9	R2	79	11,0	0,383	51,3	LOS D	3,7	28,5	0,96	0,77	32,1
Approach		376	11,0	0,705	52,5	LOS D	7,6	58,2	0,99	0,84	31,8
West: N14											
10	L2	142	11,0	0,260	15,7	LOS B	6,3	48,2	0,51	0,58	48,0
11	T1	419	11,0	0,260	10,1	LOS B	6,5	49,6	0,51	0,48	50,9
12	R2	50	11,0	0,184	22,2	LOS C	1,4	11,0	0,60	0,71	43,0
Approach		610	11,0	0,260	12,4	LOS B	6,5	49,6	0,51	0,53	49,5
All Vehicles		2536	10,6	0,751	27,1	LOS C	13,5	103,1	0,72	0,69	41,1

PHASING SUMMARY

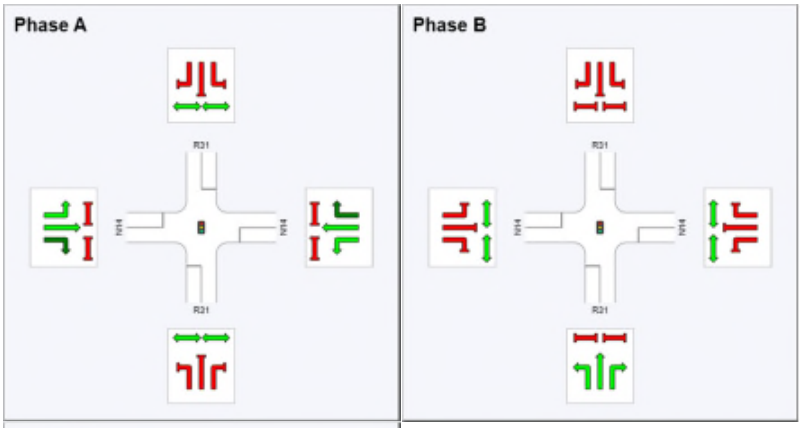
Site: Post Dev Year 2027 - PM - Upgraded Phasing - 30% - Proposed

Kuruman Metals Cluster
Signals - Fixed Time Isolated Cycle Time = 100 seconds (User-Given Cycle Time)

Phase times determined by the program
Sequence: Sequence5
Movement Class: All Movement Classes
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Reference Phase	Yes	No	No
Phase Change Time (sec)	0	66	82
Green Time (sec)	60	10	12
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	66	16	18
Phase Split	66%	16%	18%



	Normal Movement		Permitted/Opposed
	Slip/Bypass-Lane Movement		Opposed Slip/Bypass-Lane
	Stopped Movement		Turn On Red
	Other Movement Class Running		Other Movement Class Stopped
	Mixed Running & Stopped Movement Classes		
	Undetected Movement		Phase Transition Applied

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