The zoning regime of the surrounding area includes the following zonings:

"Residential 1"; "Residential 3;" "Business 3"; "Institutional" and "Municipal".

2.4 Land Use

A land use plan, based on a visual survey, is attached as ***Annexure E***. The subject property is currently vacant, while surrounding land uses include:

- Dwelling houses;
- Open Spaces; and
- Public Roads.

It becomes clear that the area is a predominantly residential area. The proposal to develop the subject property for higher density residential uses will contribute to the livelihood of the area and create additional housing opportunities.

The proposed land-use will have no detrimental effect on any of the surround properties on municipal infrastructure.

3. BONDS, CONDITIONS OF TITLE AND SERVITUDES

3.1 Mortgage Bond

There is currently no bond registered over the property. The consent from a bondholder is therefore not required.

3.2 Conditions of title

The subject property is not affected by any conditions of title which may prove to be restrictive to the proposed development. No removal of restrictions is therefore required.

3.3 Servitudes

In terms of Deed of Transfers T27309/2009 and T27310/2009 the properties are subject to the following servitude:

- A servitude for sewer and other municipal services purposes 2 metres wide, in favour of the City Council of Johannesburg along any two boundaries other than a street boundary.

This servitude will be retained and accommodated in the development proposal and on the final Site Development Plan.

4. DEVELOPMENT PROPOSAL

4.1 Application Particulars and Development Proposal

4.1.1 Application is made in terms of the provisions of Section 21 of the City of Johannesburg Municipal Planning By-Law, 2016 for the amendment of the Johannesburg Town-Planning Scheme, 1979, by the simultaneous rezoning of Erf 962 & Erf 963, Ormonde Extension 22, subject to the following conditions:

Floor Area Ratio	:	0.7
Coverage	:	30%
Height	:	Four (4) storeys
Parking requirements	:	1.3 parking bays per unit
Building lines	:	In accordance with an approved site development plan
Number of Units	:	176 units

4.1.2 Al parking and manoeuvring space will be provide on-site. No parking within the road reserve will be allowed or will be necessary. The proposed site plan is attached hereto as ***Annexure G.*** Parking will be provided at a ratio of 1.3 parking bays per unit, with a total of 229 parking bays being required. A total of 230 parking bays will be provided on-site, to ensure sufficient parking for residents and visitors. All parking and manoeuvring space will be covered with a permanent dust-free surface.

4.1.3 Access to the development will be obtained via Msasa Crescent. Access will be provided to the satisfaction of the municipality. The current road network is sufficient to accommodate the minimal increase in traffic. If so required by Council, upgrades to the road and services network can be made through a service agreement between the developer and Council.

4.1.3 Sufficient opens space (gardens / lawns) will be provide within the development, as per the minimum requirements from Council.

4.1.4 The privacy of the neighbouring properties will be protected by means of building design, landscaping and building lines. The height of the proposed development will be limited four storeys and building lines will be determined in accordance with an approved site development plan.

4.2 Existing vs Proposed Zoning

4.2.1 The proposed scheme document is attached hereto as ***Annexure F***.

4.2.2 The type of housing unit that is being proposed is IHS C-Type (3-4 levels). The design of the units will be done by Boogertman & Partners Architects. A formal Site Development Plan and Building Plans will be submitted to Council after approval of the rezoning application. A concept plan is attached to form part of the application documentation.

4.2.3 The following table compares the current and proposed land use rights:

CURRENT ZONING	PROPOSED ZONING
Existing Zoning: *"Residential 3"*	**Proposed Zoning:** *"Residential 3"*
Permitted land uses: Residential dwelling units	**Permitted land uses:** Residential dwelling units
Permitted Density: 25 units/ha	**Proposed Density:** 110 units/ha
Number of Units allowed: 40 sectional title units	**Number of Units allowed:** 176 sectional title units
Height Restriction: Three (3) storeys	**Proposed Height Restriction:** Four (4) storeys
Coverage: 30%	**Proposed Coverage:** 30%
Floor Area Ratio: 0.4	**Proposed Floor Area Ratio:** 0.7
Parking: 1 parking space per dwelling unit of 3 or less habitable rooms. 2 parking space per dwelling unit of 4 or more habitable rooms. Plus 0.3 parking spaces per dwelling unit for visitors.	**Parking:** 1.3 parking bays per unit Required: 229 Provided: 230
Building lines: 0m on all street fronts	**Building lines:** In accordance with an approved site development plan

5. MUNICIPAL SERVICES

5.1 The region is generally well provided with civil service infrastructure. Development pressure in this area challenges the rate at which bulk infrastructure can be provided to accommodate expansion. Existing infrastructure will however be capable of accommodating the proposed additional land-use rights.

5.2 During the application stage, the different engineering departments will get an opportunity to indicate whether additional engineering studies will be required before the rezoning application can be approved. If so required, Professional Engineers will be appointed to investigate the civil services and compile an outline scheme document.

5.3 The amount of Bulk Services Contributions for civil services payable to the City of Joburg will be determined with the finalisation of the rezoning application. Rebate will be given for the existing land use rights on the final amounts.

5.4 A formal Traffic Access Study is currently being prepared by the project Engineers. It will be submitted to Council as soon as it is received.

5.5 The electricity connection has been discussed with City Power. Adequate capacity is currently available for the development at the nearby Crown substation and an estimated 2,2 MVA can therefore be made available for planned developments in the Ormonde area, of which this application forms part of.

Capacity can be released by shifting loads between the various distributor areas. A feeder cable from Crown substation is thus not required. A detailed Electrical Report and/or Outline Scheme Report will be submitted to Council in due course.

6. POLICIES

6.1 National Development Guidelines

6.1.1 Spatial Planning and Land Use Management Act, 2013 (Act No. 16 of 2013)

Section 7 of the Spatial Planning and Land Use Management Act, 2013 (Act No. 16 of 2013) confirms that the following principles applies to spatial planning, land development and land use management:

7(a) The principle of spatial justice, whereby-:

(i) Past spatial and other development imbalances must be redressed through improved access to and use of land.

It is our opinion that the greater community of this area will benefit from the development proposal through various new housing opportunities.

The development will enhance the urban environment through the strengthening of the residential character and the creation of economic growth, as required in terms of local policies.

(ii) Spatial development frameworks and policies at all spheres of government must address the inclusion of persons and areas that were previously excluded, with an emphasis on informal settlements, former homeland areas and areas characterised by widespread poverty and deprivation.

(iii) Spatial planning mechanism, including land use schemes, must incorporate provisions that enable redress in access to land by disadvantaged communities and persons.

(iv) Land use management system must include all areas of a municipality and specifically include provisions that are flexible and appropriate for the management of disadvantaged areas, informal settlements and former homeland areas.

(v) Land development procedures must include provisions that accommodate access to secure tenure and incremental upgrading of informal areas.

(vi) A Municipal Planning Tribunal considering an application before it, may not be implemented or restricted in the exercise of its discretion solely on the ground that the value of land or property is affected by the outcome of the application.

Principles (7)(a) (ii) to (vi) relates to obligations imposed on local government, and in this regard the legislation is clear in respect of the procedures to facilitate the development to the property.

7(b) The principle of spatial sustainability, whereby spatial planning and land use management systems must-:

(i) Promote land development that is within the fiscal, institutional and administrative means of the Republic.

The proposed development, as motivated, complies with the fiscal, institutional and

administrative means of the Republic as well as the Local Authority.

Development Policies, related administration and laws (City of Johannesburg Municipal Planning By-Law, 2016) and the National Environmental Management Act, 1998, do allow for the application, as submitted, to be entertained. The proposal has been discussed with the relevant Town Planners at Council before submission of the application.

(ii) Ensure that special consideration is given to the protection of prime and unique agricultural land.

The property is surrounded by existing urban infrastructure, and in terms of Municipal policy, the property is earmarked for higher density residential development.

(iii) Uphold consistency of land use measures in accordance with environmental management instruments.

This principle relates to obligations imposed on local government, and in this regard the legislation is clear in respect of the procedures to facilitate the development to the property.

(iv) Promote and stimulate the effective and equitable functioning of land markets.

This principle relates to obligations imposed on local government, and in this regard the legislation is clear in respect of the procedures to facilitate the development to the property.

(v) Consider all current and future cost to all parties for the provision of infrastructure and social services in land developments.

This principle relates to obligations imposed on local government, and in this regard the legislation is clear in respect of the procedures to facilitate the development to the property.

(vi) Promote land development in locations that are sustainable and limit urban sprawl.

The subject property is situated within Region F of the City of Johannesburg and will not contribute to urban sprawl. The proposed development will serve as infill development and will ensure the optimisation of developable land and municipal infrastructure and services.

According to relevant policy guidelines of the Municipality (i.e. the Municipal Spatial Development Framework), the subject property is earmarked for purposes of higher density residential development. The proposal is, in principle, supported by Council.

(vii) Result in communities that are viable.

The proposed development is in close proximity to other residential, some commercial, lifestyle and educational opportunities. It is furthermore located near public transport facilities and is also ideally situated in terms of the main through routes in the area (i.e. the M1-Highway).

7(c) The principle of efficiency, whereby-:

(i) Land development optimises the use of existing resources and infrastructure.

The proposed development will promote efficient land development, as it entails the development of residential housing in close proximity to commercial, lifestyle and educational opportunities. Public transport is also available in close proximity.

The subject property is strategically situated in relation to transportation routes, e.g. M1 Freeway and Shakespeare Avenue.

Civil services are also available in the area for the proposed development.

(ii) Decision-making procedures are designed to minimise negative financial, social, economic or environmental impacts.

This principle relates to obligations imposed on local government, and in this regard the legislation is clear in respect of the procedures to facilitate the development to the property.

(iii) Development application procedures are efficient and streamlined and timeframes are adhered to by all parties.

This principle relates to obligations imposed on local government, and in this regard the legislation is clear in respect of the procedures to facilitate the development to the property.

***7(d) Principal of spatial resilience** whereby flexibility in spatial plans, policies and land use management systems are accommodated to ensure sustainable livelihoods in communities most likely to suffer the impacts of economic and environmental shocks.*

This principle relates to obligations imposed on local government, and in this regard the legislation is clear in respect of the procedures to facilitate the development to the property.

7(e) The principle of good administration, whereby-:

(i) All spheres of government ensure an integrated approach to land use and land development that is guided by the spatial planning and land use management systems as embodied in this Act.

This principle relates to obligations imposed on local government. The application will be circulated to relevant internal municipal departments for their comments.

(ii) All government departments must provide their sector inputs and comply with any other prescribed requirements during the preparation or amendment of spatial planning frameworks.

This principle relates to obligations imposed on local government.

(iii) The requirements of any law relating to land development and land use are met timeously.

This principle relates to obligations imposed on local government.

(iv) The preparation and amendment of spatial plans, policies, land use schemes as well as procedures for development applications, include transparent processes of public participation that afford all parties the opportunity to provide inputs on matters affecting them.

This principle relates to obligations imposed on local government. It is also confirmed

that the application will be advertised by the applicant in the prescribed manner.

(v) *Policies, legislation and procedures must be clearly set in order to inform and empower members of the public.*

This principle relates to obligations imposed on local government.

6.1.2 National Development Plan, 2030

The National Development Plan identifies five principles for spatial development: spatial justice, spatial sustainability, spatial resilience, spatial quality and special efficiency.

It confirms that South African cities are highly fragmented, as little has been achieved in reversing apartheid geography. The Plan proposes that the situation be addressed by establishing new norms and standards: amongst others by densifying cities, improving transport and locating jobs where people live.

The containment of urban sprawl is particularly highlighted in the Plan, confirming that sprawl be contained and reversed (if possible), *"… as denser forms of development are more efficient in terms of land usage, infrastructure cost and environmental protection."*

The proposed development aligns with the vision of the National Development Plan, as it will promote compaction of the city and limiting urban sprawl (by means of infill development), by the redevelopment of a property which is currently vacant instead of developing outside the urban edge.

6.2 Provincial Development Guidelines

6.2.1 Gauteng Metropolitan Spatial Development Framework, 2011

The Gauteng Metropolitan Spatial Development Framework (MSDF), 2011, was, amongst others, compiled to specify a clear set of spatial objectives for municipalities to achieve in order to ensure realisation of the future provincial spatial infrastructure; and to enable and direct growth.

The MSDF aims to articulate the spatial objectives of the Gauteng region to assist the alignment of neighbouring municipalities' spatial plans. It is proposed that key principles in local municipality SDFs should include (applicable to this application):

- Promotion of densification in specific areas to utilise resources more efficiently;
- Establishment of a hierarchy of nodes and supporting existing development nodes.

The MSDF confirms that *"it remains the intension to limit urban sprawl as a fundamental tenet or urban growth policy and to promote the intentions of intensification and densification, together with a transformed urban structure that de-emphasises the need for outward expansion of the urban system".*

The development proposal will not contribute to urban sprawl and should be regarded as infill development.

6.2.2 Gauteng Spatial Development Framework, 2011

The Gauteng Spatial Development Framework (SDF), 2011, was, amongst others, compiled to specify a clear set of spatial objectives for municipalities to achieve in order to ensure realisation of the future provincial spatial infrastructure; and to enable and direct growth.

The SDF aims to articulate the spatial objectives of the Gauteng region to assist the alignment of neighbouring municipalities' spatial plans. It is proposed that key principles in local municipality SDFs should include (applicable to this application):

- Promotion of densification in specific areas to utilise resources more efficiently;
- Establishment of a hierarchy of nodes and supporting existing development nodes.

The SDF confirms on page 128 that *"it remains the intension to limit urban sprawl as a fundamental tenet or urban growth policy and to promote the intentions of intensification and densification, together with a transformed urban structure that de-emphasises the need for outward expansion of the urban system".*

The SDF furthermore identified four critical factors for development in the province, relevant to this development:

- **Contained urban growth:**

  To contain urban growth, an Urban Edge was identified to curb urban sprawl. The idea behind the urban edge is to limit development within certain areas of a city. Only certain types of developments are allowed on the outside of the urban edge. The goal is to curb urban sprawl and thereby protecting the natural environment. One way to do this is to increase the densities of the built environment within the urban edge.

  This edge is however not set in stone and can be amended if development pressure in an area requires the alteration of this "line" or edge. Normally, areas identified for future development or as future development nodes are not included within the urban edge of a municipality. Amendments to the relevant spatial legislation and frameworks of the municipality usually later include these areas within the edge, so the development potential can be unlocked. Approval of net land-use rights and applications in an area indicates that the characteristics of the area have changed over the ears.

- **Resourced based economic development:**

  Resource based economic development should result in identification of the economic core. Development should be encouraged in close proximity to existing resources, which includes infrastructure such as roads, water and electricity.

  The proposed development is situated near existing and adjacent to approved proposed developments and infrastructure networks. Recent similar approved township establishment applications indicate that there is a growing economic base in the area.

- **Re-direction of urban growth:**

  Developments in economically non-viable areas should be limited and thereby achieving growth within the economic growth sphere. This part of the Municipality is a fast growing sector in Joburg and growth should be encouraged in the precinct.

- **Increased access and mobility:**

  The proposed land development area could be regarded as highly accessible.

6.3 Local Development Guidelines

6.3.1 Spatial Development Framework (SDF), 2011

The SDF was compiled to realise the vision of the Municipality through spatial restructuring and to integrate all aspects of spatial planning.

The subject property is earmarked for purposes of residential development. The Ormonde area is situated within a mixed use area, focussing on sporting / entertainment facilities, light industrial with a very large residential component.

In light of the above, it is apparent that the proposed development is consistent with the principles contained in the SDF.

6.3.2 Integrated Development Plan (IDP), 2012/2016

The Municipality has adopted an Integrated Development Plan (IDP) for 2012/2016 in terms of Section 25 of the Local Government, Municipal Systems Act, 2000 (Act No. 32 of 2000), which plan integrates and coordinates plans and aligns the resources and capacity of the Municipality to implement these plans. The compilation of Spatial Development Frameworks forms part of the IDP.

The Johannesburg Municipality seeks to focus its efforts to complement National and Provincial Government to accomplish the following strategic objectives through the IDP:

- Provide quality basic services and infrastructure;
- Facilitate higher and shared economic growth and development;
- To fight poverty, build clean, healthy, safe and sustainable communities;
- Foster participatory democracy through a caring, accessible and accountable service; and
- To ensure good governance, financial viability and optimal institutional transformation with capacity to execute its mandate.

The Strategic Levers emanating from the city's macro and long-term strategy, including the medium-term plan reflect Joburg's attempts in actively working towards achieving the targets set out at national and provincial level

The IDP confirms the status of the Ormonde area which focusses on the residential component as indicated in the SDF. The proposed development therefore finds support in the IDP.

7. MOTIVATION AND BURDEN OF PROOF

7.1 Need

7.1.1 The need for the development of residential units on the property is acknowledged in the land use policies of the Municipality, particularly the SDF which confirms that the property is earmarked for purposes of residential development. This confirms that the need for the development on the property is also acknowledged from a policy perspective.

7.1.2 The proximity of the subject property to important transport routes (e.g. the, M1 freeway and Shakespeare Avenue), public transport, job opportunities and most importantly renders that the property ideal for the intended land use.

7.1.3 Open and vacant, unutilised land within a build-up area can be perceived as a weakness due to the security threat that vacant land imposes, as well as the negative influence it has on the image of a neighbourhood. Unused open or vacant land, which implies lower densities, makes the provision of essential municipal services less viable and more expensive to provide. By developing the existing land, the development of urban fibre can be stimulated through the strengthening of the development node and region. The proposed land use rights of the erf accommodated in this application is in accordance with the proposals of the Integrated Development Plan (IDP), as the IDP earmarks this area for medium to high density residential uses.

7.1.4 The proposed development will positively influence the income base of the Municipality. The income generated by rates is a function of land value, which is in turn a function of the land use. The establishment of the residential townships (which includes a retail erf) broadens the economic base of the area. The

development will also ensure the following:

- Infill development – The application site is a vacant portion of land situated adjacent to an existing and future residential townships, within the Municipality;
- New work opportunities in close proximity to place of residence during construction; and
- Optimal use of existing infrastructure.

7.1.5 The proposed development is also consistent with approved land use policies in Johannesburg. The need for the proposed development is substantiated by the principles of the IDP, i.e. the infill of vacant land and the optimal use of existing infrastructure, as well as from current market forces.

7.2 Desirability

7.2.1 There is a need for more residential units within the Ormonde area and this development will contribute to this need. Mounting development pressure within the municipality is resulting in all available developable land being developed.

7.2.2 The development proposal is also consistent with, and will promote, the land use policy guidelines of the Municipality. The development can be regarded as being desirable and will have several beneficial social and economic impacts on the area, which can be summarised as follow:

- Optimum utilisation of services and infrastructure;
- Increase in property values of surrounding properties;
- Increased security;
- Compatibility with surrounding land uses; and
- Increased housing opportunities

7.2.3 The proposed development will maximize the potential of the subject property and is consistent with the strategic location of the site. The proposed development will additionally contribute to the overall efficiency, sustainability and improved quality of the greater area. The development will have several beneficial social, economic and ecological impacts once the construction thereof is finalised, which can be summarised as follow:

- Reduction of potential dumping areas and informal settlements;
- Optimum utilisation of services and infrastructure;
- Expansion of municipal infrastructure and services;
- Increase in property values of surrounding properties;
- Increased security;
- Eradication of invasive species;
- Compatibility with surrounding land uses; and
- Landscaping could improve fauna numbers and species.

As mentioned above, the proposed development will include community and will be easy accessible through public transport. The need for social and economic facilities in this area is identified in various planning policies and policy frameworks of the Municipality. The development will provide much needed residential and retail facilities for the area, and thus make a positive contribution with regards to social welfare.

7.2.4 The proposed development will align with the existing urban form and character of the area. It will uplift the area economically and might attract other potential developers to the area as well. Thus, in effect, in might have a very positive financial influence to the precinct. Furthermore, the proposed development will contribute to an economic base in the area. Thus, it is argued that the proposed development will have a positive influence to the area.

7.2.5 When considering that the Building Plans and Site Development Plans which must be submitted to the Municipality, will have to comply with the relevant design guidelines and development parameters of land

use policies, the proposed development can be perceived as desirable from a land use perspective.

7.3 Compliance with SPLUMA principles

7.3.1 With reference to Section 7.1.1 of this Memorandum, it is confirmed that the development proposal complies with the principles of the Spatial Planning and Land Use Management Act, 2013 (Act No. 16 of 2013).

7.4 Public interest in terms of Section 47(2) of the Spatial Planning and Land Use Management Act, 2013 (Act No. 16 of 2013)

7.4.1 The proposed development is in the public interest, as the land use rights is consistent with approved policy guidelines on national, provincial and local level.

7.5 Facts and circumstances of application in terms of Section 42 of the Spatial Planning and Land Use Management Act, 2013 (Act No. 16 of 2013)

7.5.1 This memorandum is submitted in support of an application in terms of the provisions of Section 21 of the City of Johannesburg Municipal Planning By-Law, 2016 for the rezoning of Erf 962 & Erf 963, Ormonde Extension 22, from *"Residential 3"* with 25 dwelling units per hectare to ***"Residential 3***" with "***110 dwelling units per hectare".***

7.5.2 The proposed development aligns with approved policy guidelines on national, provincial and local level.

7.6 Rights and obligations of affected parties in terms of Section 42 of the Spatial Planning and Land Use Management Act, 2013 (Act No. 16 of 2013)

7.6.1 The rights and obligations of affected parties will be taken into account in the following manner:

- The application will be advertised as prescribed in Section 21(2) of the City of Johannesburg Municipal Planning By-Law, 2016, by the publications of notices in the Gauteng Provincial Gazette, Beeld and Citizen during February/ March 2017, and by the simultaneous display of a notice on site for fourteen (14 days). An objection period of 28 days will be afforded to any affected parties; and

- The City Planning Department will circulate the application for comments from internal departments of the Municipality. Any concerns raised will have to be dealt with to the satisfaction of the relevant department.

7.7 Interested persons in terms of Section 45 of the Spatial Planning and Land Use Management Act, 2013 (Act No. 16 of 2013)

7.7.1 The application will be advertised as prescribed in Section 21(2) of the City of Johannesburg Municipal Planning By-Law, 2016, granting any person the opportunity to register as an interested party.

7.8 Impact on engineering services, social infrastructure and open space in terms of Sections 42 and 49 of the Spatial Planning and Land Use Management Act, 2013 (Act No. 16 of 2013), read with Section 46, 47 and 48 of the City of Johannesburg Municipal Planning By-Law, 2016

7.8.1 The impact of the proposed development will be confirmed by the internal departments of the Municipality who will be afforded an opportunity to comment on the application.

7.8.2 Any adverse impacts will be mitigated and addressed by suitable solutions, which may include service agreements and/or payment of bulk contributions to upgrade existing services infrastructure.

7.9 Reply to objections

7.9.1 The applicant will reply to any valid objections to the application.

7.9.2 The advertisements will comply with the requirements of the relevant sections of the City of Johannesburg Municipal Planning By-Law, 2016. The rights of potential objectors and or interested parties will be brought to the attention of probable objectors and or interested parties in terms of the requirements of Section 21(2) of the City of Johannesburg Municipal Planning By-Law, 2016.

7.9.3 In submitting this application, applicant has endeavoured to comply with the requirements of the relevant provincial legislation as well as the provisions of the City of Johannesburg Municipal Planning By-Law, 2016, read with the Spatial Planning and Land Use Management Act, 2013 (Act No. 16 of 2013).

7.9.4 The application clearly indicates the land- use rights, scheme documents, diagrams, layout plans, need and desirability, co-ordinated harmonious development and all other relevant requirements in terms of provincial legislation.

7.9.5 The application further complies with the relevant requirements of the Spatial Planning and Land Use Management Act, 2013 (Act 16 of 2013). Specifically, Sections 7, 42, 47 and 49 thereof.

8. CONCLUSION

8.1 Application is made in terms of the provisions of Section 21 of the City of Johannesburg Municipal Planning By-Law, 2016 for the rezoning of Erf 962 & Erf 963, Ormonde Extension 22, from *"Residential 3" with a density of "25 dwelling units per hectare; FAR of 0.4; Height of 3 storeys; and coverage of 30%"* to *"Residential 3" with a density of "110 dwelling units per hectare; FAR of 0.7; Height of 4 storeys; and coverage of 30%",* subject to the following conditions

8.2 The purpose of this application is to obtain the appropriate land use rights to enable higher residential development. The application clearly confirms the need and desirability and compliance with all other relevant requirements in terms of relevant policies and legislation.

8.3 Note that a separate application for the consolidation of the two properties, terms of the provisions of Section 33 of the City of Johannesburg Municipal Planning By-Law, 2016, was also submitted to the Municipality. Even though the rezoning and consolidation applications are submitted separately, approval of both applications will be required before submission of any building plans to Council and before construction can commence.

8.4 We trust that Council will evaluate and consider the application on its merit.

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Werner Slabbert B(TRP)
Professional Planner - Pr. Pln A/2190/2015

URBAN INNOVATE CONSULTING CC
CK2007/191853/23

LIST OF ANNEXURES

ANNEXURE C

CAPACITY CALCULATION RESULTS

MOVEMENT SUMMARY

Site: 2017 AM BG

Akker Avenue / Alwen Road / Shakespeare Avenue Junction
2017 AM Peak Hour Background Traffic Volumes
Existing Configuration
Signals - Fixed Time Cycle Time = 80 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Shakespeare Avenue (S)											
1	L	183	0.0	0.791	18.2	LOS B	29.7	207.7	0.77	0.95	42.0
2	T	901	0.0	0.792	10.0	LOS B	29.7	207.7	0.77	0.72	43.9
Approach		1084	0.0	0.792	11.4	LOS B	29.7	207.7	0.77	0.76	43.5
North: Alwen Road (N)											
8	T	417	0.0	0.304	6.1	LOS A	8.5	59.3	0.45	0.40	49.6
9	R	59	0.0	0.407	34.0	LOS C	2.9	20.1	0.82	0.79	30.9
Approach		476	0.0	0.407	9.5	LOS A	8.5	59.3	0.50	0.44	46.1
West: Akker Avenue (W)											
10	L	191	0.0	1.225	465.9	LOS F	102.2	715.7	1.00	2.58	4.3
12	R	323	0.0	1.225	466.2	LOS F	102.2	715.7	1.00	2.58	4.3
Approach		514	0.0	1.226	466.1	LOS F	102.2	715.7	1.00	2.58	4.3
All Vehicles		2074	0.0	1.225	123.6	LOS F	102.2	715.7	0.76	1.14	13.5

Level of Service (Aver. Int. Delay): LOS F. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS F. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on average delay for all vehicle movements.

SIDRA INTERSECTION

MOVEMENT SUMMARY

Site: 2017 PM BG

Akker Avenue / Alwen Road / Shakespeare Avenue Junction
2017 PM Peak Hour Background Traffic Volumes
Existing Configuration
Signals - Fixed Time Cycle Time = 70 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Shakespeare Avenue (S)											
1	L	160	0.0	0.488	18.3	LOS B	13.0	90.8	0.65	0.90	41.3
2	T	391	0.0	0.487	10.1	LOS B	13.0	90.8	0.65	0.58	43.9
Approach		551	0.0	0.487	12.5	LOS B	13.0	90.8	0.65	0.67	43.1
North: Alwen Road (N)											
8	T	794	0.0	0.537	4.9	LOS A	13.9	97.6	0.50	0.45	50.6
9	R	131	0.0	0.322	14.4	LOS B	2.2	15.4	0.60	0.76	42.9
Approach		924	0.0	0.537	6.3	LOS A	13.9	97.6	0.51	0.50	49.4
West: Akker Avenue (W)											
10	L	28	0.0	0.603	39.7	LOS D	7.3	50.8	0.98	0.82	28.5
12	R	138	0.0	0.603	39.9	LOS D	7.3	50.8	0.98	0.82	28.5
Approach		166	0.0	0.603	39.9	LOS D	7.3	50.8	0.98	0.82	28.5
All Vehicles		1641	0.0	0.603	11.8	LOS B	13.9	97.6	0.61	0.59	44.0

Level of Service (Aver. Int. Delay): LOS B. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS D. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on average delay for all vehicle movements.

MOVEMENT SUMMARY

Site: 2022 AM BG

Akker Avenue / Alwen Road / Shakespeare Avenue Junction
2022 AM Peak Hour Background Traffic Volumes
Existing Configuration
Signals - Fixed Time Cycle Time = 80 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Shakespeare Avenue (S)											
1	L	213	0.0	0.918	36.4	LOS D	57.1	400.0	0.93	1.10	31.4
2	T	1044	0.0	0.917	28.2	LOS C	57.1	400.0	0.93	1.03	31.8
Approach		1257	0.0	0.918	29.6	LOS C	57.1	400.0	0.93	1.04	31.7
North: Alwen Road (N)											
8	T	483	0.0	0.352	6.3	LOS A	9.9	69.3	0.47	0.42	49.2
9	R	67	0.0	0.589	47.1	LOS D	3.9	27.6	0.98	0.83	26.0
Approach		551	0.0	0.589	11.3	LOS B	9.9	69.3	0.53	0.47	44.4
West: Akker Avenue (W)											
10	L	221	0.0	1.421	815.9	LOS F	171.9	1203.2	1.00	3.50	2.6
12	R	375	0.0	1.421	816.1	LOS F	171.9	1203.2	1.00	3.50	2.5
Approach		596	0.0	1.421	816.0	LOS F	171.9	1203.2	1.00	3.50	2.5
All Vehicles		2403	0.0	1.421	220.4	LOS F	171.9	1203.2	0.86	1.52	8.4

Level of Service (Aver. Int. Delay): LOS F. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS F. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on average delay for all vehicle movements.

MOVEMENT SUMMARY

Site: 2022 PM BG

Akker Avenue / Alwen Road / Shakespeare Avenue Junction
2022 PM Peak Hour Background Traffic Volumes
Existing Configuration
Signals - Fixed Time Cycle Time = 70 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Shakespeare Avenue (S)											
1	L	186	0.0	0.566	19.0	LOS B	15.5	108.3	0.70	0.90	40.9
2	T	453	0.0	0.566	10.8	LOS B	15.5	108.3	0.70	0.62	43.1
Approach		639	0.0	0.566	13.2	LOS B	15.5	108.3	0.70	0.70	42.5
North: Alwen Road (N)											
8	T	920	0.0	0.622	5.5	LOS A	17.2	120.7	0.56	0.51	49.8
9	R	151	0.0	0.422	15.5	LOS B	2.6	18.4	0.67	0.77	41.9
Approach		1071	0.0	0.622	6.9	LOS A	17.2	120.7	0.57	0.55	48.5
West: Akker Avenue (W)											
10	L	33	0.0	0.697	41.3	LOS D	8.5	59.4	1.00	0.86	27.9
12	R	160	0.0	0.698	41.5	LOS D	8.5	59.4	1.00	0.86	27.9
Approach		193	0.0	0.698	41.5	LOS D	8.5	59.4	1.00	0.86	27.9
All Vehicles		1902	0.0	0.698	12.5	LOS B	17.2	120.7	0.66	0.63	43.2

Level of Service (Aver. Int. Delay): LOS B. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS D. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on average delay for all vehicle movements.

MOVEMENT SUMMARY

Site: 2017 AM BGD

Akker Avenue / Alwen Road / Shakespeare Avenue Junction
2017 AM Peak Hour Background and Developement Traffic Volumes
Proposed Configuration
Signals - Fixed Time Cycle Time = 100 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Shakespeare Avenue (S)											
1	L	187	0.0	0.173	8.5	LOS A	0.8	5.5	0.12	0.69	48.4
2	T	901	0.0	0.870	30.4	LOS C	43.9	307.0	0.96	0.96	31.1
Approach		1088	0.0	0.870	26.6	LOS C	43.9	307.0	0.81	0.91	33.2
North: Alwen Road (N)											
8	T	417	0.0	0.403	16.6	LOS B	14.1	98.4	0.67	0.59	39.4
9	R	94	0.0	0.842	68.1	LOS E	7.1	49.4	1.00	1.00	20.8
Approach		511	0.0	0.842	26.1	LOS C	14.1	98.4	0.73	0.66	33.9
West: Akker Avenue (W)											
10	L	297	0.0	0.850	44.3	LOS D	31.9	223.4	0.98	0.94	27.0
12	R	335	0.0	0.850	44.4	LOS D	31.9	223.4	0.98	0.94	27.0
Approach		632	0.0	0.850	44.4	LOS D	31.9	223.4	0.98	0.94	27.0
All Vehicles		2231	0.0	0.870	31.5	LOS C	43.9	307.0	0.84	0.86	31.3

Level of Service (Aver. Int. Delay): LOS C. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS E. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on average delay for all vehicle movements.

MOVEMENT SUMMARY

Site: 2017 PM BGD

Akker Avenue / Alwen Road / Shakespeare Avenue Junction
2017 PM Peak Hour Background and Developement Traffic Volumes
Proposed Configuration
Signals - Fixed Time Cycle Time = 120 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Shakespeare Avenue (S)											
1	L	172	0.0	0.858	39.2	LOS D	7.5	52.3	0.85	0.83	28.8
2	T	391	0.0	0.526	32.5	LOS C	19.0	132.9	0.85	0.73	30.4
Approach		562	0.0	0.859	34.5	LOS C	19.0	132.9	0.85	0.76	29.9
North: Alwen Road (N)											
8	T	794	0.0	0.494	5.2	LOS A	17.7	123.8	0.40	0.36	50.8
9	R	229	0.0	0.680	16.9	LOS B	5.1	35.6	0.56	0.79	40.8
Approach		1023	0.0	0.679	7.8	LOS A	17.7	123.8	0.43	0.46	48.2
West: Akker Avenue (W)											
10	L	71	0.0	0.808	67.8	LOS E	14.6	102.0	1.00	0.90	20.9
12	R	142	0.0	0.808	67.9	LOS E	14.6	102.0	1.00	0.90	20.9
Approach		213	0.0	0.808	67.9	LOS E	14.6	102.0	1.00	0.90	20.9
All Vehicles		1798	0.0	0.858	23.3	LOS C	19.0	132.9	0.63	0.61	35.8

Level of Service (Aver. Int. Delay): LOS C. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS E. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on average delay for all vehicle movements.

MOVEMENT SUMMARY

Site: 2022 AM BGD

Akker Avenue / Alwen Road / Shakespeare Avenue Junction
2022 AM Peak Hour Background and Developement Traffic Volumes
Proposed Configuration
Signals - Fixed Time Cycle Time = 120 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Shakespeare Avenue (S)											
1	L	217	0.0	0.200	8.4	LOS A	0.9	6.4	0.10	0.68	48.5
2	T	1044	0.0	0.917	39.1	LOS D	65.8	460.8	0.99	1.02	27.6
Approach		1261	0.0	0.917	33.9	LOS C	65.8	460.8	0.83	0.96	29.8
North: Alwen Road (N)											
8	T	501	0.0	0.441	16.9	LOS B	18.2	127.6	0.64	0.57	39.2
9	R	85	0.0	1.001[3]	80.5	LOS F	7.5	52.3	1.00	0.86	18.6
Approach		586	0.0	1.000	26.2	LOS C	18.2	127.6	0.69	0.61	33.8
West: Akker Avenue (W)											
10	L	327	0.0	0.987	104.7	LOS F	65.6	459.2	1.00	1.14	15.4
12	R	386	0.0	0.987	104.8	LOS F	65.6	459.2	1.00	1.14	15.4
Approach		714	0.0	0.987	104.8	LOS F	65.6	459.2	1.00	1.14	15.4
All Vehicles		2561	0.0	1.001	51.9	LOS D	65.8	460.8	0.85	0.93	24.2

Level of Service (Aver. Int. Delay): LOS D. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS F. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on average delay for all vehicle movements.

3 x = 1.00 due to short lane

MOVEMENT SUMMARY

Akker Avenue / Alwen Road / Shakespeare Avenue Junction
2022 PM Peak Hour Background and Developement Traffic Volumes
Proposed Configuration
Signals - Fixed Time Cycle Time = 60 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Shakespeare Avenue (S)											
1	L	197	0.0	0.682	23.1	LOS C	5.7	39.7	0.69	0.83	36.6
2	T	453	0.0	0.525	14.2	LOS B	11.7	81.7	0.80	0.69	40.8
Approach		649	0.0	0.682	16.9	LOS B	11.7	81.7	0.76	0.73	39.5
North: Alwen Road (N)											
8	T	920	0.0	0.720	8.6	LOS A	19.6	137.4	0.75	0.68	45.9
9	R	251	0.0	0.648	17.8	LOS B	5.1	35.7	0.79	0.82	40.2
Approach		1171	0.0	0.720	10.5	LOS B	19.6	137.4	0.75	0.71	44.5
West: Akker Avenue (W)											
10	L	75	0.0	0.588	31.9	LOS C	8.3	57.8	0.95	0.82	31.9
12	R	164	0.0	0.588	32.0	LOS C	8.3	57.8	0.95	0.82	31.9
Approach		239	0.0	0.588	32.0	LOS C	8.3	57.8	0.95	0.82	31.9
All Vehicles		2059	0.0	0.720	15.0	LOS B	19.6	137.4	0.78	0.73	41.0

Level of Service (Aver. Int. Delay): LOS B. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS C. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on average delay for all vehicle movements.

SIDRA INTERSECTION

AutoJ

DoradO | Alwen | Ormonde

V/C, delay and queue | Xwe

Stop street on west and east approaches

&AutoJ1308 horak-civilconcepts

	control	Q 3hr	V/C	% optim
this control	Xwe	4.6	0.86	73%
best possible	Xwe	4.6	0.86	73%

Volume (incl HV)

	vol/hr North approach						vol/hr South approach						vol/hr West approach						vol/hr East approach						veh vol
	left slip	left	str	right		L+S+R	Peds	left slip	left	str	right		L+S+R	Peds	left slip	left	str	right		L+S+R	Peds	left slip	left	str	right		L+S+R	Peds	Total
AM		141	263	0		**404**				785	299		**1 084**				0	0		**0**			131	0	41		**172**		**1 660**
		0	0	0		**0**				0	0		**0**				0	0		**0**			0	0	0		**0**		**0**
PM		153	576	0		**729**				255	151		**406**				0	0		**0**			210	0	107		**317**		**1 452**
~lanes		0.5	0.5			**1.0**				0.5	0.5		**1.0**										0.3	0.4	0.3		**1.0**		**10 726**

Control

North approach				South approach				West approach				East approach			
L slip	L	S	R	L slip	L	S	R	L slip	L	S	R	L slip	L	S	R
										Stop	Stop		Stop	Stop	Stop

approx. capacity
3 230
#DIV/0!
3 177

Volume to Capacity ratio

LOS A<0.5, B<0.8, C<0.9, D<0.95, E<0.99

LOS | A-B | C-D | E | F

	V/C North approach						V/C South approach						V/C West approach						V/C East approach						V/C
	L slip	L	S	R		all	Peds	L slip	L	S	R		all	Peds	L slip	L	S	R		all	Peds	L slip	L	S	R		all	Peds	i/section
AM		0.21	0.21			**0.21**				0.66	0.66		**0.66**										0.31		0.31		**0.31**		0.51
PM		0.38	0.38			**0.38**				0.28	0.28		**0.28**										0.86		0.86		**0.86**		0.46

max V/C; movement, approach, pedestrian, i/s: **0.86** | **0.86** | **0.51**

Average Delay per vehicle (seconds)

LOS A<10, B<15, C<25, D<35, E<50

LOS | A-B | C-D | E | F

	Ave Delay North approach						Ave Delay South approach						Ave Delay West approach						Ave Delay East approach						ave. del
	L slip	L	S	R		all	Peds	L slip	L	S	R		all	Peds	L slip	L	S	R		all	Peds	L slip	L	S	R		all	Peds	i/section
AM		0	0			**0**	*0*			3	5		**4**	*3*									10		10		**10**	*10*	4
PM		1	1			**1**	*1*			1	3		**1**	*1*									28		29		**28**	*29*	7

Average Queue Length (= Total Delay in veh-hrs/hr)

	Q North approach						Q South approach						Q West approach						Q East approach						Q
	L slip	L	S	R		all	Peds	L slip	L	S	R		all	Peds	L slip	L	S	R		all	Peds	L slip	L	S	R		all	Peds	Total
AM		0.0	0.0			**0.1**				0.7	0.4		**1.2**										0.4		0.1		**0.5**		**1.7**
PM		0.0	0.2			**0.2**				0.0	0.1		**0.2**										1.6		0.9		**2.5**		**2.9**
max		0.0	0.2							0.7	0.4												1.6		0.9				**4.6**

AutoJ

DoradO | **Alwen** | Ormonde

V/C, delay and queue **Xwe**

Stop street on west and east approaches

&AutoJ1308 horak-civilconcepts

	control	Q 3hr	V/C	% optim
this control	Xwe	39.8	1.18	40%
best possible	RR	8.8	0.81	70%

Volume (incl HV)

	vol/hr North approach						vol/hr South approach						vol/hr West approach						vol/hr East approach						veh vol
	left slip	left	str	right		L+S+R	Peds	left slip	left	str	right		L+S+R	Peds	left slip	left	str	right		L+S+R	Peds	left slip	left	str	right		L+S+R	Peds	Total
AM		164	304	0		**468**				910	346		**1 256**				0	0		**0**			152	0	48		**200**		**1 924**
		0	0	0		**0**				0	0		**0**				0	0		**0**			0	0	0		**0**		**0**
PM		178	667	0		**845**				296	176		**472**				0	0		**0**			244	0	124		**368**		**1 685**
~lanes		0.5	0.5			**1.0**				0.5	0.5		**1.0**										0.3	0.4	0.3		**1.0**		**12 439**

Control

North approach				South approach				West approach				East approach				
L slip	L	S	R	L slip	L	S	R	L slip	L	S	R	L slip	L	S	R	
										Stop	Stop		Stop	Stop	Stop	

approx. capacity 3 180 #DIV/0! 2 954

Volume to Capacity ratio

LOS A<0.5, B<0.8, C<0.9, D<0.95, E<0.99

LOS | A-B | C-D | E | F

	V/C North approach							V/C South approach							V/C West approach							V/C East approach							V/C
	L slip	L	S	R		all	Peds	L slip	L	S	R		all	Peds	L slip	L	S	R		all	Peds	L slip	L	S	R		all	Peds	i/section
AM		0.24	0.24			**0.24**				0.77	0.77		**0.77**										0.39		0.39		**0.39**		0.61
PM		0.44	0.44			**0.44**				0.33	0.33		**0.33**										1.18		1.18		**1.18**		0.57
																						max V/C; movement, approach, pedestrian, i/s					**1.18**	**1.18**	**0.61**

Average Delay per vehicle (seconds)

LOS A<10, B<15, C<25, D<35, E<50

LOS | A-B | C-D | E | F

	Ave Delay North approach							Ave Delay South approach							Ave Delay West approach							Ave Delay East approach							ave. del
	L slip	L	S	R		all	Peds	L slip	L	S	R		all	Peds	L slip	L	S	R		all	Peds	L slip	L	S	R		all	Peds	i/section
AM		1	1			**1**	*1*			6	8		**7**	*6*									10		11		**10**	*11*	5
PM		1	1			**1**	*1*			1	3		**2**	*1*									354		357		**355**	*357*	79

Average Queue Length (= Total Delay in veh-hrs/hr)

	Q North approach							Q South approach							Q West approach							Q East approach							Q
	L slip	L	S	R		all	Peds	L slip	L	S	R		all	Peds	L slip	L	S	R		all	Peds	L slip	L	S	R		all	Peds	Total
AM		0.0	0.0			**0.1**				1.5	0.8		**2.3**										0.4		0.1		**0.6**		**2.9**
PM		0.1	0.3			**0.3**				0.1	0.1		**0.2**										24.0		12.3		**36.3**		**36.8**
max		*0.1*	*0.3*							*1.5*	*0.8*												*24.0*		*12.3*				**39.8**

AutoJ

DoradO | Alwen | Ormonde

V/C, delay and queue | Xwe

Stop street on west and east approaches

&AutoJ1308 horak-civilconcepts

	control	Q 3hr	V/C	% optim
this control	Xwe	4.4	0.78	79%
best possible	Xwe	4.4	0.78	79%

Volume (incl HV)

	vol/hr North approach						vol/hr South approach						vol/hr West approach						vol/hr East approach						veh vol
	left slip	left	str	right		L+S+R	Peds	left slip	left	str	right		L+S+R	Peds	left slip	left	str	right		L+S+R	Peds	left slip	left	str	right		L+S+R	Peds	Total
AM		141	279	0		**420**				835	349		**1 184**				0	0		**0**			148	0	41		**189**		**1 793**
		0	0	0		**0**				0	0		**0**				0	0		**0**			0	0	0		**0**		**0**
PM		153	623	0		**776**				276	172		**448**				0	0		**0**			257	0	107		**364**		**1 588**
~lanes		*0.5*	*0.5*			***1.0***				*0.5*	*0.5*		***1.0***										*1.0*		*1.0*		***2.0***		**11 654**

Control

North approach				South approach				West approach				East approach				
L slip	L	S	R	L slip	L	S	R	L slip	L	S	R	L slip	L	S	R	
										Stop	Stop		Stop	Stop	Stop	

approx. capacity 3 156 #DIV/0! 3 670

Volume to Capacity ratio

LOS A<0.5, B<0.8, C<0.9, D<0.95, E<0.99

LOS | A-B | C-D | E | F

	V/C North approach						V/C South approach						V/C West approach						V/C East approach						V/C
	L slip	L	S	R		all	Peds	L slip	L	S	R		all	Peds	L slip	L	S	R		all	Peds	L slip	L	S	R		all	Peds	i/section
AM		0.22	0.22			**0.22**				0.73	0.73		**0.73**										0.21		0.74		**0.33**		0.57
PM		0.40	0.40			**0.40**				0.32	0.32		**0.32**										0.58		0.78		**0.64**		0.43

max V/C; movement, approach, pedestrian, i/s: **0.78** | **0.73** | **0.57**

Average Delay per vehicle (seconds)

LOS A<10, B<15, C<25, D<35, E<50

LOS | A-B | C-D | E | F

	Ave Delay North approach						Ave Delay South approach						Ave Delay West approach						Ave Delay East approach						ave. del
	L slip	L	S	R		all	Peds	L slip	L	S	R		all	Peds	L slip	L	S	R		all	Peds	L slip	L	S	R		all	Peds	i/section
AM		1	0			**1**	*0*			5	7		**5**	*5*									9		18		**11**	*18*	5
PM		1	1			**1**	*1*			1	3		**2**	*1*									13		21		**15**	*21*	4

Average Queue Length (= Total Delay in veh-hrs/hr)

	Q North approach						Q South approach						Q West approach						Q East approach						Q
	L slip	L	S	R		all	Peds	L slip	L	S	R		all	Peds	L slip	L	S	R		all	Peds	L slip	L	S	R		all	Peds	Total
AM		0.0	0.0			**0.1**				1.1	0.7		**1.8**										0.4		0.2		**0.6**		**2.4**
PM		0.1	0.2			**0.3**				0.1	0.1		**0.2**										0.9		0.6		**1.5**		**2.0**
max		*0.1*	*0.2*							*1.1*	*0.7*												*0.9*		*0.6*				**4.4**

AutoJ

DoradO | Alwen | Ormonde

V/C, delay and queue | Xwe

Stop street on west and east approaches

&AutoJ1308 horak-civilconcepts

	control	Q 3hr	V/C	% optim
this control	Xwe	28.5	1.35	40%
best possible	RR	11.9	0.87	80%

Volume (incl HV)

	vol/hr North approach						vol/hr South approach						vol/hr West approach						vol/hr East approach						veh vol Total
	left slip	left	str	right		L+S+R	Peds	left slip	left	str	right		L+S+R	Peds	left slip	left	str	right		L+S+R	Peds	left slip	left	str	right		L+S+R	Peds	
AM		164	321	0		**485**				960	397		**1 357**				0	0		**0**			168	0	48		**216**		**2 058**
		0	0	0		**0**				0	0		**0**				0	0		**0**			0	0	0		**0**		**0**
PM		178	715	0		**893**				316	196		**512**				0	0		**0**			291	0	124		**415**		**1 820**
~lanes		0.5	0.5			**1.0**				0.5	0.5		**1.0**										1.0		1.0		**2.0**		**13 367**

Control

North approach				South approach				West approach				East approach				
L slip	L	S	R	L slip	L	S	R	L slip	L	S	R	L slip	L	S	R	approx. capacity
										Stop	Stop		Stop	Stop	Stop	3 065
																#DIV/0!
																3 396

Volume to Capacity ratio

LOS A<0.5, B<0.8, C<0.9, D<0.95, E<0.99

LOS | A-B | C-D | E | F

	V/C North approach						V/C South approach						V/C West approach						V/C East approach						V/C i/section
	L slip	L	S	R		all	Peds	L slip	L	S	R		all	Peds	L slip	L	S	R		all	Peds	L slip	L	S	R		all	Peds	
AM		0.25	0.25			**0.25**				0.85	0.85		**0.85**										0.26		1.35		**0.50**		0.67
PM		0.46	0.46			**0.46**				0.37	0.37		**0.37**										0.75		1.23		**0.90**		0.54
																										max V/C; movement, approach, pedestrian, i/s		**1.35**	**0.90**		**0.67**

Average Delay per vehicle (seconds)

LOS A<10, B<15, C<25, D<35, E<50

LOS | A-B | C-D | E | F

	Ave Delay North approach							Ave Delay South approach							Ave Delay West approach							Ave Delay East approach							ave. del i/section
	L slip	L	S	R		all	Peds	L slip	L	S	R		all	Peds	L slip	L	S	R		all	Peds	L slip	L	S	R		all	Peds	
AM		1	1			**1**	*1*			9	12		**10**	*9*									9		554		**130**	*554*	21
PM		2	2			**2**	*2*			1	3		**2**	*1*									18		425		**140**	*425*	33

Average Queue Length (= Total Delay in veh-hrs/hr)

	Q North approach							Q South approach							Q West approach							Q East approach							Q Total
	L slip	L	S	R		all	Peds	L slip	L	S	R		all	Peds	L slip	L	S	R		all	Peds	L slip	L	S	R		all	Peds	
AM		0.0	0.1			**0.1**				2.5	1.3		**3.8**										0.4		7.4		**7.8**		**11.7**
PM		0.1	0.3			**0.4**				0.1	0.2		**0.3**										1.5		14.6		**16.1**		**16.7**
max		*0.1*	*0.3*							*2.5*	*1.3*												*1.5*		*14.6*				**28.5**

MOVEMENT SUMMARY

Site: 2017 AM BG

Akker Avenue / Chamfuti Crescent North Junction
2017 AM Peak Hour Background Traffic Volumes
Existing Configuration
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Akker Avenue (S)											
2	T	432	0.0	0.212	1.3	LOS A	2.2	15.3	0.46	0.00	52.0
3	R	2	0.0	0.211	9.7	LOS A	2.2	15.3	0.46	0.97	49.3
Approach		434	0.0	0.212	1.4	LOS A	2.2	15.3	0.46	0.00	52.0
East: Chamfuti Crescent North (E)											
4	L	7	0.0	0.164	20.6	LOS C	0.7	5.2	0.66	0.80	39.0
6	R	45	0.0	0.165	20.4	LOS C	0.7	5.2	0.66	1.00	39.2
Approach		53	0.0	0.165	20.4	LOS C	0.7	5.2	0.66	0.97	39.2
North: Akker Avenue (N)											
7	L	23	0.0	0.123	8.2	LOS A	0.0	0.0	0.00	1.03	49.0
8	T	226	0.0	0.122	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		249	0.0	0.122	0.8	LOS A	0.0	0.0	0.00	0.10	58.8
All Vehicles		736	0.0	0.212	2.5	NA	2.2	15.3	0.32	0.10	52.8

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS C. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on the worst delay for any vehicle movement.

MOVEMENT SUMMARY

Akker Avenue / Chamfuti Crescent North Junction
2017 PM Peak Hour Background Traffic Volumes
Existing Configuration
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Akker Avenue (S)											
2	T	147	0.0	0.073	1.4	LOS A	0.7	4.9	0.45	0.00	52.1
3	R	1	0.0	0.075	9.8	LOS A	0.7	4.9	0.45	0.96	49.3
Approach		148	0.0	0.073	1.4	LOS A	0.7	4.9	0.45	0.01	52.1
East: Chamfuti Crescent North (E)											
4	L	1	0.0	0.039	15.7	LOS C	0.2	1.2	0.53	0.81	42.6
6	R	17	0.0	0.039	15.5	LOS C	0.2	1.2	0.53	0.92	42.8
Approach		18	0.0	0.039	15.5	LOS C	0.2	1.2	0.53	0.91	42.8
North: Akker Avenue (N)											
7	L	29	0.0	0.150	8.2	LOS A	0.0	0.0	0.00	1.02	49.0
8	T	277	0.0	0.150	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		306	0.0	0.150	0.8	LOS A	0.0	0.0	0.00	0.10	58.7
All Vehicles		473	0.0	0.150	1.6	NA	0.7	4.9	0.16	0.10	55.7

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS C. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on the worst delay for any vehicle movement.

MOVEMENT SUMMARY

Site: 2022 AM BG

Akker Avenue / Chamfuti Crescent North Junction
2022 AM Peak Hour Background Traffic Volumes
Existing Configuration
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Akker Avenue (S)											
2	T	500	0.0	0.246	1.7	LOS A	2.7	19.0	0.52	0.00	51.2
3	R	2	0.0	0.234	10.1	LOS B	2.7	19.0	0.52	0.97	49.4
Approach		502	0.0	0.246	1.7	LOS B	2.7	19.0	0.52	0.00	51.2
East: Chamfuti Crescent North (E)											
4	L	8	0.0	0.241	24.9	LOS C	1.1	7.7	0.74	0.86	36.3
6	R	53	0.0	0.238	24.8	LOS C	1.1	7.7	0.74	1.02	36.4
Approach		61	0.0	0.239	24.8	LOS C	1.1	7.7	0.74	1.00	36.4
North: Akker Avenue (N)											
7	L	26	0.0	0.141	8.2	LOS A	0.0	0.0	0.00	1.03	49.0
8	T	263	0.0	0.142	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		289	0.0	0.142	0.7	LOS A	0.0	0.0	0.00	0.09	58.8
All Vehicles		853	0.0	0.246	3.0	NA	2.7	19.0	0.36	0.11	52.0

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS C. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on the worst delay for any vehicle movement.

MOVEMENT SUMMARY

Site: 2022 PM BG

Akker Avenue / Chamfuti Crescent North Junction
2022 PM Peak Hour Background Traffic Volumes
Existing Configuration
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Akker Avenue (S)											
2	T	171	0.0	0.084	1.7	LOS A	0.9	6.0	0.50	0.00	51.5
3	R	1	0.0	0.088	10.1	LOS B	0.9	6.0	0.50	0.97	49.4
Approach		172	0.0	0.084	1.8	LOS B	0.9	6.0	0.50	0.01	51.5
East: Chamfuti Crescent North (E)											
4	L	1	0.0	0.053	17.1	LOS C	0.2	1.6	0.57	0.83	41.6
6	R	20	0.0	0.052	16.9	LOS C	0.2	1.6	0.57	0.95	41.7
Approach		21	0.0	0.052	16.9	LOS C	0.2	1.6	0.57	0.95	41.7
North: Akker Avenue (N)											
7	L	34	0.0	0.174	8.2	LOS A	0.0	0.0	0.00	1.02	49.0
8	T	320	0.0	0.173	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		354	0.0	0.173	0.8	LOS A	0.0	0.0	0.00	0.10	58.7
All Vehicles		546	0.0	0.174	1.7	NA	0.9	6.0	0.18	0.10	55.4

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS C. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on the worst delay for any vehicle movement.

MOVEMENT SUMMARY

Akker Avenue / Chamfuti Crescent North Junction
2017 AM Peak Hour Background and Developement Traffic Volumes
Existing Configuration
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Akker Avenue (S)											
2	T	549	0.0	0.270	1.7	LOS A	3.1	21.4	0.53	0.00	51.0
3	R	2	0.0	0.263	10.1	LOS B	3.1	21.4	0.53	0.97	49.4
Approach		552	0.0	0.270	1.7	LOS B	3.1	21.4	0.53	0.00	51.0
East: Chamfuti Crescent North (E)											
4	L	7	0.0	0.230	26.6	LOS D	1.0	7.2	0.76	0.86	35.3
6	R	45	0.0	0.229	26.5	LOS D	1.0	7.2	0.76	1.02	35.4
Approach		53	0.0	0.229	26.5	LOS D	1.0	7.2	0.76	1.00	35.4
North: Akker Avenue (N)											
7	L	23	0.0	0.142	8.2	LOS A	0.0	0.0	0.00	1.03	49.0
8	T	266	0.0	0.142	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		289	0.0	0.142	0.7	LOS A	0.0	0.0	0.00	0.08	58.9
All Vehicles		894	0.0	0.270	2.9	NA	3.1	21.4	0.37	0.09	51.9

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS D. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on the worst delay for any vehicle movement.

MOVEMENT SUMMARY

Akker Avenue / Chamfuti Crescent North Junction
2017 AM Peak Hour Background and Developement Traffic Volumes
Existing Configuration
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Akker Avenue (S)											
2	T	154	0.0	0.076	1.6	LOS A	0.8	5.3	0.48	0.00	51.7
3	R	1	0.0	0.075	10.0	LOS A	0.8	5.3	0.48	0.96	49.4
Approach		155	0.0	0.076	1.6	LOS A	0.8	5.3	0.48	0.01	51.7
East: Chamfuti Crescent North (E)											
4	L	1	0.0	0.042	16.4	LOS C	0.2	1.3	0.55	0.82	42.1
6	R	17	0.0	0.041	16.2	LOS C	0.2	1.3	0.55	0.93	42.3
Approach		18	0.0	0.041	16.2	LOS C	0.2	1.3	0.55	0.92	42.3
North: Akker Avenue (N)											
7	L	29	0.0	0.165	8.2	LOS A	0.0	0.0	0.00	1.03	49.0
8	T	306	0.0	0.165	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		336	0.0	0.165	0.7	LOS A	0.0	0.0	0.00	0.09	58.8
All Vehicles		508	0.0	0.165	1.5	NA	0.8	5.3	0.17	0.09	55.7

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS C. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on the worst delay for any vehicle movement.

MOVEMENT SUMMARY

Akker Avenue / Chamfuti Crescent North Junction
2022 AM Peak Hour Background and Developement Traffic Volumes
Existing Configuration
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Akker Avenue (S)											
2	T	513	0.0	0.252	1.6	LOS A	2.8	19.3	0.50	0.00	51.4
3	R	2	0.0	0.263	10.0	LOS A	2.8	19.3	0.50	0.97	49.4
Approach		515	0.0	0.252	1.6	LOS A	2.8	19.3	0.50	0.00	51.3
East: Chamfuti Crescent North (E)											
4	L	8	0.0	0.241	24.9	LOS C	1.1	7.7	0.74	0.85	36.4
6	R	53	0.0	0.238	24.7	LOS C	1.1	7.7	0.74	1.02	36.5
Approach		61	0.0	0.238	24.7	LOS C	1.1	7.7	0.74	1.00	36.5
North: Akker Avenue (N)											
7	L	26	0.0	0.135	8.2	LOS A	0.0	0.0	0.00	1.02	49.0
8	T	249	0.0	0.135	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		276	0.0	0.135	0.8	LOS A	0.0	0.0	0.00	0.10	58.7
All Vehicles		852	0.0	0.263	3.0	NA	2.8	19.3	0.36	0.11	52.0

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS C. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on the worst delay for any vehicle movement.

MOVEMENT SUMMARY

Akker Avenue / Chamfuti Crescent North Junction
2022 PM Peak Hour Background and Developement Traffic Volumes
Existing Configuration
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Akker Avenue (S)											
2	T	171	0.0	0.084	1.8	LOS A	0.9	6.1	0.51	0.00	51.3
3	R	1	0.0	0.088	10.2	LOS B	0.9	6.1	0.51	0.97	49.3
Approach		172	0.0	0.084	1.9	LOS B	0.9	6.1	0.51	0.01	51.3
East: Chamfuti Crescent North (E)											
4	L	1	0.0	0.053	17.4	LOS C	0.2	1.7	0.58	0.84	41.3
6	R	20	0.0	0.054	17.2	LOS C	0.2	1.7	0.58	0.96	41.4
Approach		21	0.0	0.054	17.3	LOS C	0.2	1.7	0.58	0.95	41.4
North: Akker Avenue (N)											
7	L	34	0.0	0.182	8.2	LOS A	0.0	0.0	0.00	1.03	49.0
8	T	338	0.0	0.182	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		372	0.0	0.182	0.7	LOS A	0.0	0.0	0.00	0.09	58.8
All Vehicles		564	0.0	0.182	1.7	NA	0.9	6.1	0.18	0.10	55.5

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS C. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on the worst delay for any vehicle movement.

MOVEMENT SUMMARY

Site: 2017 AM BG

Akker Avenue / Chamfuti Crescent South Junction
2017 AM Peak Hour Background Traffic Volumes
Existing Configuration
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Akker Avenue (S)											
2	T	340	0.0	0.167	0.9	LOS A	1.6	11.0	0.38	0.00	53.2
3	R	1	0.0	0.175	9.3	LOS A	1.6	11.0	0.38	0.97	49.2
Approach		341	0.0	0.167	1.0	LOS A	1.6	11.0	0.38	0.00	53.2
East: Chamfuti Crescent South (E)											
4	L	2	0.0	0.081	17.5	LOS C	0.4	2.6	0.57	0.76	41.2
6	R	31	0.0	0.083	17.3	LOS C	0.4	2.6	0.57	0.98	41.4
Approach		33	0.0	0.082	17.3	LOS C	0.4	2.6	0.57	0.97	41.3
North: Akker Avenue (N)											
7	L	16	0.0	0.096	8.2	LOS A	0.0	0.0	0.00	1.03	49.0
8	T	181	0.0	0.096	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		197	0.0	0.096	0.7	LOS A	0.0	0.0	0.00	0.08	58.9
All Vehicles		571	0.0	0.175	1.8	NA	1.6	11.0	0.26	0.09	54.1

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS C. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on the worst delay for any vehicle movement.

MOVEMENT SUMMARY

Site: 2017 PM BG

Akker Avenue / Chamfuti Crescent South Junction
2017 PM Peak Hour Background Traffic Volumes
Existing Configuration
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Akker Avenue (S)											
2	T	106	0.0	0.053	0.9	LOS A	0.5	3.2	0.38	0.00	53.3
3	R	1	0.0	0.053	9.3	LOS A	0.5	3.2	0.38	0.96	49.2
Approach		107	0.0	0.053	1.0	LOS A	0.5	3.2	0.38	0.01	53.3
East: Chamfuti Crescent South (E)											
4	L	1	0.0	0.028	13.8	LOS B	0.1	0.9	0.45	0.78	44.1
6	R	15	0.0	0.028	13.7	LOS B	0.1	0.9	0.45	0.88	44.3
Approach		16	0.0	0.028	13.7	LOS B	0.1	0.9	0.45	0.87	44.3
North: Akker Avenue (N)											
7	L	31	0.0	0.111	8.2	LOS A	0.0	0.0	0.00	1.00	49.0
8	T	196	0.0	0.111	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		226	0.0	0.111	1.1	LOS A	0.0	0.0	0.00	0.13	58.2
All Vehicles		349	0.0	0.111	1.6	NA	0.5	3.2	0.14	0.13	55.8

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on the worst delay for any vehicle movement.

MOVEMENT SUMMARY

Site: 2022 AM BG

Akker Avenue / Chamfuti Crescent South Junction
2022 AM Peak Hour Background Traffic Volumes
Existing Configuration
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Akker Avenue (S)											
2	T	395	0.0	0.193	1.1	LOS A	1.9	13.4	0.43	0.00	52.5
3	R	1	0.0	0.211	9.6	LOS A	1.9	13.4	0.43	0.97	49.3
Approach		396	0.0	0.193	1.2	LOS A	1.9	13.4	0.43	0.00	52.5
East: Chamfuti Crescent South (E)											
4	L	2	0.0	0.111	19.6	LOS C	0.5	3.4	0.64	0.77	39.7
6	R	35	0.0	0.110	19.4	LOS C	0.5	3.4	0.64	1.00	39.9
Approach		37	0.0	0.110	19.4	LOS C	0.5	3.4	0.64	0.99	39.9
North: Akker Avenue (N)											
7	L	19	0.0	0.112	8.2	LOS A	0.0	0.0	0.00	1.03	49.0
8	T	209	0.0	0.112	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		228	0.0	0.112	0.7	LOS A	0.0	0.0	0.00	0.09	58.9
All Vehicles		661	0.0	0.211	2.0	NA	1.9	13.4	0.29	0.09	53.6

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS C. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on the worst delay for any vehicle movement.

MOVEMENT SUMMARY

Site: 2022 PM BG

Akker Avenue / Chamfuti Crescent South Junction
2022 PM Peak Hour Background Traffic Volumes
Existing Configuration
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Akker Avenue (S)											
2	T	123	0.0	0.061	1.1	LOS A	0.6	3.9	0.41	0.00	52.7
3	R	1	0.0	0.062	9.5	LOS A	0.6	3.9	0.41	0.96	49.2
Approach		124	0.0	0.061	1.2	LOS A	0.6	3.9	0.41	0.01	52.7
East: Chamfuti Crescent South (E)											
4	L	1	0.0	0.036	14.6	LOS B	0.2	1.2	0.49	0.79	43.5
6	R	18	0.0	0.036	14.4	LOS B	0.2	1.2	0.49	0.90	43.7
Approach		19	0.0	0.036	14.4	LOS B	0.2	1.2	0.49	0.89	43.6
North: Akker Avenue (N)											
7	L	35	0.0	0.129	8.2	LOS A	0.0	0.0	0.00	1.00	49.0
8	T	227	0.0	0.129	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		262	0.0	0.129	1.1	LOS A	0.0	0.0	0.00	0.13	58.3
All Vehicles		405	0.0	0.129	1.7	NA	0.6	3.9	0.15	0.13	55.6

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on the worst delay for any vehicle movement.

MOVEMENT SUMMARY

Akker Avenue / Chamfuti Crescent South Junction
2017 AM Peak Hour Background and Developement Traffic Volumes
Existing Configuration
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Akker Avenue (S)											
2	T	459	0.0	0.225	1.2	LOS A	2.3	16.2	0.45	0.00	52.2
3	R	1	0.0	0.211	9.7	LOS A	2.3	16.2	0.45	0.97	49.3
Approach		460	0.0	0.225	1.3	LOS A	2.3	16.2	0.45	0.00	52.2
East: Chamfuti Crescent South (E)											
4	L	2	0.0	0.111	21.5	LOS C	0.5	3.4	0.69	0.77	38.5
6	R	31	0.0	0.112	21.3	LOS C	0.5	3.4	0.69	1.00	38.6
Approach		33	0.0	0.112	21.3	LOS C	0.5	3.4	0.69	0.99	38.6
North: Akker Avenue (N)											
7	L	16	0.0	0.115	8.2	LOS A	0.0	0.0	0.00	1.04	49.0
8	T	220	0.0	0.115	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		236	0.0	0.115	0.5	LOS A	0.0	0.0	0.00	0.07	59.1
All Vehicles		728	0.0	0.225	1.9	NA	2.3	16.2	0.31	0.07	53.4

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS C. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on the worst delay for any vehicle movement.

MOVEMENT SUMMARY

Akker Avenue / Chamfuti Crescent South Junction
2017 PM Peak Hour Background and Developement Traffic Volumes
Existing Configuration
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Akker Avenue (S)											
2	T	154	0.0	0.076	1.6	LOS A	0.8	5.3	0.48	0.00	51.7
3	R	1	0.0	0.075	10.0	LOS A	0.8	5.3	0.48	0.96	49.4
Approach		155	0.0	0.076	1.6	LOS A	0.8	5.3	0.48	0.01	51.7
East: Chamfuti Crescent South (E)											
4	L	1	0.0	0.036	16.3	LOS C	0.2	1.1	0.55	0.82	42.2
6	R	15	0.0	0.036	16.1	LOS C	0.2	1.1	0.55	0.93	42.3
Approach		16	0.0	0.036	16.1	LOS C	0.2	1.1	0.55	0.92	42.3
North: Akker Avenue (N)											
7	L	31	0.0	0.165	8.2	LOS A	0.0	0.0	0.00	1.03	49.0
8	T	306	0.0	0.165	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		337	0.0	0.165	0.7	LOS A	0.0	0.0	0.00	0.09	58.8
All Vehicles		507	0.0	0.165	1.5	NA	0.8	5.3	0.16	0.09	55.8

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS C. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on the worst delay for any vehicle movement.

MOVEMENT SUMMARY

Akker Avenue / Chamfuti Crescent South Junction
2022 AM Peak Hour Background and Developement Traffic Volumes
Existing Configuration
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Akker Avenue (S)											
2	T	513	0.0	0.251	1.5	LOS A	2.7	19.1	0.50	0.00	51.5
3	R	1	0.0	0.263	9.9	LOS A	2.7	19.1	0.50	0.97	49.4
Approach		514	0.0	0.251	1.5	LOS A	2.7	19.1	0.50	0.00	51.5
East: Chamfuti Crescent South (E)											
4	L	2	0.0	0.150	24.5	LOS C	0.6	4.5	0.75	0.79	36.6
6	R	35	0.0	0.152	24.3	LOS C	0.6	4.5	0.75	1.00	36.7
Approach		37	0.0	0.152	24.3	LOS C	0.6	4.5	0.75	0.99	36.7
North: Akker Avenue (N)											
7	L	19	0.0	0.132	8.2	LOS A	0.0	0.0	0.00	1.04	49.0
8	T	249	0.0	0.131	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		268	0.0	0.131	0.6	LOS A	0.0	0.0	0.00	0.07	59.1
All Vehicles		819	0.0	0.263	2.2	NA	2.7	19.1	0.35	0.07	52.7

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS C. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on the worst delay for any vehicle movement.

MOVEMENT SUMMARY

Site: 2022 PM BGD

Akker Avenue / Chamfuti Crescent South Junction
2022 PM Peak Hour Background and Developement Traffic Volumes
Existing Configuration
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Akker Avenue (S)											
2	T	171	0.0	0.084	1.8	LOS A	0.9	6.1	0.51	0.00	51.3
3	R	1	0.0	0.088	10.2	LOS B	0.9	6.1	0.51	0.97	49.3
Approach		172	0.0	0.084	1.9	LOS B	0.9	6.1	0.51	0.01	51.2
East: Chamfuti Crescent South (E)											
4	L	1	0.0	0.048	17.4	LOS C	0.2	1.5	0.58	0.84	41.3
6	R	18	0.0	0.048	17.2	LOS C	0.2	1.5	0.58	0.95	41.5
Approach		19	0.0	0.048	17.2	LOS C	0.2	1.5	0.58	0.95	41.5
North: Akker Avenue (N)											
7	L	35	0.0	0.183	8.2	LOS A	0.0	0.0	0.00	1.03	49.0
8	T	338	0.0	0.183	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		373	0.0	0.183	0.8	LOS A	0.0	0.0	0.00	0.10	58.8
All Vehicles		563	0.0	0.183	1.7	NA	0.9	6.1	0.18	0.10	55.5

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS C. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on the worst delay for any vehicle movement.

MOVEMENT SUMMARY

Site: 2017 AM BG

Akker Avenue / Msasa Crescent Junction
2017 AM Peak Hour Background Traffic Volumes
Existing Configuration
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Msasa Crescent (S)											
1	L	5	0.0	0.026	14.7	LOS B	0.1	0.8	0.43	0.78	43.4
3	R	8	0.0	0.026	14.5	LOS B	0.1	0.8	0.43	0.94	43.5
Approach		14	0.0	0.026	14.6	LOS B	0.1	0.8	0.43	0.88	43.5
East: Akker Avenue (E)											
4	L	7	0.0	0.086	8.2	LOS A	0.0	0.0	0.00	1.06	49.0
5	T	168	0.0	0.086	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		176	0.0	0.086	0.3	LOS A	0.0	0.0	0.00	0.04	59.4
West: Akker Avenue (W)											
11	T	309	0.0	0.163	0.8	LOS A	1.4	10.0	0.35	0.00	53.7
12	R	5	0.0	0.164	9.2	LOS A	1.4	10.0	0.35	0.98	49.1
Approach		315	0.0	0.163	1.0	LOS A	1.4	10.0	0.35	0.02	53.6
All Vehicles		504	0.0	0.164	1.1	NA	1.4	10.0	0.23	0.05	55.1

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on the worst delay for any vehicle movement.

MOVEMENT SUMMARY

Site: 2017 PM BG

Akker Avenue / Msasa Crescent Junction
2017 PM Peak Hour Background Traffic Volumes
Existing Configuration
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Msasa Crescent (S)											
1	L	3	0.0	0.009	12.4	LOS B	0.0	0.3	0.35	0.80	45.3
3	R	3	0.0	0.009	12.3	LOS B	0.0	0.3	0.35	0.88	45.5
Approach		6	0.0	0.009	12.3	LOS B	0.0	0.3	0.35	0.84	45.4
East: Akker Avenue (E)											
4	L	9	0.0	0.091	8.2	LOS A	0.0	0.0	0.00	1.05	49.0
5	T	177	0.0	0.091	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		186	0.0	0.091	0.4	LOS A	0.0	0.0	0.00	0.05	59.3
West: Akker Avenue (W)											
11	T	93	0.0	0.053	0.7	LOS A	0.4	2.9	0.32	0.00	54.0
12	R	6	0.0	0.053	9.2	LOS A	0.4	2.9	0.32	0.95	49.0
Approach		99	0.0	0.053	1.3	LOS A	0.4	2.9	0.32	0.06	53.7
All Vehicles		292	0.0	0.091	1.0	NA	0.4	2.9	0.12	0.07	56.9

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on the worst delay for any vehicle movement.

MOVEMENT SUMMARY

Site: 2022 AM BG

Akker Avenue / Msasa Crescent Junction
2022 AM Peak Hour Background Traffic Volumes
Existing Configuration
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Msasa Crescent (S)											
1	L	6	0.0	0.036	15.8	LOS C	0.2	1.1	0.48	0.78	42.5
3	R	11	0.0	0.036	15.7	LOS C	0.2	1.1	0.48	0.97	42.6
Approach		17	0.0	0.036	15.7	LOS C	0.2	1.1	0.48	0.90	42.6
East: Akker Avenue (E)											
4	L	8	0.0	0.099	8.2	LOS A	0.0	0.0	0.00	1.06	49.0
5	T	195	0.0	0.099	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		203	0.0	0.099	0.3	LOS A	0.0	0.0	0.00	0.04	59.4
West: Akker Avenue (W)											
11	T	358	0.0	0.189	1.0	LOS A	1.7	12.1	0.39	0.00	53.0
12	R	6	0.0	0.191	9.4	LOS A	1.7	12.1	0.39	0.97	49.2
Approach		364	0.0	0.189	1.1	LOS A	1.7	12.1	0.39	0.02	53.0
All Vehicles		584	0.0	0.191	1.3	NA	1.7	12.1	0.26	0.05	54.7

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS C. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on the worst delay for any vehicle movement.

MOVEMENT SUMMARY

Site: 2022 PM BG

Akker Avenue / Msasa Crescent Junction
2022 PM Peak Hour Background Traffic Volumes
Existing Configuration
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Msasa Crescent (S)											
1	L	4	0.0	0.012	12.8	LOS B	0.1	0.4	0.39	0.80	45.0
3	R	4	0.0	0.012	12.6	LOS B	0.1	0.4	0.39	0.89	45.2
Approach		8	0.0	0.012	12.7	LOS B	0.1	0.4	0.39	0.85	45.1
East: Akker Avenue (E)											
4	L	12	0.0	0.106	8.2	LOS A	0.0	0.0	0.00	1.05	49.0
5	T	205	0.0	0.106	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		217	0.0	0.106	0.4	LOS A	0.0	0.0	0.00	0.06	59.3
West: Akker Avenue (W)											
11	T	106	0.0	0.061	0.9	LOS A	0.5	3.4	0.36	0.00	53.5
12	R	7	0.0	0.061	9.3	LOS A	0.5	3.4	0.36	0.94	49.0
Approach		114	0.0	0.061	1.4	LOS A	0.5	3.4	0.36	0.06	53.2
All Vehicles		339	0.0	0.106	1.1	NA	0.5	3.4	0.13	0.08	56.7

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on the worst delay for any vehicle movement.

MOVEMENT SUMMARY

Akker Avenue / Msasa Crescent Junction
2017 AM Peak Hour Background and Developement Traffic Volumes
Existing Configuration
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Msasa Crescent (S)											
1	L	5	0.0	0.329	19.3	LOS C	1.9	13.0	0.64	0.85	39.9
3	R	126	0.0	0.324	19.1	LOS C	1.9	13.0	0.64	1.04	40.1
Approach		132	0.0	0.324	19.1	LOS C	1.9	13.0	0.64	1.04	40.1
East: Akker Avenue (E)											
4	L	47	0.0	0.106	8.2	LOS A	0.0	0.0	0.00	0.95	49.0
5	T	168	0.0	0.106	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		216	0.0	0.106	1.8	LOS A	0.0	0.0	0.00	0.21	57.2
West: Akker Avenue (W)											
11	T	309	0.0	0.163	1.0	LOS A	1.5	10.3	0.39	0.00	53.0
12	R	5	0.0	0.164	9.5	LOS A	1.5	10.3	0.39	0.97	49.2
Approach		315	0.0	0.163	1.2	LOS A	1.5	10.3	0.39	0.02	52.9
All Vehicles		662	0.0	0.329	4.9	NA	1.9	13.0	0.31	0.28	50.9

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS C. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on the worst delay for any vehicle movement.

MOVEMENT SUMMARY

Akker Avenue / Msasa Crescent Junction
2017 PM Peak Hour Background and Developement Traffic Volumes
Existing Configuration
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Msasa Crescent (S)											
1	L	3	0.0	0.099	14.4	LOS B	0.5	3.3	0.49	0.82	43.7
3	R	51	0.0	0.097	14.2	LOS B	0.5	3.3	0.49	0.92	43.9
Approach		54	0.0	0.097	14.2	LOS B	0.5	3.3	0.49	0.92	43.8
East: Akker Avenue (E)											
4	L	120	0.0	0.148	8.2	LOS A	0.0	0.0	0.00	0.86	49.0
5	T	177	0.0	0.148	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		297	0.0	0.148	3.3	LOS A	0.0	0.0	0.00	0.35	55.0
West: Akker Avenue (W)											
11	T	93	0.0	0.053	1.3	LOS A	0.5	3.2	0.42	0.00	52.4
12	R	6	0.0	0.054	9.7	LOS A	0.5	3.2	0.42	0.94	49.1
Approach		99	0.0	0.053	1.8	LOS A	0.5	3.2	0.42	0.06	52.2
All Vehicles		449	0.0	0.148	4.3	NA	0.5	3.3	0.15	0.35	52.8

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on the worst delay for any vehicle movement.

MOVEMENT SUMMARY

Akker Avenue / Msasa Crescent Junction
2022 AM Peak Hour Background and Developement Traffic Volumes
Existing Configuration
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Msasa Crescent (S)											
1	L	6	0.0	0.372	22.1	LOS C	2.3	15.8	0.70	0.90	38.1
3	R	128	0.0	0.381	21.9	LOS C	2.3	15.8	0.70	1.07	38.2
Approach		135	0.0	0.381	21.9	LOS C	2.3	15.8	0.70	1.06	38.2
East: Akker Avenue (E)											
4	L	48	0.0	0.120	8.2	LOS A	0.0	0.0	0.00	0.96	49.0
5	T	195	0.0	0.120	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		243	0.0	0.120	1.6	LOS A	0.0	0.0	0.00	0.19	57.4
West: Akker Avenue (W)											
11	T	358	0.0	0.189	1.2	LOS A	1.8	12.6	0.43	0.00	52.4
12	R	6	0.0	0.191	9.7	LOS A	1.8	12.6	0.43	0.97	49.3
Approach		364	0.0	0.189	1.4	LOS A	1.8	12.6	0.43	0.02	52.3
All Vehicles		742	0.0	0.381	5.2	NA	2.3	15.8	0.34	0.26	50.4

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS C. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on the worst delay for any vehicle movement.

MOVEMENT SUMMARY

Site: 2022 PM BGD

Akker Avenue / Msasa Crescent Junction
2022 PM Peak Hour Background and Developement Traffic Volumes
Existing Configuration
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Msasa Crescent (S)											
1	L	4	0.0	0.105	15.0	LOS B	0.5	3.5	0.52	0.84	43.2
3	R	51	0.0	0.106	14.8	LOS B	0.5	3.5	0.52	0.94	43.4
Approach		55	0.0	0.106	14.8	LOS B	0.5	3.5	0.52	0.94	43.3
East: Akker Avenue (E)											
4	L	121	0.0	0.162	8.2	LOS A	0.0	0.0	0.00	0.88	49.0
5	T	205	0.0	0.162	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		326	0.0	0.162	3.0	LOS A	0.0	0.0	0.00	0.32	55.4
West: Akker Avenue (W)											
11	T	106	0.0	0.062	1.5	LOS A	0.5	3.8	0.45	0.00	52.0
12	R	7	0.0	0.062	9.9	LOS A	0.5	3.8	0.45	0.94	49.1
Approach		114	0.0	0.062	2.0	LOS A	0.5	3.8	0.45	0.06	51.8
All Vehicles		495	0.0	0.162	4.1	NA	0.5	3.8	0.16	0.33	52.9

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on the worst delay for any vehicle movement.

MOVEMENT SUMMARY

Site: 2017 AM BGD

Msasa Crescent / Proposed Access Junction
2017 AM Peak Hour Background and Development Traffic Volumes
Proposed Configuration
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Msasa Crescent (S)											
1	L	1	0.0	0.001	8.2	LOS A	0.0	0.0	0.00	0.82	49.0
2	T	1	0.0	0.001	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		2	0.0	0.001	4.1	LOS A	0.0	0.0	0.00	0.41	53.9
North: Msasa Crescent (N)											
8	T	1	0.0	0.028	0.0	LOS A	0.1	1.0	0.02	0.00	59.5
9	R	39	0.0	0.028	8.5	LOS A	0.1	1.0	0.02	0.70	48.5
Approach		40	0.0	0.028	8.2	LOS A	0.1	1.0	0.02	0.68	48.8
West: Propose Access (W)											
10	L	118	0.0	0.100	10.7	LOS B	0.5	3.4	0.02	0.98	46.4
12	R	1	0.0	0.096	10.5	LOS B	0.5	3.4	0.02	1.04	46.5
Approach		119	0.0	0.100	10.7	LOS B	0.5	3.4	0.02	0.99	46.4
All Vehicles		161	0.0	0.100	10.0	NA	0.5	3.4	0.02	0.90	47.0

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on the worst delay for any vehicle movement.

MOVEMENT SUMMARY

Site: 2017 PM BGD

Msasa Crescent / Proposed Access Junction
2017 PM Peak Hour Background and Development Traffic Volumes
Proposed Configuration
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Msasa Crescent (S)											
1	L	1	0.0	0.001	8.2	LOS A	0.0	0.0	0.00	0.82	49.0
2	T	1	0.0	0.001	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		2	0.0	0.001	4.1	LOS A	0.0	0.0	0.00	0.41	53.9
North: Msasa Crescent (N)											
8	T	1	0.0	0.075	0.0	LOS A	0.4	2.8	0.02	0.00	59.4
9	R	111	0.0	0.077	8.5	LOS A	0.4	2.8	0.02	0.69	48.5
Approach		112	0.0	0.077	8.4	LOS A	0.4	2.8	0.02	0.68	48.6
West: Propose Access (W)											
10	L	47	0.0	0.041	10.7	LOS B	0.2	1.3	0.01	0.99	46.4
12	R	1	0.0	0.040	10.5	LOS B	0.2	1.3	0.01	1.04	46.5
Approach		48	0.0	0.041	10.7	LOS B	0.2	1.3	0.01	0.99	46.4
All Vehicles		162	0.0	0.077	9.0	NA	0.4	2.8	0.02	0.77	48.0

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on the worst delay for any vehicle movement.

MOVEMENT SUMMARY

Site: 2022 AM BGD

Msasa Crescent / Proposed Access Junction
2022 AM Peak Hour Background and Development Traffic Volumes
Proposed Configuration
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Msasa Crescent (S)											
1	L	1	0.0	0.001	8.2	LOS A	0.0	0.0	0.00	0.82	49.0
2	T	1	0.0	0.001	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		2	0.0	0.001	4.1	LOS A	0.0	0.0	0.00	0.41	53.9
North: Msasa Crescent (N)											
8	T	1	0.0	0.028	0.0	LOS A	0.1	1.0	0.02	0.00	59.5
9	R	39	0.0	0.028	8.5	LOS A	0.1	1.0	0.02	0.70	48.5
Approach		40	0.0	0.028	8.2	LOS A	0.1	1.0	0.02	0.68	48.8
West: Propose Access (W)											
10	L	118	0.0	0.100	10.7	LOS B	0.5	3.4	0.02	0.98	46.4
12	R	1	0.0	0.096	10.5	LOS B	0.5	3.4	0.02	1.04	46.5
Approach		119	0.0	0.100	10.7	LOS B	0.5	3.4	0.02	0.99	46.4
All Vehicles		161	0.0	0.100	10.0	NA	0.5	3.4	0.02	0.90	47.0

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on the worst delay for any vehicle movement.

MOVEMENT SUMMARY

Msasa Crescent / Proposed Access Junction
2022 PM Peak Hour Background and Development Traffic Volumes
Proposed Configuration
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Msasa Crescent (S)											
1	L	1	0.0	0.001	8.2	LOS A	0.0	0.0	0.00	0.82	49.0
2	T	1	0.0	0.001	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		2	0.0	0.001	4.1	LOS A	0.0	0.0	0.00	0.41	53.9
North: Msasa Crescent (N)											
8	T	1	0.0	0.075	0.0	LOS A	0.4	2.8	0.02	0.00	59.4
9	R	111	0.0	0.077	8.5	LOS A	0.4	2.8	0.02	0.69	48.5
Approach		112	0.0	0.077	8.4	LOS A	0.4	2.8	0.02	0.68	48.6
West: Propose Access (W)											
10	L	47	0.0	0.041	10.7	LOS B	0.2	1.3	0.01	0.99	46.4
12	R	1	0.0	0.040	10.5	LOS B	0.2	1.3	0.01	1.04	46.5
Approach		48	0.0	0.041	10.7	LOS B	0.2	1.3	0.01	0.99	46.4
All Vehicles		162	0.0	0.077	9.0	NA	0.4	2.8	0.02	0.77	48.0

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on the worst delay for any vehicle movement.

ANNEXURE D

EXISTING TRAFFIC SIGNAL TIMING PLANS OBTAINED FROM JRA

Yellow cells require input

1

Intersection	Shakespeare and Akker/ Alwen Rd West	
Draughting	M.Erasmus	Engineer
Designed by	M.Erasmus	Engineer
Checked by	A du Toit	Senior Traffic Engineer
Date	14-Apr-08	
Intersection nr	R2046	
Version	Version 1	
Version	1	

VERSION (Revise timings, offset, loops added? All plans etc?)

	Description	**Version to use**
AM peak		
Off Peak		
PM peak		
Night Peak		
Sat Peak		

2 **Clearance Distances**

		Straight	**Right**
Street Name N	Alwen Rd West	14.9	
Street Name E			
Street Name S	Shakespeare	22.9	
Street Name W	Akker		14.6

3

		Approach Speed [km/hr]	**Grade [%]**	**Clearance Distance**	**Yellow interval required [sec]**
Street Name N	Alwen Rd West	60	-2%	14.9	3.0
Street Name E	0			0.0	
Street Name S	Shakespeare	60	2%	22.9	3.0
Street Name W	Akker	60	4%	14.6	3.0

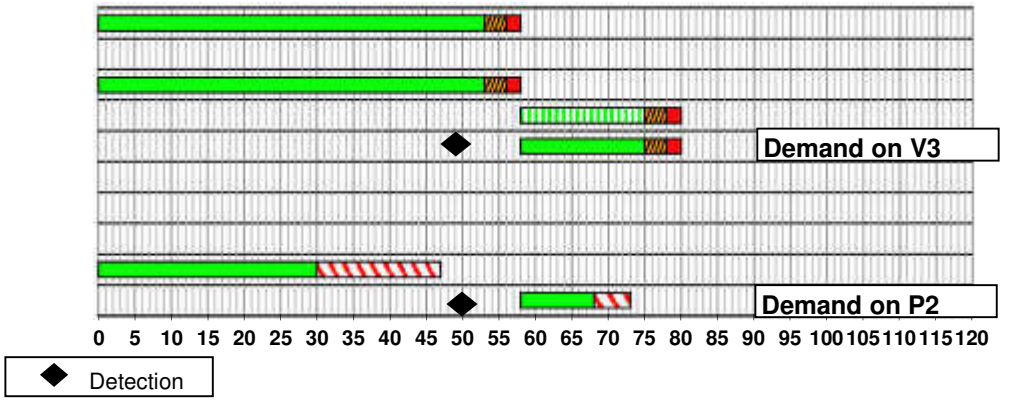
Use this table to determine Yellow interval

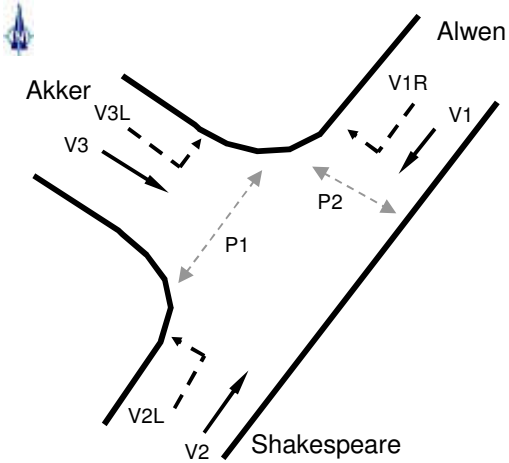
Speed	**Gradiant**		
	downhill	**downhill**	**flat/uphill**
	<-8	**-8to-4**	**>-4**
60	4	3.5	3
70	4.5	4	3.5
80	5	4.5	4

Time

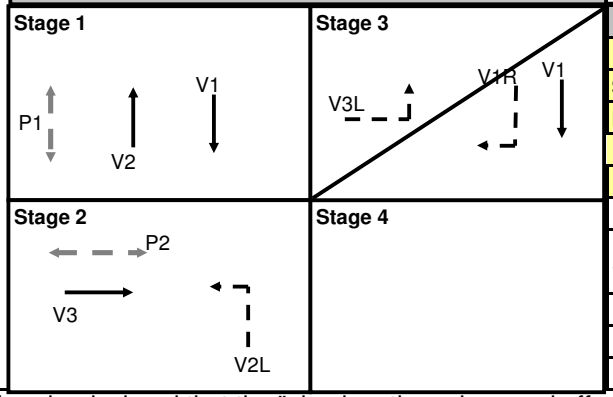
Stage	Start	Gr	FRed	FlGr	Ext	Yel	AR	Total
V1	0	53.0				3.0	2.0	*58.0*
V1R								*0.0*
V2	0	53.0				3.0	2.0	*58.0*
V2L	58			17.0		3.0	2.0	*22.0*
V3	58	17.0				3.0	2.0	*22.0*
V3L								*0.0*
								0.0
								0.0
P1	0	30.0	17.0					*47.0*
P2	58	10.0	5.0					*15.0*
CYCLE								***80***

Semi VA Time Plan





Stage Movements



NOTES

Signal to rest in stage 1 until either V3 or P2 is called

P2 to operate on demand only

Version 1

National Road Traffic Regulation 287A. It is hereby declared that the "phasing, time plans and offset settings of the junction" is approved.

Signed:		**Signed:**		**In operation**	
Name:	M.Erasmus	**Name:**	A du Toit	**Time Plan :**	AM Peak Plan 1
Position:	Engineer	**Position:**	Senior Traffic Engineer	**Cycle :**	80
Date:	14-Apr-08	**Date:**	14-Apr-08	**From-To:**	05:30-09:00
				Operation:	Semi VA Time Plan
				Offset:	0 "
				Version:	1

Intersection Name: Shakespeare and Akker/ Alwen Rd West

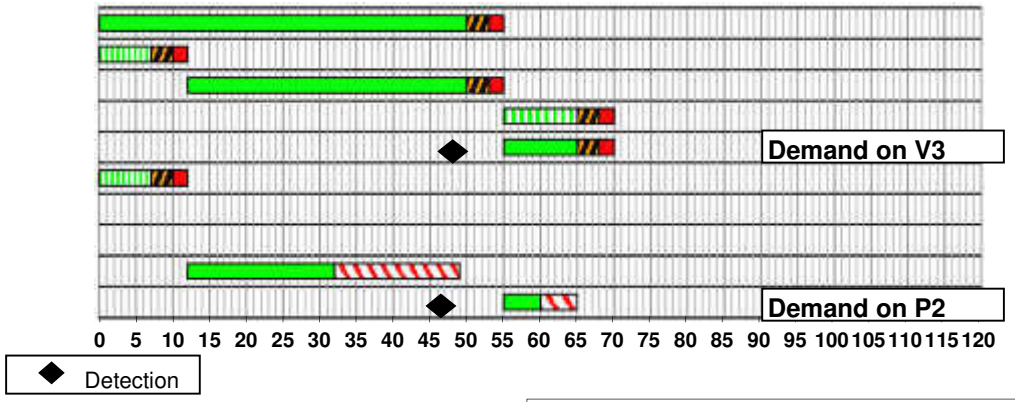
Intersection No. R2046

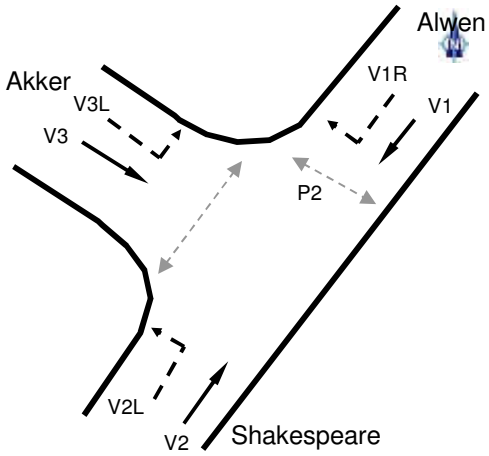
Shakespeare and Akker/ Alwen Rd West *Version 1*

Time

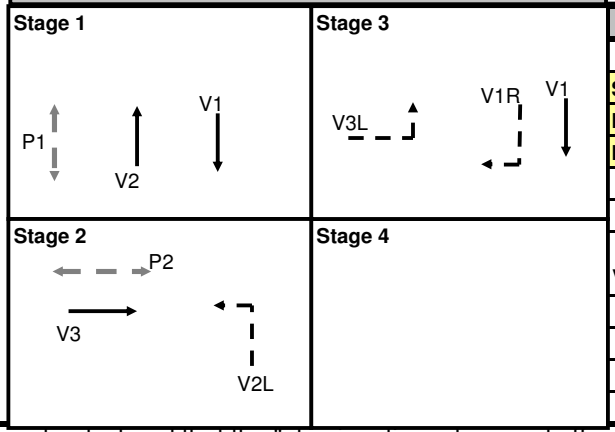
Stage	Start	Gr	FRed	FlGr	Ext	Yel	AR	Total
V1	0	50.0				3.0	2.0	*55.0*
V1R	0			7.0		3.0	2.0	*12.0*
V2	12	38.0				3.0	2.0	*43.0*
V2L	55			10.0		3.0	2.0	*15.0*
V3	55	10.0				3.0	2.0	*15.0*
V3L	0			7.0		3.0	2.0	*12.0*
								0.0
								0.0
P1	12	20.0	17.0					*37.0*
P2	55	5.0	5.0					*10.0*
CYCLE								***70***

Semi VA Time Plan





Stage Movements



NOTES

Signal to rest in stage 1 until either V3 or P2 is called

P2 to operate on demand only

P2 Clearance time has been incorporated in to the IG period.

Version 1

National Road Traffic Regulation 287A. It is hereby declared that the "phasing, time plans and offset settings of the junction" is approved.

Signed:	
Name:	M.Erasmus
Position:	Engineer
Date:	14-Apr-08

Johannesburg Roads Agency

Signed:	
Name:	A du Toit
Position:	Senior Traffic Engineer
Date:	14-Apr-08

In operation

Time Plan :	PM Peak Plan 2
Cycle :	70
From-To:	15:45-18:30
Operation:	Semi VA Time Plan
Offset:	0"
Version:	1

Intersection Name:
Shakespeare and Akker/ Alwen Rd West

Intersection No.
R2046

Shakespeare and Akker/ Alwen Rd West

Version 1

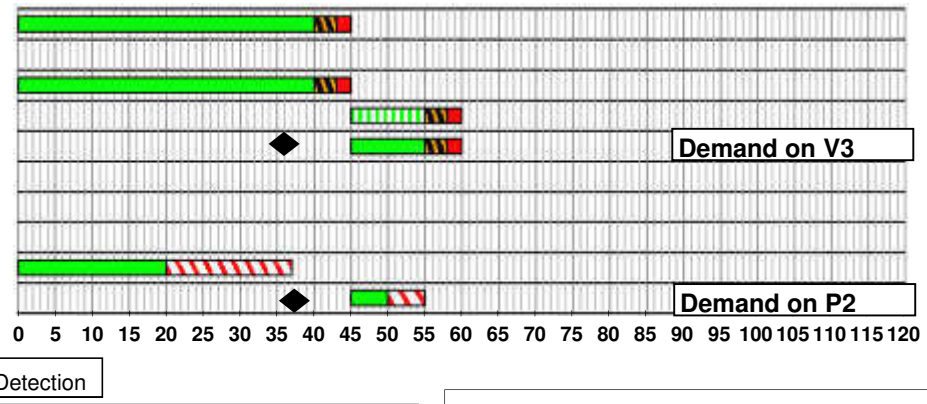
1. Signal Identification
2. Intersection Layout
3. Signal Layout
4. Signal Plans
5. Traffic Counts
6. Signal Timing Calculations
7. Other
8. Check-Lists

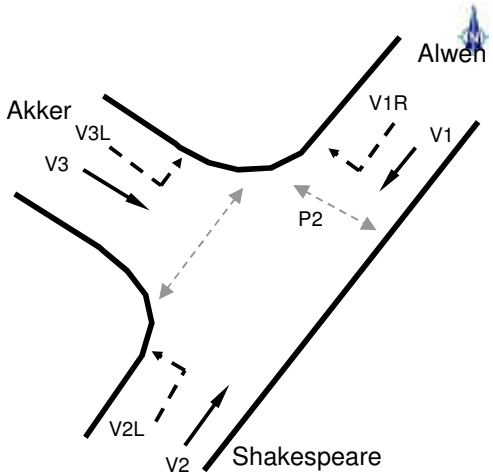
Shakespeare and Akker/ Alwen Rd West

Version 1

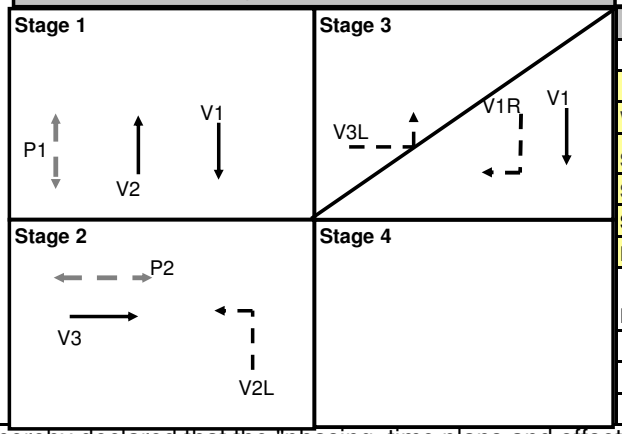
Time								
Stage	**Start**	**Gr**	**FRed**	**FlGr**	**Ext**	**Yel**	**AR**	**Total**
V1	**0**	40.0				3.0	2.0	*45.0*
V1R								*0.0*
V2	**0**	40.0				3.0	2.0	*45.0*
V2L	**45**			10.0		3.0	2.0	*15.0*
V3	**45**	10.0				3.0	2.0	*15.0*
V3L								*0.0*
								0.0
								0.0
P1	**0**	20.0	17.0					*37.0*
P2	**45**	5.0	5.0					*10.0*
CYCLE								***60***

Semi VA Time Plan





Stage Movements



NOTES

Plan also to run on:

Weekday: 09:00-15:45, 18:30 - 24:00, 00:00 - 05:30

Saturday: 00:00 - 24:00

Sunday: 00:00-24:00

Signal to rest in stage 1 until either V3 or P2 is called

P2 to operate on demand only

P2 Clearance time has been incorporated in to the IG period.

National Road Traffic Regulation 287A. It is hereby declared that the "phasing, time plans and offset settings of the junction" is approved.

Signed:		**Signed:**		**In operation**	
Name:	M.Erasmus	**Name:**	A du Toit	**Time Plan :**	Off Peak Plan 3
Position:	Engineer	**Position:**	Senior Traffic Engineer	**Cycle :**	60
Date:	14-Apr-08	**Date:**	14-Apr-08	**From-To:**	09:00-15:45, 18:30-05:30
				Operation:	Semi VA Time Plan
				Offset:	0 "
				Version:	1

Intersection Name: Shakespeare and Akker/ Alwen Rd West

Intersection No. R2046

1. Signal Identification
2. Intersection Layout
3. Signal Layout
4. Signal Plans
5. Traffic Counts
6. Signal Timing Calculations
7. Other
8. Check-Lists

Shakespeare and Akker/ Alwen Rd West

EVENTS TABLE

Day of the Week	Start Time	End Time	Plan No.	Cycle	Offset
Weekday	00:00	05:30	3 (OFF)	60	0
Weekday	05:30	09:00	1 (AM)	80	0
Weekday	09:00	15:45	3 (OFF)	60	0
Weekday	15:45	18:30	2 (PM)	70	0
Weekday	18:30	24:00	3 (OFF)	60	0
Saturday	00:00	24:00	3 (OFF)	60	0
Sunday	00:00	24:00	3 (OFF)	60	0

Signed:	Johannesburg Roads Agency	**Signed:**	**Intersection Name:** Shakespeare and Akker/ Alwen Rd West
Name: M.Erasmus		**Name:** A du Toit	
Position Engineer		**Position:** Senior Traffic Engineer	**Intersection No.:** R2046
Date: 14-Apr-08		**Date:** 14-Apr-08	

ANNEXURE E

TRAFFIC SIGNAL PHASINGS AND TIMINGS

PHASING SUMMARY

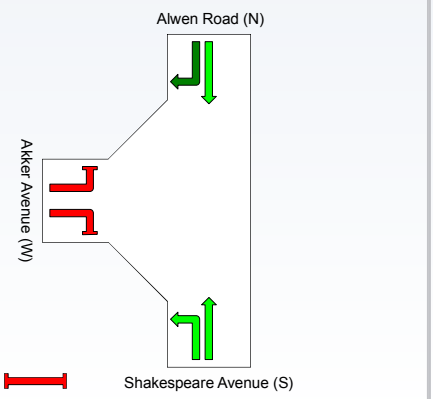
Akker Avenue / Alwen Road / Shakespeare Avenue Junction
2017 AM Peak Hour Background Traffic Volumes
Existing Configuration
Signals - Fixed Time Cycle Time = 80 seconds

Cycle Time Option: **User-specified Cycle Time**
Phase times specified by the user
Sequence: Opposed Turns
Input Sequence: A, B
Output Sequence: A, B

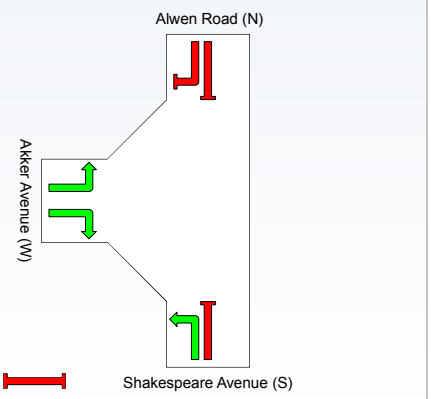
Phase Timing Results

Phase	A	B
Green Time (sec)	53	17
Yellow Time (sec)	3	3
All-Red Time (sec)	2	2
Phase Time (sec)	58	22
Phase Split	73%	28%

Phase A



Phase B



Normal Movement
Slip-Lane Movement
Stopped Movement
Turn On Red
Permitted/Opposed
Opposed Slip-Lane
Continuous Movement
Undetected Movement
Phase Transition Applied

Unlicensed Trial Version
PHASING SUMMARY

Site: 2017 PM BG

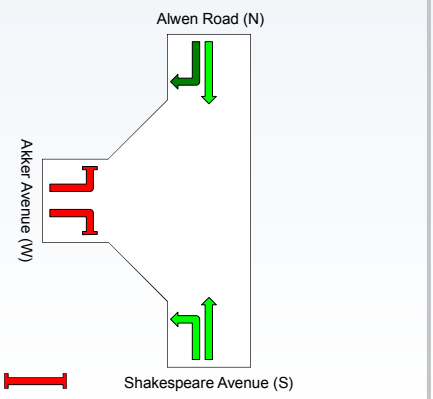
Akker Avenue / Alwen Road / Shakespeare Avenue Junction
2017 PM Peak Hour Background Traffic Volumes
Existing Configuration
Signals - Fixed Time Cycle Time = 70 seconds

Cycle Time Option: **User-specified Cycle Time**
Phase times specified by the user
Sequence: Opposed Turns
Input Sequence: A, B, C
Output Sequence: A, B, C

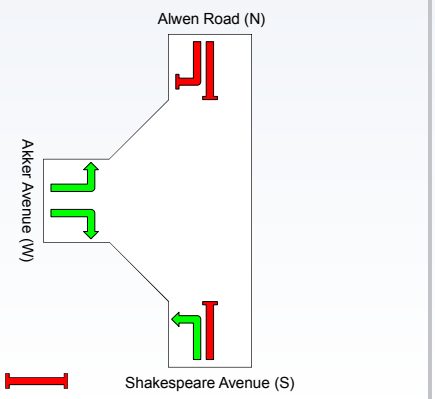
Phase Timing Results

Phase	A	B	C
Green Time (sec)	38	10	7
Yellow Time (sec)	3	3	3
All-Red Time (sec)	2	2	2
Phase Time (sec)	43	15	12
Phase Split	61%	21%	17%

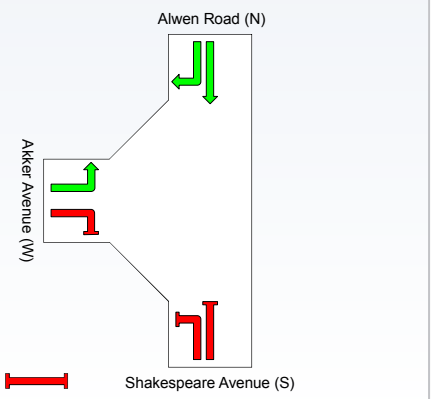
Phase A



Phase B



Phase C



Normal Movement
Slip-Lane Movement
Stopped Movement
Turn On Red
Permitted/Opposed
Opposed Slip-Lane
Continuous Movement
Undetected Movement
Phase Transition Applied

PHASING SUMMARY

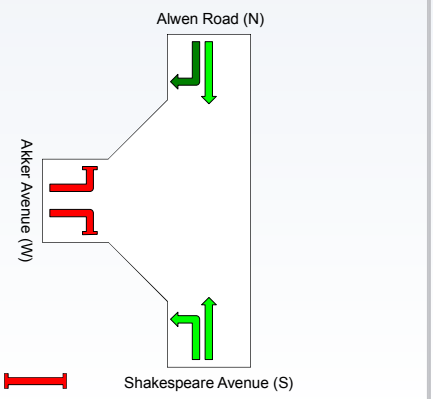
Akker Avenue / Alwen Road / Shakespeare Avenue Junction
2022 AM Peak Hour Background Traffic Volumes
Existing Configuration
Signals - Fixed Time Cycle Time = 80 seconds

Cycle Time Option: **User-specified Cycle Time**
Phase times specified by the user
Sequence: Opposed Turns
Input Sequence: A, B
Output Sequence: A, B

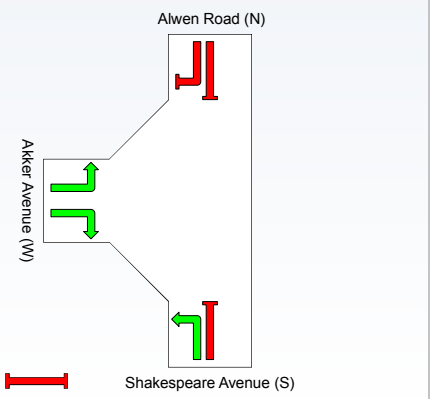
Phase Timing Results

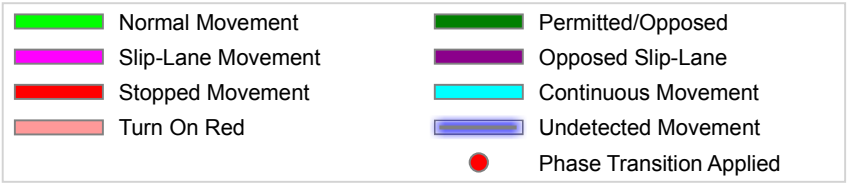
Phase	A	B
Green Time (sec)	53	17
Yellow Time (sec)	3	3
All-Red Time (sec)	2	2
Phase Time (sec)	58	22
Phase Split	73%	28%

Phase A



Phase B





PHASING SUMMARY

Site: 2022 PM BG

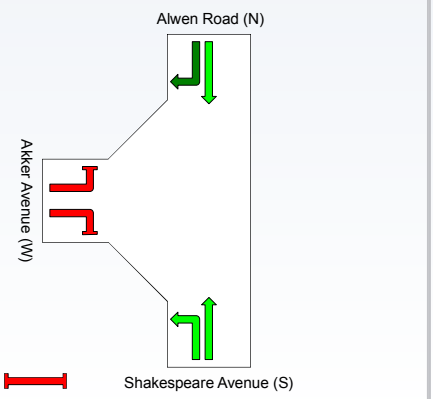
Akker Avenue / Alwen Road / Shakespeare Avenue Junction
2022 PM Peak Hour Background Traffic Volumes
Existing Configuration
Signals - Fixed Time Cycle Time = 70 seconds

Cycle Time Option: **User-specified Cycle Time**
Phase times specified by the user
Sequence: Opposed Turns
Input Sequence: A, B, C
Output Sequence: A, B, C

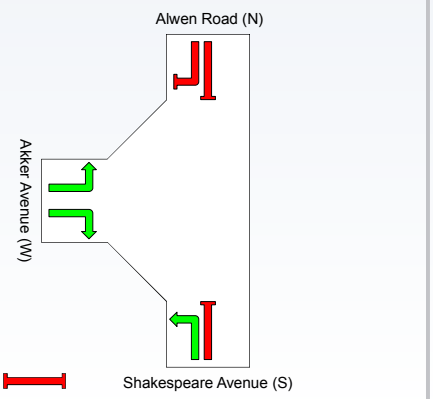
Phase Timing Results

Phase	A	B	C
Green Time (sec)	38	10	7
Yellow Time (sec)	3	3	3
All-Red Time (sec)	2	2	2
Phase Time (sec)	43	15	12
Phase Split	61%	21%	17%

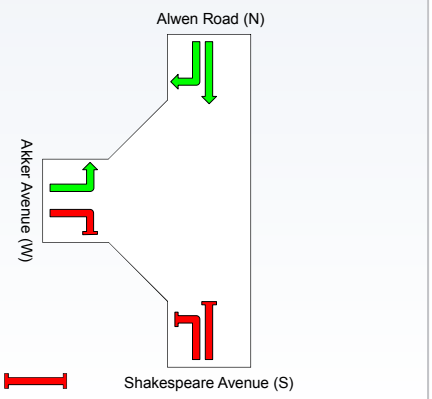
Phase A



Phase B



Phase C



Normal Movement
Slip-Lane Movement
Stopped Movement
Turn On Red
Permitted/Opposed
Opposed Slip-Lane
Continuous Movement
Undetected Movement
Phase Transition Applied

PHASING SUMMARY

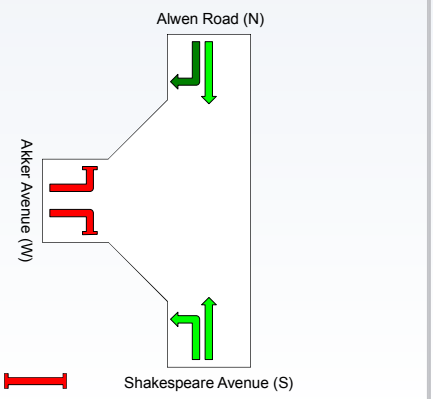
Akker Avenue / Alwen Road / Shakespeare Avenue Junction
2017 AM Peak Hour Background and Developement Traffic Volumes
Proposed Configuration
Signals - Fixed Time Cycle Time = 100 seconds

Cycle Time Option: **User-specified Cycle Time**
Phase times specified by the user
Sequence: Opposed Turns
Input Sequence: A, B
Output Sequence: A, B

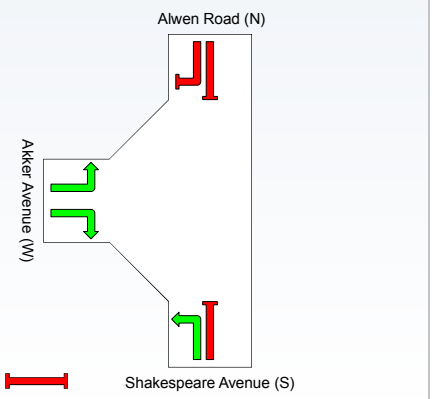
Phase Timing Results

Phase	A	B
Green Time (sec)	50	40
Yellow Time (sec)	3	3
All-Red Time (sec)	2	2
Phase Time (sec)	55	45
Phase Split	55%	45%

Phase A



Phase B



Normal Movement
Slip-Lane Movement
Stopped Movement
Turn On Red
Permitted/Opposed
Opposed Slip-Lane
Continuous Movement
Undetected Movement
Phase Transition Applied

PHASING SUMMARY

Site: 2017 PM BGD

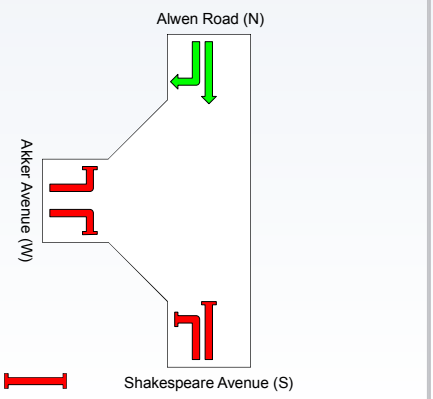
Akker Avenue / Alwen Road / Shakespeare Avenue Junction
2017 PM Peak Hour Background and Developement Traffic Volumes
Proposed Configuration
Signals - Fixed Time Cycle Time = 120 seconds

Cycle Time Option: **User-specified Cycle Time**
Phase times specified by the user
Sequence: Opposed Turns
Input Sequence: A, B, C
Output Sequence: A, B, C

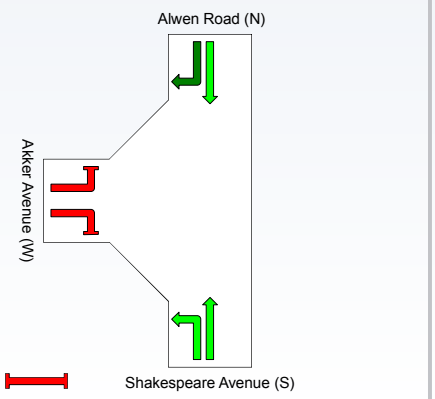
Phase Timing Results

Phase	A	B	C
Green Time (sec)	45	43	17
Yellow Time (sec)	3	3	3
All-Red Time (sec)	2	2	2
Phase Time (sec)	50	48	22
Phase Split	42%	40%	18%

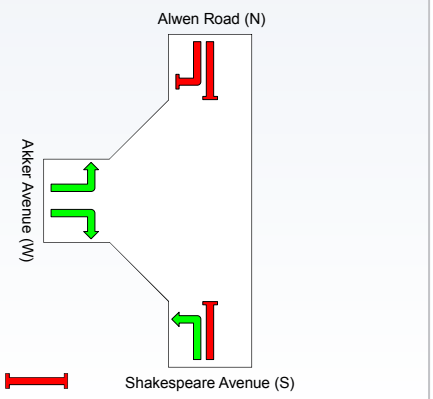
Phase A

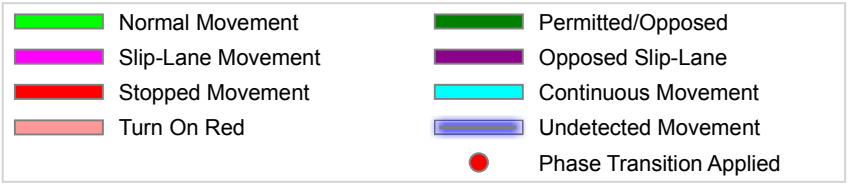


Phase B



Phase C





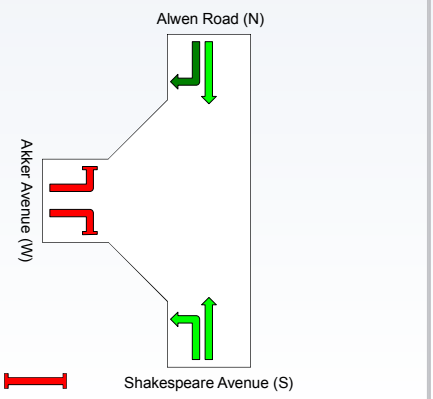
Akker Avenue / Alwen Road / Shakespeare Avenue Junction
2022 AM Peak Hour Background and Developement Traffic Volumes
Proposed Configuration
Signals - Fixed Time Cycle Time = 120 seconds

Cycle Time Option: **User-specified Cycle Time**
Phase times specified by the user
Sequence: Opposed Turns
Input Sequence: A, B
Output Sequence: A, B

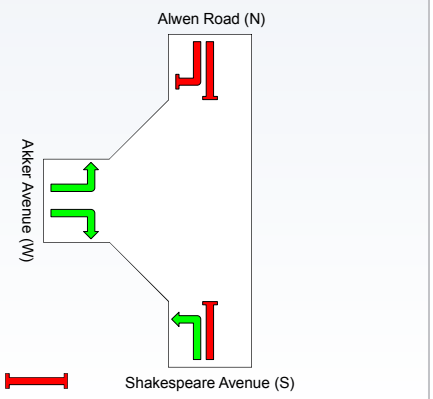
Phase Timing Results

Phase	A	B
Green Time (sec)	66	44
Yellow Time (sec)	3	3
All-Red Time (sec)	2	2
Phase Time (sec)	71	49
Phase Split	59%	41%

Phase A



Phase B



Normal Movement
Slip-Lane Movement
Stopped Movement
Turn On Red
Permitted/Opposed
Opposed Slip-Lane
Continuous Movement
Undetected Movement
Phase Transition Applied

PHASING SUMMARY

Site: 2022 PM BGD

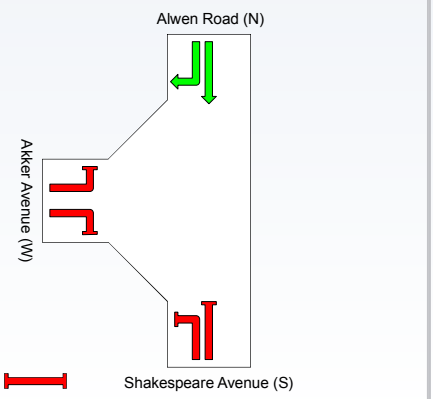
Akker Avenue / Alwen Road / Shakespeare Avenue Junction
2022 PM Peak Hour Background and Developement Traffic Volumes
Proposed Configuration
Signals - Fixed Time Cycle Time = 60 seconds

Cycle Time Option: **User-specified Cycle Time**
Phase times specified by the user
Sequence: Opposed Turns
Input Sequence: A, B, C
Output Sequence: A, B, C

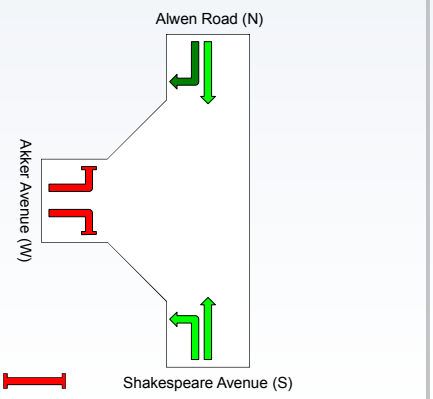
Phase Timing Results

Phase	A	B	C
Green Time (sec)	7	25	13
Yellow Time (sec)	3	3	3
All-Red Time (sec)	2	2	2
Phase Time (sec)	12	30	18
Phase Split	20%	50%	30%

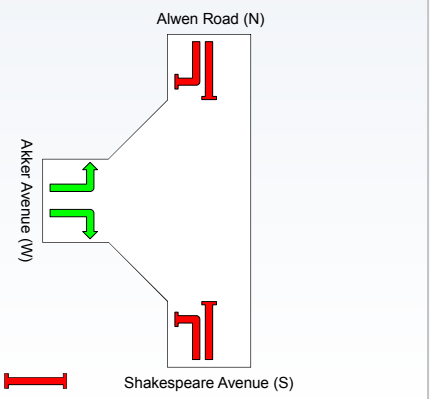
Phase A

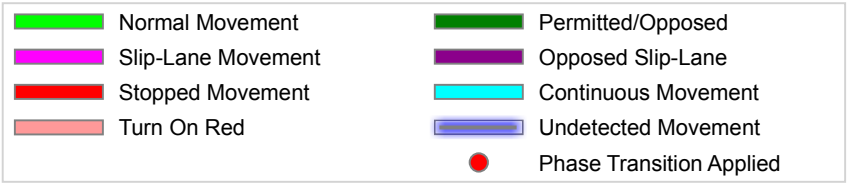


Phase B



Phase C





ANNEXURE F

STORAGE LANE CALCULATIONS

Required Storage Lane Calculation 18-Nov-16

ORMONDE EXTENSION 22 - SITE B DEVELOPMENT

AM PEAK HOUR TRIP ASSIGMENT
(ACCESS OFF MSASA CRESCENT)

Input Values:

Trips

	Development IN	37	/h
	Development OUT	112	/h

from: Guidelines for traffic Impact Studies - Table 5.2: Typical parking control service rates per lane

Security gate	max. service rate: Coded Card Reader	350	/hour
Number of channels (IN)	**N**:	1	lanes
Number of channels (OUT)	**N**:	1	lanes
Exceed Probability:	M (queue L) could be exceeded	5%	of the time

Output values:
Trips Generated:

Peak hour:	Primary direction (demand/arrival rate) **q1**:	37	
	Secondary direction (demand/arrival rate) **q2**:	112	
		149	v/h (100%)

Queue length (M) *(ref. Transport & Land Development By Stover / Koepke Eq 8-9b)*

Utilization factor (ρ): ***ρ = q(1,2) / NQ*** *= arrival rate [demand] / (number of channels x service rate per channel)*

ρ =demand (arrive) rate / (**N** x max. service rate)

= 37 / (1 x 350) = 0.1057

= 112 / (1 x 350) = 0.3200

Qm1 (from Table 8-11) = 0.1057

Qm2 (from Table 8-11) = 0.2400

Queue length (M)1 = ((LN[**Probability**]-LN[**Qm**]) / LN[**ρ**]) - 1

= ((LN[0.05]-LN[0.106]) / LN[0.106]) - 1

= (-0.749 / -2.247) - 1 = **-0.7** **Zero queue**

-6 *m*

Queue length (M)2 = ((LN[**Probability**]-LN[**Qm**]) / LN[**ρ**]) - 1

= ((LN[0.05]-LN[0.240]) / LN[0.320]) - 1

= (-1.569 / -1.139) - 1 = **0.7** **Vehicles**

6 *m*

Required Storage Lane Calculation 18-Nov-16

ORMONDE EXTENSION 22 - SITE B DEVELOPMENT

PM PEAK HOUR TRIP ASSIGMENT
(ACCESS OFF MSASA CRESCENT)

Input Values:

Trips

	Development IN	105	/h
	Development OUT	45	/h

from: Guidelines for traffic Impact Studies - Table 5.2: Typical parking control service rates per lane

Security gate	max. service rate: Coded Card Reader	350	/hour
Number of channels (IN)	**N**:	1	lanes
Number of channels (OUT)	**N**:	1	lanes
Exceed Probability:	M (queue L) could be exceeded	5%	of the time

Output values:
Trips Generated:

Peak hour:	Primary direction (demand/arrival rate) **q1**:	105	
	Secondary direction (demand/arrival rate) **q2**:	45	
		150	v/h (100%)

Queue length (M) *(ref. Transport & Land Development By Stover / Koepke Eq 8-9b)*

Utilization factor (ρ): ***ρ = q(1,2) / NQ*** *= arrival rate [demand] / (number of channels x service rate per channel)*

ρ =demand (arrive) rate / (**N** x max. service rate)

= 105 / (1 x 350) = 0.3000

= 45 / (1 x 350) = 0.1286

Qm1 (from Table 8-11) = 0.2000

Qm2 (from Table 8-11) = 0.1286

Queue length (M)1 = ((LN[**Probability**]-LN[**Qm**]) / LN[**ρ**]) - 1

= ((LN[0.05]-LN[0.200]) / LN[0.300]) - 1

= (-1.386 / -1.204) - 1 = **0.5** **Vehicles**

6 *m*

Queue length (M)2 = ((LN[**Probability**]-LN[**Qm**]) / LN[**ρ**]) - 1

= ((LN[0.05]-LN[0.129]) / LN[0.129]) - 1

= (-0.944 / -2.051) - 1 = **-0.6** **Zero queue**

-6 *m*

ANNEXURE G

PROPOSED ROAD UPGRADES LAYOUT PLANS FOR ERVEN 962 AND 963

CIVIL CONCEPTS

ORMONDE X22: PROPOSED EXTERNAL ROAD UPGRADES
AKKER AVE. / ALWEN RD / SHAKESPEARE AVE INTERSECTION

DATE 2016/11/10

SCALE 1:500

CIVIL CONCEPTS

ORMONDE X22: PROPOSED EXTERNAL ROAD UPGRADES
ALWEN ROAD / DORADO AVENUE INTERSECTION

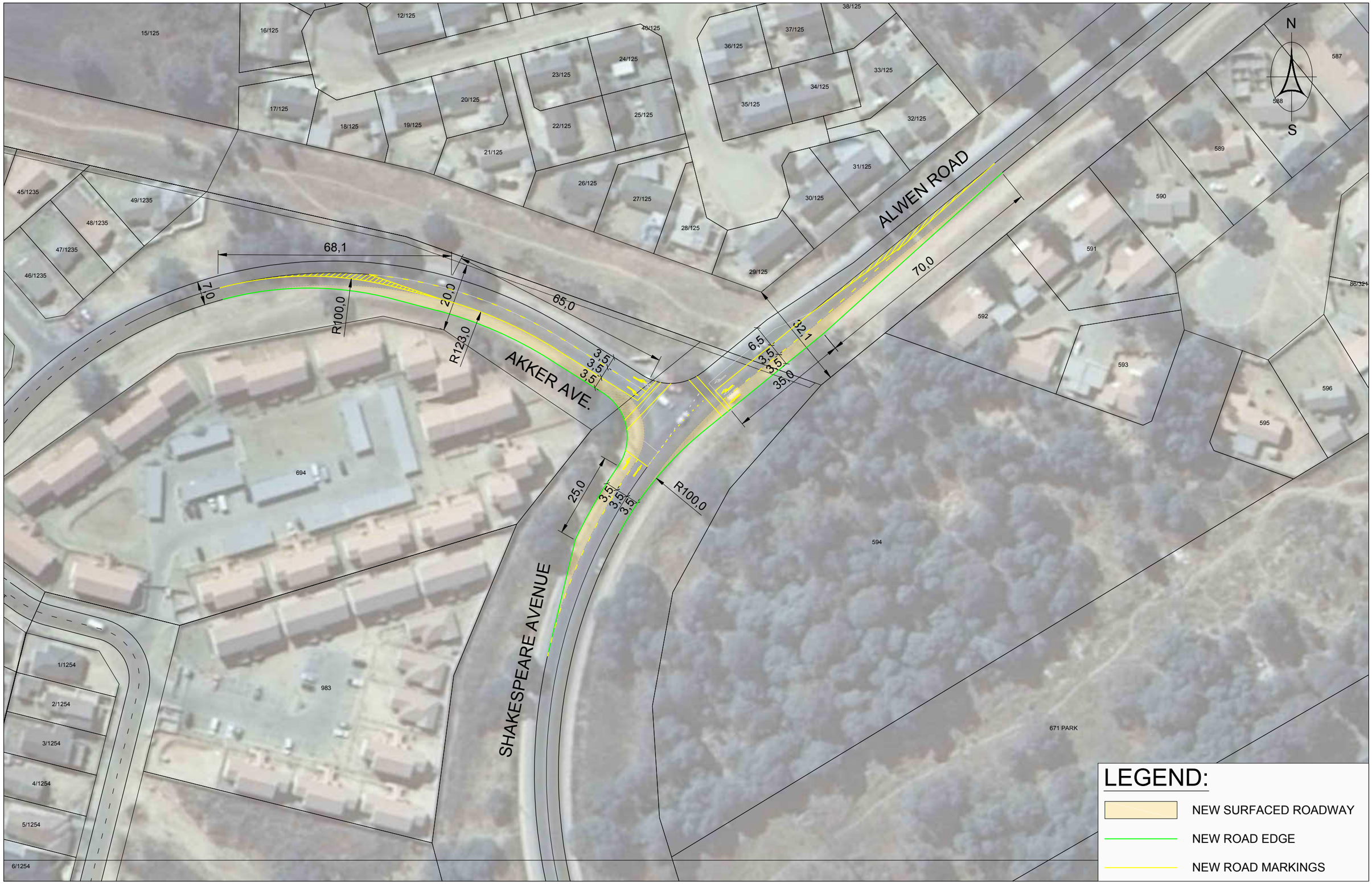
DATE
2016/11/10

SCALE
1:500

ANNEXURE H

ULTIMATE PROPOSED ROAD UPGRADES

LAYOUT PLANS OF ALL FOUR SITES

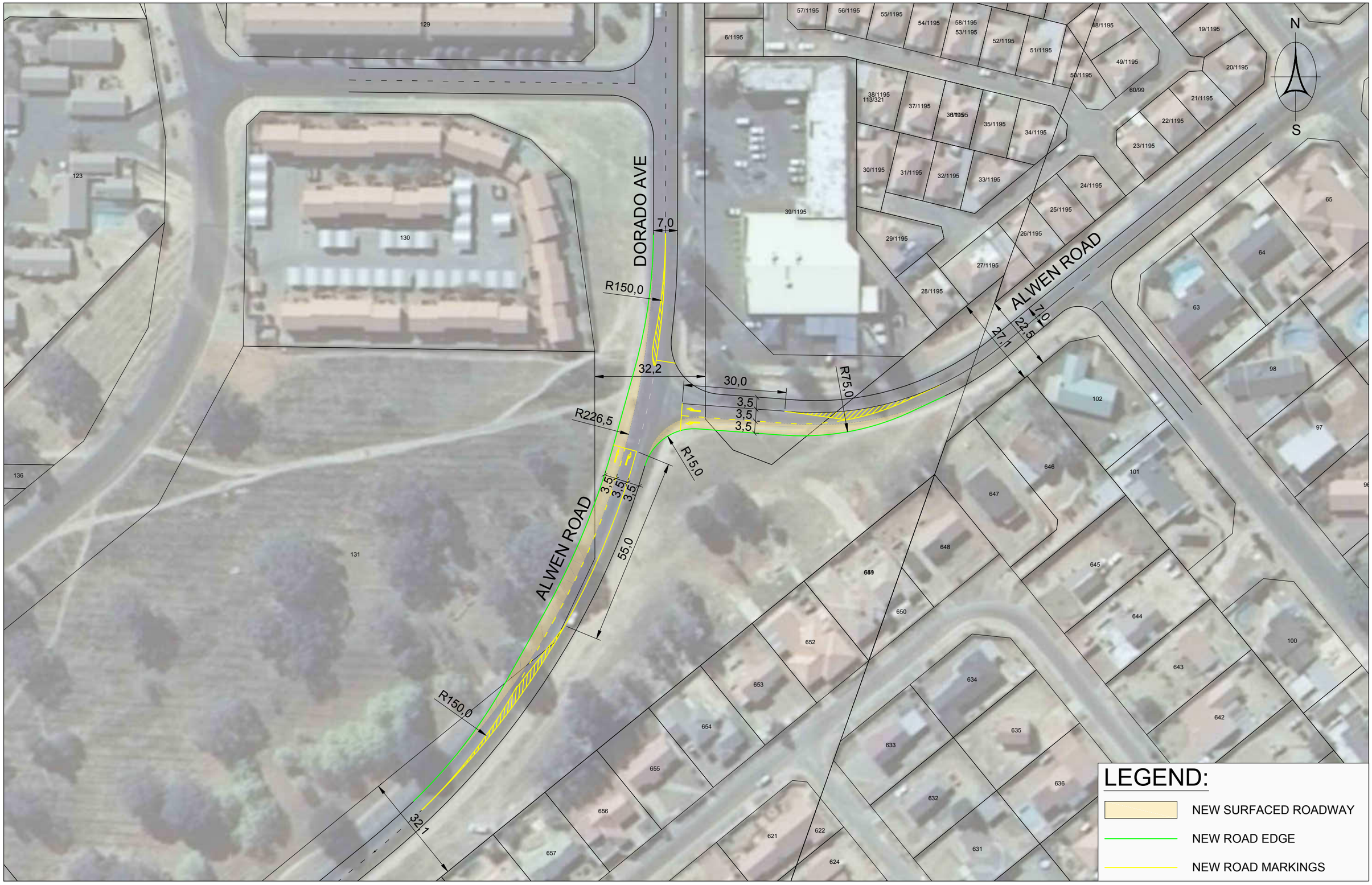


CIVIL CONCEPTS

ORMONDE X22: PROPOSED EXTERNAL ROAD UPGRADES
AKKER AVENUE / ALWEN ROAD / SHAKESPEARE AVENUE INTERSECTION

DATE
2016/11/17

SCALE
1:1000

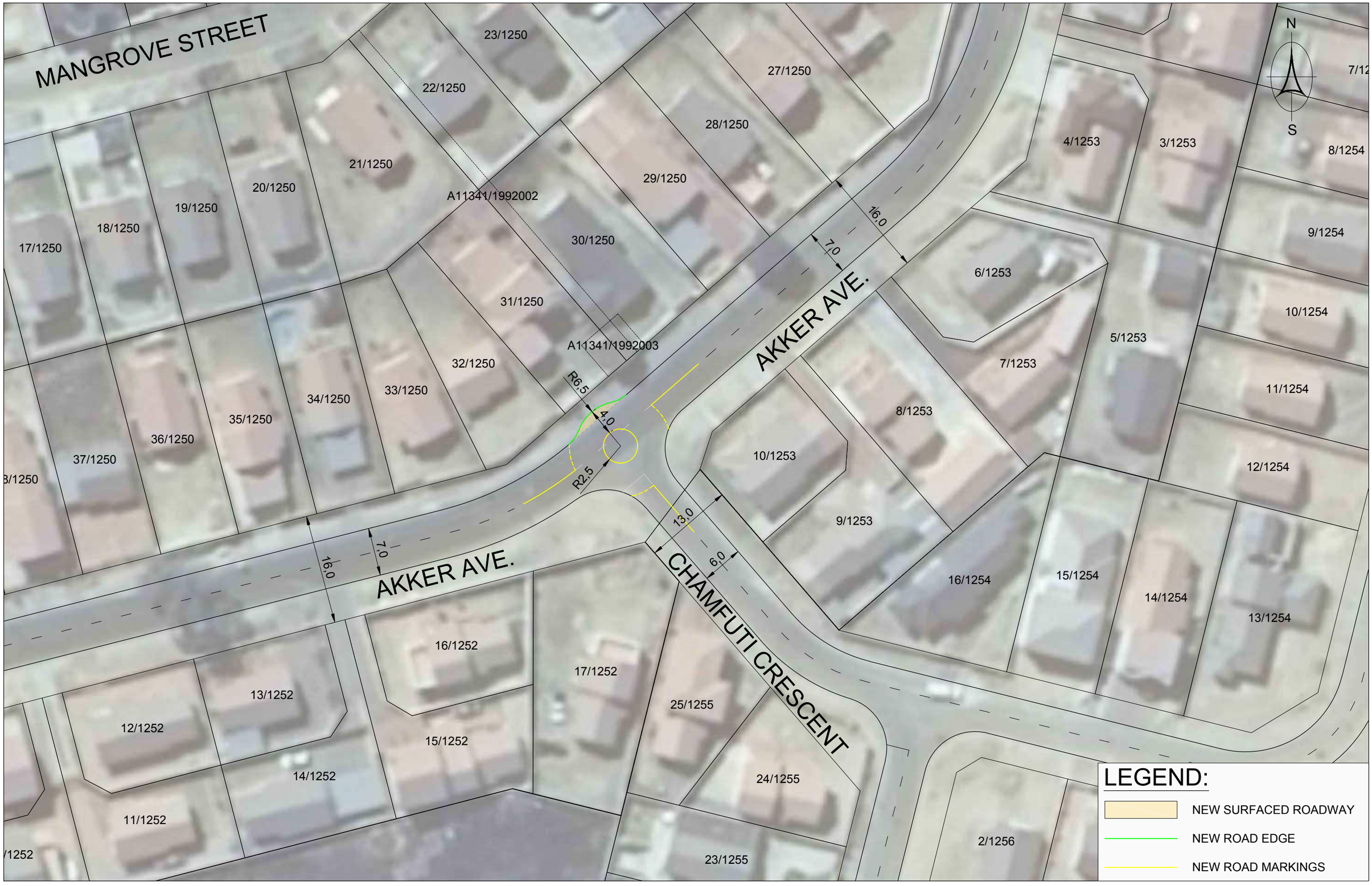


CIVIL CONCEPTS

ORMONDE X22: PROPOSED EXTERNAL ROAD UPGRADES
ALWEN ROAD / DORADO AVENUE INTERSECTION

DATE 2016/11/17

SCALE 1:1000



CIVIL CONCEPTS

ORMONDE X22: PROPOSED EXTERNAL ROAD UPGRADES
AKKER AVENUE / CHAMFUTI CRESCENT INTERSECTION

DATE
2016/11/17

SCALE
1:500

CIVIL CONCEPTS

ORMONDE X22: PROPOSED EXTERNAL ROAD UPGRADES
AKKER AVENUE / MSASA CRESCENT INTERSECTION

DATE 2016/11/17

SCALE 1:500

No	INTERSECTION	CONSTRUCTION TYPE	ROADWAY	EARTH WORKS	KERBING	REMOVE KERBS	PAINT LINES	PAINT SYMBOL	REMOVE & REPLACE GUARDRAIL	RELOCATE KERB INLET	RELOCATE STREET LIGHT	RELOCATE SIGN	REMOVE TREE	TRAFFIC SIGNALS	TOTAL PER UPGRADE (RANDS)
		UNIT	m²	m²	m	m	m	m²	m	No.	No.		No.	COMPLETE	
		RANDS / UNIT	***1200***	***120***	***170***	***60***	***80***	***150***	***700***	***15000***	***7500***	***3500***	***3500***	***1000000***	
1	AKKER AVE / ALWEN RD / SHAKESPEARE AVE		840	1150	360	365	650	65	100	2	3	2	11	0.5	**R 1 958 850.00**
2	ALWEN ROAD / DORADO AVE		625		280	285	505	65		1	6	3	2	1	**R 1 942 350.00**
3	AKKER AVE / MSASA CRESCENT		15		12	11	60	10							**R 27 000.00**
4	AKKER AVE / CHAMFUTI CRESCENT		15		12	11	60	10			1				**R 34 500.00**
5															
6															
	SUB-TOTAL UNITS		1495	1150	664	672	1275	150	100	3	10	5	13		
	SUB-TOTAL PRICE (RANDS)		**R 1 794 000**	**R 138 000**	**R 112 880**	**R 40 320**	**R 102 000**	**R 22 500**	**R 70 000**	**R 45 000**	**R 75 000**	**R 17 500**	**R 45 500**		
												TOTAL			**R 3 962 700.00**
												Add: Contingencies	**10%**		R 396 270.00
															R 4 358 970.00
												VAT	**14%**		R 610 255.80
												AMOUNT			**R 4 969 225.80**

ANNEXURE I

COST ESTIMATES OF THE PROPOSED UPGRADES

No	INTERSECTION	CONSTRUCTION TYPE	ROADWAY	EARTH WORKS	KERBING	REMOVE KERBS	PAINT LINES	PAINT SYMBOL	REMOVE & REPLACE GUARDRAIL	RELOCATE STREET LIGHT	RELOCATE OH LINE POLE	RELOCATE SIGN	REMOVE TREE	TRAFFIC SIGNALS	TOTAL PER UPGRADE (RANDS)
		UNIT	m^2	m^2	m	m	m	m^2	m	No.	No.		No.	COMPLETE	
		RANDS / UNIT	***1200***	***120***	***170***	***60***	***80***	***150***	***700***	***7500***	***12000***	***3500***	***3500***	***1000000***	
1	AKKER AVE / ALWEN RD / SHAKESPEARE AVE		200	1000	90	90	90	15	100	3		1	8	0.25	**R 764 150.00**
2	ALWEN ROAD / DORADO AVE		300		117	118	150	35				1			**R 407 720.00**
	SUB-TOTAL UNITS		650	1000	252	235	260	50	100	3	0	2	10		
	SUB-TOTAL PRICE (RANDS)		**R 780 000**	**R 120 000**	**R 42 840**	**R 14 100**	**R 20 800**	**R 7 500**	**R 70 000**	**R 22 500**	**R 0**	**R 7 000**	**R 35 000**		
												TOTAL			**R 1 369 740.00**
												Add: Contingencies	**10%**		R 136 974.00
															R 1 506 714.00
												VAT	**14%**		R 210 939.96
												AMOUNT			**R 1 717 653.96**