
SOLAIR CONCEPT PLAN

Rural Municipality of Corman Park, SK

April 2024



SOLAIR CONCEPT PLAN

Rural Municipality of Corman Park, SK
April 2024

Prepared for:
Arbutus Properties

Prepared by:
Lateral Office
Lola Sheppard, M.Arch, OAA, OAQ

Kerr Wood Leidal Consulting Engineers
Chris Johnson, P.Eng

Catterall & Wright Consulting Engineers
Phil Shilling, P.Eng

Wallace Insights
Al Wallace RPP, MCIP



TABLE OF CONTENTS

EXECUTIVE SUMMARY	5
1.0 DEVELOPMENT CONTEXT	7
1.1 Location & Area	
1.2 Planning Context	
1.3 Plan Objectives	
1.4 Solair's Alignment with Regional Priorities	
2.0 BACKGROUND INFORMATION	10
2.1 Existing Conditions	
2.2 Engineering and Environmental Assessments	
2.3 Geotechnical Assessments	
2.4 Ecological Assessment	
3.0 DESIGN RATIONALE	11
4.0 DESIGN PRINCIPLES	13
5.0 PLAN COMPONENTS	14
5.1 Residential	
5.2 Mixed Use Development	
5.3 Commercial Developments	
5.4 Parks & Pedestrian linkages	
6.0 TRANSPORTATION	18
6.1 Background	
6.2 Traffic Analysis	
6.3 Pedestrian Facilities	
7.0 SUSTAINABLE INFRASTRUCTURE	20
7.1 Energy - Solar PV	
7.2 Proposed System	
7.4 Proposed Watermain System	
7.3 Proposed Sanitary Sewer System	
8.0 IMPLEMENTATION	25
8.1 A P3 Approach To Building Solair	
8.2 Cost Benefit Analysis	
8.3 Development Staging	
8.4 Approval Process	
9.0 PUBLIC ENGAGEMENT	29
9.1 Engagement Plan	
9.2 Engagement Results	
CONCLUSION	31
DOCUMENTS REFERENCED	
LIST OF DRAWINGS	

TABLE OF CONTENTS CON'T

APPENDIX 1 - SOLAIR KEY CONCEPTS	32
APPENDIX 2 - P4G POLICY ALIGNMENT.....	40
APPENDIX 3 - POLICY ALIGNMENT	47
APPENDIX 4 - ARBUTUS LETTER OF INTENT	51
APPENDIX 5 - RAIN GARDEN AND OVERLAND WATER APPROACH	56
APPENDIX 6 - LETTER OF INTENT BETWEEN ARBUTUS & DES NEDHE	61
APPENDIX 7 - PUBLIC ENGAGEMENT REPORT	65
APPENDIX 8 - LETTER OF INTENT FROM OPERATIONS/MAINTENANCE CONTRACTORS	73
APPENDIX 9 - RETAIL ANALYSIS	77
APPENDIX 10 - TRAFFIC IMPACT ANALYSIS	80

EXECUTIVE SUMMARY

Arbutus Properties has entered a partnership with the owners of 63.8 hectares (158 acres) of land, located on the quarter section NW 16-36-6-W3, and adjacent to the CP rail tracks east of The Meadows in Saskatoon. The Partnership is proposing to take a highly sustainable approach to development of these lands than the standard suburban subdivisions which dominate the Canadian landscape. This new approach has already involved a number of collaborations including the University of Saskatchewan, University of British Columbia's School of Community and Regional Planning, Arizona State University, the Province of Saskatchewan, the Saskatoon North Partnership for Growth (P4G) and a cross section of planning and engineering experts and Saskatoon community members. This will be a bold initiative; a sustainable suburban neighborhood unlike any in Canada. With all of the research and collective knowledge we have about the state of our planet's environment, the Partnership, with the assistance and support of the P4G Partners, will blaze a new trail for greenfield development by proposing this bold new alternative development model.

This undeveloped land offers a unique opportunity to demonstrate for all urban and rural municipalities in Canada, who are also experiencing rapid growth, that there is a different way to develop: to be greener, to minimize the impact of the built form, to de-emphasize the automobile, to provide more pedestrian and bike-oriented living, to deliver localized small scale retail and live/work environments, and to build a community with a strong sense of identity which is in alignment with the natural environment. And to do so within a regional setting and scale. Based on the project's sustainable approach and the fact that this neighbourhood will be powered by a community solar energy system, the name Solair has been selected for this area.

When fully developed, the Solair neighbourhood will have approximately 1700 units of housing of which 640 are single family housing and approximately 1060 of mid-density housing and mixed-use units, anticipating a residential population of approximately 4050 people. A diverse range of housing options will be provided in Solair to appeal to people of varying income levels and ages. The plan sets up linkages between the Solair site and adjacent future neighbourhoods in Saskatoon and the surrounding RM lands through integrated transportation networks, trails and park systems. It will also support local urban agriculture and community food production.

The Partnership is embarking on a very different development path for Solair; one born out of sense of doing the right thing at a time when a departure from the traditional suburban land development is needed and the belief that there is a growing market for this type of project in the Saskatoon region. The project aligns with the regional (P4G's) stated priorities and will lead the way in design and sustainability innovation.

There are several key factors supporting this project.

1) The regional plan (Saskatoon North Partnership for Growth – P4G) has been adopted by all five municipal partners in September 2020. A new zoning bylaw and new planning district were approved and took effect on January 1, 2022. The land use provided for in the Solair development completely aligns to the P4G Land Use Plan (the District OCP).

2) The region needs a truly sustainable project such as Solair. Saskatchewan municipalities are beginning to adopt sustainable growth principles and low impact development standards, and have talked about this kind of development initiative for a

long time. Unfortunately, there are few to no examples on the ground, built to scale. Solair offers a critical opportunity for proof of concept, demonstrating that such a development is entirely doable, economically viable, environmentally performative, and desirable by the market.

3) Solair creates more residential options by filling a gap in the residential marketplace and addresses the lack of location choices that Saskatoon is facing once the Lakewood Sector is completed. Only 3 development sectors remain within the City of Saskatoon, plus University infill lands. Solair solves this limited choice problem by advancing several new planning, housing and infrastructure initiatives at a neighbourhood scale.

4) Solair is unique because it does not require large and expensive trunk systems for sanitary, storm or water infrastructure.

5) Solair challenges the urban/rural divide and develops a density which does not require a large centralized pipe and plant systems. Proven technology and Low Impact Development standards allow this to happen.

6) Solair will promote a truly regional model for service delivery. It moves current thinking forward and requires the municipalities to move beyond a co-operative, but divided growth model, towards a metropolitan framework. It may be time for the RM to think about expanded service provision. This is an evolution in the growth of the residential sector and challenges us to think about sustainability in all jurisdictions.

There are however, significant financial risks involved. In order to mitigate these risks, the Partnership has embarked on an iterative planning and design process so we can assess potential outcomes at each step of the way. Solair is a project anticipated and contemplated by the new P4G Regional Plan. It will advance the thinking of what a sustainable metropolitan region can be in the Saskatoon regional context.

1.0 DEVELOPMENT CONTEXT

1.1 Location & Area

The 64 hectare property lies northeast of the CP rail mainline and east of Zimmerman Road in the southeast of Saskatoon (See to Figure 1). The current land use is agricultural. As it is currently being used for farming purposes, there is no drainage plan or municipal services to, or within the property. The site is outside the City of Saskatoon’s municipal boundaries and lies within the P4G Planning District.

The site is located adjacent to Saskatoon's Lakewood and Holmwood Sector plans which extend west and north of the site. The 2017 Holmwood Sector Plan (HSP) designates future development in that sector primarily as urban residential, aligned with the land use of the Solair project. See Figures 2 and 3 for location of site and current land use. See Figure 4 for relation of the Solair site to Lakewood and Holmwood Sectors.

1.2 Planning Context

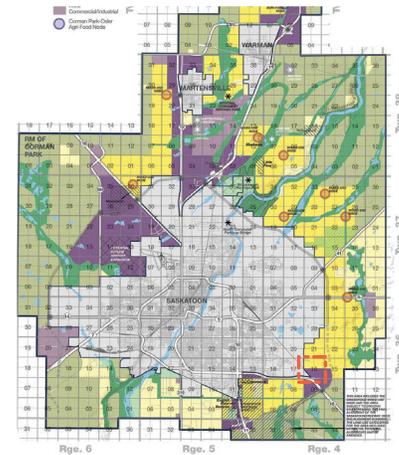
The focus of the Partnership proposal is two-fold; one to provide a sustainable and affordable alternative housing type targeted to a market with an unfulfilled need and desire. Secondly, the Partnership believes doing a project that is more focused on a lower impact on the environment with renewable energy and green approaches will be of interest to the RM of Corman Park and its regional partners, the Province of Saskatchewan and the Government of Canada. This radically different approach to regional sustainable development could assist in mobilizing support and meaningfully address issues around the formidable global issue of climate change that hasn't been focused on enough in Saskatchewan or the other prairie provinces. The Solair project will be independently serviced. Solair is the first regional urban project, built to scale, which will not require direct connection to City water, sanitary sewer or infrastructure. The project will serve as a model of regional sustainable development across Canadian cities which are also experiencing rapid growth.

According to the Saskatoon North Partnership for Growth Regional Land Use Map, the land currently outside of the Saskatoon municipal boundary is designated for future Urban Residential use. While the Solair development conforms to the District Official Community Plan (DOCP) land use, the RM of Corman Park requires this Solair Concept plan to be appended to the P4G DOCP, to which it will provide a development framework to support subsequent rezoning and subdivision of the Solair. Therefore, this development application is to append this concept plan to the P4G DOCP to provide a development framework to support subsequent rezoning and subdivision of the Solair community.

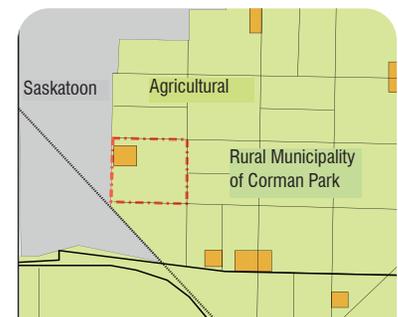
1.3 Plan Objectives

The objectives of the Solair Development Project are to:

- Develop an integrated design and interface between Solair, a complete regional community, and surrounding neighbourhoods, to create a unique, new residential neighbourhood currently not offered in the RM of Corman Park or the Saskatoon region, in terms of mobility, open space networks, and urban/rural relationships.



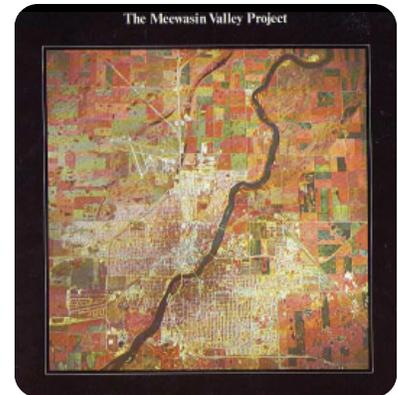
Planning for Growth Land Use Plan



Land use around Solair lands in RM of Corman Park



- Ensure efficient access and egress into and within the neighbourhood.
- Ensure strong vehicular, transit, bike and open space linkages between Solair and the surrounding neighbourhoods over the long term.
- Solair will be developed to be 'transit-ready'. There is no requirement or expectation for transit service in the early phases of development. Solair remains ready to accept transit service when regional transit options are made available.
- Develop the highest caliber of sustainable design, including the integration of renewable energy infrastructure, on-site water and wastewater management, and energy building design, at scale.
- Ensure design excellence and innovation in the planning of the community, the design of housing typologies, and design of unique open spaces.
- Develop a range of housing and mixed-use building types to attract a diverse range of age and income demographics to create a vibrant and integrated community to satisfy a growing portion of the market that seeks socially and environmentally conscious lifestyles.
- Provide opportunities for local food production, beyond typical community gardens, to support environmental and community sustainability.



1.4 Solair's Alignment with Regional Priorities

As a new regional development, Solair addresses many of the key ambitions of the P4G in relation to urban neighbourhood development.

- Efficient use of land and infrastructure
- Connectivity to existing transit networks
- Urban form and green spaces which promote biking and walking
- Provision of a range of housing types to meet the needs of all people
- Provision of housing types that encourage live work and small scale entrepreneurs in the community

The Solair project ties directly into a number of P4G objectives, which the RM of Corman Park, along with its four other municipal partners have signed onto. These objectives include focusing future urban growth on residential development, and in particular on the development of complete, innovative communities, and developments which minimize land use. Now is the time for a regional approach to urban growth and development. The P4G creates this opportunity using inter-municipal agreements, and other tools offered within the Planning and Development Act. See Appendix 2 for a full discussion on Solair's alignment to P4G policy.

The project also aligns with several priorities articulated over forty years ago in the Meewasin Valley Project, authored by architect Raymond Moriyama (1977) which advocated for supporting recreational, educational and cultural nodes, in close relationship to the existing landscape and river network, for the City of Saskatoon and Corman Park.

For additional planning and design context, it is worth recalling the principles set out in the original Meewasin Valley Project as it exemplifies many of the objectives that Solair is attempting to address, albeit not all are applicable today.

Moriyama, in rather visionary fashion, noted: "There is a need to define these [new] communities, but to define prematurely is to kill their potentials: if they could be clearly defined in advance, there would be no need for research and for 'live-in' testing."

Moriyama understood that change occurs incrementally. He identified several high level issues below which society needs to begin to address and resolve over time. Solair begins to address some of these issues.

- a) increasing demand for water
- b) alternative sources of energy
- c) energy conservation
- d) waste recycling
- e) food growing (hydroponic, fish, meat)
- f) social organization
- g) densities in urban and rural areas
- h) materials and forms indigenous to the land
- i) relationships to natural frameworks (sloughs, coulees, aspen rings)
- j) better adaptation to the climate of the area
- k) methods of treating and using highly mineralized ground water
- l) maintaining acceptable water quality in lakes for recreation

Solair seeks to carry forward the ambitious social and ecological vision put forward in the Meewasin Valley report; one which uses design as a tool for promoting awareness and stewardship about the land, ecology, and community.

2.0 BACKGROUND INFORMATION

2.1 Existing Conditions

The lands for the Solair Project are designated for Urban Residential use in the current P4G land use plan. The CP rail line, with its right of way, defines the western edge of the site. Future Taylor Street, which is a primary arterial roadway on the east side of the river, will form the northern edge of the site, and offer strong connectivity between Solair and the larger Saskatoon region. The Rosewood neighbourhood lies to the west of the site and the Holmwood area lies mainly to the north. Some existing seasonal wetland features also exist on site.

2.2 Engineering and Environmental Assessments

The “Phase 1 Environmental Site Assessment of the Franko Land Parcels,” performed by Polson Environmental in April 2017 does not identify any environmental concerns. There do not appear to have been any dump sites on any of the land, or adjacent lots. As per the report, the land appears to have been cultivated since 1944 and likely continuously up until 2016. The report notes that the surficial geology of the site is described as GLP – Glacial Lacustrine Plain, which offers moderately well drained soils. The extent of the wetlands on the site varies by year depending on the amount of precipitation and snow cover. There are several power and natural gas lines and telephone cables, on the site.

2.3 Geotechnical Assessments

The “Preliminary Geotechnical Investigation” for Solair, prepared by P. Machibroda Engineering LTD notes that the general subsurface soil conditions encountered during field investigations consisted of a layer of topsoil underlain by variable deposits of low to medium plastic silt and medium to highly plastic clay followed by glacial till. The current groundwater table appears to be situated between approximately 1.1 to 3.2 metres below the existing ground surface with an average depth of 2.2 metres. The groundwater will fluctuate with site drainage and seasonable changes. Higher groundwater levels should be expected during and/or following periods of precipitation or snow-melt. The preliminary assessment does not present any unforeseen or unusual conditions that would cause concern for civil infrastructure construction and operation and suggests typical building construction for Saskatchewan.

2.4 Heritage Desktop Screening

An online screening of the subject lands has revealed that there are no designated heritage sites within the boundaries. Furthermore, these lands are not heritage sensitive according to the Saskatchewan Developers Online Screening Tool.

2.5 Ecological Assessment

According to the November 2015 “Holmwood East Natural Area Screening Study,” prepared by Golder Associates for the City of Saskatoon, the southeast Holmwood study area is located within the Moist Mixed Grassland Ecoregion. Wetlands on the site seem to be of the semi-permanent type, with typical vegetation being cattails, and varieties of bulrushes (p.23). Most of the wetlands on the Solair site drain towards the Holmwood North Drainage Area. The study notes that most of the area is characterized by an anthropogenically-disturbed landscape that has been extensively modified (e.g., cultivation, road/infrastructure construction and use, and occupied dwellings), the natural habitat quality for both vegetation and wildlife has been adversely affected. The study concludes that most of the wetlands that exist have already been “extensively modified” and operate in a patchwork fashion, creating habitats that are largely associated with the dispersed, isolated wetland complexes. Their long-term viability is still unknown but “efforts should be employed to apply sound ecological principles as part of the planning process.”

3.0 DESIGN RATIONALE

The design project was based on the findings of an extensive six-month research project led by University of British Columbia Community and Regional Planning graduate students, reviewing historic and current thinking about sustainable urbanism. Their research made clear that across decades of planning precedents, certain key themes in sustainability emerge which strongly informed Solair's design.

a) Neighbourhood Pattern and Design

Key to social sustainability is a mix of uses to support a range of demographics. The plan seeks to create a hierarchy of streets and urban fabrics, and a range of housing types. Higher densities ensure smaller footprint on the land, a greater mix of housing types, walkable communities, and better streetscapes, while maintaining the advantages of suburban living. The blocks are oriented north-south, offering the majority of houses east-west exposure. This has benefits for solar photo-voltaic (pv) panels and also sunlight exposure to both front and back yards.

b) Integration and Linkage

Future regional suburbs will need to consider greater connectivity within the community and in relation to the city, through adjacency, transit, bike routes and improved urban design. The Solair plan encourages walking to local shops and creates connectivity across neighbourhoods, through expanded pedestrian and bike trails. The plan is unique but will ultimately integrate well with adjacent urban and rural frameworks and promotes a healthy lifestyle.

c) Green Space and Amenities

Key to community building is a range of open spaces and landscapes, diverse in size and character, that support a variety of activities; small local parks for playing or meeting up, larger community parks for sports, and a linear trail park tied to biking, jogging and recreational activities shape the identity of Solair. The parks are located in existing topographically low-lying parts of the site, to support drainage integration. As much as possible, native plant species will be used, both to enhance local ecologies and reinforce a sense of the distinct Saskatoon regional landscape.

The parks are conceived in terms of activities across seasons: sports fields, community gardens, winter sledding and skating, amongst others. A significant tree canopy, created by tree planting along the streets, as well as in the numerous parks, will reduce the heat island effect and support biodiversity, while contributing to the character of the neighbourhoods.

d) Local Food Production

Agricultural and horticultural uses are permitted within dedicated municipal reserve lands. The Solair design anticipates that there will be demand for community-owned and operated gardens and organic food plots. Part of the municipal reserve dedication for this project will include a range of plot sizes to be allocated and identified for this purpose making Solair a unique blend of urban and rural settings and lifestyles.



Horsted Park, Kent, UK



Folsom powerhouse, sustainable housing, San Francisco



Playground, upstate New York



Community infrastructure: St Vital park pavilion, Winnipeg



Community gardens, The Beaches, Toronto

Urban farm plots and gardens will be sized and located according to the requirements of local commercial food producers and community needs. Solair will pursue the possibility of capturing the profits from food production and re-invest in further enhancements to food production infrastructure. A farmers market, or local grocery outlet will be considered. There is a growing market and desire to source food locally to reduce GHG emissions and carbon footprint. Parts of the site may be used as an incubator for new farmers and as demonstration fields. It is possible to consider using detention to irrigate the Urban Agricultural Zone.

Farm plots provide opportunities for teaching and learning about food production. Studies have shown that many urban youth have no idea where food comes from. Awareness of food production is tied to healthier lifestyles. There is the potential to attract people from across Saskatoon for events, education, food harvesting, and to participate in community activities.

e) Sustainability: Water Management and Energy

A key component to Solair’s sustainability mandate is to maximize reliance of renewable energy sources, including solar, and minimize the project’s impact on existing municipal infrastructure. Stormwater will be managed and retained on site through a series of rain gardens/bioswales on residential streets, stormwater parks integrated in community parks. These rain gardens, water ponds, and greenscape will also shape the spatial identity of the community. It is the intent of Solair to meet the community’s electrical needs with a solar photo-voltaic (PV) system. In combination with high energy efficient building construction, the opportunity exists for solar PV to at least partially meet the heating demands of the community.

f) Integration into Regional Plan

The Solair Development fits into the broader sectoral and regional plan in terms of land use, urban fabric, transit, active transportation, and other perspectives. The project’s gridded road system allows seamless road connectivity to existing and future collector and arterial roads. The site will also be well serviced by the extensions of Taylor Street and Zimmerman Road. Given the relatively small area of the Solair site, the project anticipates partnering with an adjacent neighbourhood development to the north or west of the Solair site to provide access to educational facilities. Solair is the first truly regional development which will integrate with urban and rural environments. It is mainly an independently serviced community, but it will also depend on a regional level of services and inter-municipal agreements to achieve integration and expand regional scale service provision. Active transportation networks, including bike networks and multi-use trails, are designed to seamlessly connect to existing and future Saskatoon bike and trail infrastructures. Solair is an anticipated development within the P4G. See Figure 10.

Solair is the first truly regional development which will integrate with urban and rural environments.

g) Urban-Rural Blend

Solair will have a light footprint, but will also blend compatible features from urban and rural land uses. This increases the range of lifestyle opportunities not currently offered in the Saskatoon marketplace. Solair is a truly regional development with small scale agricultural and horticultural areas blended within the boundaries of an urban environment.



Community gardens, Vancouver



Sustainable community infrastructure



Pocket park, Victoria



Rain gardens,

4.0 DESIGN PRINCIPLES

Solair will provide for a range of housing and mixed-use types to attract a diverse range of age and income demographics to create a vibrant and integrated community.

The design is driven by seven key design ideas:

1. Back to the Grid

The plan embraces the traditional street grid found in many of Saskatoon’s older neighbourhoods. The grid facilitates connectivity and encourages walking, and pedestrian access to park spaces and commercial areas. A series of local parks, each with a distinct character, defines sub-neighbourhoods within the plan, to give a strong sense of identity and communal focal points.

2. Strong Edges

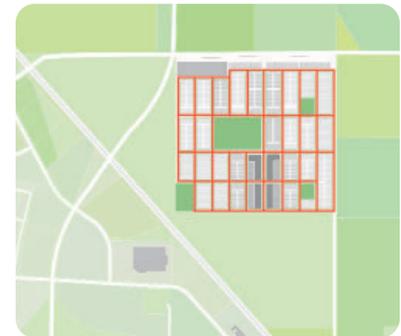
The main collector roads and anchor parks are fronted with mixed use, multi-family, or medium density residential building types. The Complete Street design approach on these streets supports active transportation options. The main streets are designed to be enjoyable to travel for pedestrians, bikes and cars, and the enhanced streetscape creates a sense of destination in and of itself.

3. A Dense Core

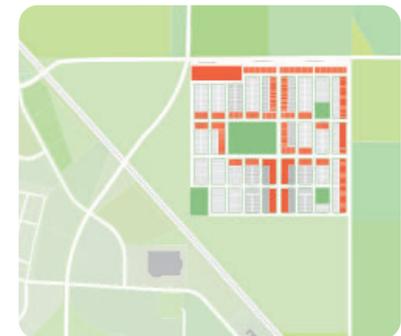
The pandemic has shown us that much of our workforce can work from anywhere. The intent is to encourage live-work and small-scale commercial enterprises to create a community in which to live, work, and play within the neighbourhood and promotes sustainable transportation options such as walking and cycling. The community’s more significant commercial needs will be easily satisfied by the commercial center in the adjacent Meadows market district.

4. Neighbourhood Character Areas

The “Parkside” character area to the North are organized around the large neighbourhood park, with a range of single family housing types. “High street” East and West sits just south of Parkside and are focused around a “main street” of row housing and small-scale mixed-use buildings with street level retail/commercial opportunities. The high street runs north south through the project and will create a focal point within the community.



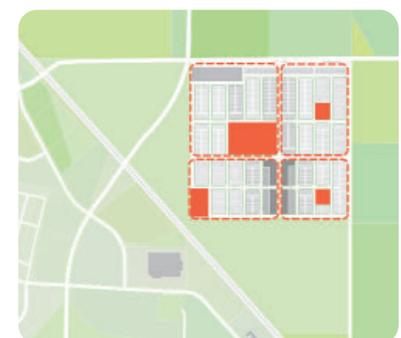
Back to the Grid



Strong Edges



Dense Core



Neighbourhoods

5. Anchor Parks

A large park anchors the plan and serves as a place to play, relax, and engage with nature. Its open edges will connect it to the surrounding neighbourhood. The open perimeter allows for easy views turning these parks into destinations for any time of year.

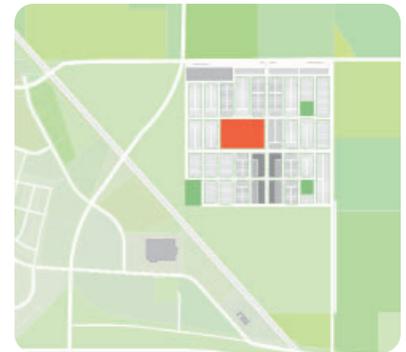
6. Green Infrastructure

Reduced pavements and generous green boulevards mean more runoff can be managed on site. At the same time the streetscapes are beautified with planting and more space is dedicated to pedestrians and cyclists.

7. Urban Agriculture

The integration of urban farm plots is one key element which sets Solair apart from traditional urban development. Health and well-being is one of the pillars of sustainability, and Solair takes full advantage of the opportunity to incorporate local food production within the neighbourhood setting.

See Appendix 1 for more details.



Anchor Parks



Green Infrastructure



Urban Agriculture

5.0 PLAN COMPONENTS

5.1 Residential

Residential development within Solair will offer a combination of low, medium, and higher density housing options to span a range of market demands and purchase price points. The project achieves an average density of 25 units/ha or 56.8 people/ha (23 people/acre). Low density residential uses will include single detached dwellings on a variety of lot widths and laneway housing. Medium density residential uses will include row housing at a variety of densities and small live/work units. High density residential uses will include mid-rise apartment buildings and stacked housing. The intent is to provide a combination of housing forms, types, and densities dispersed throughout the neighbourhood to encourage a strong social and economic mix, accommodate a diverse demographic, and allow individuals to age in place.

5.2 Mixed Use Development

Smaller scale commercial will be integrated in the “main street”. These sites will offer a combination of retail/office and residential uses that can encourage live/work, and small-scale local employment, and be flexible to adapt to a range of conditions. It ensures community members can access some services, such as places to eat, small stores, and local business locally, rather than have to drive longer distances. This builds a strong sense of community and supports local business, just as the main street in rural communities once did.

The concept identifies two blocks of mixed-use main street development. The main street mixed use area is comprised of 2.4 hectares (5.9 acres) representing 3.7% of gross area for the entire community. It is important to note that Main Street is expected to draw its primary market from the entire neighbourhood. It is also important to note that the mixed-use area is comprised mainly of residential use. The commercial/retail component is only located at grade level and is intended to be supported mainly by pedestrians originating from Solair. The retail space is modest, street facing, has a high degree of design and pedestrian orientation.

Analysis shows that Solair could support approximately 75,000 ft² of retail floor space (See Appendix 9). The retail space is expected to be a series of small retail CRUs clustered on both sides of the main street over two blocks and supported by residential uses on site. Complementary retail service, personal service trades, food service and other grade level storefront enterprises are expected to create an attractive and viable retail experience for residents and visitors on Main Street.

5.3 Commercial Developments

There is no large scale commercial or industrial development proposed in Solair. Large-scale commercial services will be provided within the region. For example, there is a commercial center currently being developed in the Meadows Marketplace on the west side of the CP train tracks.



Row housing: Western Riverside, Bath, UK



Illinois solar house, Solar Decathlon, 2009



Multi-family housing: COH housing, Montreal



Multi-family housing: 62M, Winnipeg



Mixed-use, Groningen, NL, S333 Architects



Winter park: Colonel Sam Smith Park, Toronto

5.4 Parks & Pedestrian Linkages

Parks form a central organizing rationale of the plan and are intended to provide active and passive greenspace as well as integrate into the neighbourhood management system. Small pocket or local parks, and one larger community scaled park will offer different outdoor space character and leisure activities, as shown Figure 10. The parks and stormwater management are located to take advantage of natural depressions in the topography. Stormwater is managed within the parks, through sunken park zones ideal for sports fields when dry and serving as storm basins as needed during major rainfall events. 10.1% (6.5 hectares) of the Solair plan is dedicated to community parks of various sizes, of which half has integrated management.

5.5 Urban Agriculture

The Urban Agricultural Zone will be dedicated to local food production. The site offers the opportunity for education and community engagement around local food production. There is a growing market and desire to source food locally to reduce GHG emissions and carbon footprint. See Figure 8 & 10.



Unbound park, Holland



Parckfarm community gardens, Belgium



Project Roble, rural Netherlands

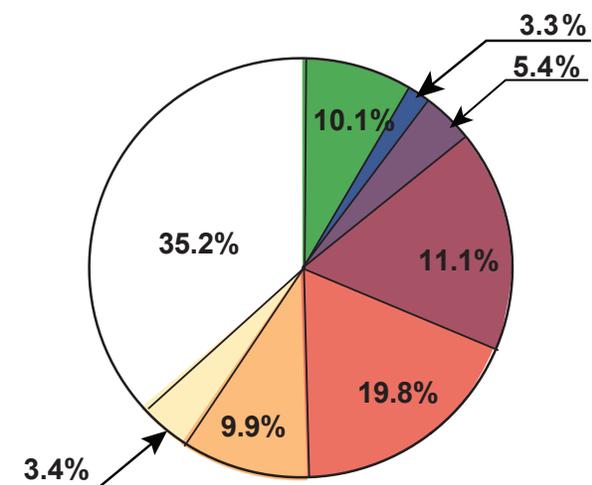
LAND USE STATISTICS

Table 1

SOLAIR LAND USE										
Proposed Land Use	Area			Frontage (m)	Dwelling Units				pp/unit	Population
	Hectares	Acres	Percent		Lot width (m)	units / ha	units / ar	Total Units (by count)		
Garage - Low Density	2.2	5.4	3.4%	598.0	13.0	14.8	6.0	46	3.0	138
Garage - Low Density	6.3	15.6	9.9%	1,853.0	10.9	19.8	8.0	170	2.8	476
Garage - Medium Density	12.7	31.2	19.8%	3,629.5	8.5	24.7	10.0	427	2.8	1,196
Townhouse	7.1	17.5	11.1%	2,910.0	6.0	49.4	20.0	485	2.5	1,213
Multi Family	3.5	8.6	5.4%	711.0	Varies	123.5	50.0	430	1.8	774
Mixed Use	2.1	5.2	3.3%	662.0	Varies	69.2	28.0	145	1.8	261
Municipal Reserve	6.5	16.0	10.1%							
Buffer	1.6	4.0	2.6%							
Roads & Laneways	20.8	51.4	32.6%							
Total Developable	33.78	83.44	52.9%							
Total Solair Lands	63.9	157.8	100.0%					Total Units 1703		
						(estimated)		Total Pop.		4,057

LEGEND	
	Roads and Water management
	Park Space
	Low Density Single Family House (Attached Garage) - 13-14 m wide lot
	Low Density Single Family House (Attached Garage) - 10.9 m wide lott
	Medium Density Laneway House (Detached Garage) 8.5 m wide lot
	Townhouse - 6.0 m wide lot
	Multi family (6 stories) - parcel size varies
	Mixed Use - parcel size varies

DISTRIBUTION OF LAND



6.0 TRANSPORTATION

6.1 Background

The Solair Plan was reviewed to properly address the transportation requirements of the project site, and its integration with urban and rural landscapes. The plan proposes a grid-based roadway network (177 metres x 85 metres measured to roadway centrelines), reminiscent of Saskatoon’s older neighbourhoods, with walkable block lengths. This hierarchical grid roadway network has been established to ensure efficient traffic flow and minimize volumes and speed through the residential nodes.

The Solair Project site’s northern edge is defined by the future extension of Taylor Street, an arterial street which runs the entire length of Saskatoon’s Eastside, from the South Saskatchewan River to the easterly city boundary. Solair’s Taylor Street is a planned four lane divided roadways with controlled access. Proposed collector roads running north/south and east/west could be designed to integrate into future, adjacent neighbourhoods to the north and east of the site. Patience Lake Road to the south of the site will also give access to the site. See Figure 7.

Major collector roadways will bisect the residential area of the neighbourhood in the east-west and north-south directions. Collector roadways A and B are proposed to have 23.2 & 20.8m right of ways, respectively. Collector A roadways will include parking on both sides, rain gardens on both sides, separate bike & sidewalks on both sides. Collector B roadways will include parking on both sides, rain gardens on both sides, and wider sidewalks on both sides. Local roadways A and B are proposed to have 15.5m and 14.5m right of ways, respectively. Local A roadways will include parking on both sides, rain garden, and combined curb and/or separate sidewalk on one side. Local B roadways will include parking on both sides and combined curb and/or separate sidewalk on one side. The proposed roadways feature reduced asphalt widths from that of the traditional grid style community. The reduced asphalt widths promote a more natural traffic calming effect, allow more permeable surfacing for infiltration, and reduced on-going maintenance costs. Roadway maintenance such as snow clearing, and street sweeping is proposed to exceed the City of Saskatoon’s current snow clearing and maintenance programs. All proposed roadways will be structurally designed to match the City of Saskatoon’s current design and development standards. The City of Saskatoon’s edge drain system will be incorporated into the rain garden systems where applicable. Figure 4, 11 & 12 shows existing and proposed roadway classifications and cross sections within Solair and their integration into Saskatoon’s major roadway networks and sector plans including the proposed Saskatoon Freeway. Proposed roadway right of way widths are shown on Figure 12.

6.2 Traffic Analysis

The Solair Traffic Impact Assessment (TIA) assesses the impacts of the Solair development on the adjacent transportation system (existing and previously proposed) and proposes major internal intersection control and high-level geometry. Details of the assessment and results can be found in Appendix 10.



Bike Trails: Cultural Trail, Indianapolis



Complete Streets



Walkable pedestrian realm - main street



Walkable pedestrian realm - local road



Western railpath, Toronto

Background traffic data utilized within the TIA was based upon existing movement count data, gathered count data, and projected buildout traffic from the 2014 Rosewood Neighborhood Concept Plan Amendment and the 2017 Holmwood Sector Plan. Total traffic volumes from Solair were determined following trip generation, distribution, and assignment. Existing, future background, and future total traffic volumes were analyzed with Synchro software to review operating conditions of the existing and proposed road network.

Results of the Solair TIA yielded that all roadways and intersections located outside of the Solair Concept plan do not require any additional improvements beyond what has been previously proposed for the region based on traffic generated directly from Solair.

The TIA also confirmed that the assumed major internal intersection configurations will be able to accommodate the project development traffic at full buildout. Recommendations for each intersection can be found in Appendix D of the TIA. In addition to the TIA, intersection control and geometry will be confirmed during the detailed design stage. The TIA also recommends that the timing of previously proposed improvements for the region be reviewed by the respective municipalities.

6.3 Pedestrian Facilities

The project will provide safe pedestrian connectivity throughout the entire neighbourhood. Street widths and layout, block dimensions, and housing types will all serve to create a comfortable and dynamic pedestrian realm. A walkable main street with small scale commercial as well as trails in the parks will further enhance the range of pedestrian experiences in the community. Solair will put 'people first' in the design of the public realm.

7.0 SUSTAINABLE INFRASTRUCTURE APPROACH

Working with experts with extensive experience, the intent is to manage on-site through rain gardens, basins, bio retention strategies integrated into the design of local parks, rainwater harvesting and reuse, and by limiting paved surfaces wherever possible. The community's water needs will be met through a connection to a dedicated water treatment facility in proximity to Solair. A reservoir strategy will provide for peaking demand and fire flows for the community. Sanitary sewer infrastructure will be managed with state of the art treatment facilities in a self-contained process, not relying on the adjacent municipalities' collection and treatment systems. Solair will employ a solar energy strategy that could see each housing/retail unit within the development to have solar panels installed. The program would be structured such that each owner would have the ability to customize their solar energy installation to deliver as large of percentage of their energy needs as they are interested in achieving, up to a full 100% offset. Saskatchewan has the highest solar energy potential of any province in Saskatchewan (energyhub.org). The program would integrate with SaskPower's current solar energy program offerings.

Other unique features/outcomes:

Role Model

- The use of solar panels at a large scale in a winter city setting will serve to test the model in a harsh Canadian climate.
- The Province and Region aspires to be more progressive on environmental issues and this project will provide progress and visibility in that regard.
- The project tests the implementation of solar PV at the scale of an entire urban neighbourhood, using next generation technology and design/construction concepts and approaches.
- The project helps prove the concept of an Arbutus Sustainable Community. While this could be considered a prototype community, the lessons learned, and knowledge gained in constructing Solair will provide a foundation and basis upon which to design and build similar communities across Canada.
- Solair will advance the need to serve regional developments which blend urban and rural characteristics - something which is currently not available in the Saskatoon region

New Knowledge

- Design team will be able to quantify GHG reduction impacts from application of new approaches and technology.
- The knowledge gained from the cost analysis and impacts of integrating net zero or net zero ready technology solutions into a community scale development will help inform policy and regulation development at the local, provincial, and national scale.
- The project will increase all stakeholders' understanding and knowledge of sustainable developments, renewable energy impacts, GHG reductions and benefits of net zero approaches to home building.



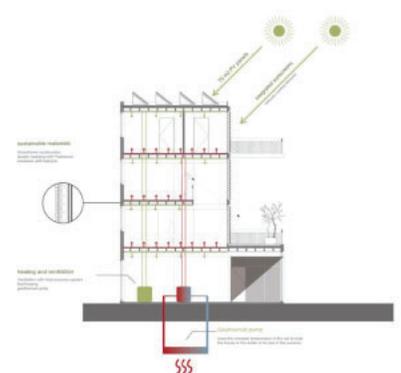
Multi unit housing with solar panels on roof, Germany



Solar Multi-unit housing, Eindhoven, NL



German solar house, Solar Decathlon, 2009



Solar Multi-unit housing, Eindhoven, NL

Partnerships

- The design team is partnering with soil scientists at University of Saskatchewan for water management systems.
- The project supports collaboration and partnership opportunities between community builders and local and provincial governments, and the provincial electric utility to develop a large scale solar microgrid
- Arbutus has partnered with Des Nedhe Development Corporation, a fully owned subsidiary company of the English River First Nation to provide independent water and wastewater treatment facilities to serve Solair, in addition to providing regional infrastructure as well.

Energy – Community Solar PV

Innovation is key to the Solair plan and a pre-requisite to design and build what is essentially an entire urban neighbourhood, based upon sustainable infrastructure construction. Solair is predicated on low impact and energy efficient design, at the scale of individual buildings and community-wide planning. Nothing like the Solair community exists in Saskatchewan and it will be the largest development of its kind in Canada.

The Saskatoon Region, with this development, will be a leader in energy conservation and efficiency.

Energy-efficient building construction will be an important aspect, but a community-wide distributed solar photo-voltaic (PV) system will be a key to success for this project.

7.1 Proposed Stormwater System

Municipalities and local governments across North America are now realizing the economic and environmental benefits of designing and building infrastructure based on Low Impact Development (LID) standards and with an understanding that better managing and utilizing natural assets can create a more resilient community with better adaptivity to climate change. It is our understanding that the Planning for Growth Partnership has an interest in these new management practices and natural capital asset strategies, and these aspirations align exactly with the Solair design development.

The proposed stormwater system for the Solair development involves a combination of roadside rain gardens, storm sewers, open channel conveyance channels, detention ponds, groundwater release outlets, and major overland flow routes. Post development runoff flows will not exceed pre-development runoff flows; this is achieved through a system of integrated low impact development stormwater designs. The road-side rain gardens (bio-retention areas) will be designed to intercept and treat the frequently occurring rainfall events such that 90% of the annual runoff from roadways will be filtered through the growing medium and vegetation. A significant portion of the intercepted water will be naturally evapo-transpired or infiltrated into the surrounding soils. Road runoff will enter the rain gardens either by sheet flow using flat panel curbs or curb-cuts with designated entry points. Excess runoff from pervious lawn areas and disconnect roof leaders, and driveways will also enter the rain gardens.

During saturated conditions and major rainfall events, runoff will leave the rain gardens either through overflow culverts, catchbasin, or through

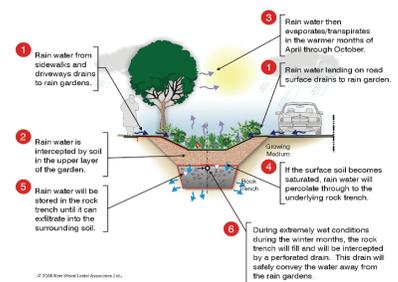


Rain Garden, The Meadows, Saskatoon



Rain garden, Alberta, KWA Engineers

How Do Rain Gardens Work?



Rain garden, BC, KWA Engineers

perforated pipes installed below the growing medium. The runoff that is released from the rain gardens during the larger rainfall events will be diverted to storm sewers and converted to detention ponds as shown in Figure 15 and 16. All storm sewers will be sized to accommodate the 1-in-2 year storm event, matching to the City of Saskatoon's current Design and Development Standards.

During extreme events, the overland flow system as shown in Figure 15 will be used which includes a combination of designated flow routes, enhanced rain gardens with erosion-protection works, and detention ponds. The overland flow system and detention ponds will be design according to the City of Saskatoon's current Design and Development Standards. The 1-in-100year (24 hour storm duration) pre-development release rate for Solair is ~158L/s, based on a pre-development C factor of 0.2 (EPB 322). The 1-in-100year post development release rate for Solair is ~412L/s (assuming no retention or detention), based on a weighted post development C factor of 0.520. Post development release rates will not exceed the pre-development flow and pond draw-down time will not exceed 48 hours. The detention ponds will be located within the Municipal Reserves as shown and sized to detain all major rainfall events up to the 1-in-100 year storm event. The detention ponds or portions of will be designed as dry ponds to allow for recreational and leisure use between storm events. The post development active storage volumes required for the design storm are summarized in Table 2. During detailed design, a detailed stormwater model will be developed to confirm the values below.

The release of water from the detention ponds will be through a combination of natural groundwater rates, exfiltration through the surrounding soils, evapotranspiration, water harvesting strategies for irrigation within the development. The overall stormwater outlet for Solair will follow the pre-existing drainage path for the area. These strategies will make Solair more permeable and let natural infiltration occur, reducing the need for expensive traditional infrastructure.

Table 2 - Ponds Active Storage and Depth

Dry Pond	Active storage depth required for design storm (m)	Active storage required for design storm (m ³)
1	0.8	26,400
2	0.5	2,450
3	0.5	2,450
4	0.5	2,450
Total active storage volumes (m ³)		33,750

7.2 Proposed Water System Concept

In partnership with SaskWater and the English River First Nation, Solair will utilize a connection to SaskWater’s Saskatoon Non-Potable East System (SANPEST) raw water supply line. The raw water will be treated at a standalone, self sufficient regional water treatment plant jointly developed by Arbutus and the English River First Nation. Arbutus and the English River First Nation have jointly signed a Letter of Intent (LOI) to pursue this matter. (See Appendix 6.) Based on projected demand volumes, there is sufficient capacity from SANPEST to supply the needs of Solair and potentially size the treatment facility to serve a larger regional need as well. The treatment plant will be located at an

appropriate site within proximity to English River and treated water will be pumped to Solair. A reservoir and booster station will be located adjacent to Solair. See Figures 18 and 19 for conceptual design options and routing.

Solair will utilize an appropriately sized internal water distribution system with all potable supply coming from its reservoir and booster station. The design of the water distribution system for the Solair will be based on supplying the greater of maximum daily demand and fire flow or peak hour demand. Peak water consumption rates and fire flow rates will match the City of Saskatoon's current Design and Development Standards, with an average daily water consumption per capita and max fire flow of 290lpcd and 220l/s, respectively. The proposed reservoir will be sized to accommodate the greater of the peak fire flow volume as specified by the Fire Underwriters Survey (FUS) or two days of peak daily use. During detailed design, a detailed hydraulic analysis will be completed for the entire Solair Development that will be based upon currently accepted engineering design standards for urban potable water systems.

7.3 Proposed Sanitary Sewer System Concept

In partnership with the English River First Nation, Solair will have its sanitary sewer treatment needs met by English River's standalone, regional treatment facility. Based on projected volumes, a marginal upsize to the existing regional treatment facility may be required. Arbutus and the English River First Nation have signed a Letter of Intent (LOI) to jointly develop any upgrades required. See Appendix 6.

The sanitary sewer collection system will be designed to provide adequate sanitary capacity for the proposed Solair development plan. The sanitary sewer collection system will be designed separate from the storm drainage system. Sanitary peak flow for Solair will be based on population density rates as specified in this report (persons/ha) and the City of Saskatoon's current Design and Development Standards which includes infiltration allowances and peaking factors. A unit flow rate of 290 lpcd will be used in detailed design. All gravity sanitary sewers will drain towards Solair's standalone onsite lift station that would ultimately pump the effluent to English River's regional facility for treatment. During detailed design, all projected volumes and flow rates will be confirmed. See Figures 20, 21 and 22 for the conceptual design options and routing.

7.4 Regional Service Delivery

The P4G Servicing Strategy contemplates and encourages the use and expansion of strategic investments in regional infrastructure and service delivery.

Similar to The Willows development in Saskatoon, Solair is a unique community which will rely on some private services to reduce the reliance on centralized public services. Where centralized public service is required, new regional service agreements, or inter-municipal service agreements will be drafted in accordance with the P4G Servicing Strategy and Provincial legislation.

According to the P4G Servicing Strategy: “(t)he benefits of regional cooperation with infrastructure and servicing include the following:

- **Costs for planning, construction, operations, and maintenance of infrastructure can be reduced through economies of scale, especially for smaller municipalities that would otherwise need to build and maintain facilities independently.**
- **Smaller municipalities can achieve higher levels of service through joint infrastructure projects and systems.**
- **Funding for new capital facilities can be pooled through cost-sharing and joint efforts to petition senior governments for support can help the P4G Region draw on additional resources.**
- **Growth planning can be supported and promoted through timely and efficient sequencing of infrastructure and services to new development areas.**

The P4G servicing strategy focuses on regional infrastructure solutions where coordination between municipalities is necessary. While this servicing strategy currently includes water, wastewater, , and transportation systems, future areas of regional coordination may include other public services, such as recreation facilities, transit or emergency services, or services provided by the private sector or Crown corporations. The servicing strategy should be expanded as required to accommodate these services." In short, the Solair development will prompt the P4G partners to establish new regional servicing protocols and agreements to accommodate this unique community as anticipated within the P4G.

The P4G servicing strategy focuses on regional infrastructure solutions where coordination between municipalities is necessary.

8.0 IMPLEMENTATION

8.1 A P3 Approach To Building Solair

There is an exciting opportunity to utilize a Private Public Partnership (P3) model to build out the Solair community. While Arbutus Properties will be responsible for the initial capital construction cost associated with the Solair build out, the benefits of taking a P3 approach can be significant, particularly with respect to the ongoing operations and maintenance of the infrastructure. For instance, we visualize a partnership opportunity between Arbutus Properties (and potentially other private sector entities), Des Nedhe Development Corporation, the RM of Corman Park as the municipal authority responsible for the development, and SaskWater as the provincial government crown corporation playing a role in the delivery of important water and sewer services. This P3 arrangement has proven beneficial for other municipalities, not only from a cost effectiveness perspective, but from the potential senior government funding grants that may be available.

The P3 model fits particularly well with respect to the ongoing operation and maintenance of the infrastructure within Solair. The operation and maintenance of urban infrastructure will be opening up a new area of service delivery for the RM of Corman Park and in order to transition to this new urban form, a Design Build Operate and Maintain (DBOM) version of the P3 model seems most reasonable.

Once the infrastructure is built and turned over to the RM to operate and maintain, this can be undertaken through a long-term concession agreement with private sector entities. These can be upwards of 30 year operating and maintenance agreements, entered into by the RM (with the assistance of Arbutus), that provide for a private sector company to act as the RM's agent and provide all the necessary resources and labour to operate and maintain the community's infrastructure. See Appendix 8 for two letters of Interest from local contractors, with experience in P3 delivery for operations and maintenance, that would be extremely interested in the opportunity to provide these services to the Solair community.

This DBOM approach works very well for example, with these significant infrastructure components within Solair:

- Water and sanitary sewer (will operate as a utility)
- Stormwater
- Roads
- Sidewalks
- Parks

See Appendix 4 for a Letter of Intent that Arbutus has provided to the RM of Corman Park providing greater certainty around the infrastructure commitment from Arbutus and provisions on how the DBOM would work.

8.2 Cost Benefit Analysis

The Planning for Growth (P4G) District Official Community Plan contains several criteria governing the way development will occur and be considered within the areas set out in the Saskatoon Region Land Use Plan that P4G has approved. One of these specific requirements contained within Clause 31.3.15 is cost/benefit considerations for a concept plan.

While the clause is nonspecific as to how such a cost benefit analysis should be constructed and presented, it is loosely focused on a triple bottom line approach. We

believe the most prudent and applicable analysis focuses on the revenue and expenditures that such a development would produce and whether it is economically sustainable for the RM to allow this higher density urban development to proceed. The key of course, is whether ongoing tax revenues are sufficient to offset all expected annual operating costs of providing urban style services to the residents of Solair.

Solair is a small (in relative terms) urban neighbourhood of relatively high density, so a typical cost of growth analysis makes sense when considering if growth pays for growth. All the initial capital cost of construction Solair is paid for by the developer (Arbutus), so there is no outlay from the RM here. The RM will collect development levies/fees from Arbutus which will compensate the RM for offsite costs that they might incur because of the Solair development proceeding. An example would be a contribution toward future transportation system improvements or toward future recreational facilities the RM may consider building. Offsite levies are intended to be Solair's contribution to general growth pressures the RM faces due to development occurring. As a result, direct capital costs are not considered part of this cost/benefit discussion.

Regardless of the municipality not having to cover the capital cost of constructing Solair, the economic benefit to the RM and Saskatoon Region is significant. Previous estimates have placed the direct investment for Solair at nearly \$1 billion, with hundreds of jobs being created. There is obviously also a significant multiplier effect of this investment and job creation that will benefit the Saskatoon region for many years. Solair will demonstrate how the first regional development is financially sustainable using a creative, new approach to regional service delivery and cost recovery. Solair is a truly regional development as envisaged by the P4G.

As for the social/environmental aspects of the triple bottom line approach, Solair would score high on these metrics as it will be one of the most sustainable and low impact developments within the Saskatoon Region. As such, Solair will have one of the smallest environmental footprints associated with urban residential development. Initial estimates placed the positive impact of Solair at potentially over 400,000 tonnes of greenhouse gas reduction and an environmental leap forward on the implementation of low impact development standards that will provide a truly sustainable urban neighbourhood.

Solair will also address the critical issue of housing availability and affordability with a wide spectrum of residential units being offered, many at affordable price points, including much needed affordable rental units for the Saskatoon region.

One of the key elements of Solair that sets it apart from the typical urban neighbourhood is its reliance on low impact development standards and on self provision of water and wastewater services. Arbutus has entered a partnership with Des Nehde Development Corporation (see Letter of Intent in Appendix 6) which will see potable water provision and wastewater collection/treatment provided by an independent water/wastewater utility with standalone, self-contained treatment plants on the English River First Nation located at Grasswood. The capital cost of the plant and collection/distribution infrastructure will be borne by the utility, as will all on going operation and maintenance costs. The utility will be funded by user fees collected by anyone served by the system, which may include a variety of developments in the region in addition to Solair. As such, there will be no tax supported costs the RM will have to bear to provide water and wastewater services for Solair. Arbutus also proposes that stormwater/drainage and waste management service, including recycling, are also provided through contracts with the private sector and operated as a user pay model. This would be similar to a number of such arrangement already established in the region.

While further review of long-term economic sustainability will be an ongoing process, initial estimates in the statement of annual revenues and expenditures show a strong starting point. We believe that Solair will be economically sustainable and we have created a statement of annual revenues and expenditures to validate this. This is essentially an indicative operating budget for Solair based on the expected service levels associated with an urban residential development in the Saskatoon Regional context.

This indicative operating budget analysis, for full build out, relies upon appropriate comparative data points pulled from multiple sources. This includes the RM of Corman Park annual operating budget, RM of Corman Park and City of Saskatoon taxation and assessment data, City of Saskatoon Operating budget costs for provision of similar services and private sector cost data for long-term operating and maintenance activities. The Arbutus team’s many years of municipal budget experience also played a significant role in preparing the preliminary estimates.

The following table summarizes the results of the cost/benefit analysis based on an indicative budget for full build out of Solair.

Summary of Tax Supported Revenues and Expenditures Indicative Operating Budget for Solar at Full Build Out	
Net New Incremental Revenue	\$3,598,500
Net New Incremental Expenditures	\$3,165,500
Surplus	\$433,000
Contribution of Revenue Stabilization Reserve	\$433,000
Net Surplus	\$0

The analysis is clear, and we are confident that Solair is cost neutral for the RM on an annual basis, with tax revenues sufficient to offset annual and long term operating and maintenance costs, which will allow a reasonable contribution to a stabilization reserve to cushion annual budget variations due to weather and other unforeseen events. The RM of Corman Park can move forward with confidence knowing the ongoing operations and maintenance of the Solair neighbourhood will not become a burden on the general tax base of the municipality. In fact, Solair will prove to be a positive addition to growth in the RM.

8.3 Development Staging

The grid layout of the plan lends itself easily to phasing, and to creating a sense of place at all phases of the project. Building types and land usage is designed to be resilient enough to enable some adaptability of building typologies as the project evolves. The build out of the project is closely tied to the management of services and is conceived of in 12 phases to be progressively developed. Phases 1- 4 to the northeast of the site will be developed first. Phases 5 - 8 in the middle, and the northwest corner, of the site would be developed second. Phases 8 -11, forming the southern boundary of the site, would be developed next. Phase 12, the northwestern corner, would represent the last phase of development. The phasing has been structured to be sufficiently flexible to allow movement and deferral of phases based upon market conditions. See Figure 23 for proposed major phasing blocks of the project.

8.4 Approval Process & Zoning for Solair

The P4G Land use Plan within the District Official Community Plan (DOCP) has already designated the lands upon which the Solair Development fall, as future Urban Residential, so the Solair Concept Plan is in full compliance with the P4G land uses already agreed to by the partnership. In addition to this, the RM of Corman Park has indicated that in accordance with Section 31.3.12 of the P4G DOCP, a Concept Plan is required to be prepared to provide the framework for the development and subdivision of a portion of the District. To that end, Arbutus Properties has prepared this Concept Plan in response to this requirement. Arbutus Properties has submitted this Concept Plan, requesting the RM of Corman Park amend the DOCP by appending this Solair Concept Plan to it. The amendment, once approved, would provide the development framework to support subsequent rezoning and subdivision applications for the Solair Community.

Arbutus has not indicated at this point what specific zoning districts should be applied to the various land uses within the Concept Plan, but is willing to assist in the development of the zoning regulations necessary to implement the Solair project upon approval of the Concept Plan.

We see the application process to have three main components, noted below, with these processes and applications occurring simultaneously over the next number of months:

1. Concept Plan submission and OCP Amendment
2. Zoning Bylaw Amendment
3. Subdivision
4. Development Permits

It is anticipated that development applications for the first phase could occur in late 2025 or early 2026.

9.0 PUBLIC ENGAGEMENT

9.1 ENGAGEMENT PLAN

Two engagement periods were authorized by Arbutus. Wallace Insights conducted the engagement process.

1. Engagement Period November 18 – December 23, 2023

First, a 3-week engagement period was undertaken in support of the Concept Planning process aimed primarily at RM of Corman Park residents. The engagement period was conducted from November 18th to December 9th, 2023. This engagement period offered several ways for respondents to review and comment on the Solair Plan:

a. Direct Notice: Direct notice via mail was provided to 28 property owners within a 1.6 kilometre radius of the proposed Solair site. The direct notice invited the owners of land to an open house and also contained a QR code and web link to a short survey. The letter included a description of the project, map of the concept plan, QR code and web link. The letters were mailed out by the RM of Corman Park during the week of November 13 - 17th.

b. Direct Notice: A notice was sent via email to the Prairie Spirit School Division seeking their comments to the proposed development. The notice was sent out on November 10, 2023, and a response was received on November 23, 2023. Please see Engagement Results below for the response.

c. General Notice in Star-Phoenix: A general notice was published twice in the Star-Phoenix on November 10th and 18th. This notice provided property owners within the city of Saskatoon with the opportunity to learn about Solair on the website, come to the Open House (see below), and participate in a short online survey.

d. Online Survey: A short online survey was created to gather feedback from the public on the proposed land development concept. The survey was available on the website until December 9th.

e. Public Open House: A 4-hour public open house was held at St. Therese of Lisieux elementary school on Saturday, November 25th from 1pm to 5pm. This provided an opportunity for attendees to learn more about the proposed land development concept, ask questions, and provide feedback.

f. Website: A website was created to provide more detailed information about the proposed land development concept, including project details, timelines, and contact information. The website also included the online survey.

g. Email Address: A dedicated email address was created to receive questions from the public about the proposed land development concept. Questions were answered within two business days.

2. Engagement Period December 13/23 – January 13/24

A second engagement period was conducted primarily for residents and property owners in Saskatoon located within a one-mile radius of the Solair Site. Once again, several ways were offered to respondents to engage with the Solair project:

a. Direct Notice: 1,216 notices were mailed out directly to city property owners. The notices contained information about the concept plan, invitation to a Public Open House, a website link and email address.

b. Online Survey: the respondents could fill out a 5-10 minute survey online (see questions in Appendix 7).

c. Public Open House: they were invited to attend an in-person open house on Monday January 8th at St. Therese of Lisieux School in Rosewood from 7pm to 9pm.

d. Website information and email address: a website containing concept plan details and information was provided, including an email address to send in questions and comments.

9.2 ENGAGEMENT RESULTS (SUMMARY)

Open House #1 – November 25/23 – 4pm to 8pm, St. Therese of Lisieux School (Rosewood)

A total of seven (7) people attended the open house on November 25th. There was no opposition expressed by any attendees. Most people were curious about the development, wanted to know more about what Solair is, and wanted to learn more about the sustainability features of Solair, in particular the solar power aspect.

Open House #2 – January 8/24 – 7pm to 9pm, St. Therese of Lisieux School (Rosewood)

A total of eight (8) people attended the open house, including one child. Of the 7 adults in attendance which included one couple from Zimmerman Road in the RM, and the other 5 were individuals.

See Appendix 7 for the full Public Engagement Report. However there were no comments received that would suggest Solair should not be approved by the RM of Corman Park and should proceed with development as provided for in this concept plan.



10.0 CONCLUSION

Solair offers a unique opportunity to develop a new model community in terms of integrated planning, design, sustainability, and mobility. The Saskatoon region is one of the fastest growing metropolitan areas in Canada. Solair offers the opportunity to imagine alternatives and is developing a host of local partnerships with planners, the provincial energy provider, municipal councils and other stakeholders, to ensure Solair addresses the current and future needs of the Saskatoon region. It imagines a bold model for a future, more sustainable regional development in order for metropolitan areas to think in regional terms. The P4G has been adopted and the Solair project seeks to think ambitiously about regional service provision and development.

Solair fills a missing piece in the Saskatoon region by providing a choice for those looking to blend urban and rural lifestyles in a regional setting. Solair will be the most dense residential development within the Saskatoon region and will provide sustainable infrastructure to support it. This density will create a strong sense of community and meet ambitious sustainability objectives. Now is the time for Corman Park and its partners in the metropolitan area to lead by moving beyond a simple planning district towards a truly regional development mindset.

DOCUMENTS REFERENCED

Active Transportation Plan Final Report. City of Saskatoon. June 2016.

City Council's Action Plan "Let's Talk 2020." City of Saskatoon.

City of Saskatoon. *Environmental Initiatives & Policy.* December 18, 2006.

COS Climate Adaptation Strategy and GHG Reduction Plan. August 13, 2018.

Green Infrastructure Strategy, Baseline Inventory Report, City of Saskatoon, 2018.

Growth Plan Summary Report. (Growth Plan to Half a Million). City of Saskatoon. by Urban System Ltd, April 2016.

Holmwood East Natural Area Screening Study, prepared by Golder Associates for the City of Saskatoon, November 2015.

Low Impact Development: Design Guide for Saskatoon, City of Saskatoon. 2016.

Official Community Plan References. City of Saskatoon.

Official Community Plan Bylaw No 8769. City of Saskatoon.

P4G District Official Community Plan. Saskatoon North Partnership for Growth, 2021.

P4G District Official Community Plan. Saskatoon North Partnership for Growth, 2021.

Park Development Guidelines and Standard Construction Specifications, City of Saskatoon Community Services Department. 2018.

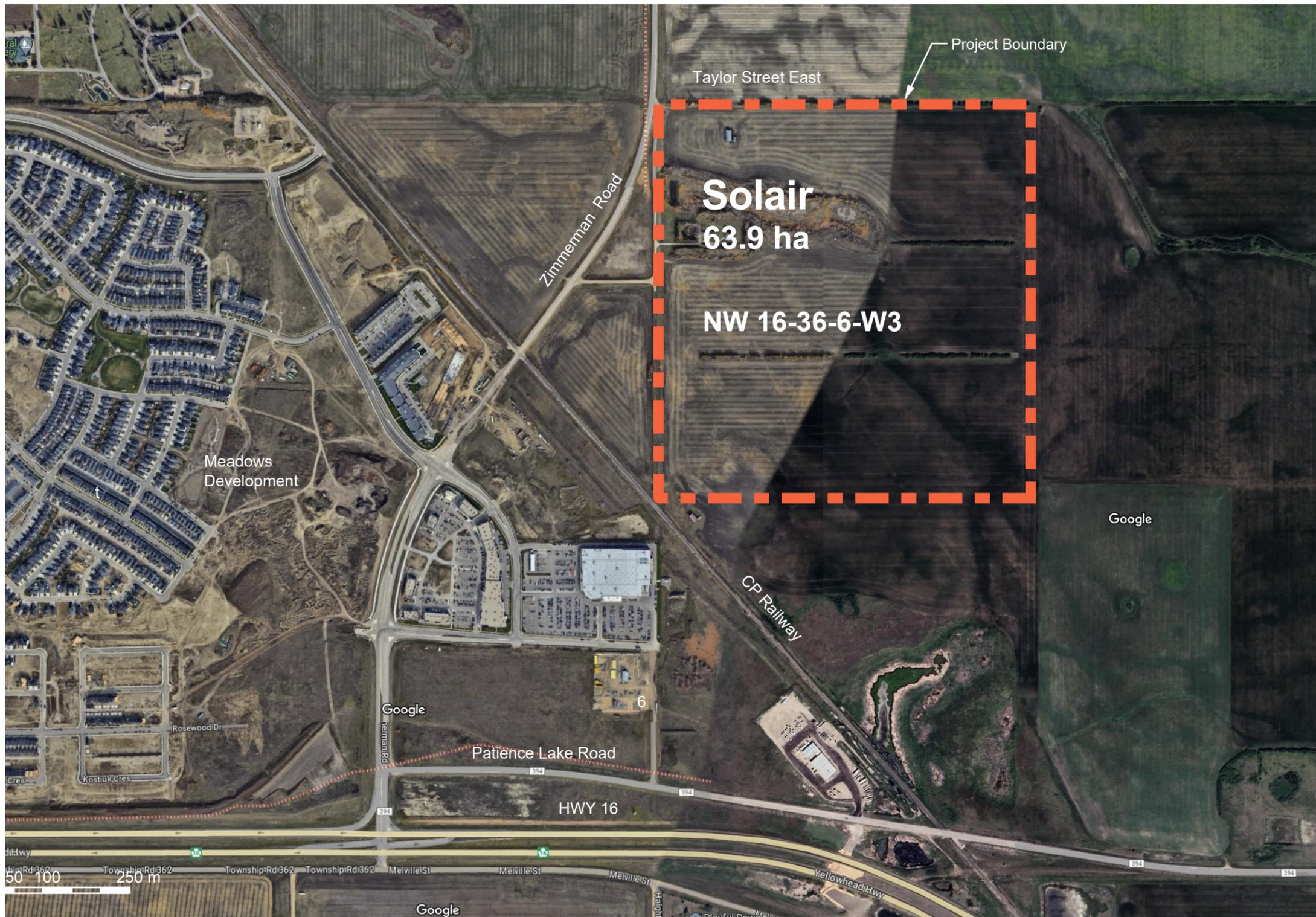
Phase 1 Environmental Site Assessment of the Franko Land Parcels, performed by Polson Environmental, April 2017.

Preliminary Geotechnical Investigation for Solair, prepared by P. Machibroda Engineering LTD, September 2017.

The Meewasin Valley Project. 100 Year Conceptual Master Plan, Raymond Moriyama Architects and Planners, Toronto, 1977.

LIST OF DRAWINGS

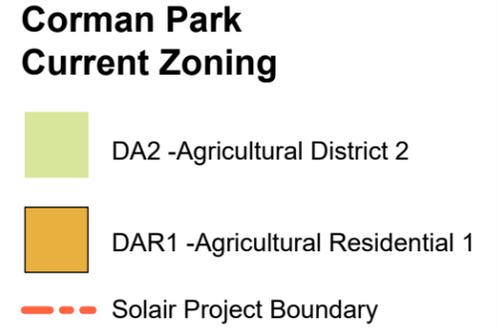
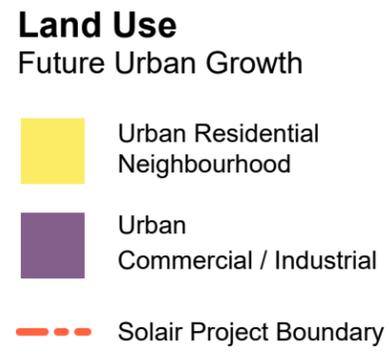
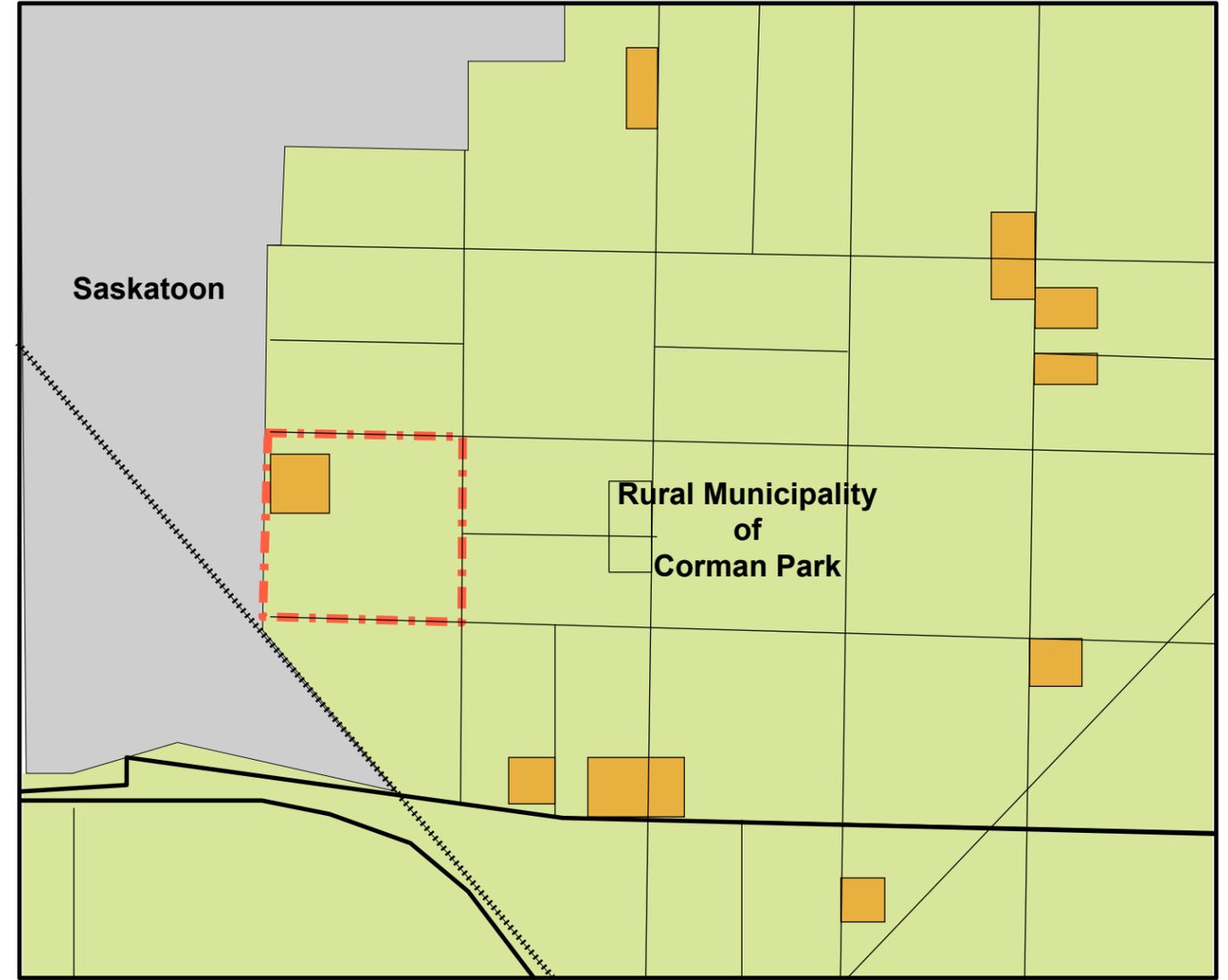
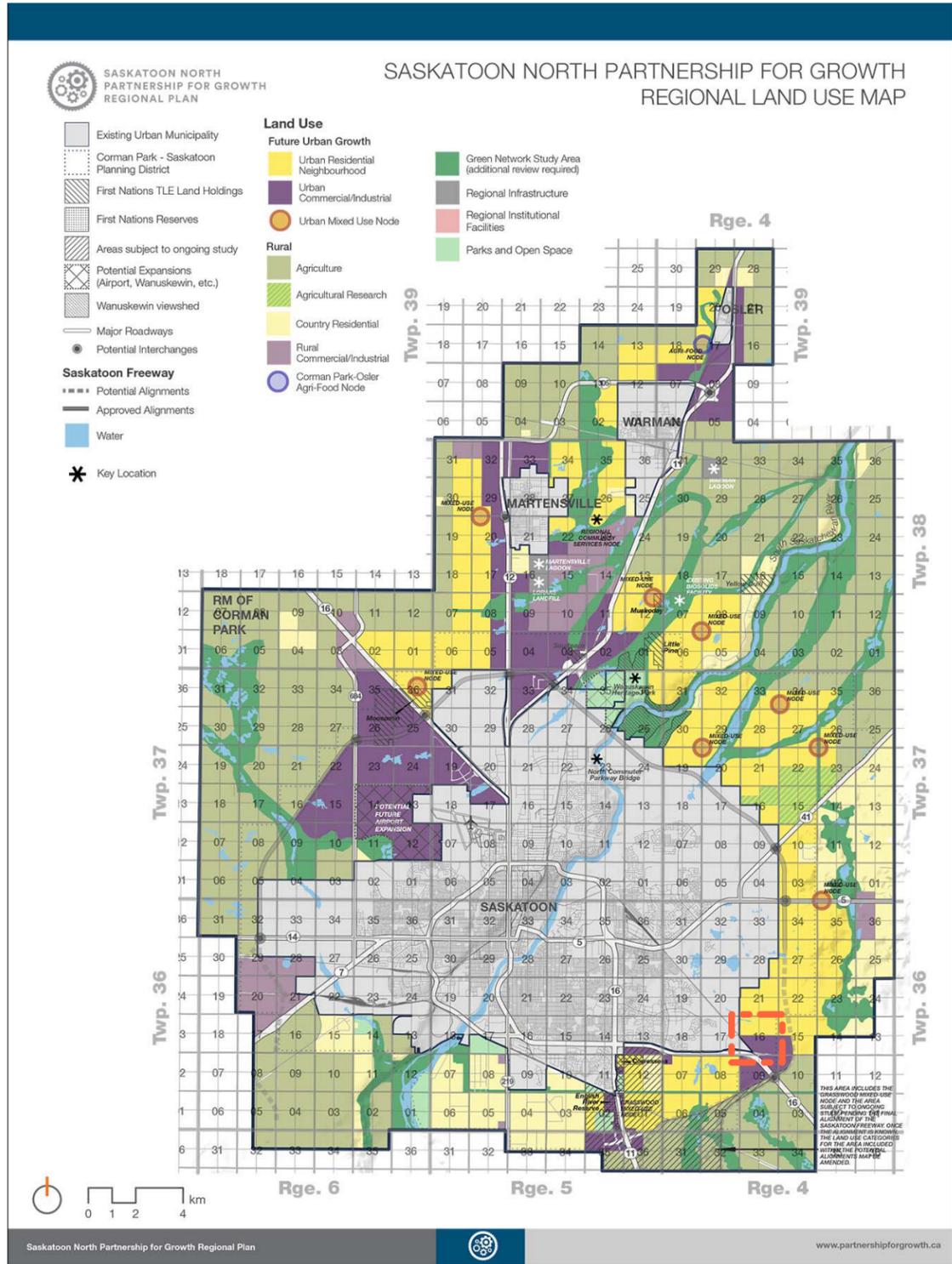
- Figure 1 - Project Overview
- Figure 2 - Regional Land Use Context
- Figure 3 - City Context Plan
- Figure 4 - Road Context Plan
- Figure 5 - Illustrative Sector Plan Integration
- Figure 6 - Diagram of Existing Topography
- Figure 7 - Block Concept Plan
- Figure 8 - Land Use plan
- Figure 9 - Land Use Statistics
- Figure 10 - Parks Types and Linkages
- Figure 11 - Road Classifications
- Figure 12 - Roadway Right of Way Widths
- Figure 13 - Site Sections: Collector Roads
- Figure 14 - Site sections: Local Roads
- Figure 15 - Overland Management
- Figure 16 - Underland Water Management
- Figure 17 - Proposed Watermain System
- Figure 18 - Water Treatment Plant Schematic - Option A
- Figure 19 - Water Treatment Plant Schematic - Option B
- Figure 20 - Proposed Sanitary System
- Figure 21 - Wasterwater Treatmment Plant Schematic - Option A
- Figure 22 - Wasterwater Treatmment Plant Schematic - Option B
- Figure 23 - Neighbourhoods and Phasing

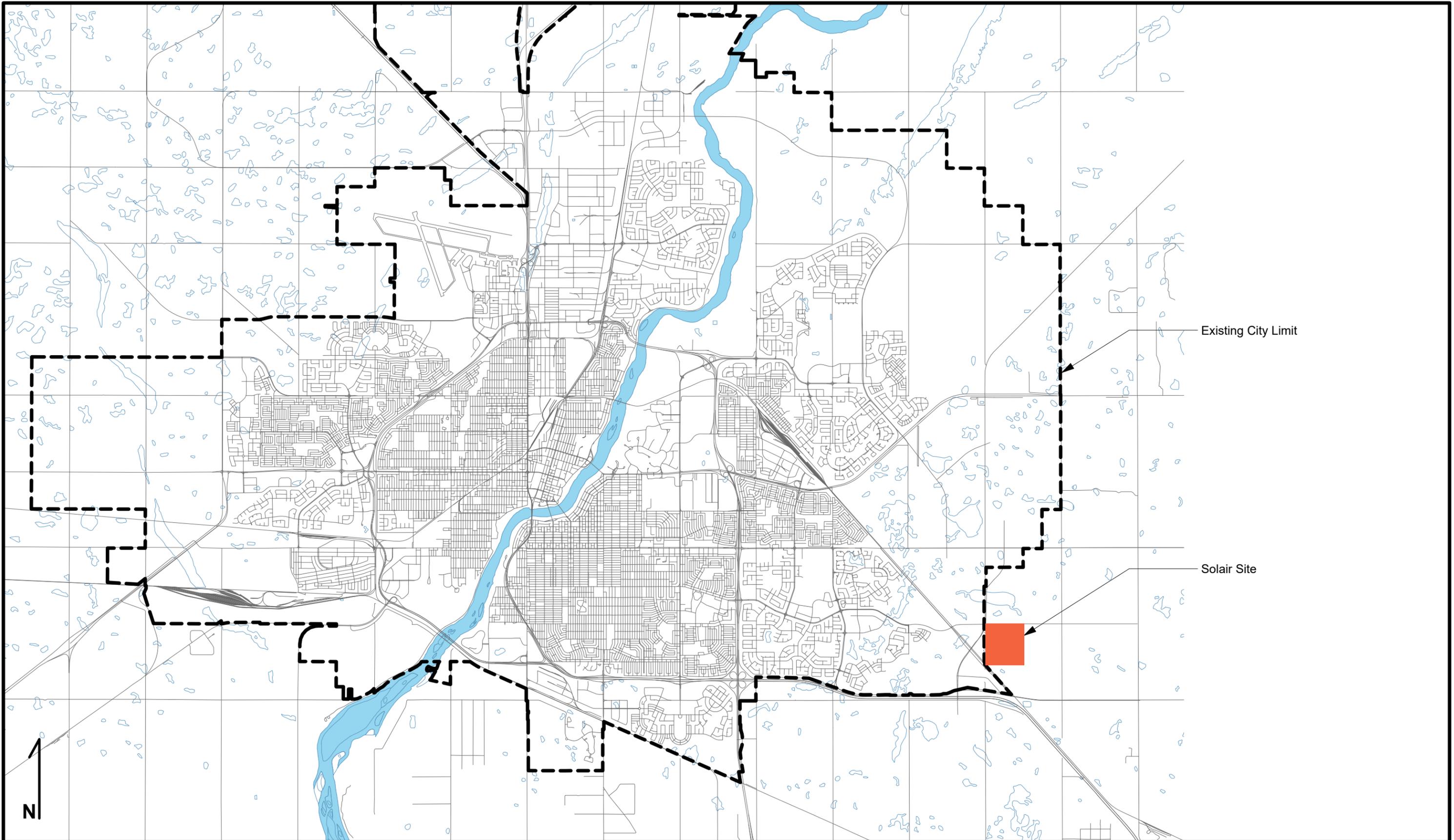


Key Plan

Legend

— Solair Project Boundary

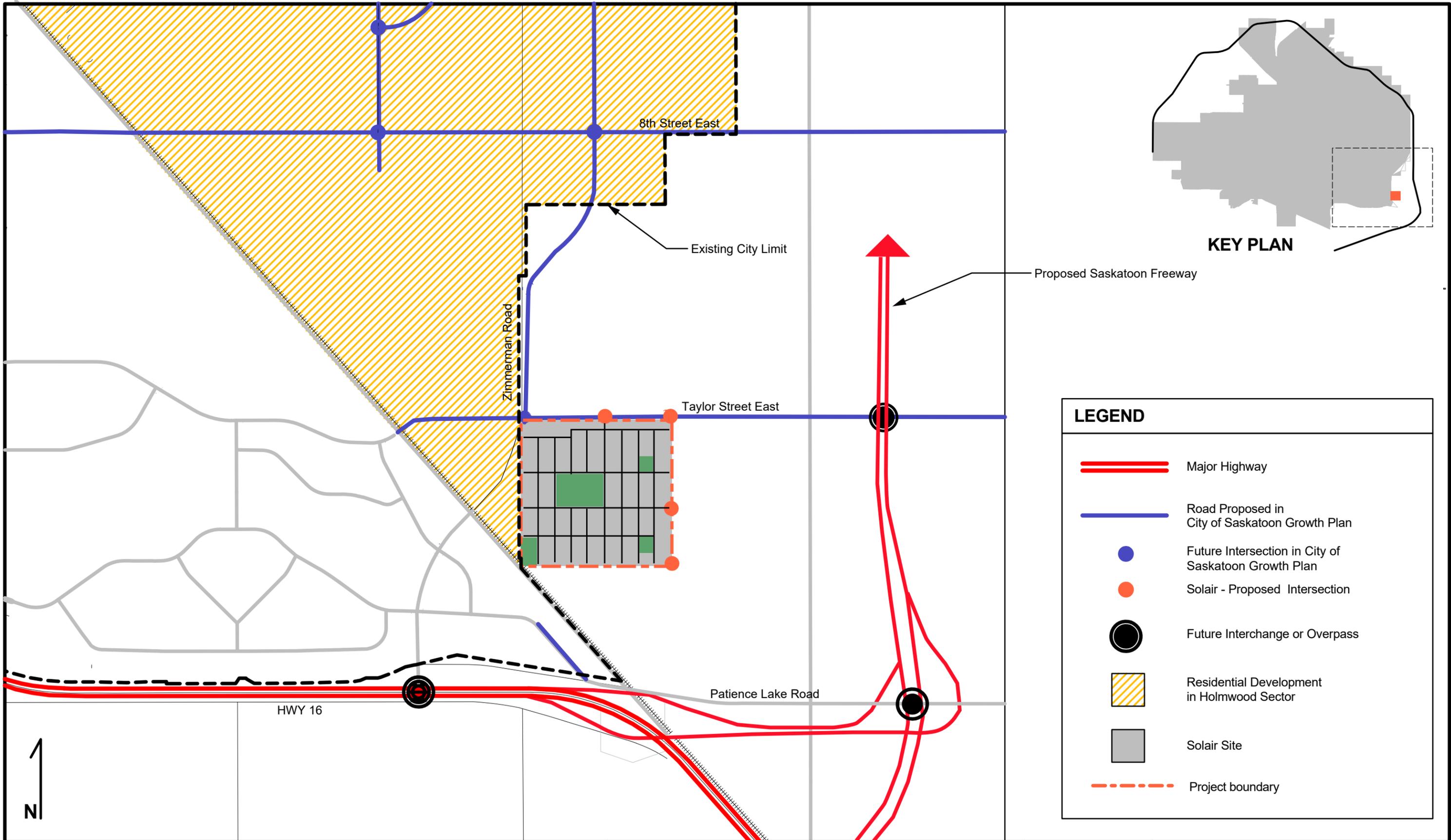


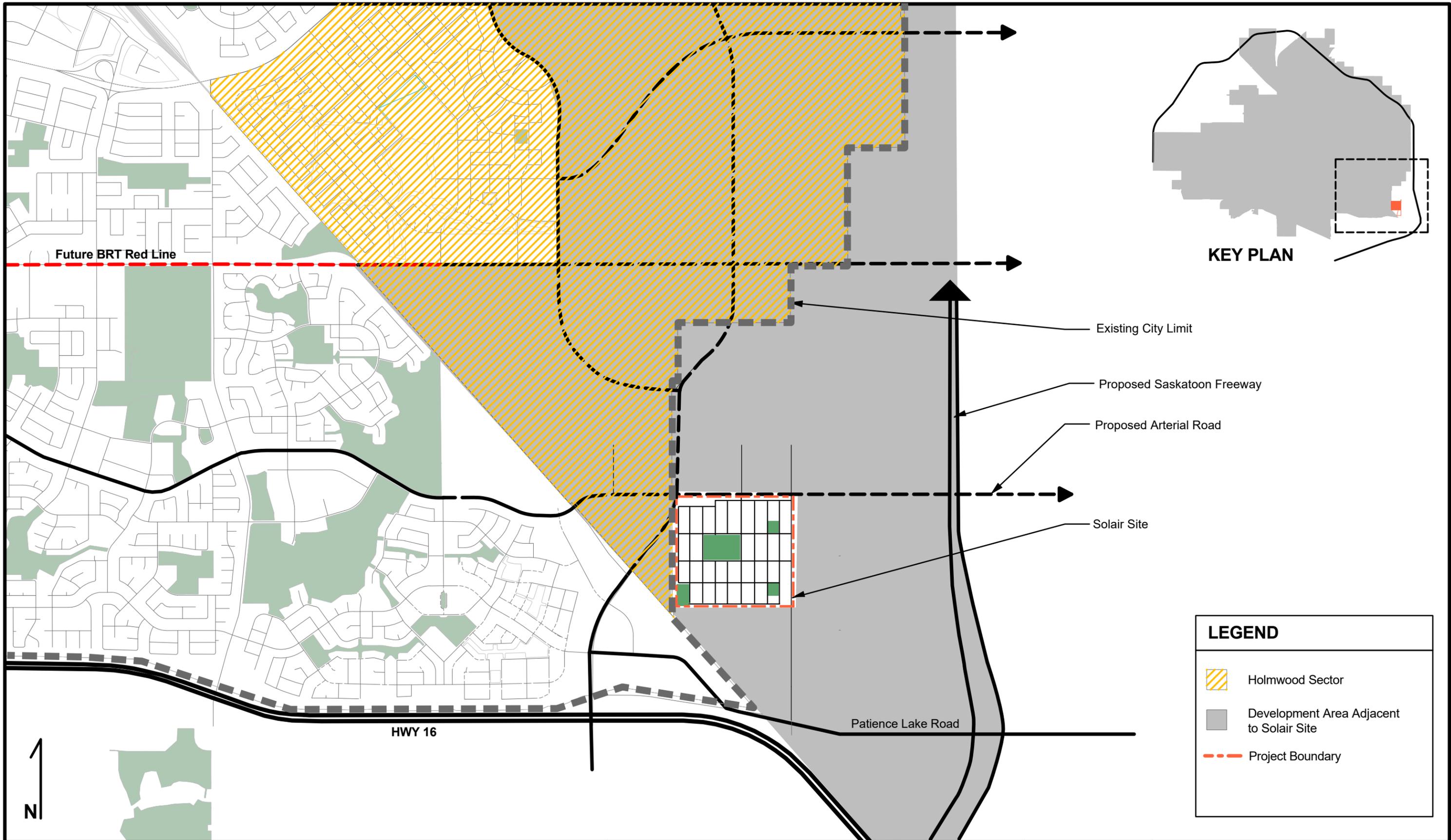


Existing City Limit

Solair Site

N





Future BRT Red Line

KEY PLAN

Existing City Limit

Proposed Saskatoon Freeway

Proposed Arterial Road

Solair Site

LEGEND

 Holmwood Sector

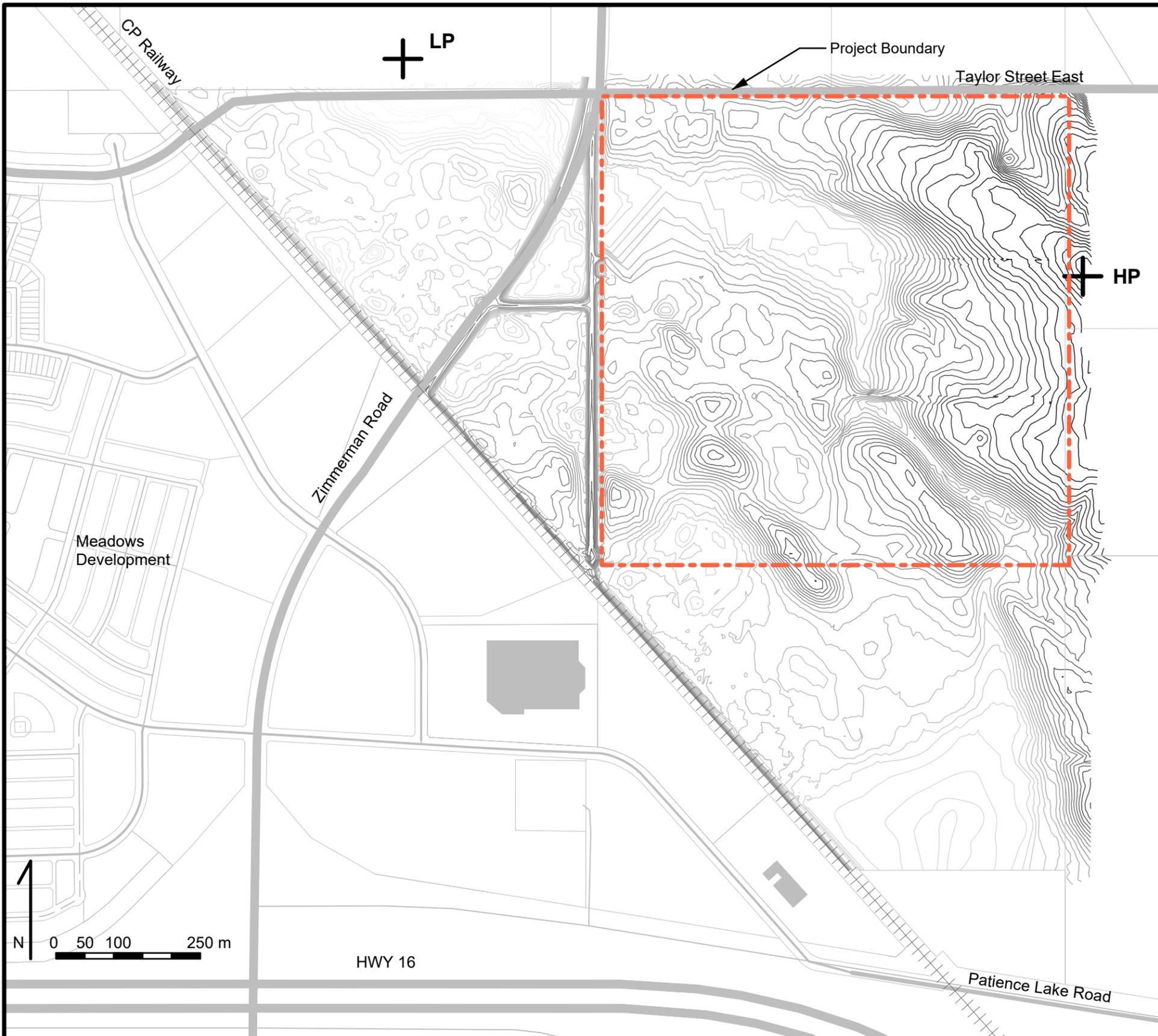
 Development Area Adjacent to Solair Site

 Project Boundary

HWY 16

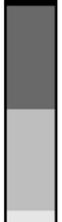
Patience Lake Road





LEGEND

 High Point = +521.0 m

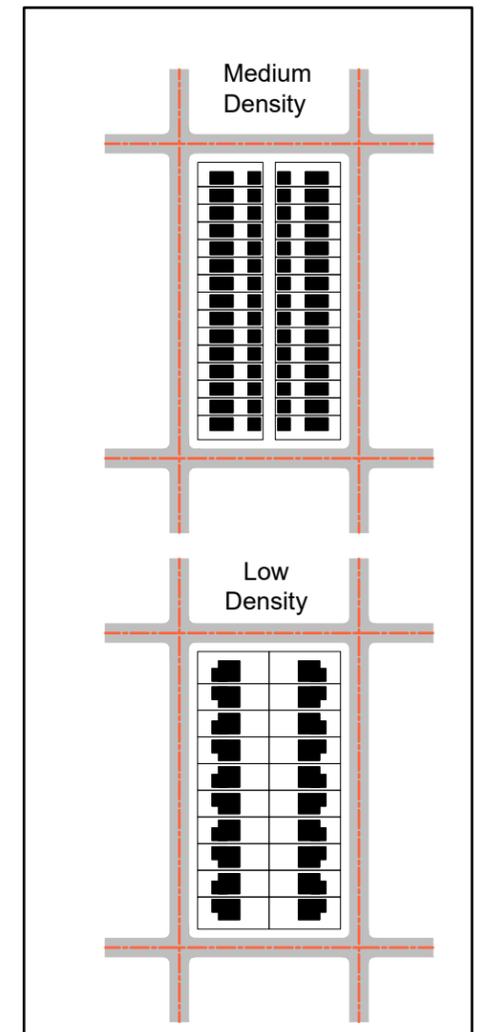
 Contours at 0.2 m intervals

 Low Point = +514.0 m

 Project Boundary

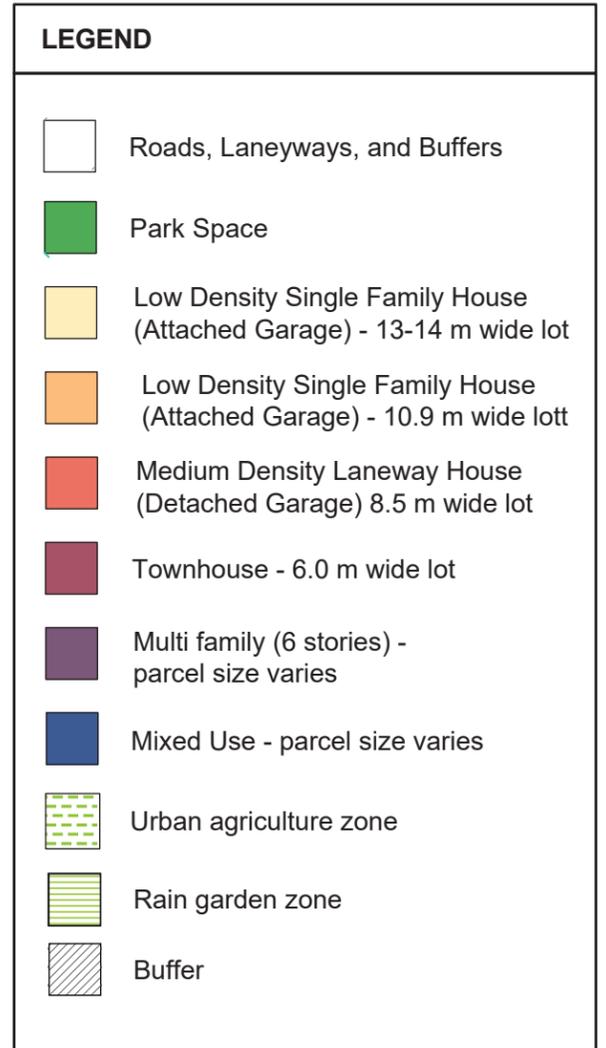
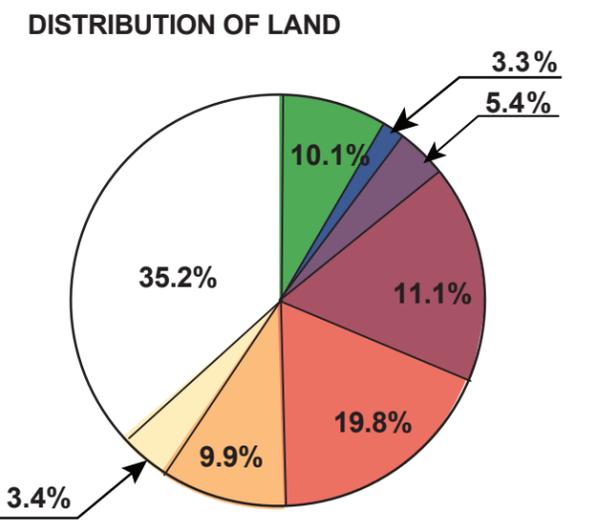


Typical Block configurations for Single Family Detached House Types

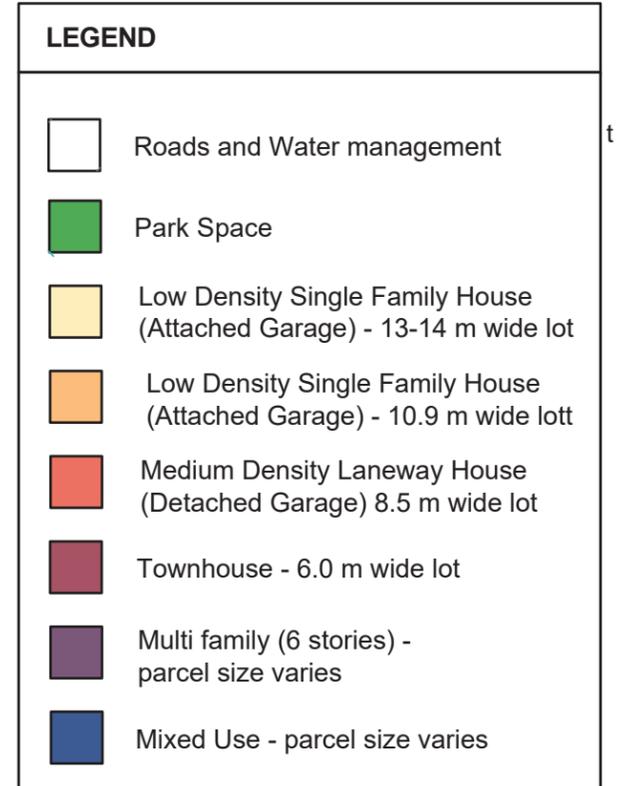
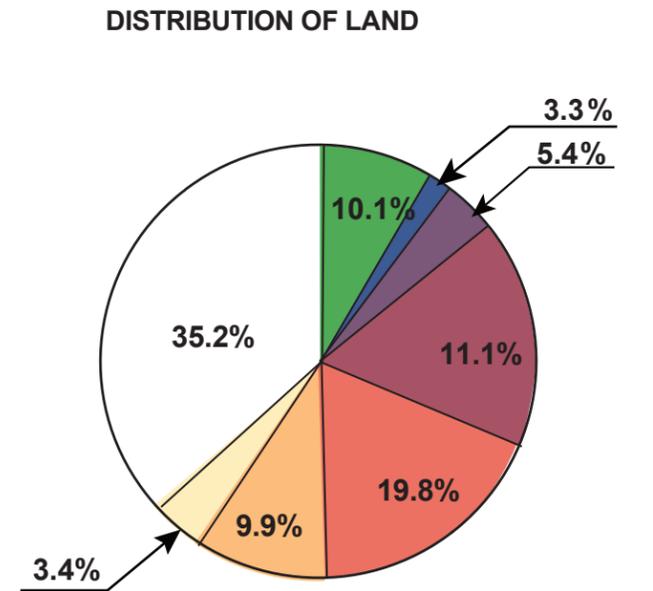


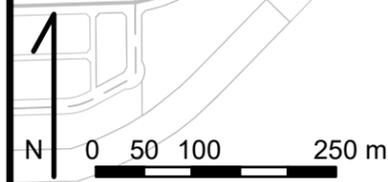
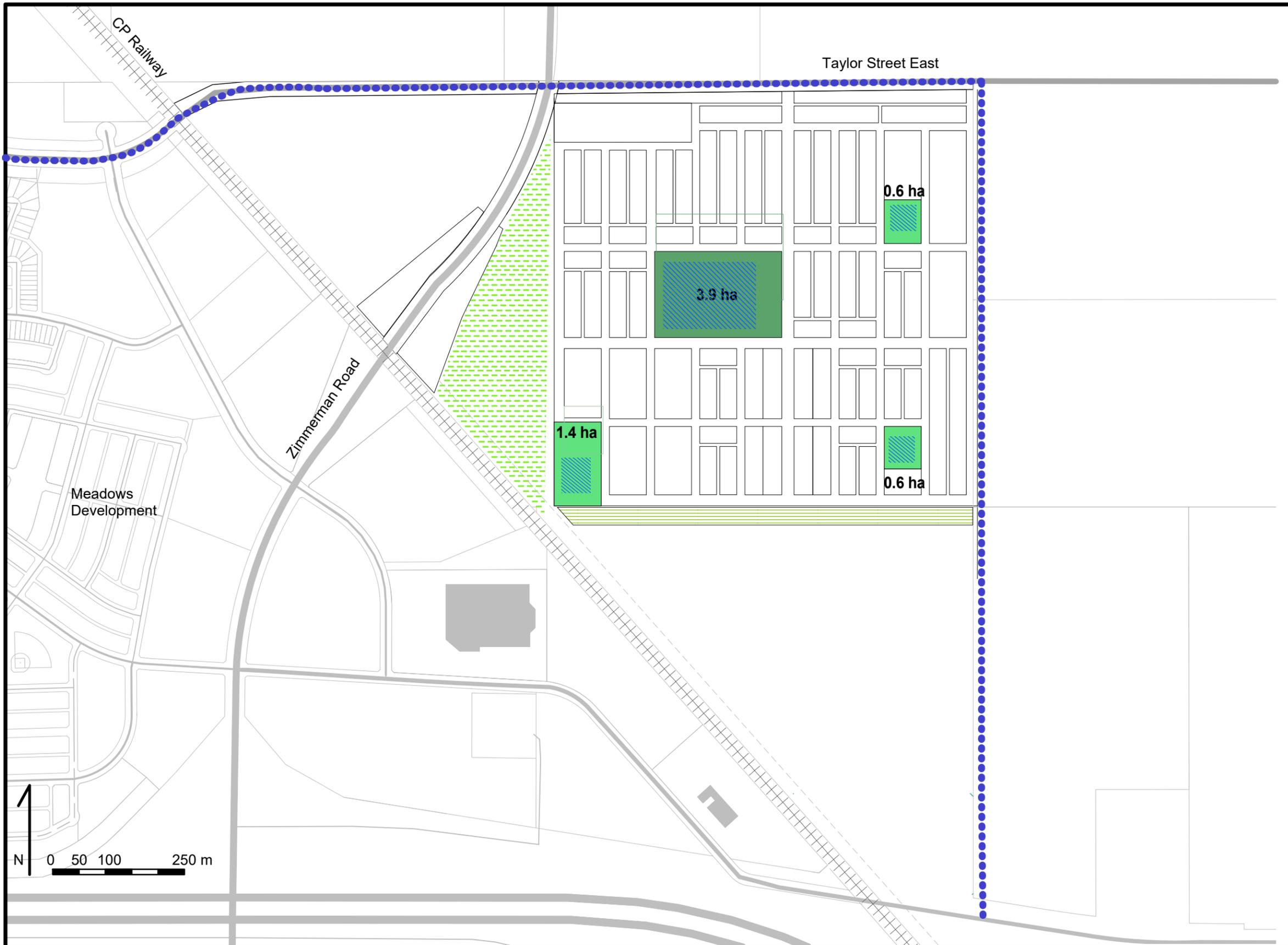
LEGEND

- Municipal Reserve
- Urban Agriculture Zone
- Rain Garden Zone
- Water Management Area
- Main Street District
- Buffer
- Collector Road
- Local Road



SOLAIR LAND USE										
Proposed Land Use	Area			Dwelling Units					pp/unit	Population
	Hectares	Acres	Percent	Frontage (m)	Lot width (m)	units / ha	units / ar	Total Units (by count)		
Garage - Low Density	2.2	5.4	3.4%	598.0	13.0	14.8	6.0	46	3.0	138
Garage - Low Density	6.3	15.6	9.9%	1,853.0	10.9	19.8	8.0	170	2.8	476
Garage - Medium Density	12.7	31.2	19.8%	3,629.5	8.5	24.7	10.0	427	2.8	1,196
Townhouse	7.1	17.5	11.1%	2,910.0	6.0	49.4	20.0	485	2.5	1,213
Multi Family	3.5	8.6	5.4%	711.0	Varies	123.5	50.0	430	1.8	774
Mixed Use	2.1	5.2	3.3%	662.0	Varies	69.2	28.0	145	1.8	261
Municipal Reserve	6.5	16.0	10.1%							
Buffer	1.6	4.0	2.6%							
Roads & Laneways	20.8	51.4	32.6%							
Total Developable	33.78	83.44	52.9%							
Total Solair Lands	63.9	157.8	100.0%					Total Units	1703	
								(estimated) Total Pop.		4,057

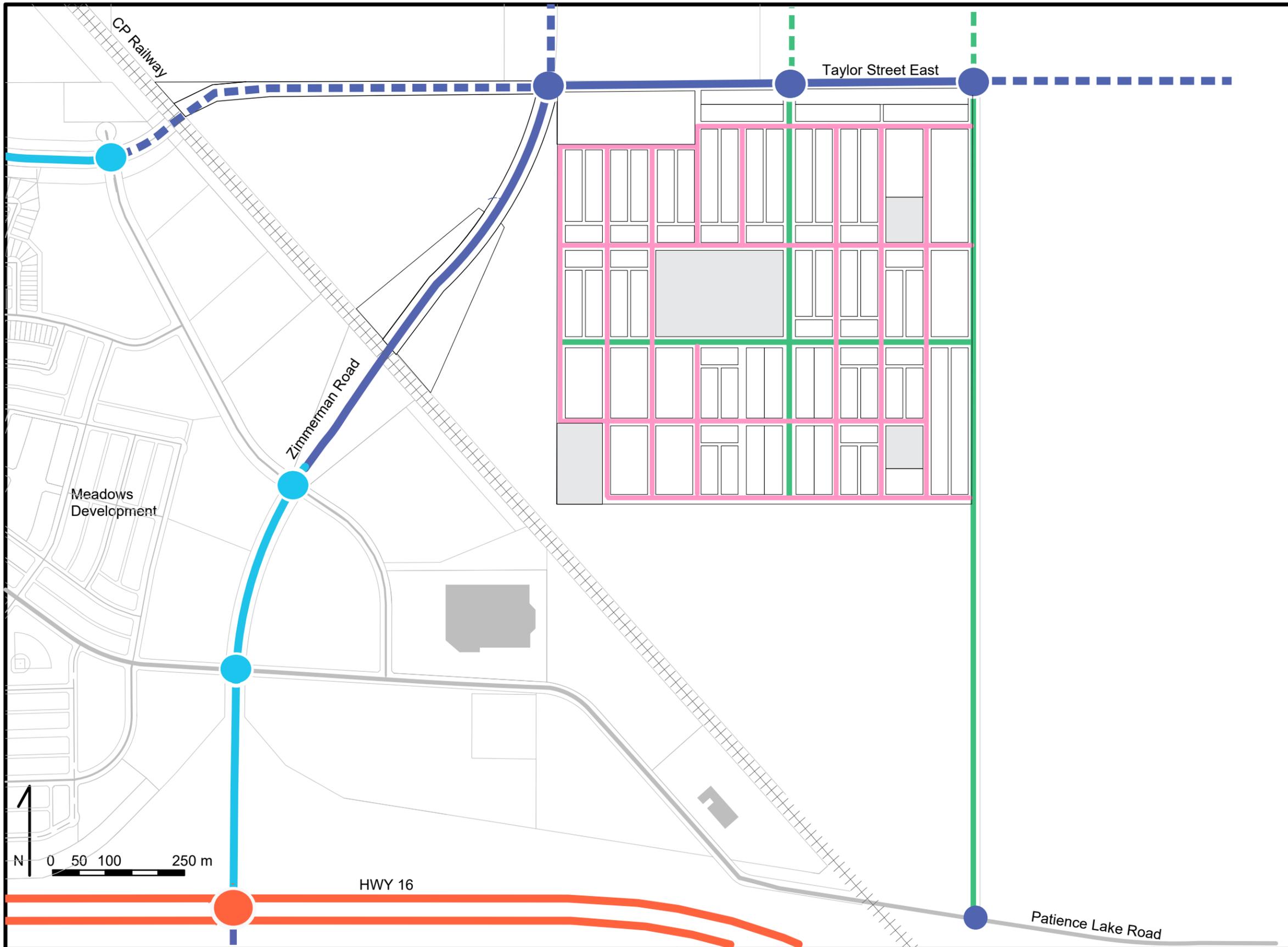




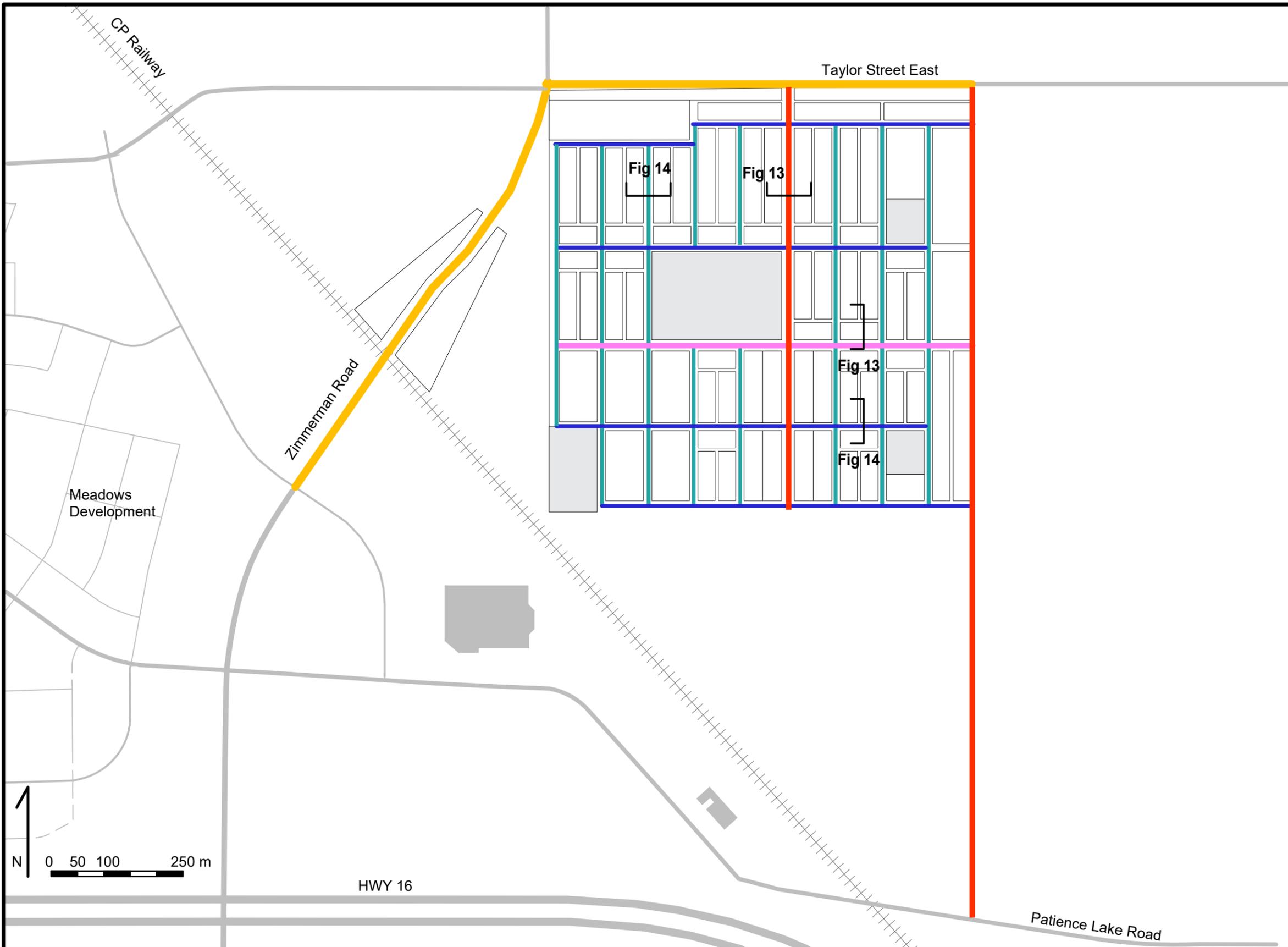
Solair Lands total area: 63.8 ha
Neighbourhood Core Parks and Pocket Parks area = 6.5 ha (10.1%)

LEGEND

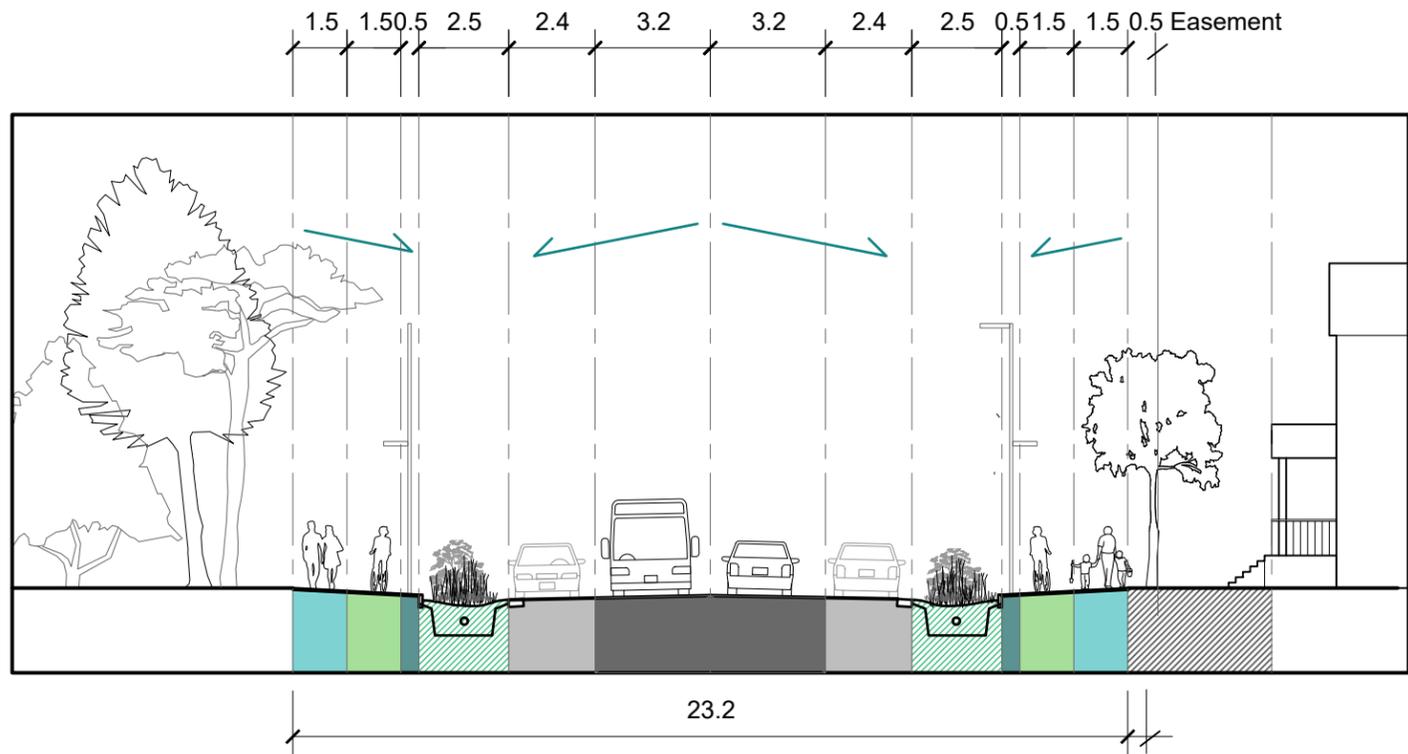
- Neighbourhood Core Park
- Pocket Park
- Urban Agriculture zone
- Rain gardens
- Storm Water management
- Future multi-use trail



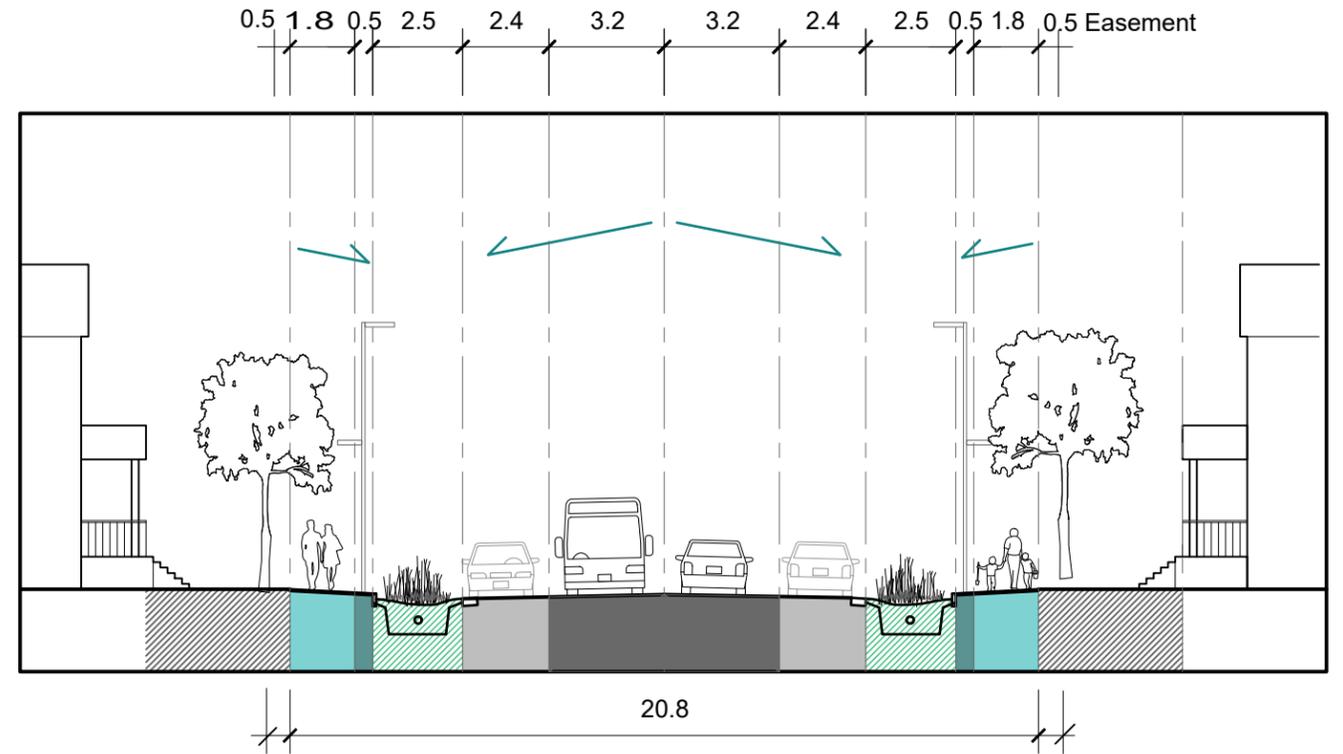
LEGEND	
	Highway
	Arterial
	Collector
	Local
	Future Arterial
	Future Collector
	Future Interchange
	Major Intersection
	Existing road & Intersection



LEGEND	
	Collector A - High Street 23.2 m
	Collector B - East West and North South 20.8 m
	Local A - North South 15.5 m
	Local B - East West 14.5 m
	Arterial B - Taylor Zimmerman 32.0m



Collector A - North South with Cycle Track

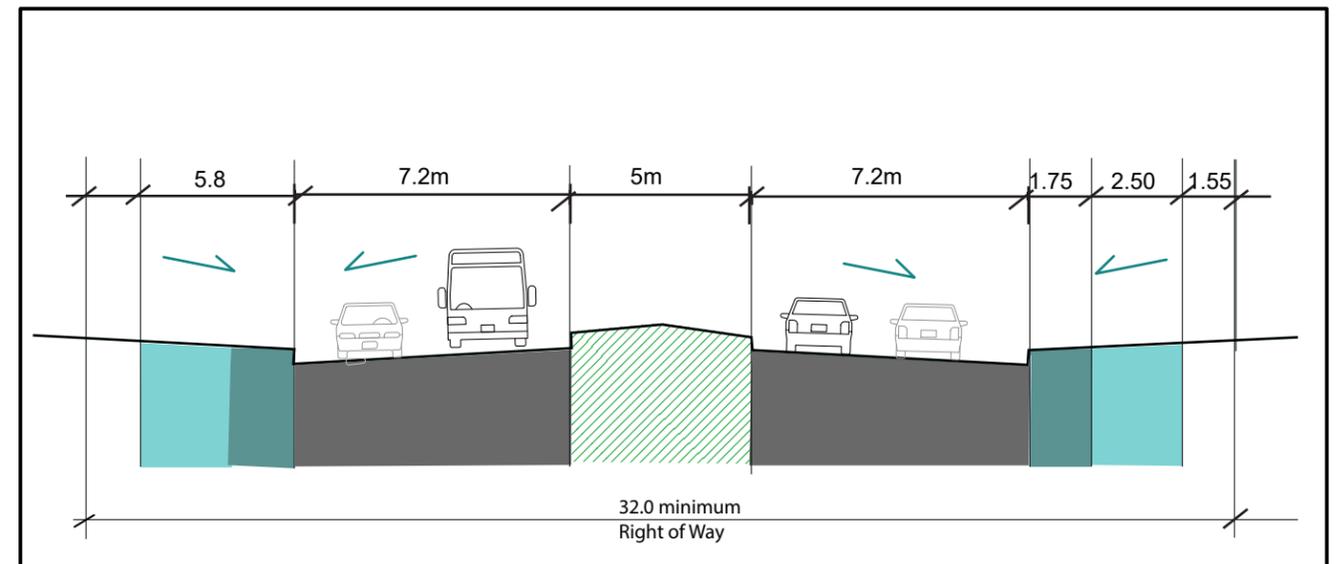
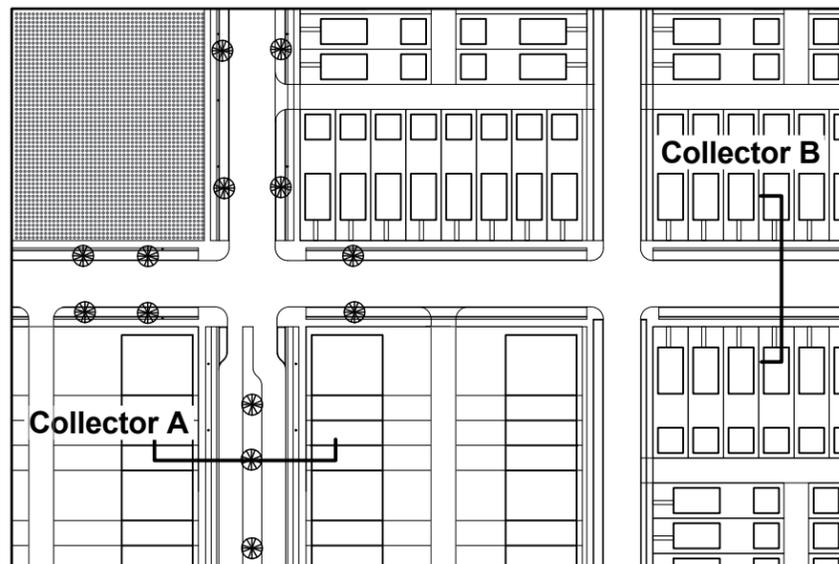


Collector B - East West

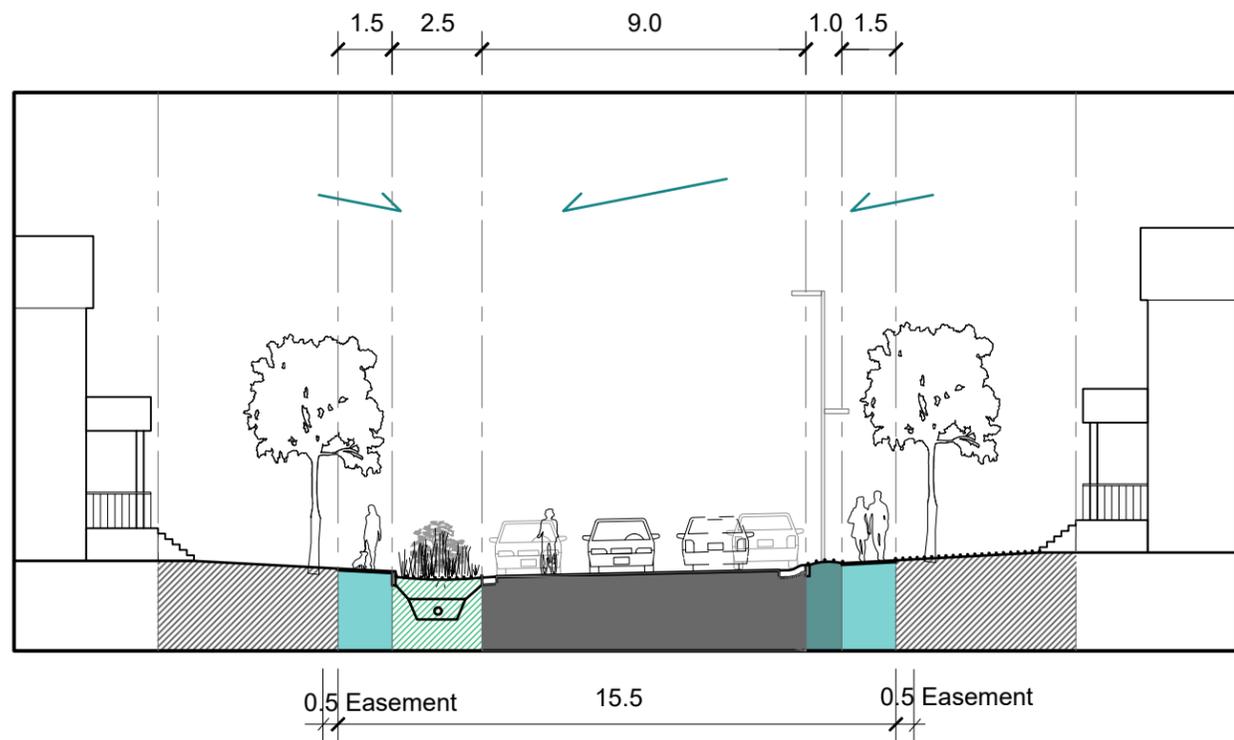
Note:
Section measurements are given in metres

Note:
Drive lane and parking lane widths set in accordance with the City of Saskatoon's Design and Development Standards Transportation System Proposed Easement to contain Public Curb Stops.

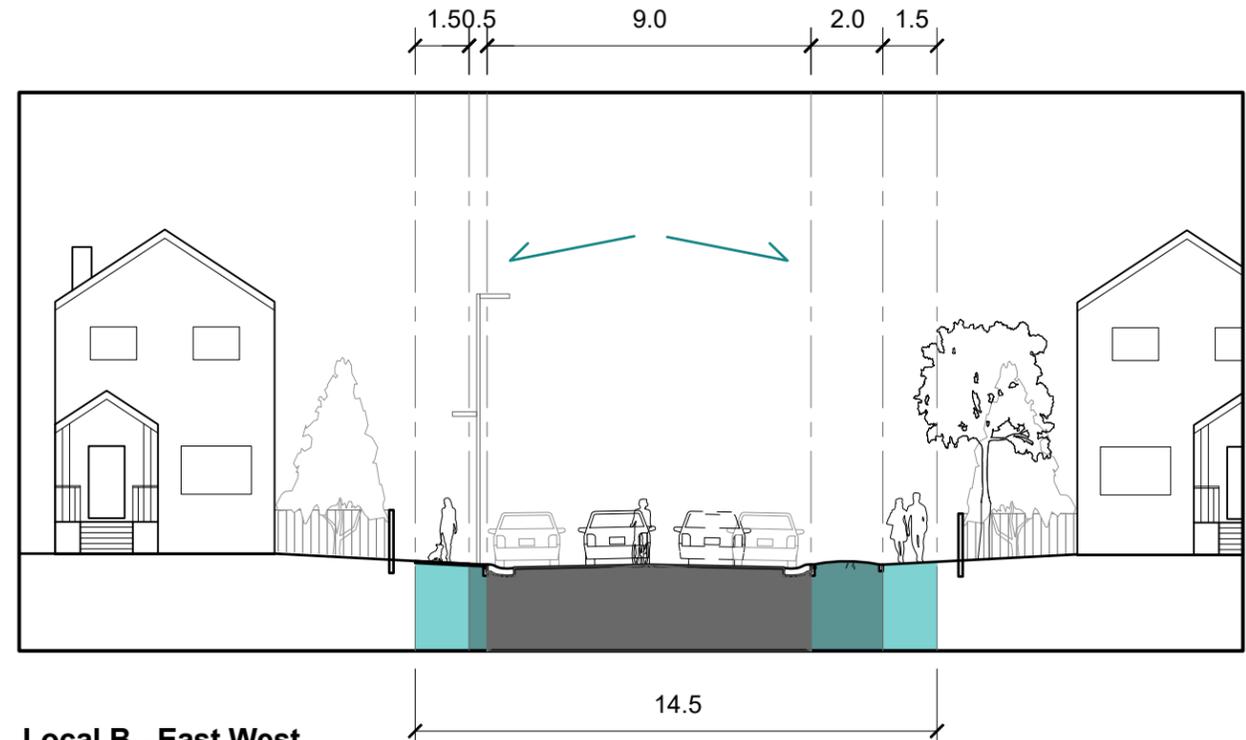
- Pedestrian zone
- Furnishing zone
- Parking
- Road
- Rain gardens
- Bike lane
- direction of slope



Arterial B - Taylor St. & Zimmerman Rd.



Local A - North South
frontage both sides, parking both sides



Local B - East West
side yards, parking both sides

Note:
Section measurements are given in metres

Note:
The 9 m wide pavement on the local roads provides land access for local traffic. Parking allowed on both sides provides a traffic calming measure where cars must slow in order to pass.

- Pedestrian zone
- Furnishing zone
- Rain gardens
- Bike lane
- Frontage zone
- Road
- direction of slope

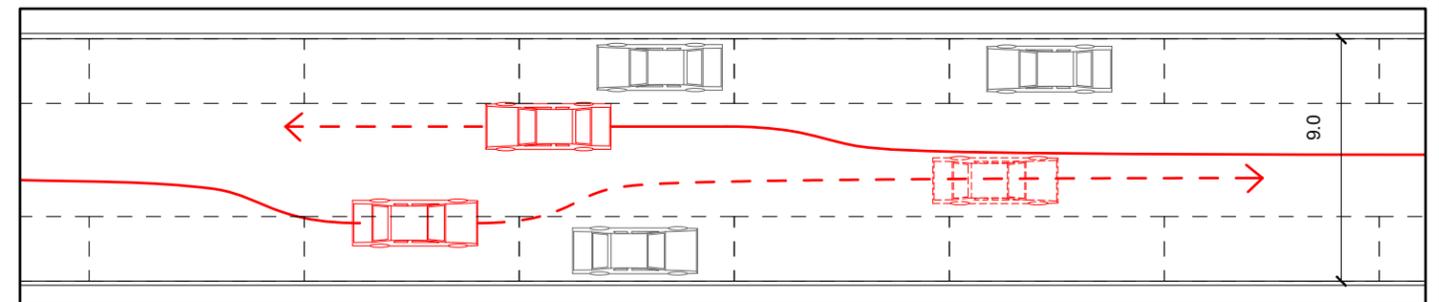
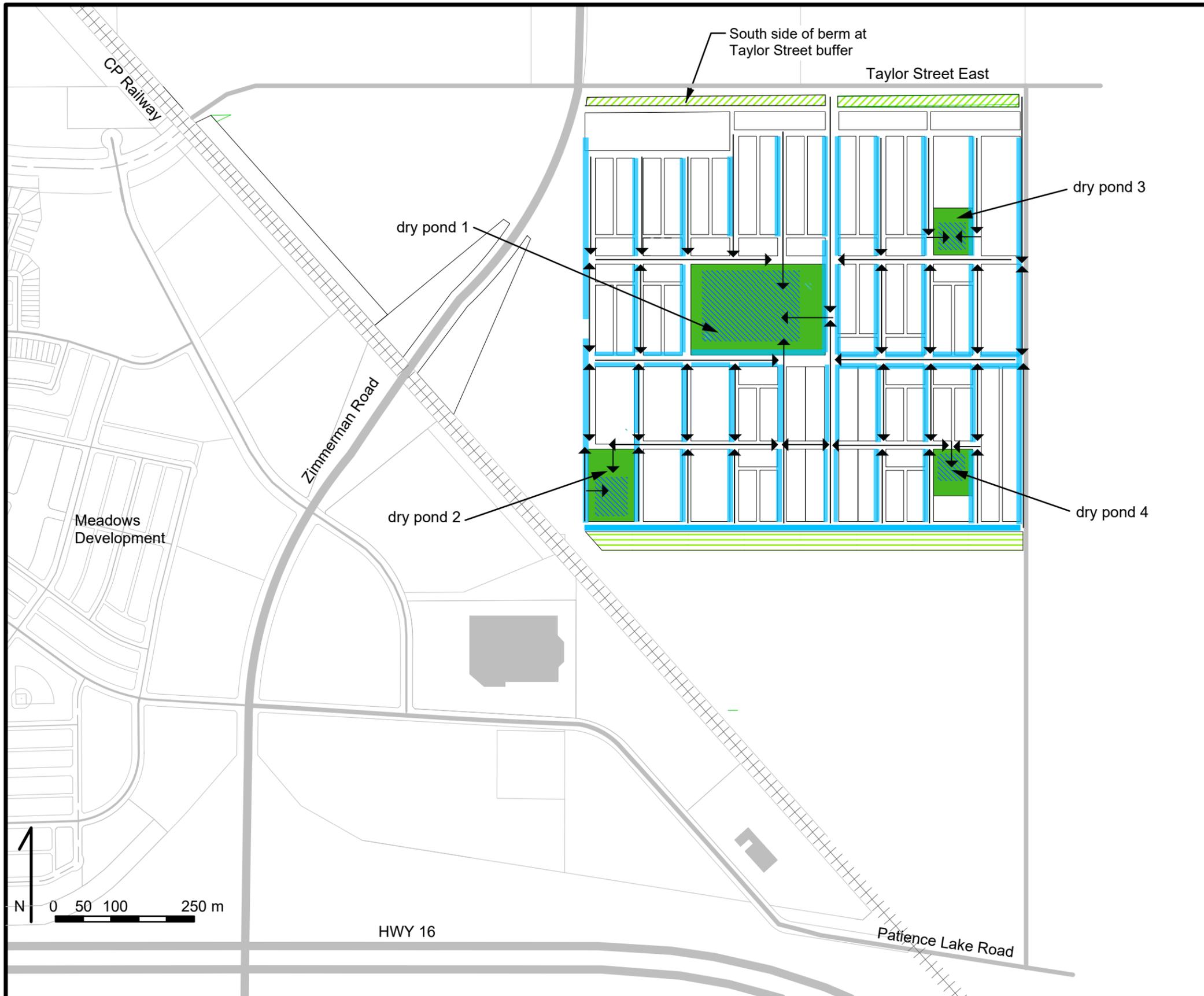
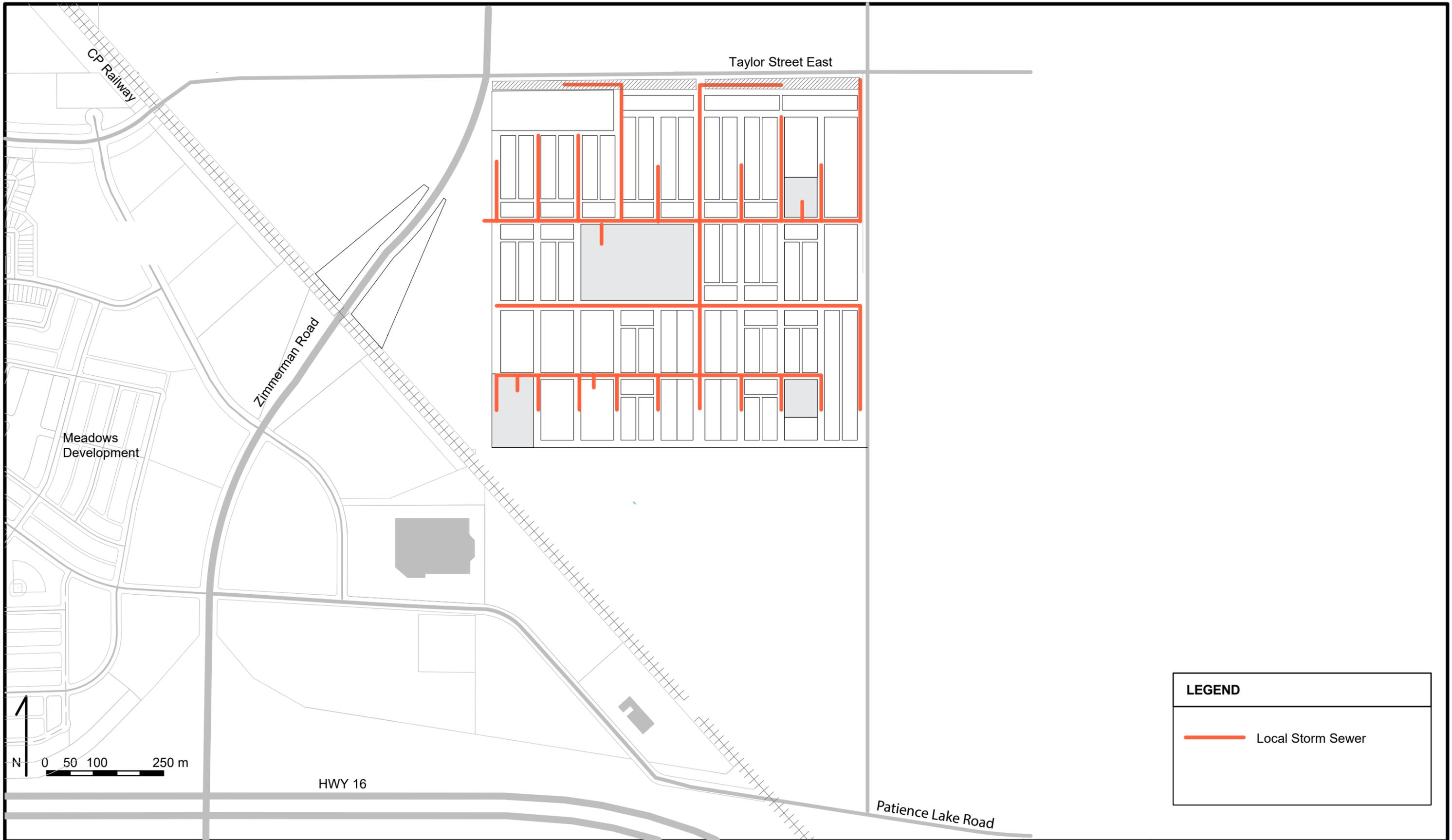


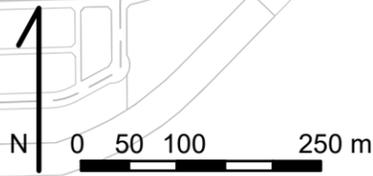
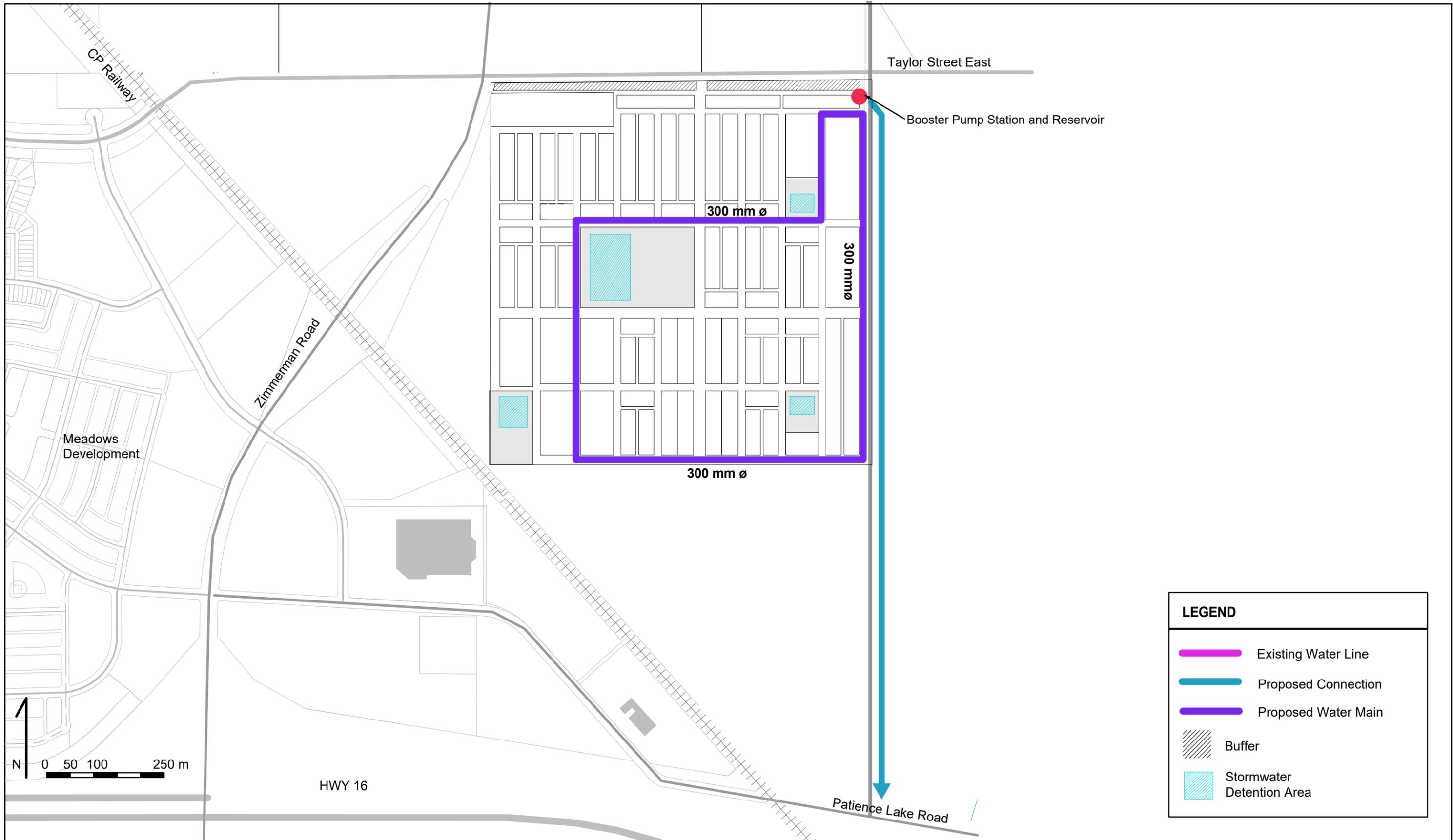
Diagram - Traffic calming on 9 m wide road with parking allowed on both sides



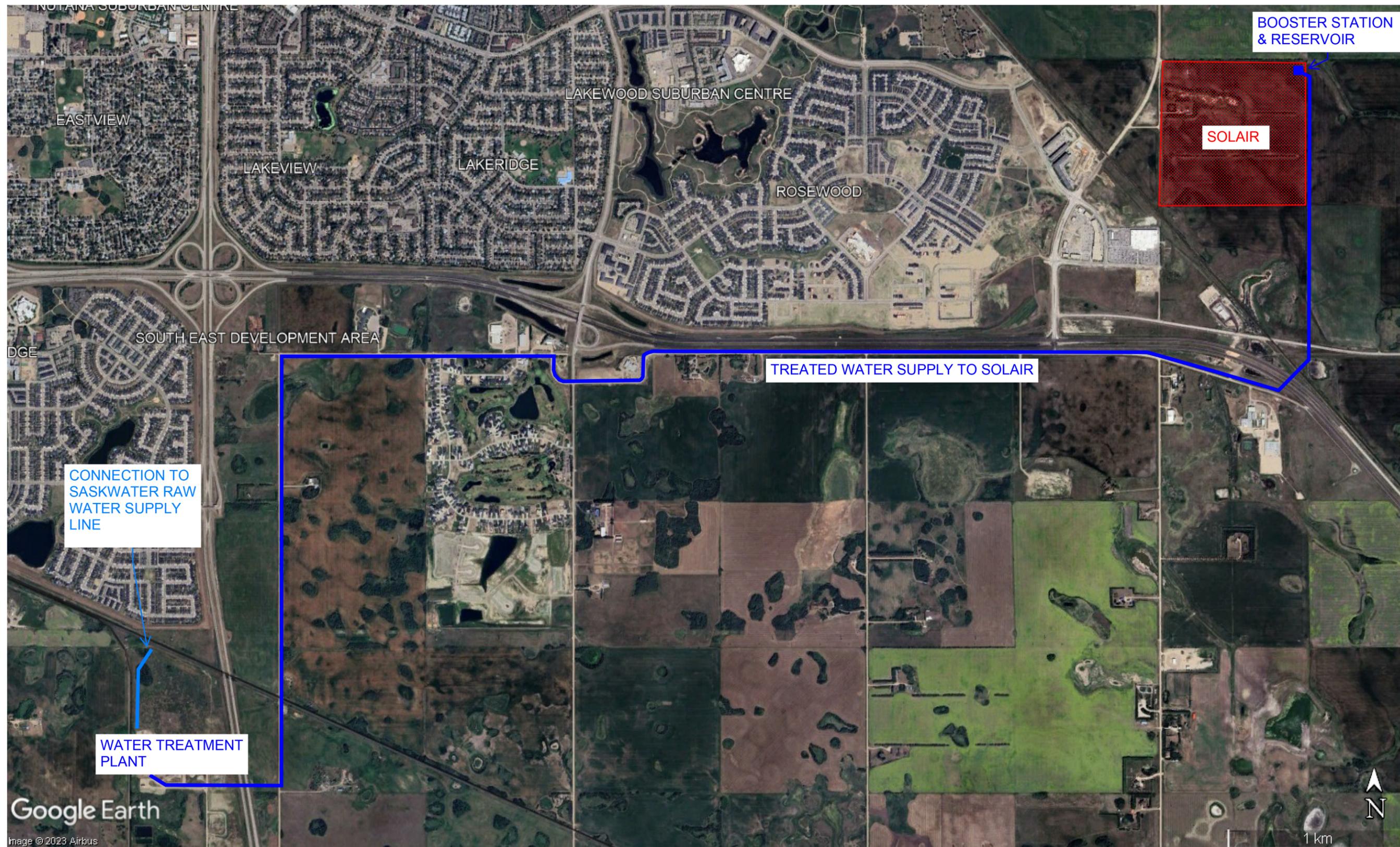
LEGEND

- ← Direction of water flow
- Rain garden (minimum 2.5 m wide)
- Municipal Reserve
- ▨ Water Management
- ▨ Rain Garden Zone





LEGEND	
	Existing Water Line
	Proposed Connection
	Proposed Water Main
	Buffer
	Stormwater Detention Area



Google Earth

Image © 2023 Airbus

SOLAIR
AN ARBUTUS COMMUNITY

LATERAL OFFICE

1024 Dupont St, Unit 18, Toronto ON M6H 1Z6
www.lateraloffice.com

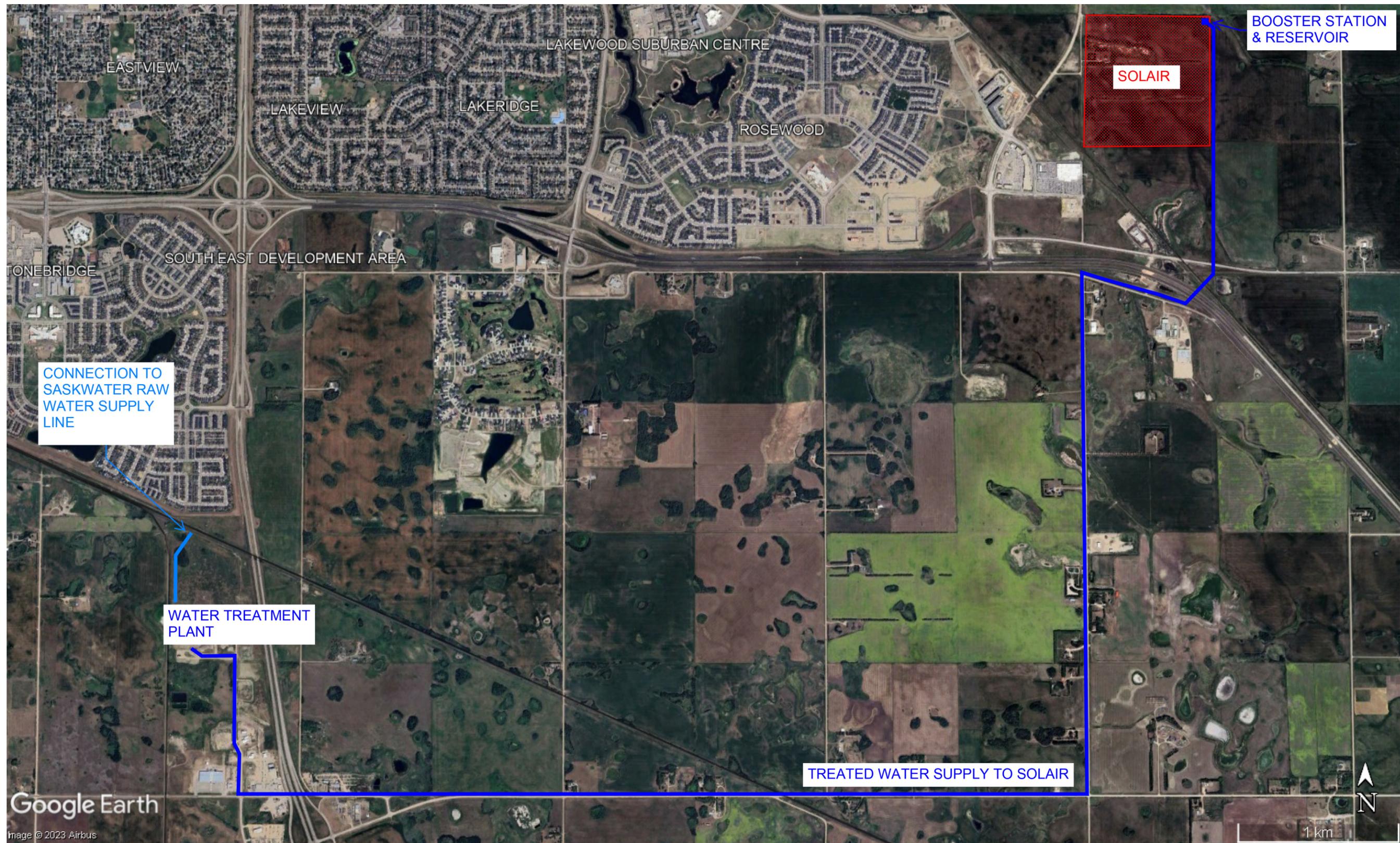
Fig 18 - Water Treatment Plan Schematic Option A

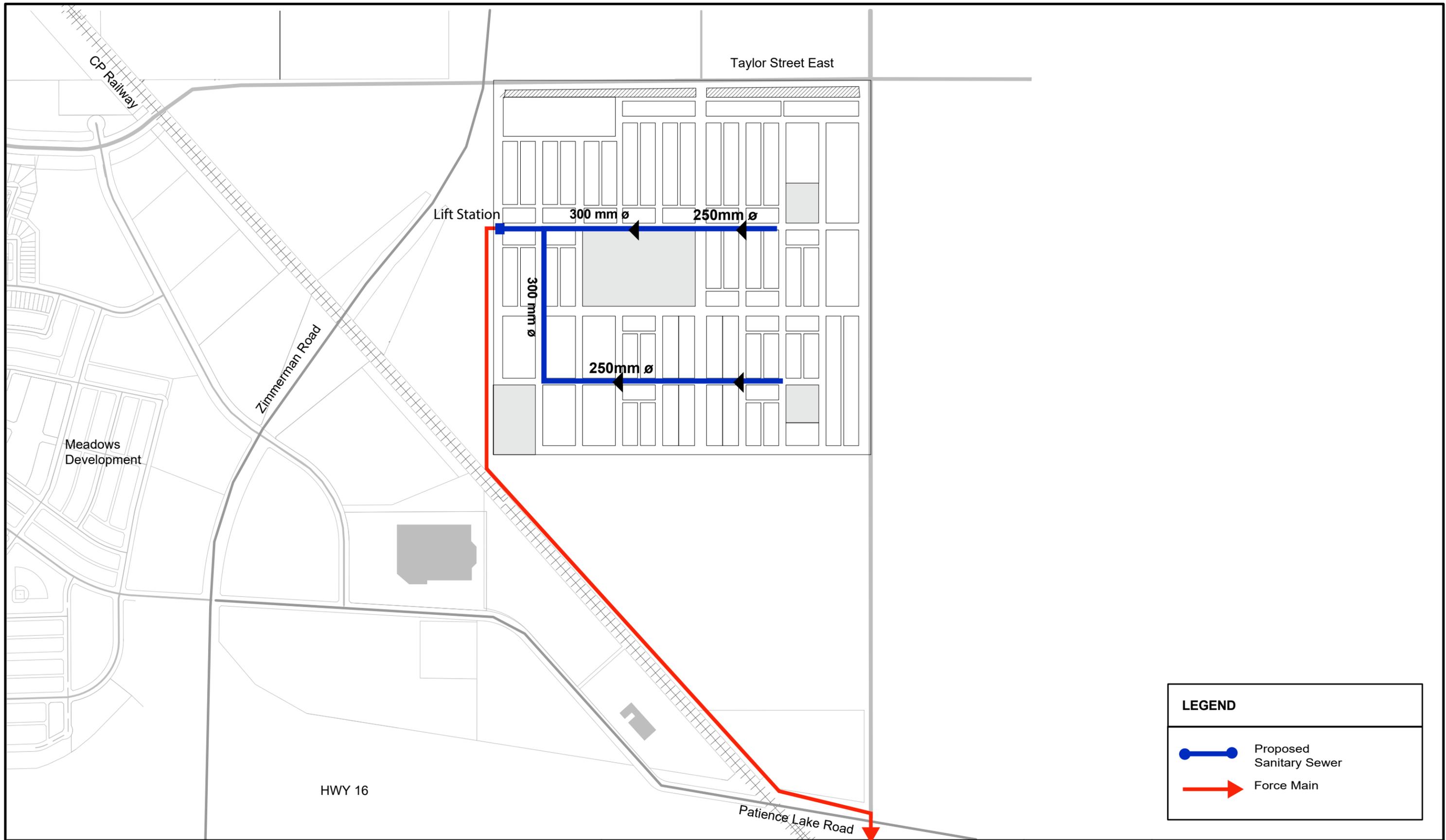
SCALE:

Not to scale unless noted otherwise

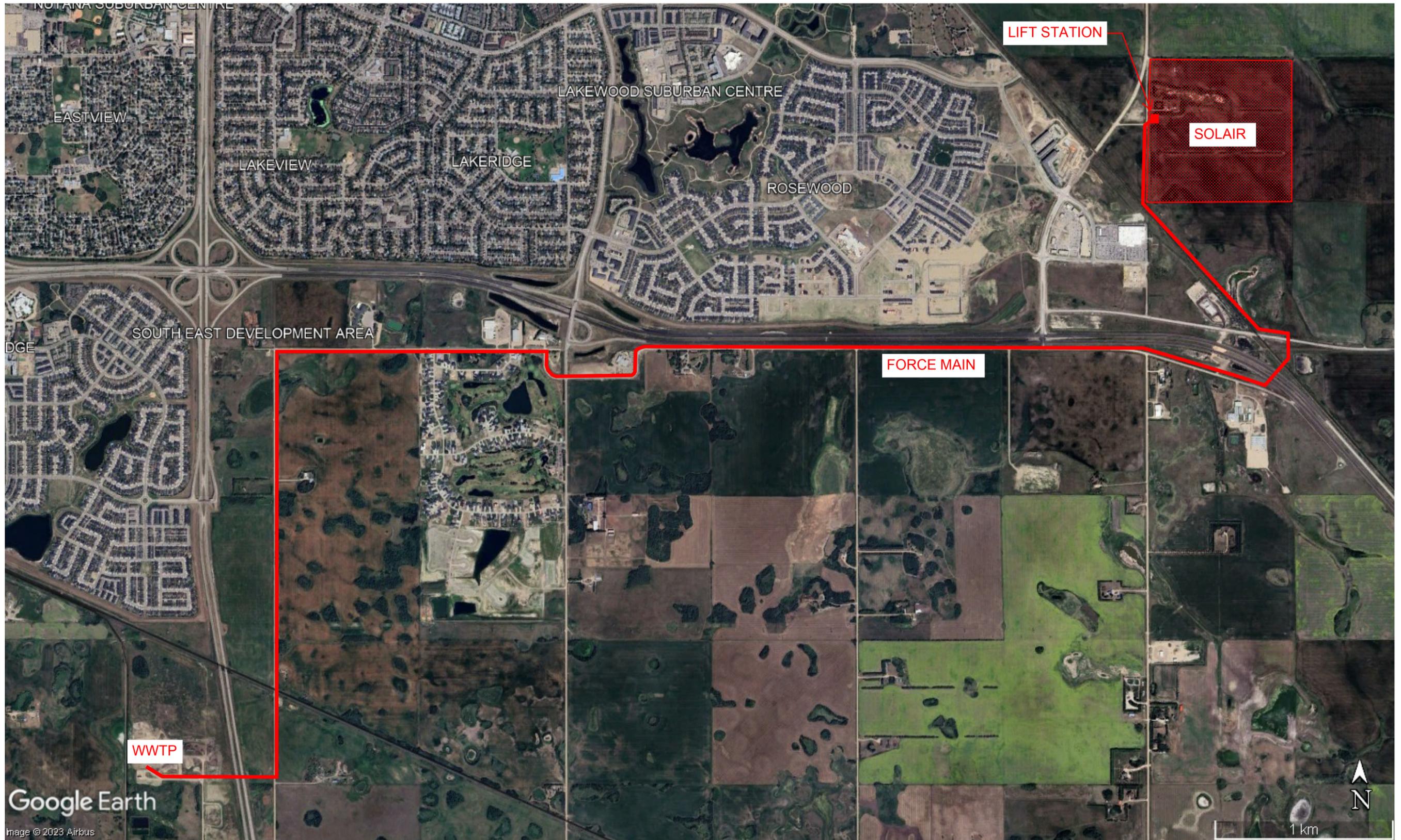
DATE:

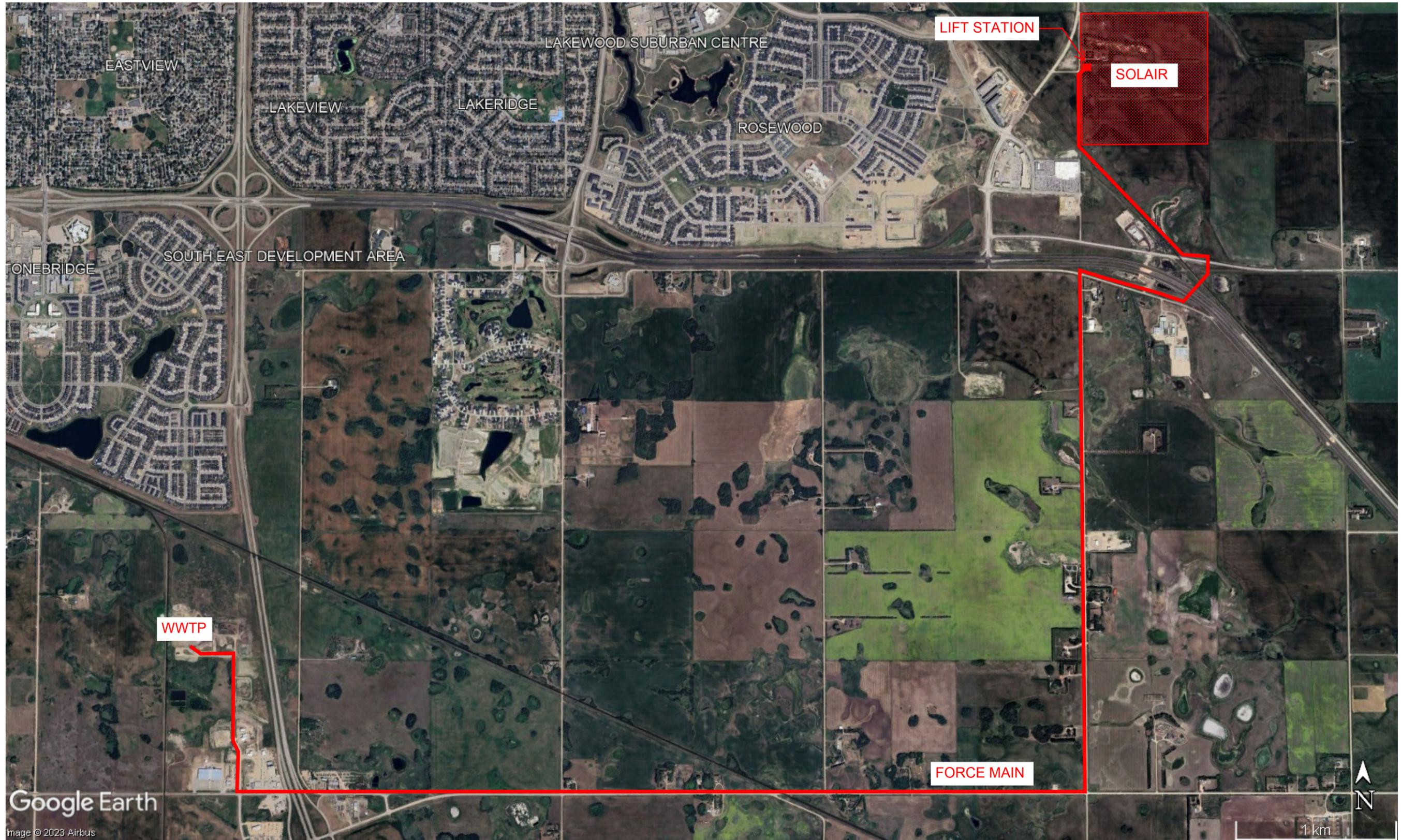
April 2024





LEGEND	
	Proposed Sanitary Sewer
	Force Main





Google Earth
Image © 2023 Airbus

SOLAIR
AN ARBUTUS COMMUNITY

LATERAL OFFICE
1024 Dupont St, Unit 18, Toronto ON M6H 1Z6
www.lateraloffice.com

**Fig 22 - Waste Water Treatment
Plan Schematic - Option B**

SCALE:
Not to scale unless
noted otherwise

DATE:
April 2024

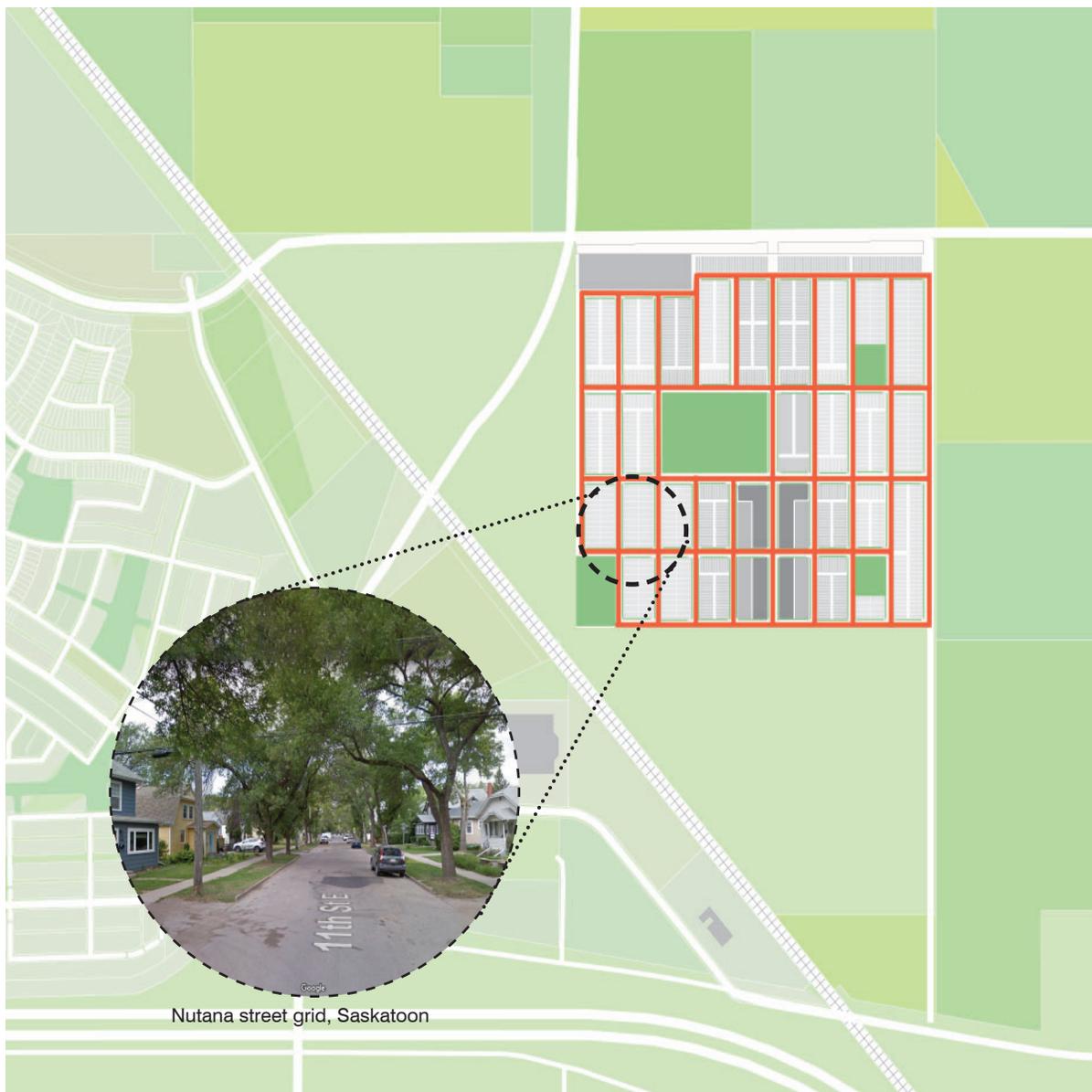


LEGEND	
■	Development Phase 1-4
■	Development Phase 5-7
■	Development Phase 8-12

APPENDIX 1 - SOLAIR KEY CONCEPTS

key concept : **BACK TO THE GRID**

The street grid is a return to an earlier way of building neighbourhoods, but is being used here as a new way to solve old problems. Current design practice in suburbs encourages wide pavements and discontinuous streets. This results in streets that can be disorienting and devoid of life. The grid establishes a network that improves connectivity, allowing vehicles to have many options to reach main collector roads. This allows local streets to have narrower pavements with the desired effect of slowing traffic while keeping active transportation options strong.



Nutana street grid, Saskatoon

key concept : A DENSE CORE & MAIN STREET

A Main Street connects to the anchor park and binds together the Solair community as a whole. A Complete Street approach to the design of the street section means there is room for pedestrians, cyclists, parking, transit, and regular vehicle traffic. Denser multi-family and mixed-use building types introduce live / work and retail components into the development, enhancing walkability within the community.



key concept : **STRONG EDGES**

The main collector roads and anchor parks are fronted with mixed-use, multi-family, or medium density residential building types. Laneway access along collector roads delegates driveways away from the main right of ways eliminating curb cuts. The Complete Street design approach reduces drive pavements to contemporary standards while dedicating space to active transportation options. The resultant public realm creates a main street which is a pleasure to travel on by foot, bike or car. The enhanced streetscape gives a sense of destination in and of itself.

The concept of strong edges is compatible with a connection to a future regional transportation system. Similar to 'corridors' in the City's growth plan, Solair's strong edges could be linked at a future date to the City's rapid transit system via a smaller feeder system.



key concept : **ANCHOR PARKS**

A large parks anchors the plan and serves as places to play, relax, and engage with nature. Its open edges gives the space a celebratory feel and connects it to the surrounding neighbourhood. The open perimeter allows for easy views making the park a destinations all year round.

gardens. Blending active healthy lifestyles with local food production lowers costs of maintenance and combines urban living with rural lifestyle options.

Rather than dedicating 100% of the Municipal Reserve to high maintenance urban park space, a sizeable amount of at least one park could be dedicated towards urban farm plots and community



The role of parks seasonally

key concept : NEIGHBOURHOOD AREAS

Within the strong edges established by the collector streets are the neighbourhoods. These are characterized by quiet local streets with calmed traffic patterns, reminiscent of small town Saskatchewan. This plan embraces recent urban design best-practice on strategies to encourage cars to slow down. Narrower 9 meter wide pavements with parking on both sides helps discourage drive-through traffic. The neighbourhoods that are not located near one of the two anchor parks are punctuated by pocket parks, creating a green nucleus for all the neighbourhoods.



key concept : **GREEN INFRASTRUCTURE**

Reduced pavements and generous green boulevards mean more Stormwater runoff can be managed on site, limiting impact on existing municipal infrastructure. At the same time the streetscapes are beautified with planting and more space is dedicated to pedestrians and cyclists.

increased permeability will mean lower costs for managing , making Solair more resilient to severe storm events, by letting more water seep into the ground naturally.

Solar infrastructure is integrated into the residential development and border landscape leveraging land and energy resources in a responsible and sustainable way. Low impact development and



key concept : **URBAN AGRICULTURE**

The integration of urban farm plots is one key element which sets Solair apart from traditional urban development. Health and well-being is one of the pillars of sustainability, and Solair takes full advantage of the opportunity to incorporate local food production within the neighbourhood setting. The area to the West of the Solair site will house farm plots, but might also include a farmer's market, an open-air space for education and community gathering.





APPENDIX 2 - P4G COMPLIANCE TABLE

SOLAIR - P4G COMPLIANCE TABLE

The following table provides a clause-by-clause analysis of the relevant sections of the P4G District Plan and how the Solair Concept Plan complies with the P4G District Plan (Plan). Key clauses within the Plan are drawn out to illustrate how Solair complies (and furthers) the goals and objectives of the Plan. The table is divided into the same Parts as outlined in the P4G District Plan.

Policy & Key Themes	Assessment of Compliance
Part 1 – Vision, Principles and Strategic Directions	
2.2 Vision – Sustainable growth and development; rich range of opportunities and lifestyle choices	<i>Solair meets the P4G vision precisely. This is a sustainable development offering a residential choice in the region which currently does not exist. Broadens the options for a variety of lifestyle choices.</i>
2.3.1 Partnership – integrated, coordinated approaches to managing regional opportunities	<i>Solair requires a regional approach to development as prescribed in the P4G District Plan. A new way of viewing development which is supported by partnerships to integrate and co-ordinate development, thereby opening the door for regional growth.</i>
2.3.2 Efficiency - increase quality of services through coordination between partners	<i>Solair is a regional development which utilizes the private sector for many of the services provided within the neighbourhood. Efficiencies are gained through density and provision of water and sewer from regional sources.</i>
2.3.3 Sustainability – economic vitality and complete communities	<i>There are currently no truly regional developments in the Saskatoon district. Low density country residential development and lightly serviced industrial areas are offered in the region. Solair is the first regional development offering a complete community within a compact footprint.</i>
2.3.4 Opportunity – diverse, vibrant regional economy	<i>Solair offers a residential choice which does not exist in Saskatoon or Corman Park. It will diversify the residential choices in the region.</i>
2.3.5 Equity & Inclusiveness – costs and benefits equitably distributed	<i>This is one of the objectives of the P4G. Growth within the region benefits <u>all partners</u>. Costs associated with regional growth can be equitably covered through mechanisms within the Planning and Development Act.</i>
2.3.6 Flexibility & Resilience – adaptive, flexible approaches, incorporate innovation & creativity	<i>Solair responds to this principle precisely. It is not a ‘business-as-usual’ development. It offers a new sustainable residential development for consumers looking for a lifestyle which blends urban and rural in a sustainable footprint.</i>
2.4.2 Regional Infrastructure & Services – regional coordination;	<i>Solair is a catalyst for this strategic direction. P4G is looking for a <u>regional transportation network</u>; <u>regional water and wastewater</u></i>

shared systems; regional investments.	<i>infrastructure; and the co-ordination of recreation facilities, emergency services and others.</i>
2.4.3 Settlement Patterns & Complete Communities – clustered; contiguous and complete.	<i>P4G wants development clustered in contiguous areas. Solair does that. It is the most dense residential development in the history of the Saskatoon district.</i>
2.4.4 Regional Economy & Economic Development – flexible, diversified, globally competitive.	<i>The Saskatoon district does not have a ‘regional’ level of development. Solair is a regional level of development blending attributes of urban and rural. This diversifies the local economy and attracts people to the region.</i>
2.4.5 Quality of Life – diverse lifestyles; unique character; enhance environmental, social, and economic resources.	<i>Solair offers a residential and mixed-use environment which is unique and will attract people seeking alternatives to city and country living. A unique quality of life is offered.</i>
2.4.6 Governance & Funding – coordinated regional action; joint actions; shared costs and benefits; collaboration.	<i>P4G changes the mindset of participating municipalities shifting away from a silo mentality (we-they) to a regional mentality, offering support for development at a regional scale. Towards a ‘Saskatoon Metropolitan Region’.</i>
2.4.7 Natural Environment & Drainage	<i>It is important to note that Solair is <u>not</u> located within the Green Network Study Area identified on the P4G Land Use Map.</i>
Part 2 – General Policies	
6.3.1 Significant Natural & Heritage Resources	<i>The Solair lands have been screened using industry standard tools and databases. These lands contain no heritage sensitive areas according to the Saskatchewan Developers Online Screening Tool. Most of the wetlands on the Solair site drain towards the Holmwood Drainage Area. Most of the area has been extensively modified (e.g. cultivation, road/infrastructure construction and use, and occupied dwellings), the natural habitat quality for both vegetation and wildlife has been adversely affected.</i>
7.3.1 Hazard Lands	<i>We note that the P4G is planning to create a Hazard Lands Map, however, we are not aware that this work is completed. To our knowledge, the Solair development is not located on any Hazard Lands. There are no mining leases, subsidence risks, slumping, landslide, erosion, or instability risks known within these lands.</i>
7.3.5 Development in Flood Plains	<i>The Solair lands are not located within a flood zone.</i>
8.3.1 Source Water Protection	<i>The Solair lands have been extensively cultivated for agricultural use. The ecological assessment concluded that most of the wetlands that exist have been extensively modified and operate in a patchwork fashion, creating habitats that are largely associated with the dispersed, isolated wetland complexes.</i>

8.3.2 Runoff from Site Development	<i>Solair proposes to utilize Low Impact Development (LID) Standards. The proposed storm-water system for the Solair development involves a combination of roadside rain gardens, storm sewers, open channel conveyance channels, detention ponds, groundwater release outlets, and major overland flow routes. Post development runoff flows will not exceed pre-development runoff flows; this is achieved through a system of integrated low impact development storm water designs.</i>
Part 3 – Land Use	
10.3.3 Future Urban Growth Areas	<i>Solair is proposed within the ‘Future Urban Growth Area’ land use designation in the P4G Land Use Map. It is also located within the 700,000 population threshold.</i>
10.3.4 Intent of Land Use Designations – Urban Residential Neighbourhood	<i>Solair contains urban density with full urban services provided primarily from new Regional Servicing infrastructure.</i>
15.3.3 Intended Uses in Future Urban Growth Areas	<i>Solair is entirely consistent with the intended uses for Future Urban Growth Areas.</i>
15.3.4 Concept Plans for Intended Uses in Future Urban Growth Area	<i>Arbutus has provided a full, detailed Concept Plan in line with requirements from the R.M. of Corman Park.</i>
15.3.5 Development Standards for Intended Uses	<i>The development standards being proposed for Solair are entirely consistent with the development standards within the adjacent urban municipality. This policy within the P4G anticipates development which is consistent with, and in advance of, development within the adjacent municipality.</i>
15.3.6 Environmental Impacts	<i>Solair is an environmentally sound proposal and the foundation for development of Solair is to advance sustainable development principles in practice and scale. No adverse environmental impacts are anticipated.</i>
15.3.7 Interim Uses in Future Urban Growth Areas	<i>Solair is not an interim use. It is intended to be Saskatoon’s first regional urban residential development with full urban services provided from regional infrastructure.</i>
15.3.16 Dedication of Reserves in Future Urban Growth Areas	<i>Solair is dedicating Municipal Reserve as indicated within the Land Use Map and Chart.</i>
15.3.18 Urban Residential Neighbourhood Area Density	<i>The Solair development will provide 10.8 units per gross acre. This exceeds the 7 units per gross acre policy and will be one of the highest density residential neighbourhoods in the Saskatoon region at full build-out.</i>
20.3.2 Development Adjacent to Urban Municipalities a). compatibility b). infrastructure & services c). location & timing	<p><i>a). Solair is proposed as Saskatoon’s first regional urban development. The land uses and development standards are compatible with the City of Saskatoon.</i></p> <p><i>b). Solair will not draw water or sewer capacity from Saskatoon. The development anticipates that many services will be drawn from private sources. Where services from Saskatoon may be</i></p>

	<p>required, the P4G encourages the use of Intermunicipal Agreements as defined in the Planning and Development Act, 2007 to ensure costs and revenues are shared between municipalities.</p> <p>c). Solair is consistent with the location and timing requirements as defined in the P4G Plan.</p>
20.3.5 Identifying Regional Infrastructure in Concept Plans	Solair will be drawing water and sanitary services from the English River Node which clusters infrastructure with enough capacity to serve regional growth and development within the South and South east areas of the P4G.
20.3.6 Co-ordination of Regional Infrastructure	Although Solair is not anticipating a significant draw on urban services, the P4G Plan states "...the P4G municipalities will consider interjurisdictional coordination of their infrastructure and servicing."
20.3.7 Criteria for Regional Infrastructure	The Solair Concept Plan addresses each of the components listed under this policy and is in conformance with each.
23.3.3 Services Provided at Developer Expense	Solair anticipates funding for all costs associated with providing the infrastructure and services required for development. Arbutus is willing to enter into a servicing agreement to address costs.
23.3.4 Municipal Infrastructure Coordination	Solair is anticipating that Municipal infrastructure plans and regional infrastructure plans can be coordinated for the benefit of the region. Solair advances these principles.
Part 4 – Servicing	
23.3.1 Regional Servicing Plans	Solair will have water and wastewater serviced by two regional facilities from the English River Node.
23.3.2 Coordination of Development & Infrastructure Planning	Arbutus and the English River First Nation have jointly signed a Letter of Intent to pursue regional coordination and servicing for Solair.
Potable Water	
24.3.2 Coordination with Regional Providers	Arbutus has signed a Letter of Intent with English River First Nation to provide region potable water service to Solair.
24.3.5 Innovation in Water Conservation	Solair builders will be encouraged to use low flow fixtures in households.
Wastewater	
25.3.1 Regional Wastewater Servicing Plan	Arbutus has signed a Letter of Intent with English River First Nation to provide wastewater treatment for Solair's effluent.
25.3.7 Innovation in Septic Treatment Encouraged	Solair's wastewater treatment facility is membrane bio-reactor plant, which are consider well-established, proven, and environmentally sustainable.
Stormwater & Drainage	
26.3.2 Drainage Plans	Solair's drainage mitigates on site and offsite impacts by utilized retention/detention principles in combination with overland flow routes.

26.3.5 Emerging Stormwater Management Technologies	<i>Solair proposes to utilize Low Impact Development (LID) Standards. The proposed storm-water system for the Solair development involves a combination of roadside rain gardens, storm sewers, open channel conveyance channels, detention ponds, and major overland flow routes. Post development runoff flows will not exceed pre-development runoff flows; this is achieved through a system of integrated low impact development storm water designs.</i>
26.3.6 Alignment of Hydrologic Modeling	<i>Solair’s hydrologic storm water model is based on the Rational Method which is in accordance with the City of Saskatoon and the Water Security Agency.</i>
26.3.8 Master Drainage Plans in Concept Plans	<i>Solair’s overland and underland storm water figures clearly denote overland drainage paths, storm ponds, storm outlets, irrigation holding areas, and local storm sewer routes.</i>
26.3.9 Stormwater Management Plans in Future Urban Growth Areas	<i>Solair’s stormwater control facilities are sized to contain the 1-in-100year storm event with a 24 hour duration.</i>
26.3.10 “No Net Impact” Standard	<i>All Solair stormwater outlets are restricted to only release the predevelopment flow rate.</i>
Transportation	
27.3.2 Future Roadway Planning	<i>Solair has considered future roadways as specified in the Holmwood Sector Plan (prepared by the City of Saskatoon) and the Perimeter Highway Alignment (prepared by the Ministry of Highways and Infrastructure).</i>
27.3.3 Roadway Access	<i>Solair provides multiple access point for its residents, visitors, and emergency personnel. The transportation plans have been reviewed by the City of Saskatoon and the Ministry of Highways and Infrastructure.</i>
27.3.4 Minimize New Roadway Construction	<i>Solair utilizes the existing Patience Lake Road and Zimmerman Road to minimize new roadway construction.</i>
27.3.5 Access Requirements for Developments	<i>Solair includes two fully paved access points connecting to Patience Lake Road and Zimmerman Road.</i>
27.3.6 Safe Access and Egress	<i>Solair accesses will be stop controlled with certain free flow roadways as recommended in the enclosed Traffic Impact Assessment (TIA). All intersections will be designed in accordance with current City of Saskatoon and Transportation Association of Canada (TAC) guidelines.</i>
27.3.8 Road Maintenance Agreements	<i>Arbutus is committed to entering into an agreement with the RM, if required.</i>
27.3.9 Road Widening	<i>Arbutus is committed to upgrade Zimmerman as part of the Solair development.</i>
27.3.16 Setbacks from Railways and Rail Facilities	<i>Solair is compliant with the sound study complete for Brighton (the same rail line), adheres to the 60m setback from rail property line to building face.</i>

27.3.1 Servicing Agreements Required	<i>Arbutus is committed to entering into an agreement with the RM, if required.</i>
27.3.2 Intermunicipal Agreements	<i>Arbutus is committed to entering into an agreement with the RM, if required.</i>
Part 5 – Implementation	
31.3.1 Amendments to the Plan - Rationale	<i>The Solair development is not requesting an amendment to the P4G Plan. It is consistent with the existing designation of Urban Residential Neighbourhood.</i>
31.3.12 Purpose of a Concept Plan	<i>Solair addresses all information requirements and is a framework for development.</i>
31.3.13 Preparation of a Concept Plan	<i>Solair is consistent with this policy as a developer-initiated concept plan. P4G Policy anticipates and allows developers to propose developments within the P4G.</i>
31.3.14 Components of a Concept Plan	<i>All elements listed within this policy have been addressed with the Solair Concept Plan.</i>
31.3.15 Cost-Benefit Considerations for a Concept Plan	<i>The cost benefit analysis for Solair not only proves that it is financially viable from a cost of growth perspective, it offers substantial social and environmental benefits to the Region as well.</i>
31.3.20 Provisions for Public Engagement	<i>A full engagement plan has been developed and allows for multiple ways for property owners in the area to contribute their views on Solair. The results are provided with this Concept Plan submission and suggest that there is no sufficient objection to the project to disqualify it from approval.</i>
31.3.25 Criteria Supporting Boundary Alteration	<i>Solair is not seeking nor encouraging a boundary alteration at this time. However, should a boundary alteration become necessary in the future, Solair is designed to easily integrate into the adjacent urban municipality.</i>
31.3.27 Alignment Statements	<i>It is anticipated by the Solair Concept Plan application that all P4G partnering municipalities will amend their respective Official Community Plans to accommodate the Solair neighbourhood.</i>

APPENDIX 3 - POLICY ALIGNMENT

P4G OCP STRATEGIC DIRECTIONS

2.4.1 Introduction

The Planning for Growth (P4G) Plan is based on seven primary Strategic Directions, which shape the focus and content of the policies and strategies included for regional action.

2.4.2 Regional Infrastructure and Services

The P4G municipalities will undertake regional coordination to develop world-class infrastructure, facilities, and services will be pursued, with the aim to realize cost effectiveness and improvements in quality through shared systems. Regional planning for public investment will consider life-cycle costs and future development in decision-making, and ensure that costs and benefits are shared in a fair and equitable way through a consistent financial model. Systems of particular interest will include a regional transportation network; water and wastewater infrastructure; and drainage. Coordination on recreation facilities, emergency services, and other investments will also be considered.

Solair Proposal Response to this Direction: Solair is the first development to propose a system of truly regional services. It will include regional water and wastewater infrastructure, low impact solutions and other desired services will be coordinated with partner municipalities within the region.

2.4.3 Settlement Patterns and Complete Communities

The P4G municipalities will meet the needs for future growth through efficient and well organized development. Existing and planned infrastructure as well as life-cycle impacts will be considered in development which will also meet the diverse needs and growth requirements for all communities as defined by consistent growth projections. Where possible, development will be clustered in contiguous areas, corridors, and nodes. Interim uses may also be permitted where they will not impact future urban growth needs or development potential.

Solair Proposal Response to this Direction: Solair is a complete, compact, contiguous development located in an area designated for regional growth to 700,000 people. It will offer a full range of services to residents and fully integrateable into the future development pattern, be it the City of Saskatoon or the RM of Corman Park.

2.4.4 Regional Economy and Economic Development

The economy of the region must be flexible, diversified, and globally competitive. The strengths of the region as a whole will be considered in efforts to support economic growth. Planning will provide the direction and guidance to encourage coordinated development and investment that builds upon the joint strengths of the region, as well as opportunities within individual jurisdictions.

Solair Proposal Response to this Direction: Solair will leverage the strengths within the region by encouraging the development of a system of regional services which will serve a growing market for urban-rural lifestyles.

2.4.5 Quality of Life

Providing a high quality of life for all residents is critical to the future of the region. This Plan is intended to provide for diversity in lifestyles and recognize the unique character of individual communities. It is intended to conserve and enhance the environmental, social, and economic resources that are key to well-being.

Solair Proposal Response to this Direction: Solair is a unique community. It will offer a development which currently does not exist within the Saskatoon marketplace or region. The project advances several sustainability objectives and goals by offering green energy options, sustainable low impact infrastructure and more choice.

2.4.6 Governance and Funding

Regional action must be coordinated between the P4G municipalities in a fair and equitable manner, with a focus on transparency and public accountability. Costs and benefits from joint actions must be shared equitably. Regional initiatives will respect the individual aspirations of the P4G municipalities while providing responsive, consensus-based approaches for collaboration and governance.

Solair Proposal Response to this Direction: Solair is proposing to advance the development of inter-municipal agreements. This step will assist in the growth and development of more regional service provision in the P4G area which will be coordinated and governed by all P4G partners.

2.4.7 Natural Environment and Drainage

This Plan recognizes sensitive ecological systems in the region as important amenities and resources to be preserved for future generations. Key ecological areas will be conserved, enhanced, and connected to promote the health and sustainability of the regional landscape. Flooding and drainage issues will be linked with an understanding of natural systems and should be considered at local and regional levels, with a focus on reducing risks through integrated approaches.

Solair Proposal Response to this Direction: Solair does not negatively impact any of the natural systems currently identified within the P4G area. Solair will offer a more natural way for handling by increasing the permeability within land uses to allow the natural infiltration of water into the soil.

2.4.8 Agriculture and Natural Resources

Agricultural and natural resource industries are an important part of the history of the region, and are recognized as key drivers of the regional economy and its future. Land uses will be managed to ensure a balance between needs for growth and the sustainability of these economic sectors. Lands will be identified for these uses, and economic development activities will be integrated with these sectors to promote spin-off industries and economic clusters.

Solair Proposal Response to this Direction: Solair is planning to offer urban farm plots to blend agriculture and food production with the convenience and efficiencies of urban densities. It respects the need to promote local food production and sustainable agricultural practices. The farm plots may yield products which can be sold at a local market, making 'farm to table' a real possibility in Solair.

SOLAIR ALIGNMENT WITH P4G REGIONAL PLAN

Six over-arching principles are critical to achieving the vision for the Saskatoon North Partnership for Growth (P4G) Region:

- Working through multiple Strategic Partnerships
- Efficiency of design and operations
- Flexibility & Resilience
- Sustainability
- Equity and Inclusiveness
- Opportunity

They are each vital and will be pursued in an integrated manner, with co-ordinated development and investment that builds upon the joint strengths of the region, as well as opportunities within individual jurisdictions.

- Solair is a strategic partnership between visionary developers, architects, planners, sustainability experts, community leaders, and infrastructure providers. Solair will continue to build out these partnerships as it evolves.
- The project achieves efficiency of land-use, infrastructure deployment, and energy resources through innovative but well-tested design strategies and systems.
- Solair embraces a sustainability approach which takes into consideration economic, social and environmental implications in an integrated manner
- Flexibility and resilience is embedded in all aspects of Solair, from the variety of housing types offered, which respond to changing market demands, to the range of parks and green infrastructures designed to engage a diverse range of ages and interests. Community agriculture increases food resilience, solar and water management increases infrastructure resilience, while live-work encourages economic and lifestyle flexibility,
- Solair offers a wide range of high calibre but affordable housing types to ensure a diverse and inclusive community, geared to a wide range of demographics, from first owners, to young families, to seniors.
- The project creates a unique development opportunity which achieving ambitious sustainability and social goals for the Region.

**APPENDIX 4 -
ARBUTUS LETTER OF INTENT**



LETTER OF INTENT

December 31, 2023

Rural Municipality of Corman Park
111 Pinehouse Drive
Saskatoon, SK, S7K 5W1

Dear Reeve Harwood,

This Letter of Intent sets forth the principal terms upon which Arbutus Properties (Arbutus) would undertake with respect to developing the Solair Community within the Rural Municipality of Corman Park (RM). The RM can rely upon this letter and conditions herein as the basis for entering into a development and servicing agreement with Arbutus for the Solair Community.

BACKGROUND:

1. Arbutus's Solair Concept Plan is a proposed 64-hectare, urban residential community located in the Southwest Quarter Section 16 and Northeast Quarter Section 16, all in Township 36, Range 4, West of the Third Meridian, located in the Rural Municipality of Corman Park, in the Province of Saskatchewan, attached as Schedule "A";
2. The RM, at its Planning Committee meeting held on June 13, 2021, when considering a presentation by Arbutus on the Solair community resolved that, "Council support in principle the proposed Solair urban residential development". This is the next step in Corman Park's evolution of going from country residential to urban residential;
3. Arbutus presented the Solair Concept Plan, for development approval, to the Council of the RM of Corman Park, at its meeting held on June 20, 2022, under cover of the transmittal letter dated June 15, 2022, attached as Schedule "B";
4. It is understood that approval of Solair requires amendment to the P4G District Official Community Plan, and the adoption of a new P4G zoning district to accommodate the densities contained in the Solair concept.
5. It is also understood that RM approval of the Solair development requires Arbutus and the RM, (the Parties) to enter into a development and servicing agreement whose broad terms and conditions are set out in this letter;
6. The purpose of the development and servicing agreement, as contemplated by this letter of intent, will be to set out responsibility for the construction of required infrastructure to develop Solair and aid the RM in the ongoing operation and maintenance of the community.

WATER AND WASTEWATER TREATMENT:

1. It is the intent of Arbutus to construct both a water treatment plant and a wastewater treatment plant to serve the domestic potable water and sanitary sewer treatment needs of the Solair community;
2. The capital cost of construction of both facilities would be borne by Arbutus, and includes:
 - a. Potable Water Treatment Plant
 - b. Primary and Direct Water Mains



- c. Wastewater Treatment Plant
 - d. Trunk, Forcemain, Lift Station, and Direct Sanitary Sewer Mains
3. Arbutus, in partnership with Des Nedhe Development Corporation, intends to create and operate both the water and wastewater services as a water utility corporation that would be effective, efficient and financially viable and supported fully by water rates. That is, there is no tax supported contribution for either operating or capital requirements needed for this service. The utility would operate on a self sufficient and self-funded basis similar to how the Saskatoon Water Utility operates;
 4. The water utility will also manage the ongoing operation, maintenance and preservation of the water distribution and wastewater collection systems that serve Solair;
 5. Arbutus intends to construct and operate the water treatment and wastewater treatment plants with the participation of SaskWater;
 6. Arbutus is further prepared to discuss the potential with the RM of providing potable water supply and wastewater treatment at a regional level to potentially serve development lands beyond the limits of the Solair community. Such an arrangement would require further negotiations and participation by the RM and/or SaskWater.

ARBUTUS DIRECT SERVICING RESPONSIBILITIES:

1. It is understood and agreed to by Arbutus that a requirement of development approval by the RM will be the Parties entering into a development and servicing agreement that specifically sets out Arbutus’s responsibilities in constructing the necessary urban infrastructure to serve the Solair development. While the final terms and conditions of such a servicing agreement will be dependant upon final RM approval, this letter sets out the generally accepted responsibilities of Arbutus;
2. As such, Arbutus agrees that development and servicing is its sole responsibility and would agree to cause the Solair community to be serviced and developed by the supply, placement, installation, construction, and warranty maintenance of the following services:
 - a. Storm Sewer Mains and Overland Drainage Control, including Storm Water Retention Areas (ponds)
 - b. Area Grading
 - c. Collector and Local Road Paving
 - d. Sidewalks and Curbing
 - e. Paved Lanes
 - f. Water and Sewer Service Connections
 - g. Parks and Buffer Strips
 - h. Street Signing and Signals
 - i. Street Lighting
 - j. Fencing of Buffers
 - k. Shallow Bury Utility Installation
3. Arbutus will ensure that all such services shall be of a size and capacity sufficient to satisfy the servicing requirements of all permitted uses to be situated within the Solair development area;



4. Arbutus is proposing that the development be designed and constructed utilizing a Design/Build/Operate/Maintain (DBOM) model. This would have Arbutus solely responsible for the design and construction of all the infrastructure and subsequently contract with the RM in establishing a long-term service agreement(s) for the key infrastructure operation and maintenance.

DEVELOPMENT CHARGES AND FEES:

1. In consideration of the RM providing certain services in relation to the reduced Solair development area, Arbutus agrees to pay the appropriate fees and levies set out by the RM as per below:
 - a. \$8,505 per single family residential lot
 - b. \$13,818 per hectare for non-residential and multifamily
 - c. Assuming the rates in a. and b. above, the offsite development charge payable to the RM by Arbutus would be approximately **\$7,000,000**.
2. Conversely, Arbutus would be agreeable to negotiate Solair specific development levy charges given that it is a fully urban neighbourhood and that the RM's current charges are based on rural services. Such a hybrid model for charges could consider specific levies related to, but not necessarily limited to, the following:
 - a. Arterial Road Levy
 - b. Interchange Levy
 - c. Recreation Levy
 - d. Drainage Levy

LONGTERM OPERATION AND MAINTENANCE OF URBAN INFRASTRUCTURE:

1. Arbutus would be agreeable to provide a standard 2-year warranty on all direct services infrastructure constructed by it under the terms of the final development agreement.
2. Arbutus also recommends that the RM deliver the long-term operation and maintenance of the direct service infrastructure through the DBOM model, specifically using a multi-decade urban services agreement;
3. Arbutus commits to work with the RM to put in place the necessary agreement, contract and necessary private sector resources and expertise to manage the Solair community urban services. We would suggest that this take the form of Arbutus being the contracted party to supply the services. An alternative approach would have Arbutus assisting the RM in putting the required contracts in place;
4. These long-term contracts would cover both day-to-day operations and long-term maintenance of the assets, including:
 - a. Roadway and Sidewalk/Curbing
 - b. Stormwater Collection System and Overland Drainage
 - c. Garbage and Recycling Collection
 - d. Park Operation and Maintenance
 - e. Traffic Control Infrastructure
 - f. Street Lighting
 - g. Street Cleaning and Sweeping
 - h. Snow and Ice Management



5. The general approach to the Operate/Maintain model would be for the RM to enter into long term service contracts, direct with Arbutus (e.g., a 25-year contract with option for a second 25-year term). Arbutus would contract a variety of third-party vendors that specialize in each area of service delivery to manage and maintain the specific asset. This model is used successfully in Saskatoon, for instance, on the North Commuter Parkway and has been proven in many other municipalities across North America. Many vendors exist to provide their expertise to assist the RM in providing and maintaining the urban services required to sustain the Solair Community;
6. The municipal portion of property tax revenue collected by the RM will be sufficient to provide for the ongoing operation and maintenance of the direct urban infrastructure services suggested, as well as current RM provided services such as Police, Fire and General Administration;
7. There is no expectation from Arbutus Properties that the RM would provide transit services to the Solair Community.

LEVY DEPOSIT

1. Upon the Council of the RM granting final development approval for the Solair project to proceed, Arbutus will submit a **\$500,000 deposit** to the RM as an initial payment toward our levy fees.

We trust this letter provides you greater clarity on Arbutus's commitment to the Solair development and meeting all the RM's expectations in this regard. We genuinely believe that Solair will be a world class development and chart a course for similar regional development for the RM and elsewhere in our province and country.

We look forward to your approvals related to our development application and the more detailed discussions that would follow. We also welcome any feedback and comments on what we have proposed within this letter and would be happy to modify and/or clarify wherever we can.

Yours Sincerely,

A handwritten signature in black ink, appearing to read 'Jeff Drexel', written over a white background.

Jeff Drexel
President
Arbutus Properties

**APPENDIX 5 - RAIN GARDEN AND
OVERLAND WATER APPROACH**

Solair Raingarden Preliminary Design Criteria Memo

May 2023

The preliminary design of the Solair roadside raingardens is based upon current best practise set out within CSA W200-18 – Design of Bioretention Systems. The City of Calgary specification was also utilized as a performance specification to adhere to in the design. Arbutus retained the services of two highly respected professionals in this area to assist with preliminary designs and soil amendments needed for the growing median in the rain gardens:

1. Chris Johnston, P.Eng, - Vice President of Kerr Wood Leidal Consulting
2. Charles Maule, Ph.D. Professor Emeritus, Centre of Hydrology, University of Saskatchewan

The experience and expertise of these gentlemen provides great confidence that the rain garden approach to managing the normal storm flows in Solair is not only workable, but a very desirable and low impact approach to development.

Rain gardens are not intended to manage the worst case stormwater flows in a development. That maximum flow design is handled with overland flows and retention basins, which is the case in Solair. Raingardens are designed to ‘capture’ the volume of rain that would fall during a 6 month, 24-hour storm. In other words, effectively manage the average or typical summer rainfall event. Part of this water management is for the raingardens to have a layer of growing medium which water must be able to pass through to be retained in the overall structure. See Attachment 1 for the typical raingarden design that will be employed in Solair. You will note that this design was for a demonstration raingarden project we constructed in our Harvest Townhome development in Rosewood Meadows.

Research into leading practises on raingarden construction would yield that the growing medium needs to have a soil infiltration rate of no less than 10 to 20 mm/hour. The ideal surface infiltration rate is 70 mm/hr.

Infiltration analysis of Rosewood Rain Garden Site.

SUMMARY

Texture, bulk density and infiltration tests was done on soil samples from the Rosewood Rain Garden Site. All analysis were done off site. As the methods of analysis were not in a controlled laboratory using recommended procedures the results are only approximate and are not to be used in formal reporting.

Given the high clay content (30-40%) of Rosewood soils and the corresponding low infiltration rates it is recommended that a mixture of compost and bark mulch be used to decrease the clay content and increase the infiltration rates to acceptable levels (> 75 mm/hr as final infiltration rates).

METHODS

Soil materials

Rosewood soil: Rosewood soil appears to have a higher clay content (30-40% by mass, as determined by hand texturing) than the SRC analysis (21% by volume, SRC report Jul 12, 2017). Sand content is about 50% as indicated by hand texturing and wet separation. The SRC report indicated 31% sand by volume. The soil is topsoil, dark due to organic matter which could be 4% by mass if agricultural soil (Acton and Ellis, 1978) and higher if undisturbed grassland. A small amount of carbonates is present (as indicated by light fizzing when vinegar was added). Wet separation of sands was accomplished by using a weak H₂O₂ solution (3%) to partially dissolve organic matter, letting sand settle out and decanting off the particles finer than sand, then obtaining the oven dry weight of sand relative to the initial soil weight.

Compost: A pile of compost (City of Saskatoon) was available on site. It was dark in color and in fine to medium aggregates (<1 to 5 mm dia.). Hand texturing indicated no clay content (less than 2% clay). Wet separation indicated a sand content of about 35%.

Mulch: bark mulch was available on site. The mulch varied from 0.5 to 6 cm long and 0.1 to 2 cm in diameter.

Mix: A mix of Rosewood soil, compost, and bark mulch was prepared on site. It appears to be about 10% (or less) mulch by volume. Sand content (by wet separation) is 40% which indicates about a 50:50 mixture. A 50:50 mixture would result in a clay content of 15 to 20% by mass.

Infiltration tests

Plastic containers (open at the top and with holes for drainage in the bottom) were used for the infiltration tests. The containers were 120 mm ID and 180 mm height. A fine gravel base (~ 2 cm thick) was placed in the bottom of the container. About 9 to 10 cm of soil materials were placed on top of the gravel. The soil materials were either lightly compacted (30 tamps with a 7 cm² wooden stick on 3 lifts of soil, each about 3 cm in thickness) or not (sides of the container were lightly rapped after filled with soil. The soil mass and antecedent moisture content was obtained so that dry bulk density could be obtained.

Water was ponded to a depth of 3 to 4 cm with care taken to avoid soil scouring or the creation of a crust. Water depth with time was measured until a steady rate was obtained (20 to 60 minutes). At the end of the infiltration test the container was covered and allowed to drain for a day and then retested for infiltration.

RESULTS (Table 1; Figure 1)

Rosewood soil had final infiltration rates near 54 mm/hr (average of 2 tests), decreasing to 29 mm/hr (1 test) a day later. The bulk density was 1.15 Mg/m³ which would be about typical for uncompacted grassland soils but higher than recently tilled agricultural or garden soil. The bulk density is not high, compacted or subsoil materials (50 cm in depth) will have values upwards of 1.5 Mg/m³.

The compost material had a lower bulk density (0.84 Mg/m³) likely due to its high organic matter. Its final infiltration rate was 83 mm/hr.

A mixture of Rosewood soil and compost (50:50) with a little amount of bark mulch (less than 10% by volume) decreased the bulk density (0.94 Mg/m³) and increased the infiltration rate slightly (70 mm/hr), however the infiltration rate a day later (35 mm/d) was not very different from that of just Rosewood soil.

Adding bulk mulch to the mixture further decreased the bulk density (0.89 Mg/m³) and increased the infiltration rate (277 mm/hr, average of three tests). The mulch likely helps to create larger continuous voids that are resistant to tamping. The infiltration rates measured 24 hours later decreased to an average of 101 mm/hr.

The effect of adding compost and mulch is to decrease the bulk density of the soil given similar packing (Figure 1). The mulch may result in creating large voids which enhances infiltration.

Table 1. Bulk density (bd) and final infiltration (fs) for tested materials

Soil	packing	bd (Mg/m ³)	fs mm/hr	fs24 mm/hr
Ra	light	1.14	53	na
Rb	light	1.16	53	na
Rc	none	1.06	55	34
Ca	light	0.86	83	na
Xa	light	0.91	72	28
Xb	light	0.97	83	51
Xc	light	0.95	54	25
Xd	none	0.84	270	76
XM1a	light	0.89	91	29
XM2a	light	0.79	167	96
XM2b	light	0.71	439	135
XM2c	light	0.78	225	73

bd: dry bulk density, fs: final infiltration rate fs24: final infiltration rate 24 hours later
R: Rosewood soil only C: compost material X: mix of Rosewood, compost and <10% mulch
XM1: 6 parts of mix plus one part of mulch by volume
XM2: 6 parts of mix plus two parts of mulch by volume
Light packing: 30 light blows with 7 cm² wood stick

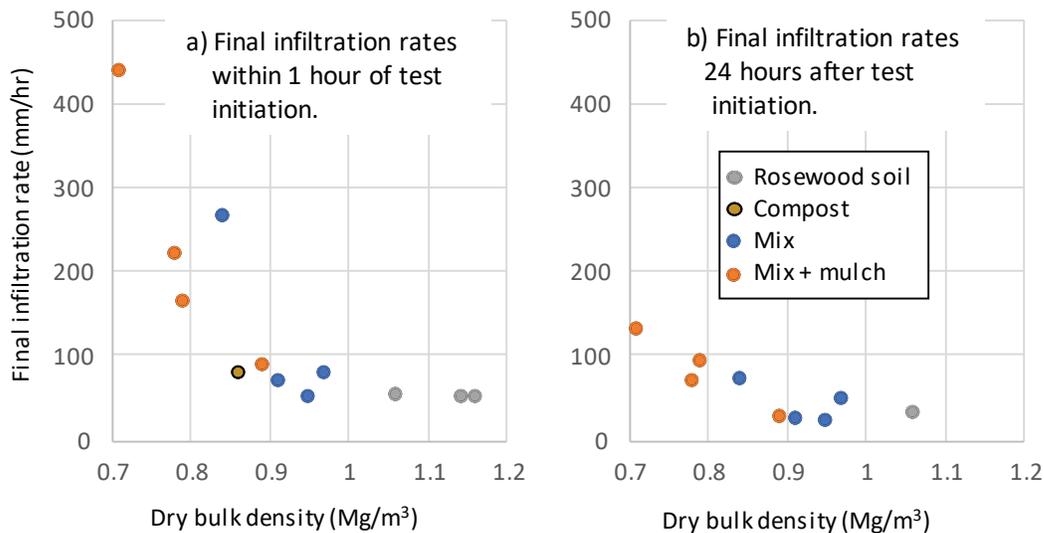


Figure 1. Rosewood soil materials final infiltration rates as a function of bulk density.

RECOMMENDATIONS

1. It is recommended that the infiltration rates measured 24 hours after the first test, be used. These rates are lower than the first set possibly due to further soil settling into larger voids.
2. For a suitable infiltration rate (greater than 75 mm/hr) it is recommended a **volume mixture of 3 parts Rosewood soil, plus 3 parts compost plus 2 parts loose bark mulch** be used. The soil and compost will provide a good water holding capacity for plants while the bark will help to create large voids to help with drainage during the initial year.
3. Compaction of the soil by machinery must be avoided during installation. The dry bulk density should remain lower than 0.9 Mg/m³ in the top 15 cm of soil.
4. It is recommended that a plant/bark mulch be established on the surface so that the soil does not develop a crust that impedes infiltration. This may need to be held in place by netting.

COMMENTS

As the soil mixture is placed it will not have any large continuous voids (natural cracks, root channels, or insect burrows) aiding infiltration during ponding events. These voids will take several years to establish (freeze-thaw, wet-dry, and plant growth are necessary for this). It is hoped that the mulch mixed with the soil will help maintain high rates.

It is possible that the higher infiltration rates caused by inclusion of bark mulch may lower during the first year as the soil settles, however if compaction is avoided such that the bulk density in the surface 15 cm remains below 0.90 Mg/m³, the final infiltration rates should remain acceptable.

The reported infiltration rates are 'final' or 'steady-state' rates. These are equivalent to saturated hydraulic conductivity of the materials. Initial infiltration rates will be higher than these and thus the soil, being usually unsaturated at the start of a major rain event, will have a higher capacity to accept waters until it reaches the state of saturation.

Frozen soils will considerably reduce infiltration rates, the wetter the soil upon freezing the lower the infiltration rate. Due to this snow melt will result in ponding and ponding may not subside until the underlying soil has thawed.

**APPENDIX 6 -
LETTER OF INTENT BETWEEN
ARBUTUS & DES NEDHE**

LETTER OF INTENT

Arbutus Properties ("**Arbutus**") is planning to develop the largest green renewable energy based, sustainable community in Canada (which proposed community is referred to as "**Solair**"). Arbutus is planning to develop Solair east of Saskatoon in the Rural Municipality of Corman Park No. 344 (the "**Rural Municipality**").

Des Nedhe Development Limited Partnership, by its general partner Des Nedhe Development Inc. ("**Des Nedhe Development**"), is a business and investment organization that is wholly owned and controlled by the English River First Nation. Des Nedhe Development, on its own behalf or through a nominee (collectively referred to herein as "**Des Nedhe**"), seeks to create wealth and workforce opportunities for the English River First Nation and its members.

This Letter of Intent ("**LOI**") summarizes the principal terms pursuant to which Arbutus and Des Nedhe wish to jointly develop and construct a wastewater treatment facility and a water treatment facility to serve Solair and potentially other residents of the RM (the "**Project**").

Each of Arbutus and Des Nedhe is a "Party" to this LOI, and together they will be referred to herein as the "Parties". This LOI is an expression of interest only and commits the Parties to act in good faith and in a commercially reasonable manner to reach a definitive agreement to develop, finance, build and operate the Project, alongside possible future technical and strategic partners not currently parties to this LOI, and is not intended to be, and does not create, legally binding obligations among the Parties, except as provided for under the heading "Binding Provisions" below.

Objectives

By executing this LOI, the Parties confirm their intent to pursue the following objectives:

1. undertake feasibility studies for the Project;
2. determine a location for the Project within English River First Nation's reserve lands;
3. perform due diligence for the Project and the Project site and, as reasonably practicable, commence any regulatory processes required for the Project to proceed;
4. secure infrastructure financing to finance the development and construction of the Project;
5. enter into a formal partnership, joint venture or similar legal arrangement pursuant to which the Parties will collaboratively develop, construct and own the Project; and
6. enter into letters of intent, memorandums of understanding or similar arrangements with other potential stakeholders in the Project including, but not limited to:
 - a. the Rural Municipality , with respect to the administration of the Project's utility services and the provision of utility services to residents of the Rural Municipality outside of Solair; and
 - b. SaskWater, with respect to the on-site operations and on-going maintenance and upkeep of the Project.

The Parties acknowledge and agree that:

1. the Project will provide substantial benefit to the members of English River First Nation, to the residents of the Rural Municipality and to the supply of sustainable, affordable and "green" housing in the Province of Saskatchewan;

2. the Parties shall take all commercially reasonable steps to fully explore and achieve the objectives set forth in this LOI in a timely manner; and
3. the Parties shall cooperate and negotiate in good faith to formalise the arrangement between the Parties in a definitive agreement.

Term

This LOI shall be effective from the date that both Parties have signed and delivered this LOI and shall remain in effect until terminated by the Parties. This LOI may be terminated by mutual agreement of the Parties or by either Party on notice to the other Party.

Confidentiality

Each Party shall maintain the confidentiality of all confidential information received from the other Party, and the Parties shall enter into such other confidentiality agreement(s) as the Parties deem appropriate.

Media Advisory

Neither Arbutus or Des Nedhe shall issue, publish, or distribute any news releases, press statements, or public announcements (collectively referred to as "**News Releases**") concerning the subject matter of this LOI, or any activities, transactions, or developments related thereto, without the prior written consent of the other party. In the event that either Arbutus or Des Nedhe wishes to issue a News Release, the requesting party shall provide a written request to the other party outlining the content, purpose, and intended publication date of the proposed News Release.

Binding Provisions

Except with respect to the provisions set out opposite the headings "Term", "Confidentiality", "Media Advisory" and this heading "Binding Provisions", which are intended to be legally binding, this LOI constitutes only a non-binding expression of present interest on the part of the Parties. This LOI, by itself, does not create a new legal entity such as a joint venture or partnership or any other recognised form of association, and nothing herein shall constrain either Party in any manner in the carrying out of any aspect of its business other than as explicitly contemplated by the terms of this LOI.

Execution

This LOI may be executed by means of electronic signature(s). This LOI may be executed in any number of counterparts, each of which is deemed an original, but all of which together are deemed to be one and the same agreement. A signed copy of this LOI delivered by facsimile, email or other means of electronic transmission is deemed to have the same legal effect as delivery of an original signed copy of this LOI.

[Remainder of page intentionally left blank; signature page follows.]

Arbutus confirms agreement to, and acceptance of, the terms and conditions outlined above, as of the 1st day of September, 2023.

ARBUTUS PROPERTIES

Per: *Jeff Drexel*
Name: Jeff Drexel
Title:

Des Nedhe confirms agreement to, and acceptance of, the terms and conditions outlined above, as of the 1st day of September, 2023.

**DES NEDHE DEVELOPMENT LIMITED PARTNERSHIP,
BY ITS GENERAL PARTNER DES NEDHE
DEVELOPMENT INC.**

Per: *Sean Willy*
Name: Sean Willy
Title: President and Chief Executive Officer

**APPENDIX 7 - PUBLIC ENGAGEMENT
REPORT**

PUBLIC ENGAGEMENT REPORT

January 14, 2024

Engagement Plan

Two engagement periods were authorized by Arbutus. Wallace Insights conducted the engagement process.

1. Engagement Period November 18 – December 23, 2023

First, a 3-week engagement period was undertaken in support of the Concept Planning process aimed primarily at R.M. of Corman Park residents. The engagement period was conducted from November 18th to December 9th, 2023. This engagement period offered several ways for respondents to review and comment on the Solair Plan:

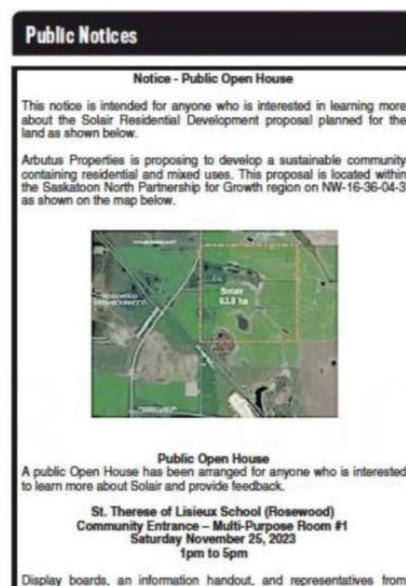
A. Direct Notice

Direct notice via mail was provided to 28 property owners within a 1.6 kilometre radius of the proposed Solair site. The direct notice invited the owners of land to an open house and also contained a QR code and web link to a short survey. The letter included a description of the project, map of the concept plan, QR code and web link. The letters were mailed out by the RM of Corman Park during the week of November 13 - 17th.

B. A notice was sent via email to the **Prairie Spirit School Division** seeking their comments to the proposed development. The notice was sent out on November 10, 2023, and a response was received on November 23, 2023. Please see Engagement Results below for the response.

C. General Notice in Star-Phoenix

A general notice was published twice in the Star-Phoenix on **November 10th and 18th**. This notice provided property owners within the city of Saskatoon with the opportunity to learn about Solair on the website, come to the Open House (see below), and participate in a short online survey.



D. **Online Survey**

A short online survey was created to gather feedback from the public on the proposed land development concept. The survey was available on the website until December 9th. The following questions were provided with plenty of space for open-ended comments:

a) The first question sought general feedback.
The owner of (legal description here...) is proposing to develop a new sustainable community containing 1,590 dwelling units in a variety of formats from low density single family lots to multi-family and mixed use. (the concept plan will be added here..). What are your thoughts about this plan? How could we make this plan better?

b) The next question asked respondents to list specific information about what they like about the plan.

1. *What do you like about the proposed plan?*

- a)
- b)
- c)

c) The next question asked respondents to describe what they dislike about the plan.

2. *What do you dislike about the proposed plan?*

- a)
- b)
- c)

d) The third question provided respondents with an open text box to list other comments.

3. *Do you have any other comments related to this proposal?*

e) The final question asked respondents what level of support they would give this proposal on a scale of 1 to 10.

4. *On a scale of 1 to 10 what level of support would you give this proposed Development?*

Low support

High support

4. **Public Open House**

A 4-hour public open house was held at St. Therese of Lisieux elementary school on Saturday, November 25th from 1pm to 5pm. This provided an opportunity for attendees to learn more about the proposed land development concept, ask questions, and provide feedback.

5. **Website:** A website was created to provide more detailed information about the proposed land development concept, including project details, timelines, and contact information. The website also included the online survey.

6. **Email Address**

A dedicated email address was created to receive questions from the public about the proposed land development concept. Questions were answered within two business days.

2. Engagement Period December 13/23 – January 13/24

A second engagement period was conducted primarily for residents and property owners in Saskatoon located within a one-mile radius of the Solair Site.

Once again, several ways were offered to respondents to engage with the Solair project:

- Direct Notice – 1,216 notices were mailed out directly to city property owners. The notices contained information about the concept plan, invitation to a Public Open House, a website link and email address.
- Online Survey – the respondents could fill out a 5-10 minute survey online (see questions above).
- Public Open House – they were invited to attend an in-person open house on Monday January 8th at St. Therese of Lisieux School in Rosewood from 7pm to 9pm.
- Website information and email address – a website containing concept plan details and information was provided, including an email address to send in questions and comments.

Overall Engagement Results

Open House #1 – November 25/23 – 4pm to 8pm, St. Therese of Lisieux School (Rosewood)

A total of seven (7) people attended the open house on November 25th. There was no opposition expressed by any attendees. Most people were curious about the development, wanted to know more about what Solair is, and wanted to learn more about the sustainability features of Solair, in particular the solar power aspect.

Open House #2 – January 8/24 – 7pm to 9pm, St. Therese of Lisieux School (Rosewood)

A total of 8 people attended the open house, including one child. Of the 7 adults in attendance which included one couple from Zimmerman Road in the RM, and the other 5 were individuals. Breaking it down further there were 5 adults and 1 child from Rosewood, and 2 adults from Corman Park. Overall, no one was opposed to the development. **It was noted that there was no one from the City of Saskatoon who attended the open house.** Following is a summary of the questions asked during the open house:

1. Where are the kids going to go to school? The response was the Prairie Spirit School Division. The attendee was then in favour of the development, there were no other concerns.
2. Will there be Safety Arms at the Railway crossing at Patience Lake Road – that will be something Transport Canada could possibly look at in the future.
3. Is Solair using City water and wastewater? The answer is No.
4. Are there high-rises in the plan? The answer is No.
5. Dust on Zimmerman Road. This roadway will be improved over time as development proceeds.
6. One attendee stated ‘I like the project - the way of the future’.
7. Price range of homes? Could not give precise answer, but the prices will fit within the Saskatoon market.
8. The number of dwellings and people who would be living here upon build out? The attendee was provided with a handout with all dwelling and population information.
9. When is it going to be built? Could not give precise answer as too many unknowns at present time.
10. Will all the roadways be built prior to the development? Roadways will be constructed in phases to correspond to, and serve, the land uses as they are developed.

Comments from Prairie Spirit School Division

Prairie Spirit School Division was required to be notified about Solair. The school division offered the following comments via email on November 23rd:

“Prairie Spirit School Division supports new developments as it supports growth of community. We appreciate being informed of new developments as it assists us in our long-term planning for schools and allows us to anticipate enrollment growth and where potential school capital projects may be required in the future.”

Overview of Online Survey Results

A total of 1,244 direct notices were sent out to residents and property owners in the R.M. of Corman Park (28) and Saskatoon (1,216). The direct notice included a QR code and weblink to a short online survey. Only 51 online surveys were received from November 18/23 to January 13/24 (8 weeks). This is a 4.1% response rate.

It is important to note that the number of online survey responses is **not** a statistically valid. For a statistically valid level of responses, 294 surveys would be required (95% confidence level with a 5% margin of error) from a total universe 1,244 potential respondents.

The following general summary is provided for the online survey responses received. It is important to note that each respondent was encouraged to provide multiple comments.

1. General Thoughts About the Plan (55 total responses): These comments reflected overall opinions about the plan, and could not be specifically categorized as likes, dislikes, or suggestions for improvement. Many of the comments were questions about things such as fire and police protection, how it will be financed, where students would go to school, etc.

-
2. Likes About the Plan (146 total responses): These responses highlight various aspects that respondents appreciate about the proposed plan. These were summarized into themes below.
 3. Dislikes About the Plan (63 total responses): These are the aspects of the plan that respondents did not favor.

Key Themes in "Likes" About the Plan

1. Grid: The grid layout (10) appears to be well-received.
2. Development: General comments of approval of the development (8).
3. Housing: Housing aspects (8) were positively noted.
4. Green: Green spaces or environmental aspects (8) received positive feedback.

Key Themes in "Dislikes" About the Plan

1. Traffic: traffic issues (9) were a major concern.
2. Too Many Units/Density: too many units or concerns about high density (8).
3. Enough development: a feeling that there's already enough development or traffic (5).
4. Green space: related to a lack of green spaces or environmental considerations (4).
5. Other: community-related concerns (design), developer concerns, proximity, etc. (4).

Summary of Rankings

- Average Ranking: 3.99 (out of 10)
- Median Ranking: 2.5 (out of 10)
- Ranking Distribution:
 - 1.0: 12 responses
 - 10.0: 7 responses
 - 0.0: 9 responses
 - Other rankings varied, with lower rankings being more common.

Email Enquiries

There were **no** email enquiries received during either of the engagement periods.

For Appendix - Additional Information For Concept Plan

Wallace Insights has used a subscription-based AI service (Chat GPT4) to analyze responses to various questions about Regional Development and the P4G Plan. This appendix provides the responses received from the use of this AI tool. The AI tool was provided with the entire texts from P4G as a Knowledge Base to ensure it was reviewing and responding to the latest P4G material:

- P4G District Official Community Plan
- P4G Regional Servicing Strategy
- P4G Regional Governance and Implementation Strategy
- P4G Zoning Bylaw
- Schedules A, B and C
- City of Saskatoon Official Community Plan, Bylaw 9700.

Question to ChatGPT

“can permanent, fully serviced, urban neighbourhoods be developed in the P4G district without being annexed into the adjacent municipality?”

Response:

“Permanent, fully serviced urban neighborhoods can be developed in the P4G district without being annexed into the adjacent urban municipality. These developments are planned within the Future Urban Growth Areas, as identified on the Schedule B – District Land Use Map and are expected to form part of the urban footprint as P4G municipalities grow to a population of 1 million. For such developments, Concept Plans are required for subdivision and development approval. These plans should closely align with the requirements of Concept Plans developed in any adjacent municipality. Furthermore, the development standards for intended uses in these Future Urban Growth Areas should be consistent with the development standards in the adjacent urban municipality. This consistency is crucial to allow for the integration of these developments with the urban municipality in the future, taking into account the type of use proposed.”

This affirms our reading and understanding of the adopted P4G Plan. Regional growth and development can indeed occur in a sustainable fashion without becoming a part of the adjacent municipality’s development stream.

Furthermore, the following question was put forward to Chat GPT concerning the City of Saskatoon policy towards regional growth. The response is derived from the City of Saskatoon Official Community Plan which further adds to the justification for sustainable regional development such as Solair:

Question to ChatGPT:

“What does the City of Saskatoon Official Community Plan say about Regional Cooperation?”

Response:

“The City of Saskatoon’s Official Community Plan (OCP) emphasizes the importance of regional cooperation in several key areas:

Regional Growth: *The City works with regional partners on comprehensive approaches to planning and servicing to support economic prosperity, a high-quality life, and to protect the region’s natural beauty, ecology, and heritage.*

Coordinated Growth: *It focuses on interjurisdictional coordination and management in land use and development policy and planning. This includes negotiations on inter-municipal development agreements for interim development in future urban growth areas and ensuring that secondary planning aligns with endorsed Concept Plans.*

Infrastructure and Services Beyond City Limits: *The City supports regional approaches to infrastructure and services like water supply, wastewater treatment, and transportation, seeking efficiencies, cost reductions, and service quality improvements. It emphasizes a fair and equitable sharing of costs and benefits of regional infrastructure and services through consistent financial models.*

Economic Development and Business Growth: *The OCP highlights the role of a coordinated approach to economic development with regional partners, First Nations, Métis communities, and other organizations to support and promote business growth in the region.*

Cost Sharing Framework: *The City aims to create a consistent framework for cost sharing when infrastructure connects and benefits multiple jurisdictions, maintaining a framework for the extension of services and coordinating joint applications for funding for regional infrastructure projects.*

Mutual Benefits and Collaboration: *It emphasizes fostering relationships with regional partners to address shared issues and support sustainable growth, coordinating land use development, and servicing for environmental, social, and economic well-being in the city and region. The City engages with other jurisdictions, agencies, and organizations for coordinated planning, development, and operating strategies.”*

These policies reflect the City of Saskatoon’s commitment to collaborative regional planning and development, emphasizing coordinated growth, infrastructure management, economic development, cost sharing, and mutual benefit among regional partners. It affirms that developments such as Solair can be accommodated within the regional development framework utilizing intermunicipal agreements, cost-sharing agreements, and other tools available in The Planning and Development Act.

**APPENDIX 8 -
LETTERS OF INTENT FROM
OPERATIONS/MAINTENANCE
CONTRACTORS**



December 22, 2023

Attention: Murray Totland

Arbutus Properties

3026 Meadows Pkwy #20

Saskatoon, SK

S7V 0R6

RE: Interest in Solair Development Maintenance and Services

Firma Contracting has been the main underground, earthworks, and snow removal contractor for Arbutus since 2017. We have developed a strong relationship throughout the hierarchy of the company and will continue to do so for the foreseeable future. We have provided all the underground infrastructure services across over 700 lots and 150 acres, along with all associated earthworks. Our workforce of multiple crews has been logging years of experience doing subdivision work in the rosewood area. Making us well versed in the soil conditions and physical requirements to execute the work. During this time, we have also assisted or fully taken all any kind of maintenance requirements, deficiencies work, and snow removal. Firma is fully qualified to not only install all types of water, sanitary, and storm services but also has the expertise to maintain and service them.

Given our extensive positive working experience with Arbutus, Firma is more than excited and eager to provide our services and maintenance for the Solair Development. Not only does the development fall into our area of expertise, but the environmental benefits of the development also align with Firma Contracting's values and direction.

We look forward to helping on this project in any way we can.

Any further information or questions please contact me.

Z.parker@firmacontracting.com – 306-203-1823

Best regards,

Zak Parker
Digitally signed by Zak Parker
DN: C=CA,
E=z.parker@firmacontracting.com,
O=Firma Contracting Inc., OU=Firma
Contracting Inc., CN=Zak Parker
Date: 2024.01.09 07:22:09-08'00'

Saskatchewan Head Office

A 121 – 105 ST. E, Saskatoon, SK S7N 1Z2



ASL PAVING LTD.
1840 Ontario Avenue
Saskatoon SK S7K 1T4
Phone: (306) 652-5525

December 5, 2023

Attention: Murray Totland
Arbutus Meadows Partnership
110-1529 West 6th Avenue
Vancouver BC V6J 1R1

Dear Mr. Totland:

RE: Expression of Interest – Solair Operations and Maintenance

Thank you very much for the opportunity to provide this expression of interest. ASL PAVING LTD. is very excited to have the opportunity to expand our operations and maintenance program through Solair Development.

ASL PAVING LTD. is the operations and maintenance provider on the City of Saskatoon's North Commuter Parkway since 2018 for Graham Commuter Partners. This stretch of roadway through Saskatoon is widely considered the best maintained roadway in the City of Saskatoon. Our reaction times to weather events is perfect, our attention to detail is unmatched and the quality of the roadway system in winter is unbeatable.

ASL PAVING LTD. constructed the roadway system on this project so maintaining it is a natural fit. As an operations and maintenance provider, it fits our overall company timeframes very well. We lay our men and women off in the winter and bring them back to work when temperatures are favourable for roadway construction. Having this opportunity will allow us to retain more workers throughout the winter to perform snow maintenance and removal services. Similarly, when winter disappears, there is a period of a month or two while frost is coming out that we lack work. With this program, we will have the capacity to perform the spring clean-up, sweeping roadways/sidewalks, garbage collection, etc.

We very much look forward to the continued discussion between the Rural Municipality of Corman Park and Arbutus.

ASL PAVING LTD.

If you have any questions, please do not hesitate to contact me.

Yours truly,

ASL PAVING LTD.



Drew Mitchell
President
DM/sm

**APPENDIX 9 -
RETAIL ANALYSIS**



Retail Analysis - Solair

November 6, 2023

This memo addresses point 13 raised by the R.M. of Corman Park in their September 27/23 comments on the Solair Concept Plan. The following analysis looks at the land use breakdown and focuses on the Main Street portion which is expected to include a street level retail component.

The concept identifies two complete blocks of mixed-use main street development. The main street mixed use area is comprised of 2.4 hectares (5.9 acres) representing 3.7% of gross area for the entire community. It is important to note that Main Street is expected to draw its primary market from the entire neighbourhood. It is also important to note that the mixed-use area is comprised mainly of residential use. The commercial/retail component is only located at grade level and is intended to be supported mainly by pedestrians originating from Solair. The retail space is modest, street facing, has a high degree of design and pedestrian orientation.

Analysis of Viability

Retail viability relies on an expected annual stream of revenue based on square footage. Retail development is highly stratified. This means that there are numerous 'formats' and each format has an expected level of revenue based on gross square footage. Below is a list of choices available to choose from in our model.

1. Supermarket
2. Specialty Food Store
3. Warehouse Member Club
4. Major Department Store
5. Discount Department Store
6. General Merchandise Store
7. Apparel & Accessories
8. Household Furnishings
9. Drug & Cosmetics
10. Durable/Semi Durables
11. Home Improvement Related Store
12. Household & Auto Supply Store

For this analysis, we have chosen a 'General Merchandise Store' as the expected format. The following analysis uses industry standard metrics to gauge the viability of specific retail formats and the market share they are expected to capture. Retail viability is affected by other factors such as location, management, customer service, etc. This analysis is one important part of the decision-making process and looks strictly at square footage, income, and density of housing within the primary market area. The table on the next page summarizes the retail viability results.

WALLACE INSIGHTS.....ENGAGE. PLAN. THRIVE. SHARE. SUSTAIN.

**APPENDIX 10 - TRAFFIC IMPACT
ANALYSIS**

RELIABLE

practical

TRUSTWORTHY

honest



Traffic Impact Assessment Solair Development

Prepared for:

Arbutus Properties Ltd.



Contact

1231 - 8th Street East
Saskatoon, SK S7H 0S5

ph.: 306.343.7280

email: www.cwce.ca



**CATTERALL
& WRIGHT**
CONSULTING ENGINEERS

March 26, 2024

TABLE OF CONTENTS

LETTER OF INTRODUCTION	II
EXECUTIVE SUMMARY	III
SIGNATURE PAGE	V
1 INTRODUCTION	1
2 EXISTING CONDITIONS & FUTURE BACKGROUND CONSIDERATIONS.....	4
3 PROPOSED DEVELOPMENTS	14
4 SITE ACCESSIBILITY	18
5 TRAFFIC OPERATIONS	30
6 COLLISION REVIEW.....	48
7 RAIL CROSSING REVIEW	49
8 CONCLUSION AND RECOMMENDATIONS.....	49
9 CLOSURE.....	51
10 REFERENCES	52

TABLE OF APPENDICES

APPENDIX A	CONCEPT PLAN OF THE PROPOSED DEVELOPMENT	A
APPENDIX B	PROPOSED ZIMMERMAN ROAD & HIGHWAY 16 INTERCHANGE CONFIGURATION	B
APPENDIX C	TRAFFIC COUNTSS	C
APPENDIX D	INTERSECTION LANE CONFIGURATION (EXISTING, PLANNED, AND MITIGATION)	D
APPENDIX E	SYNCHRO ANAYLSIS FOR EXISTING, BACKGROUND, & TOTAL CONDITIONS	E
APPENDIX F	CITY PROVIDED SIGNAL TIMING PLANS	F
APPENDIX G	SYNCHRO ANALYSIS FOR MITIGATION RECOMMENDATIONS	G

LIST OF FIGURES

FIGURE 1	LOCATION PLAN	3
FIGURE 2	EXISTING 2023 TRAFFIC VOLUMES	8
FIGURE 3	2029 FUTURE BACKGROUND TRAFFIC VOLUMES	11
FIGURE 4	2034 FUTURE BACKGROUND TRAFFIC VOLUMES	12
FIGURE 5	2039 FUTURE BACKGROUND TRAFFIC VOLUMES	13
FIGURE 6	SOLAIR PHASING/STAGING PLAN	14
FIGURE 7	STAGE 1 DEVELOPMENT PROPOSED ROADWAYS	15
FIGURE 8	STAGE 2 DEVELOPMENT PROPOSED ROADWAYS	16
FIGURE 9	STAGE 3 DEVELOPMENT PROPOSED ROADWAYS	17
FIGURE 10	PROPOSED COLLECTOR & LOCAL ROADWAY CROSS-SECTIONS	19
FIGURE 11	PROPOSED PEDESTRIAN & CYCLIST FACILITY CONNECTIONS	20
FIGURE 12	2029 STAGE 1 TRIPS	21
FIGURE 13	2029 STAGE 2 TRIPS	22
FIGURE 14	2034 STAGE 1,2, & 3 TRIPS	23
FIGURE 15	2029 TOTAL TRAFFIC	24
FIGURE 16	2034 TOTAL TRAFFIC	25
FIGURE 17	2039 TOTAL TRAFFIC	26

LIST OF TABLES

TABLE 1	APPLICABLE LAND USES & CODES	21
TABLE 2	TRIP GENERATION STANDARD RATES	21
TABLE 3	TRIP GENERATION ESTIMATES FROM THE PROPOSED SITE	21
TABLE 4	TRIP GENERATION ESTIMATES FROM EACH STAGE OF THE PROPOSED SITE	22
TABLE 5	LOS CRITERIA FOR SIGNALIZED & UNSIGNALIZED INTERSECTIONS	30
TABLE 6	2024 EXISTING CONDITION ANALYSIS RESULTS	31
TABLE 7	2029 FUTURE BACKGROUND CONDITION ANALYSIS RESULTS	33
TABLE 8	2034 FUTURE BACKGROUND CONDITION ANALYSIS RESULTS	34
TABLE 9	2039 FUTURE BACKGROUND CONDITION ANALYSIS RESULTS	35
TABLE 10	2029 TOTAL TRAFFIC CONDITION ANALYSIS RESULTS	38
TABLE 11	2034 TOTAL TRAFFIC CONDITION ANALYSIS RESULTS	40
TABLE 12	2039 TOTAL TRAFFIC CONDITION ANALYSIS RESULTS	42
TABLE 13	TOTAL TRAFFIC CONDITION ANALYSIS RESULTS AFTER MITIGATION	47
TABLE 14	5-YEAR COLLISION HISTORY	48

Project No.: 668.057

CLIENT: ARBUTUS PROPERTIES

Solair Development Traffic Impact Assessment

LETTER OF INTRODUCTION

March 26, 2024

Arbutus Properties

Attention: Murray Totland, Director of Planning

Email: mtotland@arbutusproperties.com

Dear Mr. Totland,

Re: Project No. 668.057 – Solair Development Traffic Impact Assessment

Catterall & Wright has a deep history of serving our clients in the Province of Saskatchewan for 59 years, since 1965. We pride ourselves on ensuring our services provide clients with practical solutions by taking a logical approach.

Our team has reviewed all applicable information thoroughly and we provide the following Traffic Impact Assessment for Arbutus Properties proposed Solair Development within the RM of Corman Park. We anticipate feedback and are planning a quick turnaround to all applicable jurisdictions including the Ministry of Highways, City of Saskatoon, and the RM of Corman Park, as needed.

Yours truly,



Brandon Williams, P.Eng.

Transportation Manager

EXECUTIVE SUMMARY

In response to the RM of Corman Park's requirement for a traffic impact assessment Arbutus Properties requested Catterall & Wright to prepare a traffic impact assessment (TIA) on their behalf that reviews the impacts of the proposed Solair Development (if any) on the existing or previously proposed transportation network, and makes recommendations for mitigating impacts, as needed. The TIA also recommends proposed intersection configurations for all proposed exterior intersections.

Catterall & Wright gathered turning movement count data from the City of Saskatoon and RM of Corman Park where available and collected turning movement count data at other study intersections using a MioVision camera where existing data was not available. Future background trips from the fully built Rosewood neighbourhood plan and Holmwood Sector Plan were also included in the future background traffic. Trip generation to the proposed development was completed using the ITE Trip Generation Manual and associated trips were distributed across the existing and proposed network in a logical manner that considered how vehicles will enter and exit the development. Condition analysis was completed for the existing conditions (2023), future background conditions (2029, 2034, and 2039), and total traffic conditions with all development related trips (2029, 2034, and 2039). Catterall & Wright also completed a collision review for Highway 16 near the project site. Existing Transportation Studies and preliminary designs for the area were also reviewed and respective results were compared to that of this TIA.

All roadway and intersections located outside of the extents of the Solair Concept Plan do not require any additional improvements beyond what has been previously proposed for the region based on the traffic generated directly from Solair.

The following roadways and intersection geometry has been analyzed and is recommended to service traffic efficiently and safely within the study area:

- Upgrade Zimmerman Road between Meadows Parkway and the Taylor Street East Extension to the City of Saskatoon's two lane arterial initial staging cross section. This will include an allocation of right-of-way for expansion to a divided 6 lane cross section.
- Construct Taylor Street East within the extents of Solair to the City of Saskatoon's two lane arterial initial staging cross section. This will include an allocation of right-of-way for expansion to a divided four lane roadway in the future.
- Construct the north-south collector roadway on the east side of Solair between Taylor Street East and Patience Lake Road to a two-lane undivided cross section.
- Stop control all intersections surrounding the development with the following roadways operating as free flow:
 - Zimmerman Road (Intersection of Taylor Street East & Zimmerman Road)
 - Taylor Street East (Intersections of Taylor Street East and Solair Collector Roadways)
 - North-South Road (Intersection of North-South Road and Solair Collector Roadways)
 - Patience Lake Road (Intersection of North-South Road and Patience Lake Road)

Project No.: 668.057

CLIENT: ARBUTUS PROPERTIES

Solair Development Traffic Impact Assessment

The timing of previously proposed improvements recommended for the region should be reviewed by the respective municipalities. Background traffic generated (not including Solair) at the various design horizons warrants the previously proposed improvements. During our analysis of the previous background traffic projections, we determined that an additional dedicated left turn lane could be considered for the westbound turn at the intersection of Meadows Parkway and Zimmerman Road. This potential improvement is not driven by any additional traffic flows generated by the Solair development but instead a direct result of additional traffic flows generated by the City's Holmwood development.

Project No.: 668.057

CLIENT: ARBUTUS PROPERTIES

Solair Development Traffic Impact Assessment

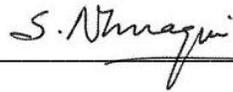
SIGNATURE PAGE

Report Prepared by:



Brandon Williams, P. Eng.

Report Prepared & Reviewed by:



Nadeem Hyder, P. Eng.



Association of Professional Engineers & Geoscientists of Saskatchewan		
CERTIFICATE OF AUTHORIZATION		
CATTERALL & WRIGHT		
Number C848		
Permission to Consult held by:		
Discipline	Sk. Reg. No.	Signature
CIVIL	28883	

1 INTRODUCTION

1.1 STUDY PURPOSE & BACKGROUND

Arbutus Properties (Arbutus) is planning to develop a proposed subdivision – Solair Development in the RM of Corman Park, SK. The proposed subdivision is located northeast of the CP rail mainline and east of Zimmerman Road in the southeast of Saskatoon. The planned development is also located within the Saskatoon North Partnership for Growth (P4G) regional planning initiative area. The location plan of the proposed subdivision is illustrated in **Figure 1**.

As part of the development process, the RM of Corman Park (Corman Park) required a Traffic Impact Assessment (TIA) report to understand the impact of the proposed subdivision on the transportation network within the study area. Arbutus Properties requested Catterall & Wright (C&W) to conduct the TIA for the proposed subdivision. The results of the TIA analysis will be used to develop strategies to mitigate the adverse impacts of the proposed project, if any, on the current or proposed transportation system within the study area. The TIA also recommends proposed intersection configurations for all proposed exterior intersections. It is important to note that numerous other transportation impact studies and preliminary geometric designs have been completed for the region. The results of this TIA will be compared to those of previous in general terms.

1.2 PROJECT LOCATION

The proposed Solair Development is bordered by the CP rail mainline to the southwest, Zimmerman Road to the west, the future extension of Taylor Street to the north and a proposed north-south road to the east. The study area of the proposed project includes three (3) existing intersections and a number of other proposed intersections which would be constructed with the Solair Development as listed below:

- Highway 16 & Zimmerman Road (existing),
- Zimmerman Road & Meadows Parkway (existing),
- Zimmerman Road & Market Drive (existing)
- Range Road 3044 & 8th Street East/Township Road 364 (existing),
- East future extension of Taylor Street East & Range Road 3044 (proposed),
- North Development Accesses & Taylor Street East (proposed)
- East Development Accesses & proposed North-South Road (proposed),
- Proposed North-South Road & Extension of Taylor Street East (proposed),
- Proposed North-South Road & Patience Lake Road (proposed).

1.3 STUDY METHODOLOGY

The TIA was completed using the following methodology:

Project No.: 668.057

CLIENT: ARBUTUS PROPERTIES

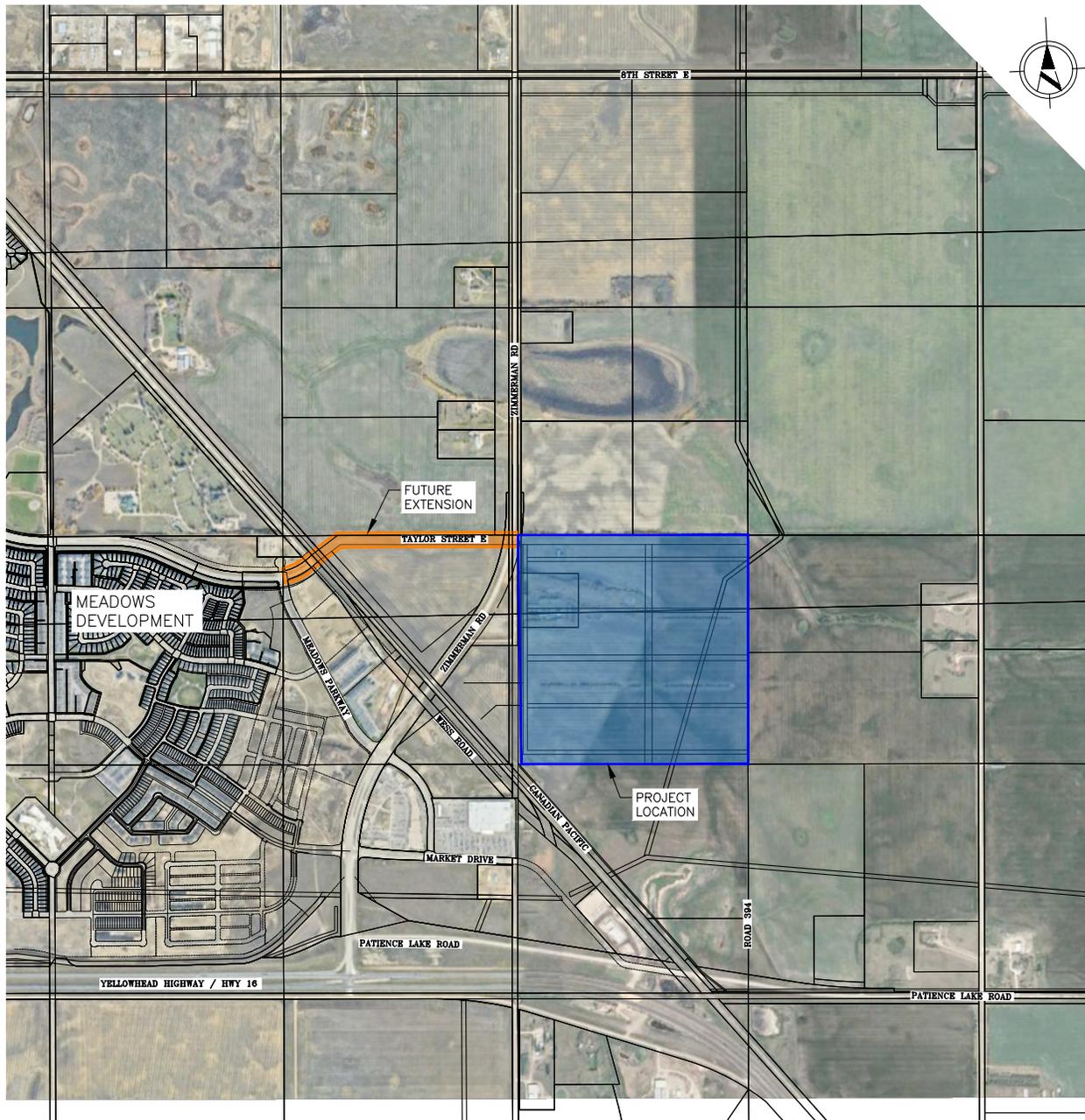
Solair Development Traffic Impact Assessment

- Collected existing turning movement counts (2023) at the study intersections.
- Conducted an existing condition analysis at the study intersections using Synchro software.
- Reviewed previous transportation studies and preliminary designs for the region including the Amendment to Rosewood Concept Plan Traffic Impact Study (Stantec, 2014), Saskatoon Transportation Master Plan (City of Saskatoon, 2021), Holmwood Sector Plan (City of Saskatoon, 2012), Highway 16 & Zimmerman Road Interchange Preliminary Design (City of Saskatoon, 2022), and the Zimmerman Road Design (City of Saskatoon, 2016).
- Projected existing traffic volumes to each horizon year to determine the background traffic volumes at each horizon year and the full build-out condition of the proposed subdivision. As the proposed subdivision is expected to be built in 12 phases, this TIA will review these phases in 3 stages. Stage 1 will include Phases 1-4, Stage 2 will include Phases 5-7, and Stage 3 will include Phases 8-12. It was assumed that each stage will be developed in 5 years, with Solair Development being fully built out in 15 years (2039), the existing traffic volumes were projected to each stage with a 2% annual growth rate.
- Estimated the site-generated trips from the proposed development for each stage using Institute of Transportation Engineer's Trip Generation Manual (ITE Manual).
- Distributed the site-generated trips at the study intersections for each stage based on the surrounding area's population and employment distribution in relation to the proposed site utilizing a manual gravity model.
- Added development trips to the future background traffic volumes to determine the total peak hour volumes at the study intersections for each horizon year (2029, 2034 & 2039).
- Conducted the capacity and level of service (LOS) analysis at the study intersections for the future background trips for each stage to determine the performance of the study intersections without the project trips.
- Conducted the capacity and level of service (LOS) analysis at the study intersection for the future total traffic volumes (background plus project trips for each stage). The objective of this analysis is to determine the performance of the study intersections with the proposed development trips and develop a strategy to mitigate the adverse impacts, if any, on the transportation system within the study area.
- Conducted a collision review for the intersection and vicinity of the Highway No. 16 and Zimmerman Road intersection.

Project No.: 668.057

CLIENT: ARBUTUS PROPERTIES

Solair Development Traffic Impact Assessment



\\C:_002\Work\Arbutus Properties - 668.057 - Solair TA\Drawing\668-057-TI.dwg Donelle 22/03/24 - 2:37 P

PRELIMINARY
NOT FOR CONSTRUCTION

OWNER/CLIENT
ARBUTUS PROPERTIES

PROJECT
SOLAIR TRAFFIC IMPACT ASSESSMENT

LOCATION
SASKATOON, SK

SHEET TITLE
LOCATION PLAN

DATE	REVISION

SCALE VERIFICATION
WHEN DRAWING IS PLOTTED FULL SIZE
THIS LINE IS 30mm IN LENGTH.

SCALE	NTS	DESIGNED	BW
DRAWN	DL	CHECKED	
DATE	23/11/08	SHEET	1 of 1
DRAWING NUMBER	FIGURE 1		

2 EXISTING CONDITIONS & FUTURE BACKGROUND CONSIDERATIONS

2.1 STUDY HORIZON YEARS

The proposed subdivision is expected to be fully built out in 3 stages within fifteen years. Thus, each horizon year (2029, 2034 & 2039) was selected for future traffic assessment of the Solair Development site. The existing traffic condition and the future horizons condition were analyzed as shown below:

- 2023 – Existing Conditions
- 2029 (Stage 1 Build Out) – Background & Post Development Conditions
- 2034 (Stage 2 Build Out) – Background & Post Development Conditions
- 2039 (Stage 3 Build Out) – Background & Post Development Conditions

2.2 EXISTING ROADWAYS

Highway 16 is a four-lane paved long-distance divided highway with a posted speed limit of 110km/hour. The speed limit reduces to 90km/hour in the vicinity of the proposed subdivision. The highway runs in the east-west direction south of the Solair Development.

Zimmerman Road/Range Road 3044 is a four-lane paved divided arterial roadway from Highway 16 to Meadows Parkway and two-lane undivided rural roadway north of Meadows Parkway. It is important to note that Zimmerman Road between Highway 16 and Meadows Parkway has been designed to accommodate a future lane expansion in both the northbound and southbound directions. The posted speed limit is 60km/hour in the vicinity of the project. The road runs in north-south direction and borders the proposed subdivision to the west.

Highway (Road) 394 is a two-lane paved undivided roadway with a posted speed limit of 90km/hour. Highway 394 is also referred to as Patience Lake Road and is planned to be rerouted solely northward before intersecting with Market Drive. The roadway runs in the east-west direction south of the Solair Development.

Meadows Parkway is a four-lane paved undivided collector roadway with a posted speed limit of 50km/hour. The roadway runs in the northwest-southeast direction and stretches from Market Drive in the south to Taylors Street in the north.

Market Drive is a four lane paved divided collector roadway with a posted speed limit of 50km/hour. The roadway runs in the east-west direction southwest of the Solair Development.

2.3 FUTURE ROADWAYS

Taylor Street - East Extension is a planned extension of the existing Taylor Street as shown in the Holmwood Sector Plan (2017) and Saskatoon's Transportation Master Plan (2021). The existing Taylor Street (east of Rosewood Gate North) is an undivided two-lane arterial roadway (with planned upgrade to a four-lane divided arterial roadway) with a posted speed limit of 50km/h. It's assumed that initially the extension will have a

Project No.: 668.057

CLIENT: ARBUTUS PROPERTIES

Solair Development Traffic Impact Assessment

similar cross section as the existing two roadway and will have allocation for future upgrades to a four-lane divided cross section. The timeline in which a portion of this road is developed is dependant upon buildout of the Holmwood Sector, and construction by the City of Saskatoon. However, the north boundary of the Solair Development that is Taylor Street will be built by Arbutus Properties to the initial two-lane configuration at the kickoff of the Solair Development.

North-South Road (east boundary of development) is a planned roadway along the east boundary of the development area that will aid to service the development. The planned North-South road is expected to extend from the Solair portion of Taylor Street at the north to Highway 394 at the south and will be constructed by Arbutus Properties. The timeline in which this road is developed is dependant upon the recommendation of this TIA.

Internal Development Road Network has been planned within the Solair Concept Plan that can be seen within **Appendix A**. The internal network is planned to consist of both local and collector roadways constructed by Arbutus Properties.

Zimmerman Road Upgrade (Meadows Parkway to Future Taylor Street) is an existing roadway that will be upgraded to facilitate the development of Solair. The configuration and timing of this roadway section is dependent on upon the recommendation of this TIA.

2.4 EXISTING INTERSECTIONS

Highway 16 & Zimmerman Road Intersection is a signalized intersection. The intersection provides two through lanes with shared right-turn lane and two exclusive left-turn lane in the eastbound direction, one exclusive right-turn lane, two through lanes, and one exclusive left turn lane in the westbound direction, one exclusive left-turn lane, one shared through-right lane in the southbound direction and one shared left-through-right lane in the northbound direction. An interchange is proposed at this location in the future (timing by the City of Saskatoon) and can be seen in **Appendix B**.

Zimmerman Road & Market Drive Intersection is a signalized intersection which provides one exclusive right-turn lane and two through lanes in the northbound direction, two exclusive left-turn lanes, and two through lanes in the southbound direction, one exclusive right-turn lane, and two left-turn lane in the westbound direction. The west leg of the intersection is currently closed. Once the west leg of the intersection is established, two northbound left-turn lanes, one exclusive southbound right-turn lane, one eastbound left-turn lane, one eastbound through, one eastbound exclusive right-turn lane and one westbound through lane will be operational. The intersection is fully built to accommodate the full operational movements as mentioned above, movements are currently restricted via jersey barriers and signage. Full operation is dependent on development of Rosewood Boulevard East. It is anticipated the intersection will be fully operational in the next 2-3 years.

8th Street East & Zimmerman Road Intersection is controlled by a stop sign in the southbound direction and a yield sign in the northbound direction. 8th Street East operates as free flow. It provides a shared left-through-right lane in all four directions.

Project No.: 668.057

CLIENT: ARBUTUS PROPERTIES

Solair Development Traffic Impact Assessment

2.5 EXISTING TRAFFIC COUNTS

Catterall & Wright collected peak hour turning movement counts at the intersections of 8th Street East & Zimmerman Road, Highway 16 & Zimmerman Road, and Zimmerman Road & Market Drive. The data was collected using the MioVision Camera on November 7th, November 9th, and November 15th, respectively. The peak hours occurred from 7:30 am to 8:30 am and 4:00 pm to 5:00 pm at the 8th Street East & Zimmerman Road intersections, from 7:30 am to 8:30 am and from 4:15 pm to 5:15 pm at Highway 16 & Zimmerman Road intersection and from 8:00 am to 9:00 am and 4:30 pm to 5:30 pm at the Zimmerman Road & Market Drive intersection.

At the existing intersection of Meadows Parkway & Zimmerman Road no data was collected. Instead, data was estimated from the Amendment to Rosewood Concept Plan - Traffic Impact Study (TIS) Report (Stantec, 2014). The 2023 data was estimated in the following manner:

- Northbound movements were interpolated using movements at Market Drive & Zimmerman Rd, where 75% of movements were assigned to the left turn movements, 10% of movements were assigned in through movements, and 15% were assigned to the right turn movements.
- Southbound movements were estimated given that the future Holmwood neighbourhood is at or near 0% complete. Extrapolation was completed from the 8th Street East & Zimmerman Road intersection turning movement counts.
- Eastbound movements were estimated using the Stantec Rosewood TIS Report assuming that 80% of the volumes were appropriate based on the overall development of Rosewood at this time for the through movements and interpolating from adjacent intersections for both left turn and right turn movements.
- Westbound movements were estimated using the Stantec Rosewood TIS Report assuming that 80% of the volumes were appropriate based on the overall development of Rosewood at this time for the through movements and interpolating from adjacent intersections for both left turn and right turn movements.

The existing morning (AM) and evening (PM) peak hour turning movement counts at the study intersections are included in **Appendix C** and the graphical representation of these are illustrated in **Figure 2**.

2.6 FUTURE INTERSECTION

The proposed Solair Concept Plan will construct a portion of Taylor Street East (Solair) within the Concept Plan. This aligns with the City's of Saskatoon's Holmwood Sector Plan detailing a future extension of Taylor Street East to Winmill Road/Range Road 3043. The Solair Development will also include a new north-south road from Taylor Street East (within the Concept Plan) to Highway 394. Seven (7) new intersections will be developed to provide access to the proposed subdivision at the following locations:

- Taylor Street East & Range Road 3044 (proposed), with Taylor Street operating as free flow and Range Road 3044 stop controlled,

Project No.: 668.057

CLIENT: ARBUTUS PROPERTIES

Solair Development Traffic Impact Assessment

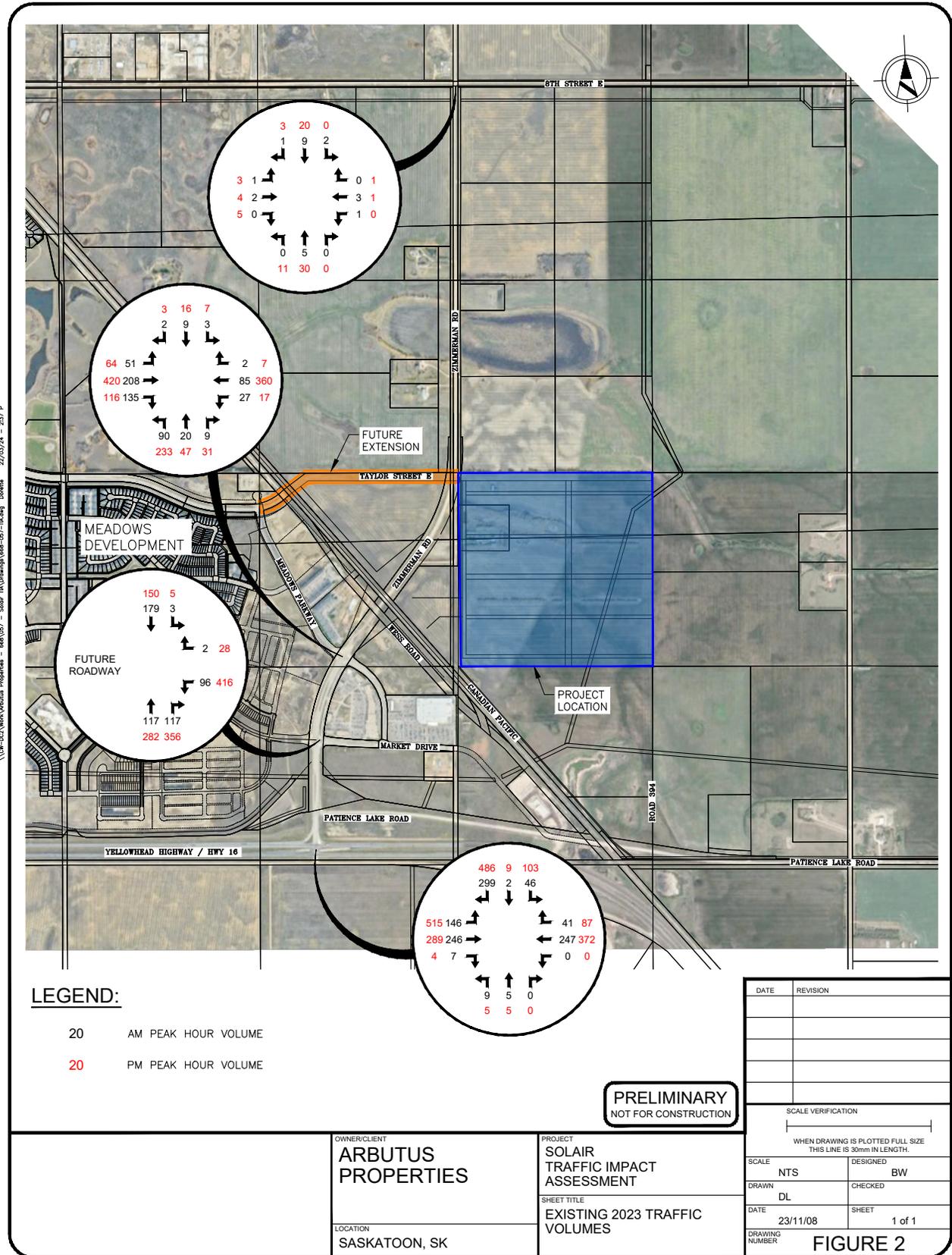
- One north development access & Taylor Street East (proposed), with Taylor Street East operating as free flow and the north development access stop controlled,
- North-South Road & Taylor Street East (proposed), with Taylor Street East operating as free flow and the North-South Road operating as stop controlled,
- North-South Road & Road 394 (proposed), with Road 394 operating as free flow and the North-South Road operating as stop controlled, and
- Three east development accesses & the North-South Road(proposed), where all accesses are stop controlled and the North-South Road is free-flow.

The timeline to develop future roadways and intersections is reviewed and recommended within this report. Where future lane configuration planning has already been undertaken such as the intersection of Zimmerman Road and Meadows Parkway, this will be utilized as the model's baseline configuration.

Project No.: 668.057

CLIENT: ARBUTUS PROPERTIES

Solair Development Traffic Impact Assessment



Project No.: 668.057

CLIENT: ARBUTUS PROPERTIES

Solair Development Traffic Impact Assessment

2.7 FUTURE BACKGROUND TRAFFIC VOLUMES AND OTHER DEVELOPMENTS

The background traffic growth reflects the growth in traffic volumes over time that are not related to the project trips. As the proposed site is expected to be fully developed in three stages in 15 years, the existing traffic volumes were projected to each development stage that are year 2029, year 2034 and year 2039.

Other developments that contribute to the existing and future background traffic at the study intersections include both the neighbourhood development area of Rosewood and the Holmwood Sector.

2.7.1 Rosewood Neighbourhood Development Area

The Rosewood Neighbourhood Development Area is located in southeast Saskatoon and is in proximity to the Solair Development TIA Study Area. The area had an Amendment to Rosewood Concept Plan – Traffic Impact Study completed back in 2014 by Stantec Consulting Ltd. When this document was prepared, it was assumed that the Rosewood neighbourhood would be completely built out by 2027.

At the time that this report is being written (2024), the Rosewood Neighbourhood Development Area is estimated to be approximately 80% of its fully built out potential. As such, any forecasting of future background traffic should account for the remaining 20% of the neighbourhood that will continue to be built. It's anticipated that by the end of the first stage of development of Solair (2029), Rosewood is assumed to be fully built out. To account for this assumption, the 2025 full buildout traffic volumes from the Amendment to Rosewood Concept Plan – Traffic Impact Study were utilized as the basis for the 2029 future background volumes within this report for the intersections of Meadows Parkway & Zimmerman Road, Market Drive & Zimmerman Road, and Highway 16 & Zimmerman Road.

2.7.2 Holmwood Sector

The Holmwood Sector is a 28 square km area on the east side of the City with majority of the lands falling within the limits of Saskatoon. The land is sufficient for five neighbourhood development areas and includes the neighbourhood of Brighton, that is currently under development.

At the time that the Amendment to Rosewood Concept Plan – Traffic Impact Study was prepared by Stantec in 2014, there was assumptions made that accounted for large volumes of traffic utilizing Zimmerman Road north of Meadows Parkway. These assumptions are believed to include projected traffic to the future Holmwood Sector and Holmwood Neighbourhood Developments. From the small number of turning movement counts observed at peak times at the intersection of Zimmerman Road & 8th Street East and the limited amount of growth within the Holmwood Sector outside of Brighton, these assumptions do not align with current conditions. Using the 2025 full buildout traffic volumes from the Amendment to Rosewood Concept Plan – Traffic Impact Study as the basis for the 2029 future background volumes within this report for the intersections of Meadows Parkway & Zimmerman Road, Market Drive & Zimmerman Road, and Highway 16 & Zimmerman Road, the following adjustments were made to attempt balance in existing conditions and future growth of the Holmwood Sector:

Project No.: 668.057

CLIENT: ARBUTUS PROPERTIES

Solair Development Traffic Impact Assessment

- 2029 Future Background Horizon
 - At the intersection of Market Drive & Zimmerman Road, northbound and southbound through movements were reduced by 55% to account for a reasonable growth of traffic to/from the Holmwood Sector area north of Rosewood.
 - At the intersection of Meadows Parkway & Zimmerman Road, northbound through, eastbound left, westbound right, and all southbound movements were reduced by 80% to account for a reasonable growth of traffic to/from the Holmwood Sector area north of Rosewood.
- 2034 Future Background Horizon
 - At the intersection of Market Drive & Zimmerman Road, northbound and southbound through movements were reduced by 45% to account for a reasonable growth of traffic to/from the Holmwood Sector area north of Rosewood.
 - At the intersection of Meadows Parkway & Zimmerman Road, northbound through, eastbound left, westbound right, and all southbound movements were reduced by 70% to account for a reasonable growth of traffic to/from the Holmwood Sector area north of Rosewood.
- 2039 Future Background Horizon
 - At the intersection of Market Drive & Zimmerman Road, northbound and southbound through movements were reduced by 35% to account for a reasonable growth of traffic to/from the Holmwood Sector area north of Rosewood.
 - At the intersection of Meadows Parkway & Zimmerman Road, northbound through, eastbound left, westbound right, and all southbound movements were reduced by 60% to account for a reasonable growth of traffic to/from the Holmwood Sector area north of Rosewood.

2.7.3 Other Growth Factors to Consider

Outside of the growth/factors applied above, additional background growth should be accounted for. The following additional growth factors were applied at the movements:

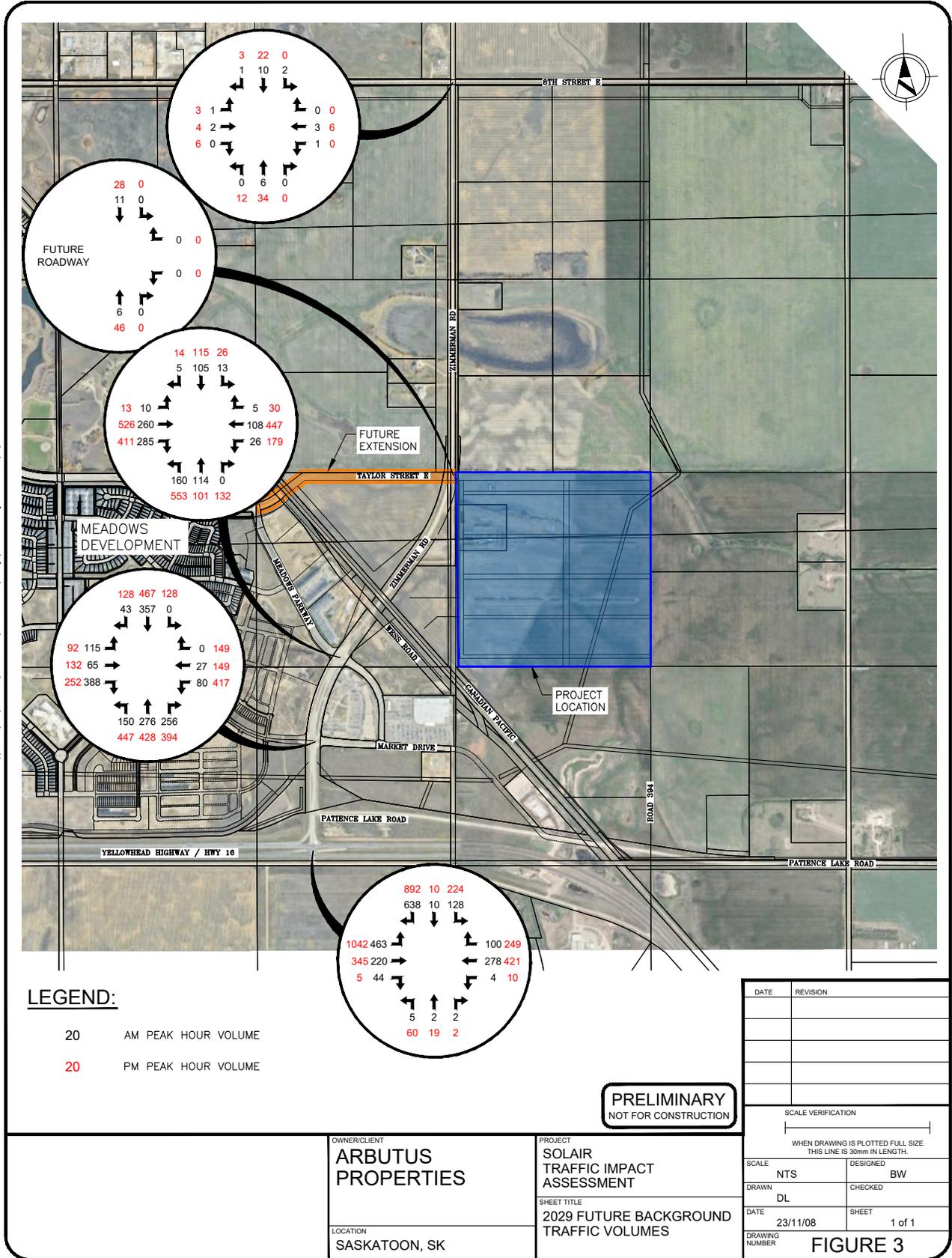
- A 2% annual growth factor was applied to all movements at the intersections of Zimmerman Road & Taylor Street East and Zimmerman Road & 8th Street East in 2029, 2034, 2039 future background horizons. The 2% factor is a typical annual growth rate applied by the City of Saskatoon.
- A 1% annual growth factor was applied to all movements (unless at movement otherwise noted above) at the intersections of Meadows Parkway & Zimmerman Road, Market Road & Zimmerman Road, and Highway 16 & Zimmerman Road in 2034, 2039 future background horizons. The 1% factor in comparison to the typical 2% is to account for the assumption that the Rosewood Neighbourhood Development Area will be fully developed by 2029.

With all these things considered, the future background turning movement volumes (without project trips) at the study intersections for each stage during AM and PM peak periods are shown in **Figure 3**, **Figure 4**, and **Figure 5**, respectively.

Project No.: 668.057

CLIENT: ARBUTUS PROPERTIES

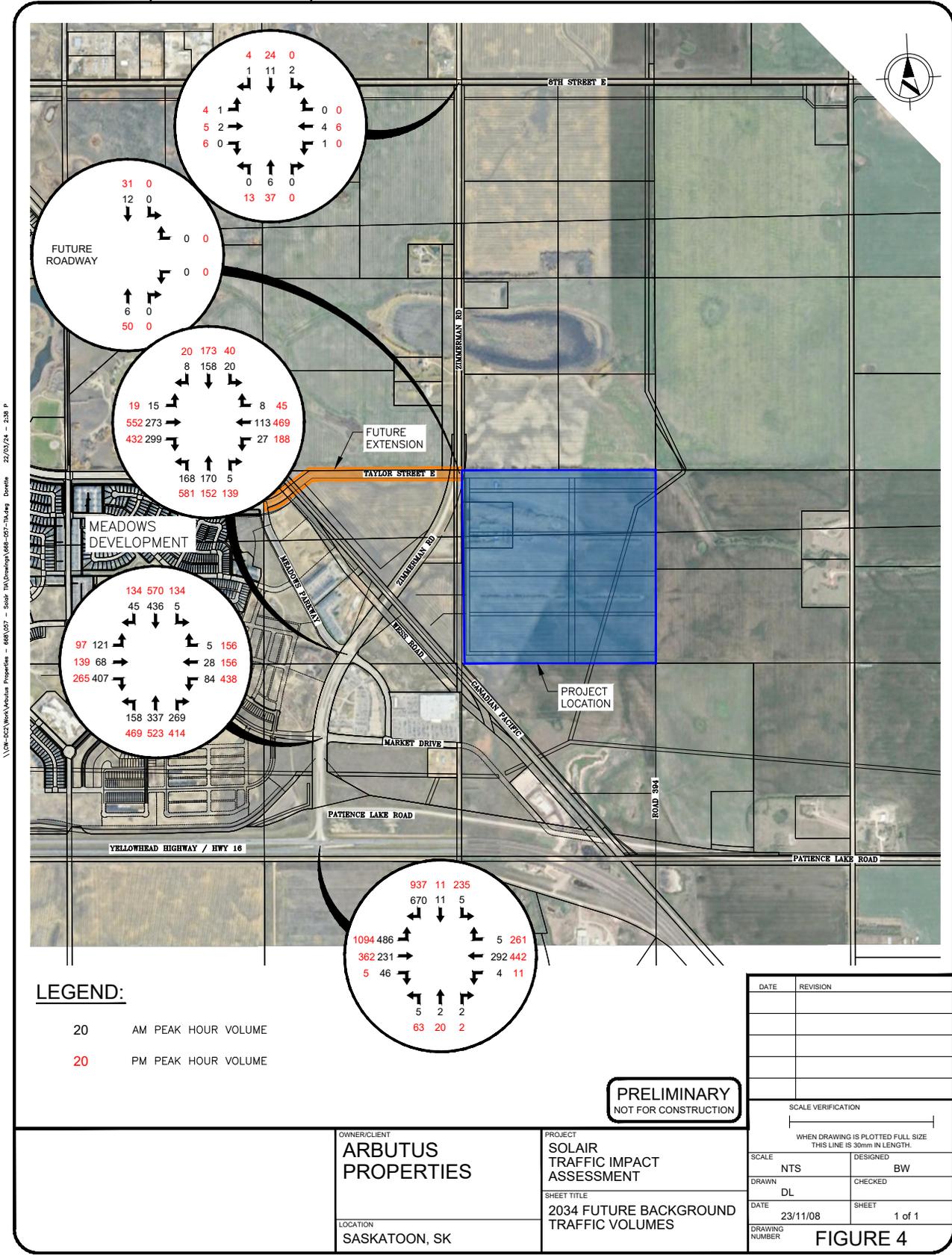
Solair Development Traffic Impact Assessment

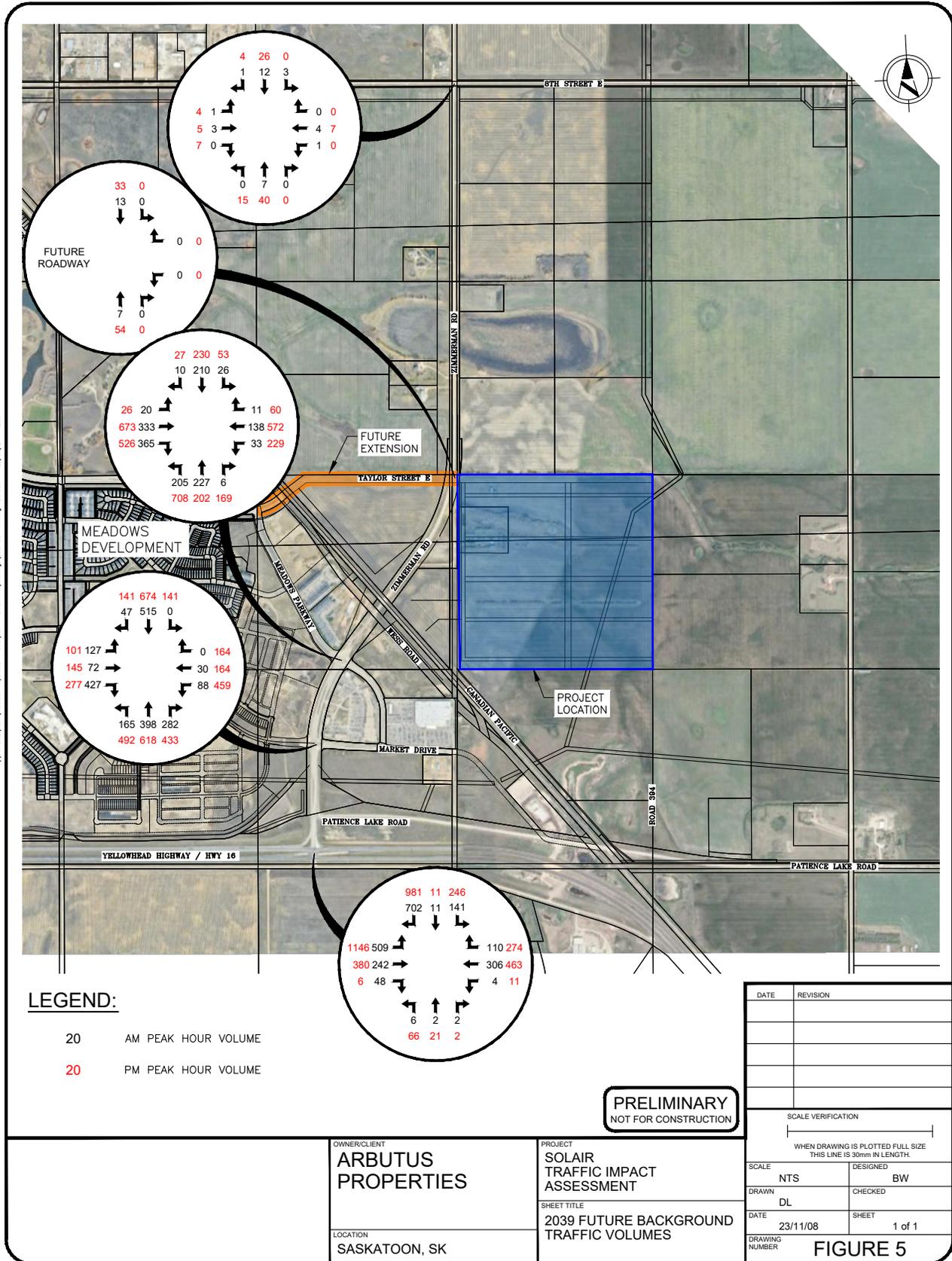


Project No.: 668.057

CLIENT: ARBUTUS PROPERTIES

Solair Development Traffic Impact Assessment





2.7.4 The Saskatoon Freeway

The Saskatoon Freeway project is another noteworthy project that is in proximity of the to the Solair Development. Specifically, Phase 2 of the freeway is near the Solair Development, with planned routing to provide future interchanges on 8th Street east of Zimmerman Road, and on Zimmerman Road south of Highway 16. Currently, the Phase 2 Functional Planning Study is underway, however, construction of the freeway is not expected that to begin for another 15 years. The completion is beyond this timeline and outside of the horizons to this study. The development and the planned accesses to and from the development are outside of the planned route for the freeway and planned interchange locations.

3 PROPOSED DEVELOPMENTS

The proposed Solair Development subdivision includes 21 acres of low-density residential development, 31.2 acres of medium-density residential development, 17.5 acres of townhouse units, 8.6 acres of multi-family housing units and 5.2 acres of mixed-use development. The mixed-use development will offer a mixture of retail/office and residential uses. The concept plan of the proposed development is attached as **Appendix A**.

3.1 DEVELOPMENT STAGING

The proposed subdivision is planned to develop progressively in 12 phases that were grouped into 3 separate Stages. Phases 1 to 4 will be developed in Stage 1, Phases 5 to 7 will be developed in Stage 2, and Phase 8 to 12 will be developed as Stage 3. The phasing/staging is broken down in **Figure 6**.



Figure 6: Solair Phasing/Staging Plan (Solair Development Application, Lateral Office, 2023)

Project No.: 668.057

CLIENT: ARBUTUS PROPERTIES

Solair Development Traffic Impact Assessment

The following development phasing assumptions are provided for each of the respective stages.

Stage 1 – Assumed 2029 Completion

Within Stage 1 of the development, the following roadways are anticipated to be developed:

- Taylor Street East from Zimmerman Road to the east boundary of the development.
- The development’s internal roadway network as indicated in **Figure 7**.

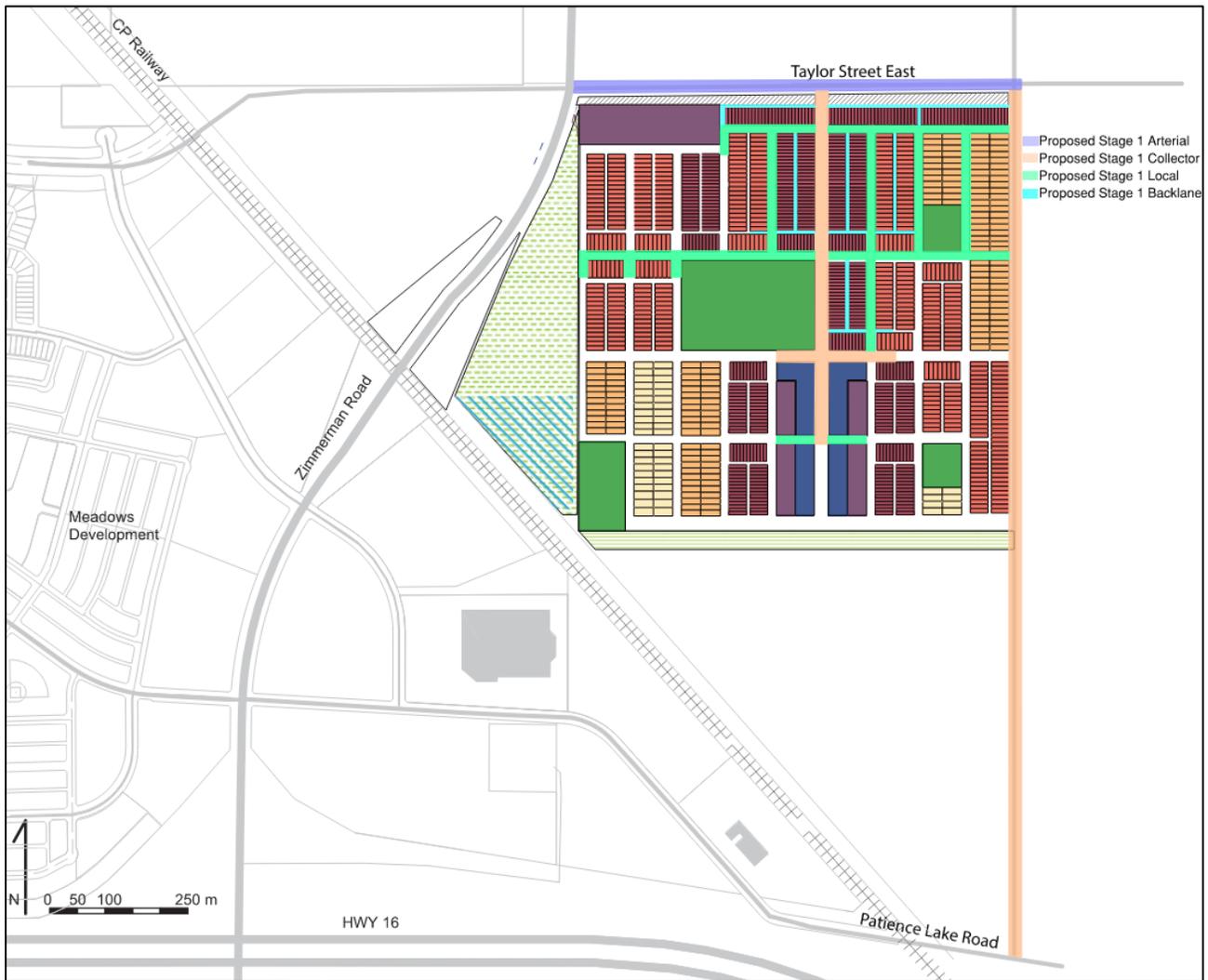


Figure 7: Stage 1 Proposed Development Roadways

Project No.: 668.057

CLIENT: ARBUTUS PROPERTIES

Solair Development Traffic Impact Assessment

Stage 2 – Assumed 2034 Completion

Within Stage 2 of the development, the following roadways are anticipated to be developed:

- The development's internal roadway network as indicated in **Figure 8**.

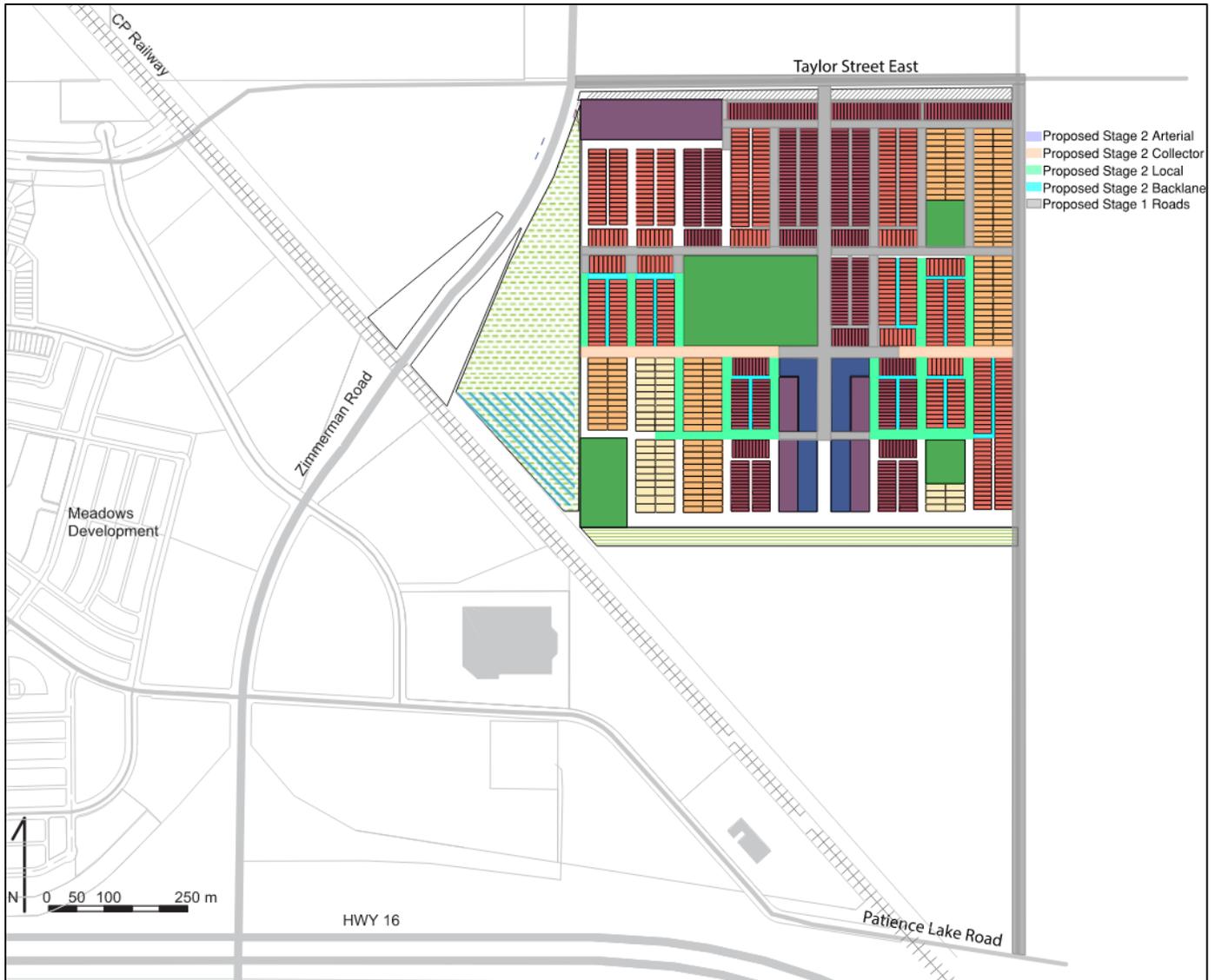


Figure 8: Stage 2 Proposed Development Roadways

Stage 3 – Assumed 2039 Completion

Within Stage 3 of the development, the following roadways are anticipated to be developed:

- The development’s internal roadway network as indicated in **Figure 9**.

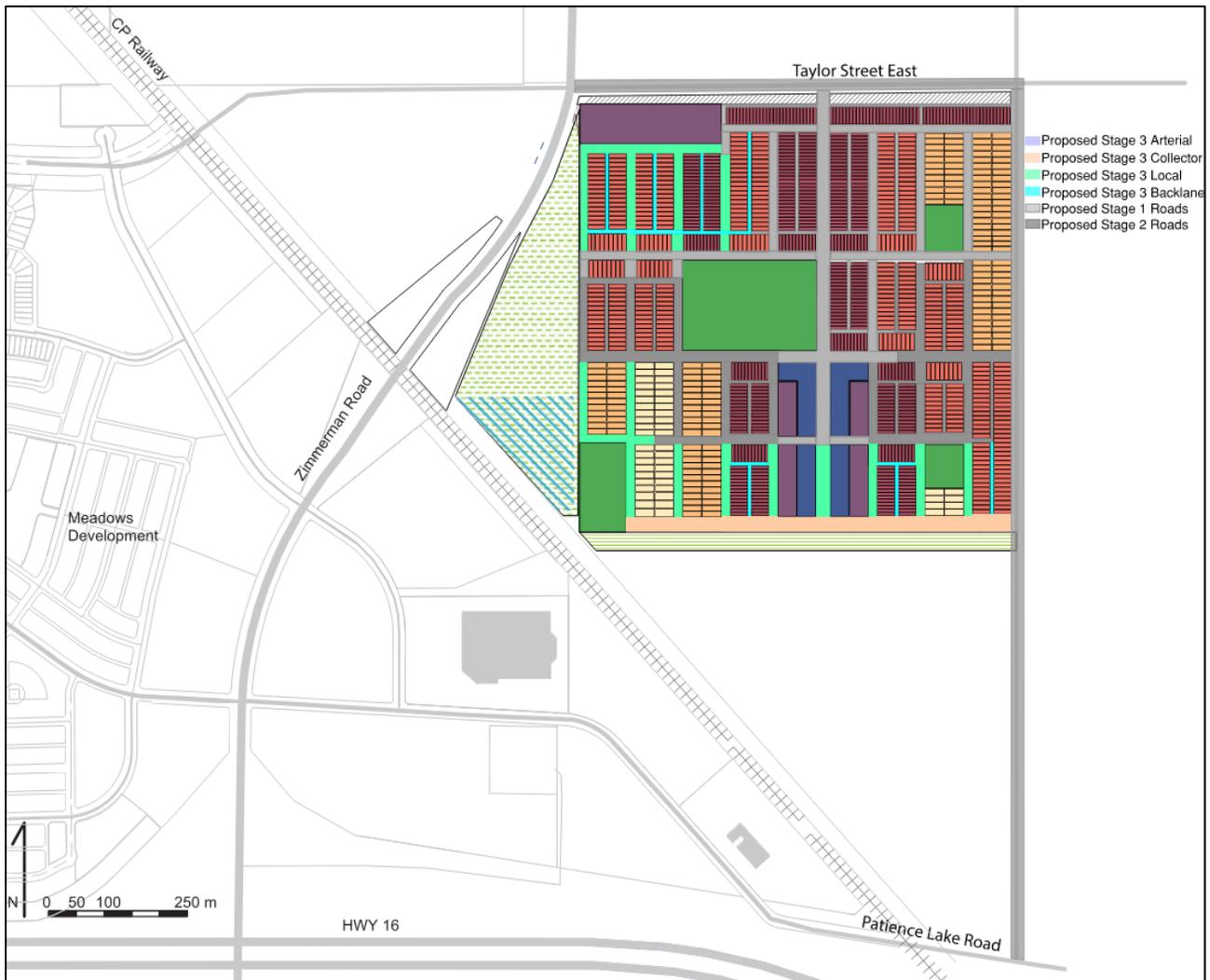


Figure 9: Stage 3 Proposed Development Roadways

4 SITE ACCESSIBILITY

4.1 ROADWAYS

In each phase/stage of development, access will need to be achieved to all the land uses being developed. The primary point of access will be via the extension of Taylor Street East, east of Zimmerman Road. Secondary access will be provided via the proposed North-South road that bounds the development to the east. As shown in **Figure 7, Figure 8 Figure 9**, the proposed network of collector and local roadways as well as laneways internal to the site will provide access to the various land uses at each of the respective stages. Drive lanes and parking lane widths on collector roadways were set according to the desired lane widths as outlined in the City of Saskatoon Complete Street Design and Policy Guide, September 2017 (p 70). The 9m wide pavement width provided on the local roadways provides land access for local traffic. Parking will be permitted on both sides of the street and will provide a traffic calming measure where cars must slow to pass one another.

4.2 PEDESTRIANS & CYCLISTS

Internal to the Solair Development, sidewalks are planned to be present on all collector and local streets. The collector that routes in the north-south direction is planned to provide both sides of the roadway with a 1.5-meter-wide sidewalk and a 1.5-meter-wide cycle track. The collector that routes in the east-west direction is planned to provide a 1.8-meter-wide sidewalk on both sides of the roadway. The local streets are planned to provide 1.5-meter-wide sidewalks on both sides of the roadways. The cross-sections of the various collectors and local roadways are detailed in **Figure 10**.

Project No.: 668.057

CLIENT: ARBUTUS PROPERTIES

Solair Development Traffic Impact Assessment

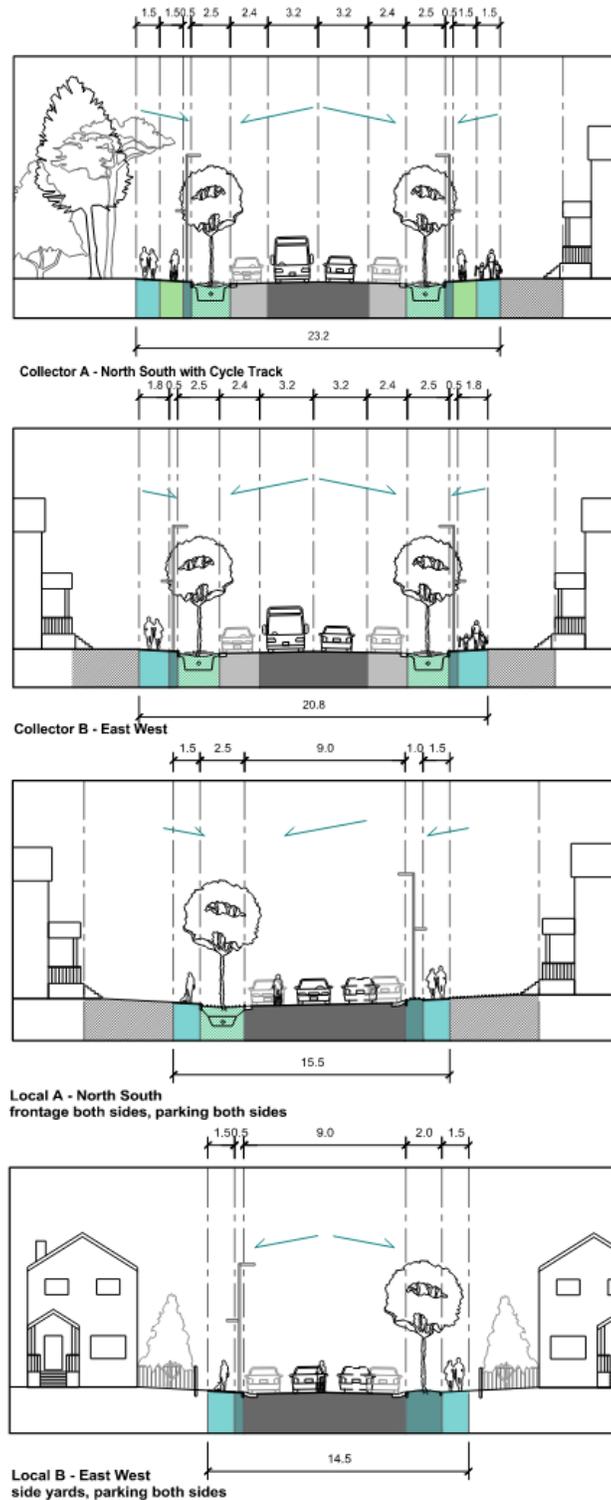


Figure 10: Proposed Collector & Local Roadway Cross-sections (Solair Development Application, Lateral Office, 2023)

Project No.: 668.057

CLIENT: ARBUTUS PROPERTIES

Solair Development Traffic Impact Assessment

External to the site, established pedestrian and cyclist linkages do not currently exist. Multi-use pathways are proposed by Arbutus Properties along both the future Taylor Street East extension to connect to the existing end point directly west of the CP railway, and along the future north-south road from Taylor Street East to Patience Lake Road. Arbutus will construct multi-use pathways within Solair's Concept Plan only. This is depicted in **Figure 11**. It's assumed that these facilities will be developed as the corresponding roadways are developed.

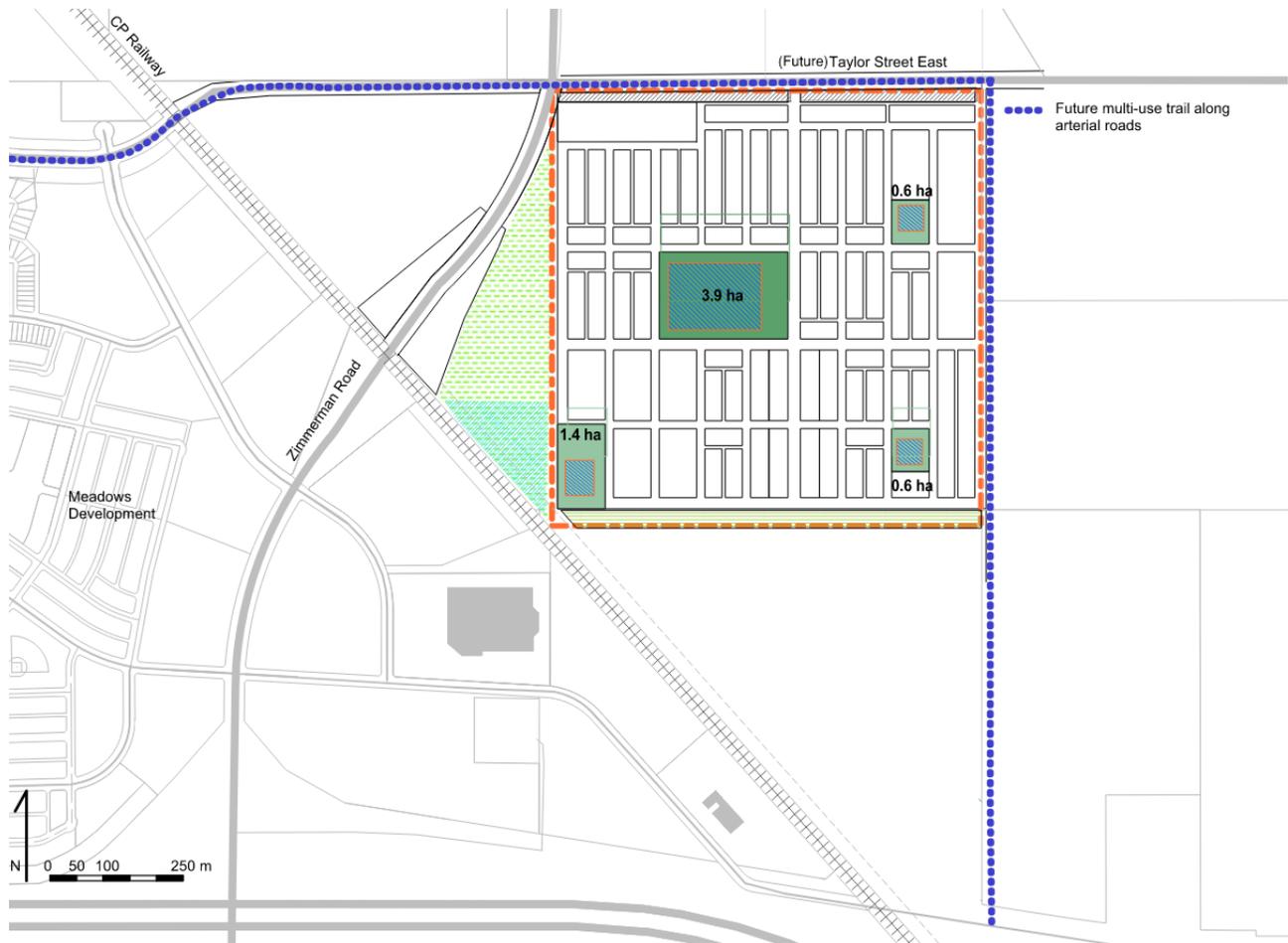


Figure 11: Proposed Pedestrian and Cyclist Facility Connections (Solair Development Application, Lateral Office, 2023)

4.3 TRIP GENERATION

The trip generation rates from the proposed development were derived from Institute of Transportation Engineers (ITE) Trip Generation Manual. The ITE standard trip rates were applied to the number of dwelling units for the residential housing. As a specific category of some uses are not included in ITE Manual, a similar land use category was used as shown in **Table 1**.

Table 1 – Applicable ITE Uses and Codes

Type	ITE Use	ITE Code
Low Density Single Family - Attached	Single Family Attached	215
Medium Density Single Family - Detached	Single Family Detached	210
Townhouse	Single Family Attached	215
Multifamily (6 stories)	Multifamily Housing (mid rise)	221
Mixed Use Development	Low Rise Residential with Ground Floor Commercial	230

The ITE standard trip generation rates are illustrated in **Table 2**.

Table 2 – Trip Generation Standard Rates

Land Use Type	ITE Code	Unit	AM Peak Hour			PM Peak Hour		
			Rate	In %	Out %	Rate	In %	Out %
Single-Family Attached Housing	215	No of Units	0.48	25	75	0.57	59	41
Single-Family Detached Housing	210	No of Units	0.7	25	75	0.94	63	37
Multifamily Housing Mid-Rise	221	No of Units	0.37	23	77	0.39	61	39
Low-Rise Residential with Ground-Floor Commercial	230	No of Units	0.44	23	77	0.36	71	29

The two-way vehicle trips anticipated to be generated from the proposed site during the weekday AM and PM peak hours are summarized in **Table 3**.

Table 3 – Trip Generation Estimates from the Proposed Site

Land Use Type	No of Units	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Single-Family Attached Housing	701	84	252	336	236	164	400
Single-Family Detached Housing	427	75	224	299	253	149	401
Multifamily Housing Mid-Rise	430	37	123	159	102	65	168
Low-Rise Residential with Ground-Floor Commercial	145	15	49	64	37	15	52
Gross Trips	1703	210	648	858	628	393	1021

Project No.: 668.057

CLIENT: ARBUTUS PROPERTIES

Solair Development Traffic Impact Assessment

The proposed site is expected to generate 858 primary vehicle trips during AM peak hour and 1,021 primary vehicle trips during PM peak hour. A total of 210 vehicles will enter and 648 vehicles will depart from the proposed site during AM peak hour. During the PM peak hour, 628 vehicles will enter, and 393 vehicles will depart. The trip generation of each respective stage is shown in **Table 4**.

Table 4 – Trip Generation Estimates from Each Stage of the Proposed Site

Land Use Type	Units	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Stage 1 (Phase 1 to 4)							
Single-Family Attached Housing	331	40	119	159	111	77	189
Single-Family Detached Housing	111	19	58	78	66	39	104
Multifamily Housing Mid-Rise	232	20	66	86	55	35	90
Low-Rise Residential with Ground-Floor Commercial	65	7	22	29	17	7	23
Stage 1 Trips	740	85	266	351	249	158	407
Stage 2 (Phase 5 to 7)							
Single-Family Attached Housing	150	18	54	72	50	35	86
Single-Family Detached Housing	175	31	92	123	104	61	165
Multifamily Housing Mid-Rise	86	7	25	32	20	13	33
Low-Rise Residential with Ground-Floor Commercial	16	2	5	7	4	2	6
Stage 2 Trips	427	58	176	233	179	111	289
Stage 3 (Phase 8 to 12)							
Single-Family Attached Housing	220	26	79	105	74	51	125
Single-Family Detached Housing	141	25	74	99	84	49	132
Multifamily Housing Mid-Rise	112	10	32	42	27	17	44
Low-Rise Residential with Ground-Floor Commercial	64	6	22	28	16	7	23
Stage 3 Trips	537	67	207	274	200	124	325
Total Project Trips		210	648	858	628	393	1021

As shown in the above table, the Stage 1 developments are expected to generate 266 vehicle trips during AM peak hour and 407 vehicle trips during PM peak hour, the Stage 2 developments would generate 176 vehicle trips during AM peak hour and 111 vehicle trips during PM peak hour and the Stage 3 developments are anticipated to generate 274 vehicle trips during AM peak hour and 325 vehicle trips during PM peak hour.

4.4 INTERNAL VERSUS EXTERNAL TRIPS

The development trips represent trips that stay within the development (internal capture trips) and the trips that leave the development via the adjacent roadway network (external trips). Internal trips are usually found in mixed land use where the origin and destination of trips are within the same developments, for instance,

4.4 INTERNAL VERSUS EXTERNAL TRIPS

The development trips represent trips that stay within the development (internal capture trips) and the trips that leave the development via the adjacent roadway network (external trips). Internal trips are usually found in mixed land use where the origin and destination of trips are within the same developments, for instance, home to shopping, home to restaurant, or home to work trips within the same development. These trips can be made either by walking or by vehicles using the internal street network without using external roadways. Given that the development is planned to be only 3.7% mixed use, the number of trips considered as internal trip capture was negligible.

4.5 PASS-BY TRIPS

A pass-by trip is made as an intermediate stop on the way from an origin to a primary trip destination without a route diversion. Pass-by trips are attracted from traffic passing the site on an adjacent street that offers direct access to the development. For example, retail-oriented developments such as shopping centers, banks and restaurants often located adjacent to busy streets in order to attract motorists already on the street system for a different purpose. Thus, the pass-by trips do not add new traffic to the adjacent street system and may be reduced from the total external trips generated by the project site.

The development is not along a major adjacent street with large volumes of existing traffic and is expected to be generating most of the immediate traffic on Zimmerman Road north of the CP railway crossing. Diversion or primary trips will be the majority of trips to the development area and pass-by trips although considered, are negligible for the context of this development.

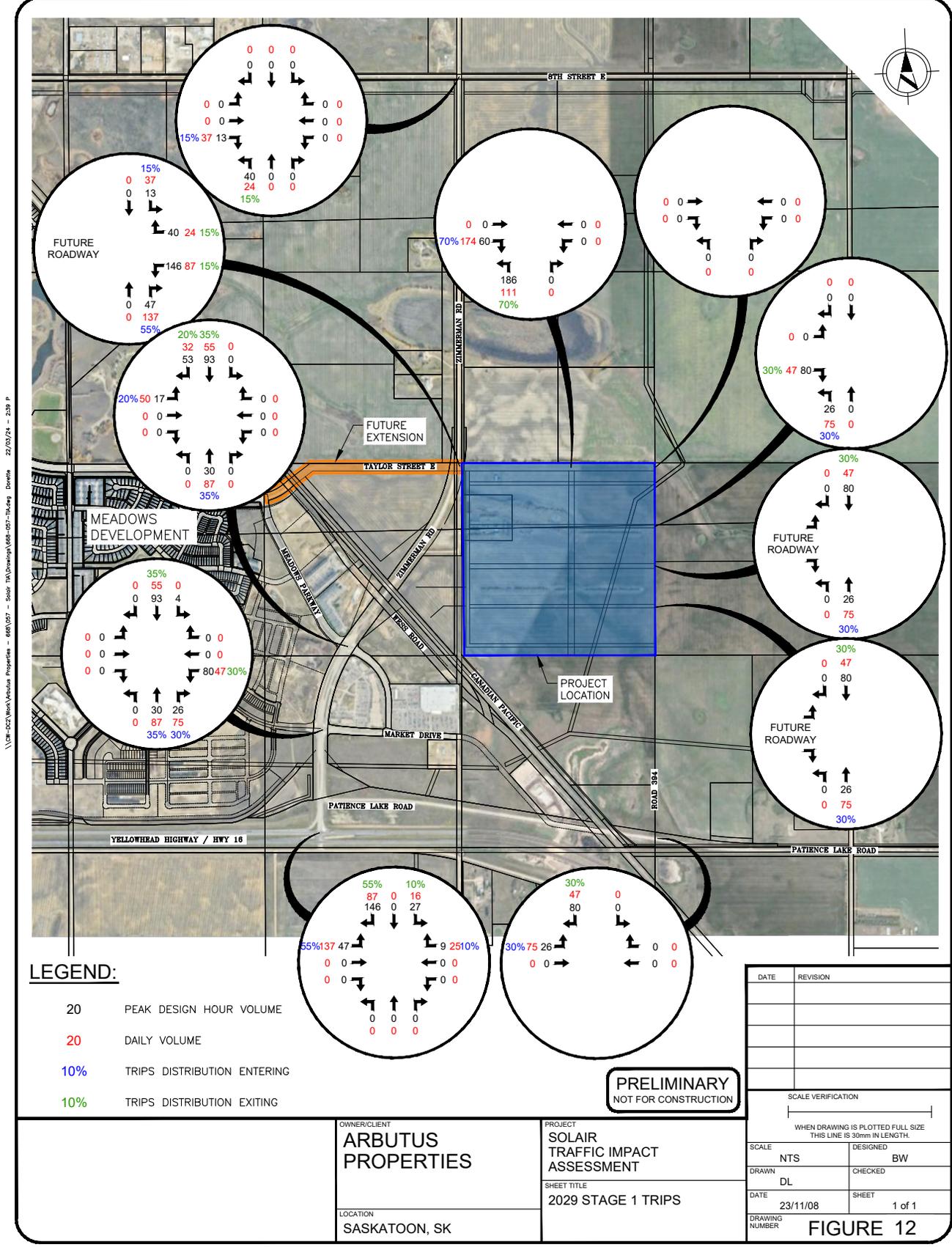
4.6 TRIP DISTRIBUTION AND ASSIGNMENT

The site-generated trips were assigned to the study intersections based on the assessment of how a vehicle would enter or exit the site. The direction from which the traffic will approach and depart the project site depends upon several factors such as size of development, type of development, type of visitors/customers and surrounding population.

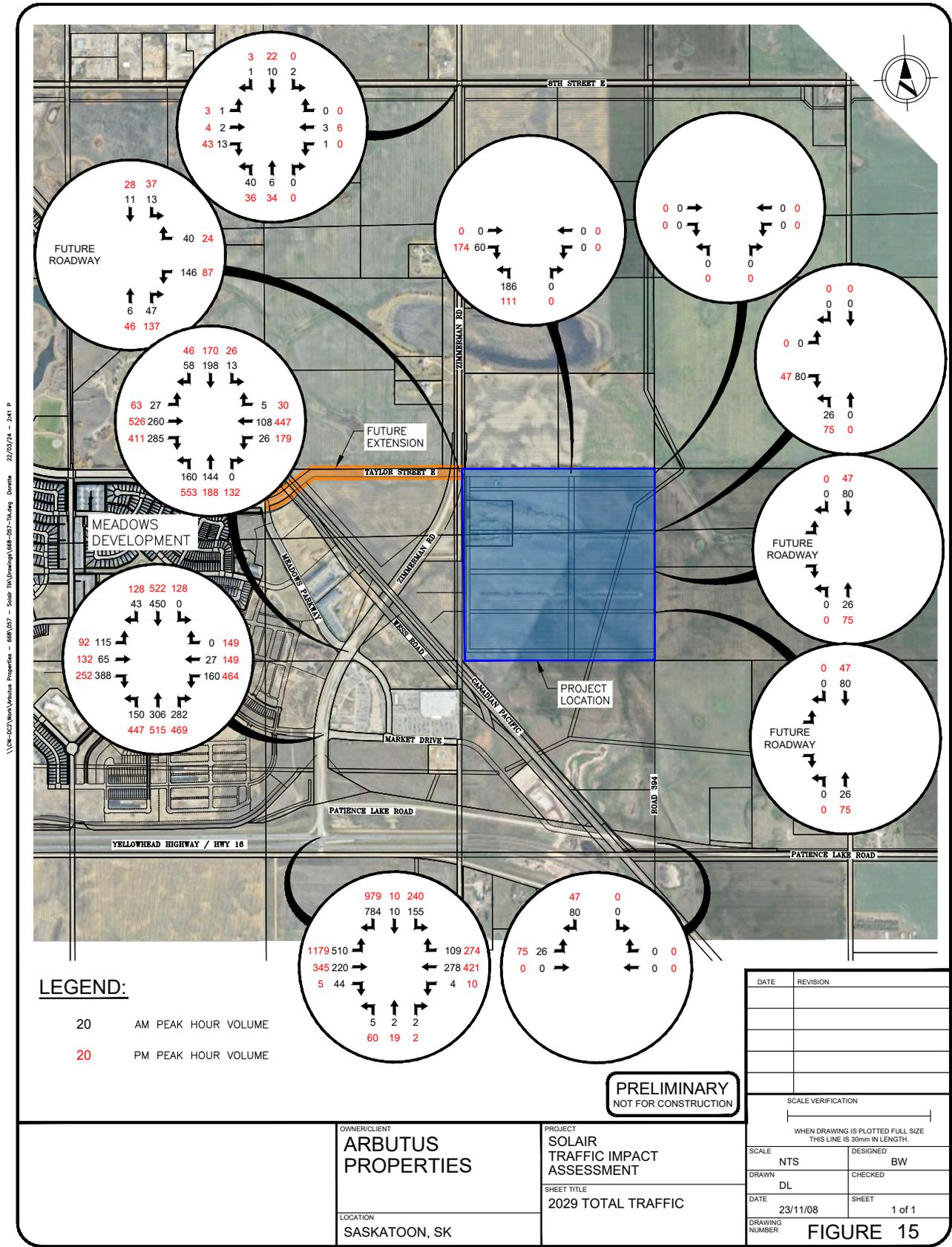
Based on the site observation, traffic count surveys and engineering judgement, the generated trips from the proposed development were assumed to be 20% to/from the west (via Meadows Parkway), 15% to/from the north (via Zimmerman Road), 55% to/from the southwest, and 10% to/from the southeast (both via Highway 16). **Figure 12, Figure 13, and Figure 14** illustrate the distribution and assignment of site-generated trips at the three separate stages of development of the proposed site.

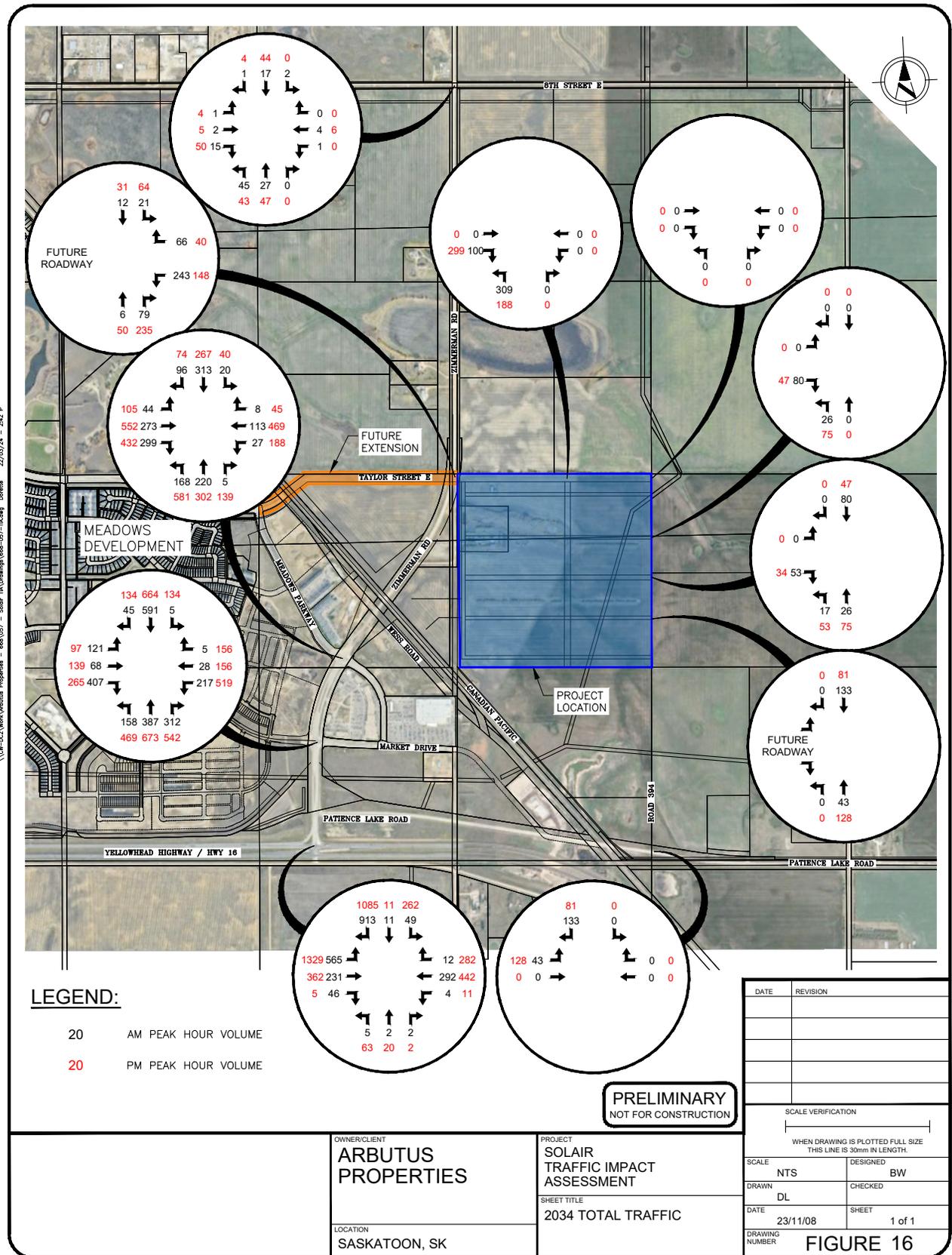
4.7 TOTAL FORECAST VOLUMES

The total forecast volumes at the study intersections were obtained by combining the background traffic growth with the additional new vehicle trips resulting from the proposed site. **Figure 15, Figure 16, and Figure 17** illustrate the total forecasted traffic volumes for the three full build-out conditions (year 2029, 2034, and 2039).

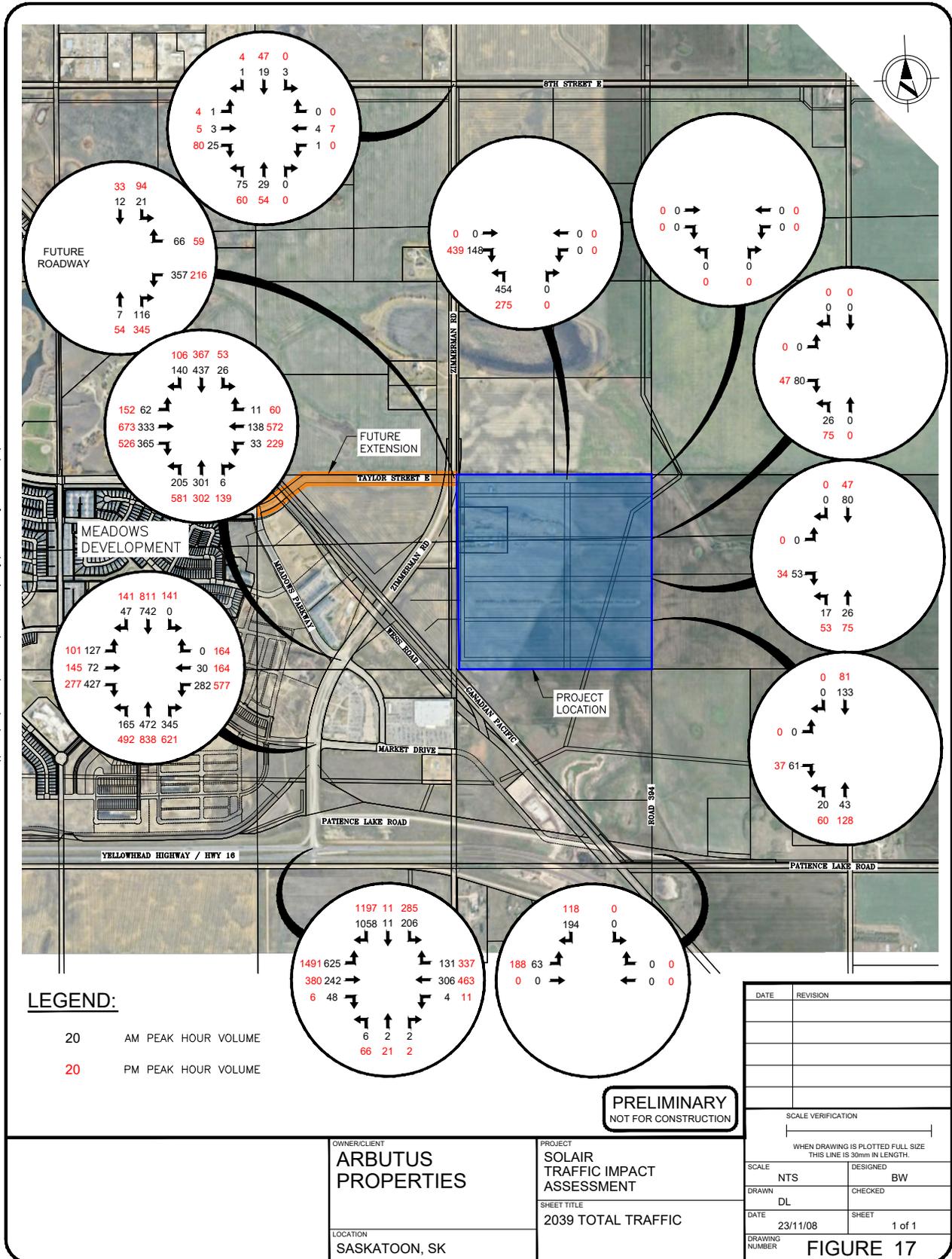


\\C:\p202\Work\Arbutus Properties - 668\057 - Solar TA\Drawings\668-057-TIA.dwg Date: 22/03/24 - 2:38 P





\\01-202\Work\Vehicle Properties - 668.057 - Solair - TA\Drawings\668-057-TA.dwg Dorelle 22/03/24 - 242 P



5 TRAFFIC OPERATIONS

5.1 INTERSECTION ANALYSIS METHODOLOGY

Existing and total traffic forecasts operations were assessed using Synchro 11.0 (industry-standard traffic micro-simulation software).

The level of service (LOS) analysis assesses the effectiveness of a transportation system alphabetically from A to F, with LOS A equating to the lowest user delay and LOS F to high user delay. LOS F is typically assumed to represent failure of a movement or intersection. LOS D or better is desirable for planning purposes. LOS E may be acceptable for left-turn movements to provide better service to opposing through movements. The LOS criteria are provided in **Table 5**.

Table 5 – LOS Criteria for Signalized and Un-Signalized Intersections

Level of Service	Average Total Delay (seconds) (Un-Signalized Intersection)	Average Total Delay (seconds) (Signalized Intersection)
A	10.0 or less	10.0 or less
B	10.1 to 15.0	10.1 to 20.0
C	15.1 to 25.0	20.1 to 35.0
D	25.1 to 35.0	35.1 to 55.0
E	35.1 to 50.0	55.1 to 80.0
F	Greater than 50.0	Greater than 80.0

Other measures, such as average vehicle delay and volume-to-capacity (v/c) ratio assist with the assessment. The v/c ratio represents the amount of congestion and available capacity at an intersection and for each individual movement at an intersection and is generally indicative of an intersection's flexibility and ability to accommodate fluctuations in traffic flow. Volume-to-capacity (v/c) has a theoretical maximum of 1.00 and a value of 0.85 is generally accepted as the maximum desirable for design of intersection improvements in urban settings.

5.2 PERFORMANCE OF STUDY INTERSECTIONS

The intersection capacity and LOS analysis were conducted at the study intersections for existing (2023) and future total traffic forecast (2038) horizon utilizing Synchro 11.0 software. The intersections were examined with existing and proposed control type and lane configurations. The lane configurations used in the analysis for each respective intersection are provided in **Appendix D**. Where designated left turning lanes are required, refer to **Appendix D** for bay lengths. The detailed Synchro outputs for AM and PM peak hour analysis are provided in **Appendix E**.

Project No.: 668.057

CLIENT: ARBUTUS PROPERTIES

Solair Development Traffic Impact Assessment

5.3 SIGNAL TIMING PLANS

The City of Saskatoon provided current signal timing plans for all signalized study intersections to be used in the condition analysis. These are attached in **Appendix F**.

5.4 2023 EXISTING CONDITIONS

The 2023 existing traffic capacity results for AM and PM peak hours are summarized in **Table 6**.

Table 6 – 2024 Existing Condition Analysis Results

		AM Peak Hour													
		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	INT	
Zimmerman Road & Highway 16															
2024	Existing	LOS	B	C	A	B	D	A	D	D	A	D	D	A	C
		Delay (s)	14.8	27.6	0.0	18.0	48.9	0.0	46.3	40.9	0.0	42.8	42.8	0.4	22.9
		V/C	0.15	0.27	0	0.0	0.58	0.03	0.07	0.05	0.00	0.12	0.12	0.24	0.58
		95th% Queue (m)	14.4	32.8	0	1.4	42.1	0.0	2.2	1.2	0.0	5.5	5.5	0	-
Zimmerman Road & Market Drive															
2024	Existing	LOS	-	-	-	C	-	C	-	B	A	A	A	-	B
		Delay (s)	-	-	-	29.9	-	20.5	-	12.8	3.5	4.7	4.9	-	11.1
		V/C	-	-	-	0.3	-	0.01	-	0.10	0.20	0.01	0.1	-	0.29
		95th% Queue (m)	-	-	-	12.9	-	1.6	-	9.7	7.7	1.0	7.5	-	-
Zimmerman Road & Meadows Parkway															
2024	Existing	LOS	B	C	A	B	C	A	B	C	A	B	C	A	B
		Delay (s)	14.2	26.1	4.6	13.7	24.5	0.0	18.9	25.8	0.0	0.1	17.3	25.6	18.3
		V/C	0.12	0.28	0.3	0.07	0.11	0.00	0.15	0.03	0.02	0.01	0.01	0.0	0.30
		95th% Queue (m)	11.2	24.7	8.6	7.1	11.7	0.0	10.2	4.3	0.0	1.0	2.6	0	-
Zimmerman Road & 8th Street East															
2024	Existing	LOS	A			A			A			A			B
		Delay (s)	1.4			1			8.9			9			6.4
		V/C	0			0			0.01			0.02			0.02
		95th% Queue (m)	0			0			0.2			0.4			-
		PM Peak Hour													
		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	INT	
Zimmerman Road & Highway 16															
2024	Existing	LOS	B	C	A	B	E	A	D	D	A	D	D	A	C
		Delay (s)	19.4	28.4	0.0	18.0	64.9	0.1	45.8	40.9	0.0	45.9	46.0	0.7	25.8
		V/C	0.57	0.31	0	0.0	0.87	0.07	0.04	0.05	0.00	0.28	0.29	0.38	0.87
		95th% Queue (m)	48.2	38.1	0	1.4	#68.0	0.0	5.0	5.6	0.0	25.4	25.8	0	-
Zimmerman Road & Market Drive															
2024	Existing	LOS	-	-	-	C	-	A	-	C	A	B	B	-	B
		Delay (s)	-	-	-	24.3	-	7.7	-	24.7	6.1	11.8	12.2	-	17.3
		V/C	-	-	-	0.5	-	0.07	-	0.40	0.57	0.01	0.11	-	0.57
		95th% Queue (m)	-	-	-	42	-	5.3	-	30.8	15.3	2.2	12.3	-	-
Zimmerman Road & Meadows Parkway															
2024	Existing	LOS	B	C	A	B	C	A	C	C	A	B	C	A	C
		Delay (s)	14.9	30.2	3.0	13.6	28.8	0.0	22.9	26.1	0.3	17.5	25.6	0.0	24.0
		V/C	0.19	0.56	0.26	0.05	0.48	0.02	0.38	0.07	0.07	0.01	0.02	0.0	0.56
		95th% Queue (m)	13.3	48.2	5	5.1	41.2	0.0	22.7	7.7	0.0	1.7	3.7	0	-
Zimmerman Road & 8th Street East															
2024	Existing	LOS	A			A			A			A			B
		Delay (s)	1.9			1.5			9.3			9.2			7.5
		V/C	0			0			0.06			0.03			0.06
		95th% Queue (m)	0.1			0			1.4			0.8			-

#95th Percentile Volume Exceeds capacity, queue may be longer. Queue shown is maximum after two cycles

Project No.: 668.057

CLIENT: ARBUTUS PROPERTIES

Solair Development Traffic Impact Assessment

Highway No. 16 & Zimmerman Road

The intersection of Highway No. 16 & Zimmerman Road operates within acceptable conditions at the existing traffic conditions during the AM peak but experiences movements with failing LOS during the PM peak. The overall intersection operates at LOS C during both the AM and PM peak hours. Westbound through movements operate at LOS E at current traffic volumes. Delays in this movement surpass a minute during the PM peak and exceed capacity.

Zimmerman Road & Market Drive

The intersection of Zimmerman Road & Market Drive operates within acceptable conditions at the existing traffic conditions during both AM and PM peaks. The overall intersection operates at LOS B and all individual movements operate at LOS C or better during both peak periods. Queuing and capacity is not a concern based on existing conditions.

Zimmerman Road & Meadows Parkway

The intersection of Zimmerman Road & Meadows Parkway operates within acceptable conditions at the existing traffic conditions during both AM and PM peaks. The overall intersection operates at LOS B during the AM peak and LOS C during PM peak. All individual movements operate at LOS C or better during both peak periods. Queuing and capacity are not a concern based on existing conditions.

Zimmerman Road & 8th Street East

The intersection of Zimmerman Road & 8th Street East operates within acceptable conditions at the existing traffic conditions during both AM and PM peaks. Little to no traffic uses this intersection during the peak hours of the day.

5.5 FUTURE BACKGROUND CONDITIONS – 2029, 2034, & 2039

The results for 2029, 2034, and 2039 future background traffic conditions analysis for AM and PM peak hours are summarized in **Table 7**, **Table 8**, and **Table 9**, respectively. Based on the assumption of full buildout of Rosewood by this timeframe, it was also assumed that the eastbound leg for the intersection of Market Drive & Zimmerman Road will be fully operational at this horizon.

Table 7 – 2029 Future Background Condition Analysis Results

AM Peak Hour		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	INT	
Zimmerman Road & Highway 16															
2029	Future Background	LOS	B	C	A	B	D	A	D	D	A	D	D	A	B
		Delay (s)	17.9	26.0	0.0	18.0	51.0	0.1	45.8	37.3	0.0	47.6	47.3	1.2	19.6
		V/C	0.47	0.29	0	0.02	0.65	0.08	0.04	0.03	0.00	0.36	0.35	0.5	0.65
		95th% Queue (m)	43	32.6	0	2.3	47	0.0	5.0	3.6	0.0	30.5	30.3	0	-
Zimmerman Road & Market Drive															
2029	Future Background	LOS	C	C	A	B	C	A	C	C	A	B	C	A	C
		Delay (s)	22.3	33.2	9.7	19.9	31.6	0.0	23.9	29.7	6.0	16.0	31.1	0.3	20.1
		V/C	0.3	0.19	0.68	0.1	0.08	0.00	0.49	0.34	0.47	0	0.44	0.09	0.68
		95th% Queue (m)	27.9	22.7	22.1	10.1	11.9	0.0	32.7	35.7	14.9	1.5	45.7	0	-
Zimmerman Road & Meadows Parkway															
2029	Future Background	LOS	B	C	A	B	C	A	C	C	A	B	C	A	B
		Delay (s)	13.3	26.9	6.5	13.7	24.8	0.0	20.8	27.1	0.0	17.5	27.0	0.0	19.7
		V/C	0.02	0.35	0.53	0.07	0.14	0.01	0.28	0.17	0.00	0.02	0.16	0.0	0.53
		95th% Queue (m)	3.7	30.2	15.1	6.9	14.2	0.0	16.3	15.5	0.0	2.5	14.5	0	-
Zimmerman Road & 8th Street East															
2029	Future Background	LOS	A			A			A			A			B
		Delay (s)	1.4			1			8.9			9			6.4
		V/C	0			0			0.01			0.02			0.02
		95th% Queue (m)	0			0			0.2			0.4			-
PM Peak Hour		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	INT	
Zimmerman Road & Highway 16															
2029	Future Background	LOS	F	C	A	B	F	A	E	D	A	E	E	A	E
		Delay (s)	123	29.2	0.0	18.3	84.3	0.3	56	44.8	0.0	56.0	56.1	2.8	59
		V/C	1.19	0.37	0	0.04	0.99	0.20	0.43	0.14	0.00	0.6	0.6	0.7	1.19
		95th% Queue (m)	#171.9	45.3	0	4	#81.7	0.0	27.3	11.8	0.0	47.3	48.1	0	-
Zimmerman Road & Market Drive															
2029	Future Background	LOS	B	D	B	B	D	A	F	D	A	D	D	A	F
		Delay (s)	16.5	45.9	12.3	17.7	40.8	7.5	690	48.1	9.3	43.7	50.8	1.0	122
		V/C	0.19	0.45	0.59	0.40	0.42	0.36	2.46	0.70	0.68	0.66	0.77	0.35	2.46
		95th% Queue (m)	20.4	48.4	24.8	39.8	50.7	14.0	#222.7	69.1	19.0	37.7	75.7	13.2	-
Zimmerman Road & Meadows Parkway															
2029	Future Background	LOS	B	C	A	C	C	A	E	C	A	B	C	A	C
		Delay (s)	13.5	33.5	7.3	27.6	30.9	0.3	64.3	26.9	4.7	17.7	27.1	0.1	32.2
		V/C	0.04	0.7	0.65	0.67	0.6	0.07	0.99	0.15	0.32	0.04	0.17	0.0	0.99
		95th% Queue (m)	4.2	61.1	16.8	32.6	51.4	0.0	#68.2	14.1	7.7	4.0	15.5	0	-
Zimmerman Road & 8th Street East															
2029	Future Background	LOS	A			A			A			A			B
		Delay (s)	1.8			1.3			9.4			9.2			7.5
		V/C	0			0			0.06			0.04			0.06
		95th% Queue (m)	0.1			0			1.5			0.9			-

Table 8 – 2034 Future Background Condition Analysis Results

AM Peak Hour		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	INT	
Zimmerman Road & Highway 16															
2034	Future Background	LOS	B	C	A	B	D	A	D	D	A	D	D	A	B
		Delay (s)	18.3	26.4	0.0	18.0	52.2	0.0	45.8	37.3	0.0	41.0	41.6	1.3	19.0
		V/C	0.5	0.3	0	0.02	0.69	0.00	0.04	0.03	0.00	0.02	0.06	0.53	0.69
		95th% Queue (m)	45.3	34.3	0	2.3	49.4	0.0	5.0	3.6	0.0	4.4	8.4	0	-
Zimmerman Road & Market Drive															
2034	Future Background	LOS	C	C	B	B	C	A	C	C	A	B	C	A	C
		Delay (s)	22.6	33.4	14.8	19.9	31.6	0.0	27.4	30.7	6.1	16.4	32.8	0.3	22.5
		V/C	0.32	0.2	0.74	0.1	0.08	0.01	0.58	0.41	0.49	0.02	0.53	0.1	0.74
		95th% Queue (m)	29.1	23.6	38.7	10.5	12.2	0.0	34.5	43.1	15.1	2.8	56	0	-
Zimmerman Road & Meadows Parkway															
2034	Future Background	LOS	B	C	A	B	C	A	C	C	A	B	C	A	C
		Delay (s)	13.4	27.2	6.5	13.8	24.8	0.0	21.2	28.0	0.0	17.6	27.8	0.1	20.4
		V/C	0.04	0.36	0.54	0.07	0.15	0.02	0.31	0.26	0.01	0.04	0.24	0.0	0.54
		95th% Queue (m)	4.8	31.6	15.4	7.1	14.7	0.0	17.1	21.6	0.0	3.4	20.3	0	-
Zimmerman Road & 8th Street East															
2034	Future Background	LOS	A			A			A			A			B
		Delay (s)	1.5			0.9			8.9			9.1			6.4
		V/C	0			0			0.01			0.02			0.02
		95th% Queue (m)	0			0			0.3			0.4			-
PM Peak Hour		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	INT	
Zimmerman Road & Highway 16															
2034	Future Background	LOS	F	C	A	B	F	A	E	D	A	E	E	A	E
		Delay (s)	153	29.5	0.0	18.4	95.9	0.3	56	45.2	0.0	57.6	57.4	3.3	71
		V/C	1.26	0.39	0	0.05	1.04	0.20	0.45	0.15	0.00	0.63	0.63	0.74	1.26
		95th% Queue (m)	#187.7	47.6	0	4.2	#88.1	0.0	28.2	1.4	0.0	49.4	49.6	0	-
Zimmerman Road & Market Drive															
2034	Future Background	LOS	B	D	B	B	D	A	F	E	A	E	E	A	F
		Delay (s)	16.6	46.6	16.3	18.0	41.3	7.5	1000	56.9	9.4	62.8	66.4	8.4	165
		V/C	0.2	0.48	0.64	0.43	0.44	0.37	3.15	0.86	0.70	0.82	0.94	0.36	3.15
		95th% Queue (m)	21.4	50.9	34.1	41.8	53.3	14.4	#254.2	#85.7	19.5	#45.5	#102.3	14.1	-
Zimmerman Road & Meadows Parkway															
2034	Future Background	LOS	B	C	B	C	C	A	F	C	A	B	C	A	D
		Delay (s)	13.7	34.6	12.8	31.8	31.5	0.4	95.3	27.7	5.4	17.8	28.0	0.2	39.7
		V/C	0.06	0.74	0.73	0.73	0.63	0.10	1.10	0.23	0.34	0.07	0.26	0.1	1.10
		95th% Queue (m)	5.4	64.5	36.7	#34.8	54	0.0	#78.7	19.7	9.2	5.4	22	0	-
Zimmerman Road & 8th Street East															
2034	Future Background	LOS	A			A			A			A			B
		Delay (s)	2			1.3			9.4			9.2			7.6
		V/C	0			0			0.07			0.04			0.07
		95th% Queue (m)	0.1			0			1.7			0.9			-

#95th Percentile Volume Exceeds capacity, queue may be longer. Queue shown is maximum after two cycles

Project No.: 668.057

CLIENT: ARBUTUS PROPERTIES

Solair Development Traffic Impact Assessment

Table 9 – 2039 Future Background Condition Analysis Results

AM Peak Hour		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	INT	
Zimmerman Road & Highway 16															
2039	Future Background	LOS	B	C	A	B	D	A	D	D	A	D	D	A	C
		Delay (s)	18.7	26.6	0.0	18.0	53.6	0.1	45.8	37.3	0.0	48.6	48.2	1.5	20.4
		V/C	0.53	0.31	0	0.02	0.72	0.09	0.04	0.03	0.00	0.39	0.38	0.55	0.72
		95th% Queue (m)	47.6	36	0	2.3	51.6	0.0	5.4	3.6	0.0	32.9	32.7	0	-
Zimmerman Road & Market Drive															
2039	Future Background	LOS	C	C	C	B	C	A	C	C	A	B	C	A	C
		Delay (s)	22.9	33.5	20.7	20.0	31.7	0.0	33.6	31.9	6.1	16.0	34.8	0.4	25.4
		V/C	0.33	0.21	0.8	0.1	0.09	0.00	0.68	0.49	0.50	0.01	0.63	0.1	0.68
		95th% Queue (m)	30.4	24.9	53	10.9	12.5	0.0	35.7	51.1	15.4	1.5	67	0	-
Zimmerman Road & Meadows Parkway															
2039	Future Background	LOS	B	C	A	B	C	A	C	C	A	B	C	A	C
		Delay (s)	13.6	28.2	6.2	14.2	25.1	0.1	20.5	29.0	0.1	17.7	28.7	0.1	22.3
		V/C	0.05	0.44	0.44	0.12	0.18	0.03	0.28	0.35	0.03	0.05	0.32	0.0	0.44
		95th% Queue (m)	5.8	37.9	13.9	9.8	17	0.0	14.8	28.0	0.0	4.0	26.1	0	-
Zimmerman Road & 8th Street East															
2039	Future Background	LOS	A		A		A		A		A		A		
		Delay (s)	1		0.9		9		9.1		6.4		-		
		V/C	0		0		0.01		0.02		0.02		0.02		
		95th% Queue (m)	0		0		0.3		0.5		-		-		
PM Peak Hour															
Zimmerman Road & Highway 16															
2039	Future Background	LOS	F	C	A	B	F	A	E	D	A	E	E	A	F
		Delay (s)	178	29.8	0.0	18.4	109.8	0.3	57	45.4	0.0	59.2	59.2	3.9	81
		V/C	1.32	0.41	0	0.05	1.09	0.21	0.48	0.16	0.00	0.66	0.66	0.77	1.32
		95th% Queue (m)	#201.6	50.1	0	4.2	#94.0	0.0	29.4	12.9	0.0	51.3	52.1	0	-
Zimmerman Road & Market Drive															
2039	Future Background	LOS	B	D	B	B	D	A	F	F	A	F	F	A	F
		Delay (s)	16.7	47.1	19.8	18.3	41.8	7.5	1069	82.8	9.6	88.6	109.4	8.3	184
		V/C	0.21	0.5	0.68	0.45	0.46	0.39	3.31	1.02	0.71	0.95	1.11	0.37	3.31
		95th% Queue (m)	22.2	52.5	40.8	44	55.7	14.6	#267.1	#116.2	19.4	#57.2	#132.2	14.3	-
Zimmerman Road & Meadows Parkway															
2039	Future Background	LOS	B	D	A	B	D	A	C	C	A	B	C	A	C
		Delay (s)	14.2	44.5	6.2	14.5	35.7	0.6	33.3	28.5	0.5	18.0	29.1	0.3	31.5
		V/C	0.11	0.89	0.39	0.12	0.76	0.14	0.73	0.31	0.12	0.10	0.35	0.07	0.89
		95th% Queue (m)	6.9	#86.6	13	7.1	67	0.0	35.3	25.2	0.0	6.7	28.3	0	-
Zimmerman Road & 8th Street East															
2039	Future Background	LOS	A		A		A		A		A		A		
		Delay (s)	1.9		1.2		9.5		9.3		7.6		-		
		V/C	0		0		0.08		0.04		0.08		0.08		
		95th% Queue (m)	0.1		0		1.9		1		-		-		

Project No.: 668.057

CLIENT: ARBUTUS PROPERTIES

Solair Development Traffic Impact Assessment

Highway No. 16 & Zimmerman Road

2029

At 2029 future background traffic conditions with the existing intersection configuration and timing plan, the intersection of Highway No. 16 & Zimmerman Road is expected to remain at acceptable conditions during the AM peak but experience movements further failing LOS at additional movements during the PM peak. The overall intersection is anticipated to deteriorate from LOS C to LOS E in the PM peak, when compared to existing conditions. Eastbound left, northbound left, and southbound left and through movements are anticipated to worsen to failing LOS at this 2029 future background conditions, given the assumptions made. Westbound through movements are expected to worsen from LOS E to LOS F over this five-year future background projection. Queuing, capacity, and delays will be of concern for eastbound left turn and westbound through movements, while delays will be the prevalent concern for southbound left and through movements during the PM peak.

2034

At 2034 future background traffic conditions with the existing intersection configuration and timing plan, the intersection of Highway No. 16 & Zimmerman Road is expected to remain at acceptable conditions during the AM peak and continue to operate at failing LOS during the PM peak. The same concerns will be present at this horizon in comparison to the 2029 future background horizon.

2039

At 2039 future background traffic conditions with the existing intersection configuration and timing plan, the intersection of Highway No. 16 & Zimmerman Road is expected to remain at acceptable conditions during the AM peak and deteriorate further to LOS F during the peak PM period. The same concerns on a will be present at this horizon in comparison to the 2029 and 2034 future background horizon.

Zimmerman Road & Market Drive

2029

At 2029 future background traffic conditions with the anticipated intersection configuration and current timing plan, the intersection of Zimmerman Road & Market Drive is foreseen to operate within acceptable conditions during the AM peak but deteriorate to LOS F during the PM peak. All movements are anticipated to operate at LOS C or better during the AM peak. Eastbound through, westbound through, northbound through, and southbound through and left turn movements are near failing while northbound left turn movements are at failing LOS based on queueing, delay, and capacity concerns.

2034

At 2034 future background traffic conditions with the existing intersection configuration and timing plan, the intersection of Zimmerman Road & Meadows Parkway is expected to remain at acceptable conditions during the AM peak and continue to operate at failing LOS during the PM peak. The same concerns will be present at this horizon in comparison to the 2029 future background horizon. Northbound through, and southbound through and left turn movements are expected to operate at failing conditions (LOS D to LOS E) at this horizon.

Project No.: 668.057

CLIENT: ARBUTUS PROPERTIES

Solair Development Traffic Impact Assessment

2039

At 2039 future background traffic conditions with the existing intersection configuration and timing plan, the intersection of Zimmerman Road & Meadows Parkway is expected to remain at acceptable conditions during the AM peak and continue to operate at failing LOS during the PM peak. The same concerns will be present at this horizon in comparison to the 2029 and 2034 future background horizons. Northbound through, and southbound through and left turn movements are expected to worsen in failing conditions (LOS E to LOS F) at this horizon.

Zimmerman Road & Meadows Parkway

2029

At 2029 future background traffic conditions with the anticipated intersection configuration and current timing plan, the intersection of Zimmerman Road & Meadows Parkway is foreseen to operate within acceptable conditions. The intersection is anticipated to operate at LOS B and LOS C during the AM and PM peak periods. All movements are anticipated to operate at LOS C or better during the AM peak. The same is true for the PM peak with exception to northbound left movements that are expected to operate at LOS E. This movement will have long delays, capacity concerns, and a 95th percentile queue that exceeds capacity.

2034

At 2034 future background traffic conditions with the existing intersection configuration and timing plan, the intersection of Zimmerman Road & Meadows Parkway is expected to remain at acceptable conditions during the AM peak and will further deteriorate during the PM peak (LOS C to LOS D). The same concerns will be present at this horizon in comparison to the 2029 future background horizon. Northbound left turn movements are expected to worsen in failing conditions (LOS E to LOS F) at this horizon.

2039

At 2039 future background traffic conditions with the existing intersection configuration and timing plan, the intersection of Zimmerman Road & Meadows Parkway is expected to remain at acceptable conditions during the AM peak and remain at failing LOS at the 2039 horizon. The same concerns on a will be present at this horizon in comparison to the 2029 and 2034 future background horizon.

Zimmerman Road & 8th Street East

2029, 2034, & 2039

The intersection of Zimmerman Road & 8th Street East is expected to operate at acceptable conditions at all three of the future background traffic horizons. LOS A for all movements and the intersection is foreseen to be the condition of this intersection.

5.6 TOTAL TRAFFIC CONDITIONS – 2029, 2034, & 2039

A total of 7 new intersections were added to the traffic model to analyze the future horizon trips at full build-out condition of the proposed subdivision. The results of traffic analysis for 2029, 2034, and 2039 total traffic condition (background plus site-generated traffic) at the study intersections are illustrated in **Table 10**, **Table 11**, and **Table 12**.

Table 10 – 2029 Total Traffic Condition Analysis Results

AM Peak Hour		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	INT	
Zimmerman Road & Highway 16															
2029	Total	LOS	B	C	A	B	D	A	D	D	A	D	D	A	B
		Delay (s)	18.6	26.0	0.0	18.0	51.0	0.1	45.8	37.3	0.0	49.3	49.4	1.9	19.1
		V/C	0.52	0.29	0	0.02	0.65	0.09	0.04	0.03	0.00	0.42	0.42	0.62	0.65
		95th% Queue (m)	47.7	32.6	0	2.6	47	0.0	5.0	3.6	0.0	34.8	35.2	0	-
Zimmerman Road & Market Drive															
2029	Total	LOS	C	C	B	C	C	A	C	C	A	B	C	A	C
		Delay (s)	22.3	33.2	18.2	20.9	31.6	0.0	26.6	30.2	6.1	16.4	33.1	0.3	23.0
		V/C	0.3	0.19	0.76	0.3	0.23	0.01	0.56	0.38	0.50	0.02	0.55	0.09	0.76
		95th% Queue (m)	27.9	22.7	46.2	17.9	11.9	0.0	32.7	39.3	15.4	2.8	57.8	0	-
Zimmerman Road & Meadows Parkway															
2029	Total	LOS	B	C	A	B	C	A	B	C	A	B	C	A	B
		Delay (s)	16.8	26.9	6.1	17.8	28.1	0.0	17.1	23.5	0.0	15.8	27.5	0.5	19.0
		V/C	0.07	0.32	0.51	0.10	0.16	0.01	0.24	0.16	0.01	0.02	0.26	0.1	0.51
		95th% Queue (m)	8.1	30.9	14.9	8	15.4	0.0	15.4	17.5	0.0	2.3	24.8	0	-
Zimmerman Road & 8th Street East															
2029	Total	LOS	A		A		A		A		A		A		
		Delay (s)	1.6		3.1		9.2		9.1		6.8				
		V/C	0		0		0.07		0.03		0.07				
		95th% Queue (m)	0.1		0.1		1.6		0.6		-				
Zimmerman Road & Taylor Street East															
2029	Total	LOS	-		A		A		A		A		A		
		Delay (s)	-		9.6		0		4		7.1				
		V/C	-		0.19		0.04		0.01		0.19				
		95th% Queue (m)	-		5.2		0		0.2		-				
Future North Access & Taylor Street East															
2029	Total	LOS	A		A		A		-		A		A		
		Delay (s)	0		3.7		10		-		7.3				
		V/C	0.05		0		0.24		-		0.24				
		95th% Queue (m)	0		0.1		7		-		-				
Road 394 & Proposed N-S Road															
2029	Total	LOS	A		A		-		A		A		A		
		Delay (s)	6.1		0		-		8.7		7.4				
		V/C	0.02		0.01		-		0.09		0.09				
		95th% Queue (m)	0.4		0		-		2.4		-				
Proposed N-S Road & East Access - North															
2029	Total	LOS	A		-		A		A		A		A		
		Delay (s)	8.7		-		6.1		0		5.8				
		V/C	0.09		-		0.02		0.01		0.09				
		95th% Queue (m)	2.4		-		0.4		0		-				
Proposed N-S Road & East Access - Central															
2029	Total	LOS	A		-		A		A		A		A		
		Delay (s)	0		-		0		0		0.0				
		V/C	0		-		0		0.01		0.01				
		95th% Queue (m)	0		-		0		0		-				
Proposed N-S Road & East Access - South															
2029	Total	LOS	A		-		A		A		A		A		
		Delay (s)	0		-		0		0		0.0				
		V/C	0		-		0		0.01		0.01				
		95th% Queue (m)	0		-		0		0		-				

Project No.: 668.057

CLIENT: ARBUTUS PROPERTIES

Solair Development Traffic Impact Assessment

PM Peak Hour			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	INT
Zimmerman Road & Highway 16															
2029	Total	LOS	F	C	A	B	F	A	E	D	A	D	D	B	F
		Delay (s)	269.5	29.5	0.0	18.4	95.9	0.4	56.3	41.3	0.0	50.7	50.5	15.5	114.6
		V/C	1.53	0.39	0	0.05	1.04	0.24	0.45	0.17	0.00	0.7	0.7	0.85	1.53
		95th% Queue (m)	#250.1	47.6	0	4.2	#88.1	0.0	28.2	13.1	0.0	m41.1	m41.6	213	-
Zimmerman Road & Market Drive															
2029	Total	LOS	C	D	B	D	D	A	B	C	B	C	D	A	C
		Delay (s)	29.0	45.1	17.4	50.2	43.3	8.1	18.0	21.1	19.0	26.5	43.1	5.9	28.8
		V/C	0.34	0.48	0.65	0.9	0.49	0.40	0.88	0.68	0.76	0.58	0.79	0.29	0.89
		95th% Queue (m)	28	49.1	35.3	#69.9	53.1	14.6	m5.6	m63.3	m66.7	28.5	96.2	11.9	-
Zimmerman Road & Meadows Parkway															
2029	Total	LOS	C	D	B	D	D	A	C	C	A	B	D	A	C
		Delay (s)	54.5	47.0	18.1	44.0	36.0	0.4	29.0	26.2	5.2	18.9	37.4	0.8	30.6
		V/C	0.43	0.83	0.78	0.80	0.62	0.10	0.79	0.32	0.27	0.1	0.45	0.2	0.83
		95th% Queue (m)	25	77.8	48.9	#50.8	62.4	0.0	59.0	36.2	11.4	5.5	38.7	0	-
Zimmerman Road & 8th Street East															
2029	Total	LOS	A			A			B			A			A
		Delay (s)	0.6			2.3			10			9.8			6.9
		V/C	0			0			0.14			0.08			0.14
		95th% Queue (m)	0.1			0.1			3.5			2			-
Zimmerman Road & Taylor Street East															
2029	Total	LOS	-			B			A			A			A
		Delay (s)	-			12.6			0			5.7			5.1
		V/C	-			0.29			0.2			0.06			0.29
		95th% Queue (m)	-			9.2			0			1.5			-
Future North Access & Taylor Street East															
2029	Total	LOS	A			A			B			-			A
		Delay (s)	0			4.1			11.4			-			4.4
		V/C	0.21			0			0.29			-			0.29
		95th% Queue (m)	0			0.1			9.1			-			-
Road 394 & Proposed N-S Road															
2029	Total	LOS	A			A			-			A			A
		Delay (s)	7.2			0			-			8.9			7.5
		V/C	0.09			0.01			-			0.1			0.10
		95th% Queue (m)	2.4			0			-			2.5			-
Proposed N-S Road & East Access - North															
2029	Total	LOS	A			-			A			A			A
		Delay (s)	8.7			-			6.9			0			7.1
		V/C	0.06			-			0.05			0.01			0.06
		95th% Queue (m)	1.4			-			1.3			0			-
Proposed N-S Road & East Access - Central															
2029	Total	LOS	A			-			A			A			A
		Delay (s)	9			-			3.3			0			0.0
		V/C	0.05			-			0.04			0.04			0.05
		95th% Queue (m)	1.2			-			1			0			-
Proposed N-S Road & East Access - South															
2029	Total	LOS	A			-			A			A			A
		Delay (s)	0			-			0			0			0.0
		V/C	0			-			0			0			0.00
		95th% Queue (m)	0			-			0			0			-

Table 11 – 2034 Total Traffic Condition Analysis Results

AM Peak Hour		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	INT	
Zimmerman Road & Highway 16															
2034	Total	LOS	B	C	A	B	D	A	D	C	A	D	D	A	B
		Delay (s)	19.5	26.4	0.0	18.0	52.2	0.0	45.8	33.9	0.0	43.3	43.3	3.0	18.4
		V/C	0.58	0.3	0	0.02	0.69	0.01	0.04	0.07	0.00	0.15	0.15	0.72	0.72
		95th% Queue (m)	53.6	34.3	0	2.3	49.4	0.0	5.0	6.4	0.0	15.8	16.1	0.0	-
Zimmerman Road & Market Drive															
2034	Total	LOS	C	C	C	C	C	A	C	C	A	B	D	A	C
		Delay (s)	21.2	27.3	33.5	24.4	28.3	0.0	22.6	28.9	5.6	17.6	35.4	0.3	26.3
		V/C	0.31	0.15	0.83	0.3	0.07	0.01	0.45	0.43	0.51	0.02	0.69	0.09	0.81
		95th% Queue (m)	28.1	21.3	#93.9	22.6	11.5	0.0	16.9	47.3	15.2	2.9	76.2	0	-
Zimmerman Road & Meadows Parkway															
2034	Total	LOS	B	C	A	B	C	A	B	C	A	B	C	A	B
		Delay (s)	18.0	28.0	6.4	18.3	28.2	0.1	16.7	23.6	0.0	15.3	28.4	2.3	20.6
		V/C	0.13	0.35	0.53	0.10	0.17	0.02	0.27	0.24	0.01	0.04	0.4	0.2	0.53
		95th% Queue (m)	11.8	32.8	15.5	8.2	16	0.0	15.7	25.0	0.0	3.1	37.2	2.8	-
Zimmerman Road & 8th Street East															
2034	Total	LOS	A		A		A		A		A		A		
		Delay (s)	1.5		2.4		9.5		9.3		7.3				
		V/C	0		0		0.1		0.04		0.10				
		95th% Queue (m)	0.1		0.1		2.6		0.9		-				
Zimmerman Road & Taylor Street East															
2034	Total	LOS	-		B		A		A		A		A		
		Delay (s)	-		10.7		0		4.8		8.1				
		V/C	-		0.33		0.06		0.02		0.33				
		95th% Queue (m)	-		11.1		0		0.4		-				
Future North Access & Taylor Street East															
2034	Total	LOS	A		A		B		-		-		A		
		Delay (s)	0		3.8		11.6		-		8.5				
		V/C	0.07		0		0.4		-		0.40				
		95th% Queue (m)	0		0.1		15		-		-				
Road 394 & Proposed N-S Road															
2034	Total	LOS	A		A		-		A		A		A		
		Delay (s)	6.6		0		-		9		8.1				
		V/C	0.03		0.01		-		0.15		0.15				
		95th% Queue (m)	0.7		0		-		4.1		-				
Proposed N-S Road & East Access - North															
2034	Total	LOS	A		-		A		A		A		A		
		Delay (s)	8.7		-		6.1		0		7.4				
		V/C	0.09		-		0.02		0.01		0.09				
		95th% Queue (m)	2.4		-		0.4		0		-				
Proposed N-S Road & East Access - Central															
2034	Total	LOS	A		-		A		A		A		A		
		Delay (s)	9.1		-		3		0		3.5				
		V/C	0.07		-		0.01		0.06		0.07				
		95th% Queue (m)	1.8		-		0.3		0		-				
Proposed N-S Road & East Access - South															
2034	Total	LOS	A		-		A		A		A		A		
		Delay (s)	0		-		0		0		0.0				
		V/C	0		-		0		0.09		0.09				
		95th% Queue (m)	0		-		0		0		-				

Project No.: 668.057

CLIENT: ARBUTUS PROPERTIES

Solair Development Traffic Impact Assessment

PM Peak Hour		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	INT	
Zimmerman Road & Highway 16															
2034	Total	LOS	F	C	A	B	F	A	E	D	A	E	E	A	F
		Delay (s)	269.4	29.5	0.0	18.4	95.9	0.3	56.3	45.2	0.0	59.7	59.5	6.8	113.7
		V/C	1.53	0.39	0	0.05	1.04	0.22	0.45	0.15	0.00	0.66	0.66	0.85	1.53
		95th% Queue (m)	#250.1	47.6	0	4.2	#88.1	0.0	28.2	12.4	0.0	52.1	52.3	0	-
Zimmerman Road & Market Drive															
2034	Total	LOS	C	D	B	D	D	A	C	C	B	C	D	A	C
		Delay (s)	29.0	45.1	17.7	40.2	43.3	8.1	24.3	23.8	12.4	21.4	46.9	5.9	29.0
		V/C	0.34	0.48	0.65	0.8	0.49	0.40	0.93	0.76	0.62	0.66	0.86	0.29	0.93
		95th% Queue (m)	28	49.1	35.8	56.5	53.1	14.6	m9.4	m70.8	m48.1	28.5	105.2	11.9	-
Zimmerman Road & Meadows Parkway															
2034	Total	LOS	C	D	C	D	D	A	C	C	A	B	D	A	C
		Delay (s)	30.9	47.0	21.1	44.0	36.0	0.4	32.4	27.4	5.2	18.9	39.0	1.2	31.8
		V/C	0.6	0.83	0.81	0.80	0.62	0.10	0.84	0.40	0.27	0.11	0.54	0.3	0.84
		95th% Queue (m)	33.7	77.8	55.8	#50.8	62.4	0.0	59.0	45.5	11.4	5.5	45.7	0	-
Zimmerman Road & 8th Street East															
2034	Total	LOS	A		A		A		A		A		A		
		Delay (s)	0.6		1.3		9.7		9.5		6.5		0.11		
		V/C	0		0		0.11		0.05		0.11		0.05		
		95th% Queue (m)	0.1		0		2.8		1.2		1.2		-		
Zimmerman Road & Taylor Street East															
2034	Total	LOS	-		B		A		A		A		A		
		Delay (s)	-		14.6		0		5.2		5.5		0.43		
		V/C	-		0.43		0.28		0.05		0.05		0.43		
		95th% Queue (m)	-		16.6		0		1.1		1.1		-		
Future North Access & Taylor Street East															
2034	Total	LOS	A		A		B		-		-		A		
		Delay (s)	0		4.2		12.9		-		4.9		0.39		
		V/C	0.28		0		0.39		-		-		0.39		
		95th% Queue (m)	0		0		14		-		-		-		
Road 394 & Proposed N-S Road															
2034	Total	LOS	A		A		-		A		A		A		
		Delay (s)	7.3		0		-		8.4		7.7		0.02		
		V/C	0.02		0		-		0.02		0.02		0.02		
		95th% Queue (m)	0.4		0		-		0.4		0.4		-		
Proposed N-S Road & East Access - North															
2034	Total	LOS	A		-		A		A		A		A		
		Delay (s)	8.4		-		5.8		0		5.7		0.01		
		V/C	0.01		-		0		0		0.01		0.01		
		95th% Queue (m)	0.2		-		0.1		0		0		-		
Proposed N-S Road & East Access - Central															
2034	Total	LOS	A		-		A		A		A		A		
		Delay (s)	8.4		-		5.4		0		0.01		0.01		
		V/C	0.01		-		0.01		0		0		0.01		
		95th% Queue (m)	0.3		-		0.3		0		0		-		
Proposed N-S Road & East Access - South															
2034	Total	LOS	A		-		A		A		A		A		
		Delay (s)	0		-		0		0		0.00		0.00		
		V/C	0		-		0		0		0		0.00		
		95th% Queue (m)	0		-		0		0		0		-		

#95th Percentile Volume Exceeds capacity, queue may be longer. Queue shown is maximum after two cycles

#95th Volume for 95th percentile is metered by upstream signal

Table 12 – 2039 Total Traffic Condition Analysis Results

AM Peak Hour		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	INT	
Zimmerman Road & Highway 16															
2039	Total	LOS	C	C	A	B	D	A	D	C	A	D	D	A	C
		Delay (s)	20.7	26.6	0.0	18.0	53.6	0.1	45.8	33.9	0.0	54.2	53.8	5.7	21.0
		V/C	0.65	0.31	0	0.02	0.72	0.10	0.04	0.07	0.00	0.56	0.55	0.83	0.83
		95th% Queue (m)	60.1	36	0	2.6	51.6	0.0	5.4	6.4	0.0	44.5	44.3	0	-
Zimmerman Road & Market Drive															
2039	Total	LOS	C	C	D	C	C	A	E	C	A	B	D	A	D
		Delay (s)	22.9	33.5	46.3	23.1	31.7	0.0	78.8	33.6	6.4	16.4	49.5	0.4	36.9
		V/C	0.33	0.21	0.94	0.4	0.09	0.01	0.96	0.58	0.57	0.02	0.91	0.1	0.96
		95th% Queue (m)	30.4	24.9	#99.1	29.9	12.5	0.0	#58.8	60.9	16.2	2.8	#108.9	0	-
Zimmerman Road & Meadows Parkway															
2039	Total	LOS	B	C	A	B	C	A	C	C	A	B	C	A	C
		Delay (s)	14.5	28.2	6.9	14.0	25.1	0.1	26.7	30.5	0.0	17.7	34.7	5.5	23.2
		V/C	0.15	0.44	0.61	0.09	0.18	0.03	0.56	0.46	0.01	0.05	0.66	0.34	0.66
		95th% Queue (m)	12.9	38.2	16.3	8.1	17.2	0.0	20.2	36.3	0.0	4.0	52.5	9.5	-
Zimmerman Road & 8th Street East															
2039	Total	LOS	A			A			A			A			A
		Delay (s)	1.1			2.4			9.8			9.3			7.5
		V/C	0			0			0.15			0.04			0.15
		95th% Queue (m)	0.1			0.1			3.9			0.9			-
Zimmerman Road & Taylor Street East															
2039	Total	LOS	-			B			A			A			A
		Delay (s)	-			12.8			0			4.9			9.7
		V/C	-			0.5			0.08			0.02			0.50
		95th% Queue (m)	-			21.9			0			0.4			-
Future North Access & Taylor Street East															
2039	Total	LOS	A			A			C			-			B
		Delay (s)	0			3.8			15.3			-			11.3
		V/C	0.11			0			0.61			-			0.61
		95th% Queue (m)	0			0.1			32.6			-			-
Road 394 & Proposed N-S Road															
2039	Total	LOS	A			A			-			A			A
		Delay (s)	6.8			0			-			9.3			8.4
		V/C	0.05			0.01			-			0.22			0.22
		95th% Queue (m)	1.1			0			-			6.4			-
Proposed N-S Road & East Access - North															
2039	Total	LOS	A			-			A			A			A
		Delay (s)	8.7			-			6.1			0			7.4
		V/C	0.09			-			0.02			0.01			0.09
		95th% Queue (m)	2.4			-			0.4			0			-
Proposed N-S Road & East Access - Central															
2039	Total	LOS	A			-			A			A			A
		Delay (s)	9.1			-			3			0			0.0
		V/C	0.07			-			0.01			0.06			0.07
		95th% Queue (m)	1.8			-			0.3			0			-
Proposed N-S Road & East Access - South															
2039	Total	LOS	A			-			A			A			A
		Delay (s)	9.5			-			2.5			0			0.0
		V/C	0.09			-			0.02			0.1			0.10
		95th% Queue (m)	2.2			-			0.4			0			-

Project No.: 668.057

CLIENT: ARBUTUS PROPERTIES

Solar Development Traffic Impact Assessment

		PM Peak Hour	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	INT
Zimmerman Road & Highway 16															
2039	Total	LOS	F	C	A	B	F	A	E	D	A	E	E	B	F
		Delay (s)	350.6	29.8	0.0	18.4	109.8	0.4	57.3	41.7	0.0	67.2	66.4	14.8	146.9
		V/C	1.71	0.41	0	0.05	1.09	0.26	0.48	0.18	0.00	0.76	0.75	0.94	1.71
		95th% Queue (m)	#292.4	50.1	0	4.2	#94.0	0.0	29.4	13.3	0.0	#65.0	#64.7	#0.9	-
Zimmerman Road & Market Drive															
2039	Total	LOS	C	D	B	D	D	A	F	E	C	D	E	A	F
		Delay (s)	22.1	37.5	18.2	43.6	38.8	7.6	869.4	72.7	30.7	52.5	64.5	4.8	137.2
		V/C	0.3	0.43	0.65	0.9	0.49	0.40	2.87	1.03	0.93	0.82	0.99	0.3	2.87
		95th% Queue (m)	24.9	45.1	39.6	#66.4	50.6	14.2	#229.7	#132.8	#108.2	#44.7	#126.0	9.6	-
Zimmerman Road & Meadows Parkway															
2039	Total	LOS	C	D	F	F	D	A	F	C	A	B	C	A	E
		Delay (s)	24.5	45.3	84.0	91.9	35.7	0.6	214.1	30.5	5.4	18.1	32.3	2.6	71.1
		V/C	0.61	0.9	1.09	1.05	0.76	0.14	1.39	0.46	0.34	0.10	0.56	0.26	1.58
		95th% Queue (m)	27.9	#87.9	#128.8	#70.9	67	0.0	#93.0	36.4	9.2	6.7	44.1	2.8	-
Zimmerman Road & 8th Street East															
2039	Total	LOS	A			A			B			B			A
		Delay (s)	0.4			2.2			10.4			10.1			6.7
		V/C	0			0			0.18			0.09			0.18
		95th% Queue (m)	0.1			0.1			4.8			2.2			-
Zimmerman Road & Taylor Street East															
2039	Total	LOS	-			C			A			A			A
		Delay (s)	-			18.5			0			6.7			7.4
		V/C	-			0.53			0.28			0.1			0.53
		95th% Queue (m)	-			24			0			2.6			-
Future North Access & Taylor Street East															
2039	Total	LOS	A			A			B			-			C
		Delay (s)	0			4.5			14.5			-			5.6
		V/C	0.31			0.01			0.47			-			0.47
		95th% Queue (m)	0			0.1			19.0			-			-
Road 394 & Proposed N-S Road															
2039	Total	LOS	A			A			-			A			A
		Delay (s)	7.4			0			-			9.1			7.8
		V/C	0.14			0.01			-			0.14			0.14
		95th% Queue (m)	3.6			0			-			3.8			-
Proposed N-S Road & East Access - North															
2039	Total	LOS	A			-			A			A			A
		Delay (s)	8.7			-			6.9			0			7.1
		V/C	0.06			-			0.05			0.01			0.06
		95th% Queue (m)	1.4			-			1.3			0			-
Proposed N-S Road & East Access - Central															
2039	Total	LOS	A			-			A			A			A
		Delay (s)	9			-			3.3			0			3.5
		V/C	0.05			-			0.04			0.04			0.05
		95th% Queue (m)	1.2			-			1			0			-
Proposed N-S Road & East Access - South															
2039	Total	LOS	A			-			A			A			A
		Delay (s)	9.3			-			2.7			0			2.8
		V/C	0.06			-			0.05			0.06			0.06
		95th% Queue (m)	1.4			-			1.1			0			-

#95th Percentile Volume Exceeds capacity, queue may be longer. Queue shown is maximum after two cycles

#95th Volume for 95th percentile is metered by upstream signal

Project No.: 668.057

CLIENT: ARBUTUS PROPERTIES

Solair Development Traffic Impact Assessment

Highway No. 16 & Zimmerman Road

2029

At 2029 total traffic conditions with the existing intersection configuration and timing plan, the intersection of Highway No. 16 & Zimmerman Road is expected to remain at acceptable conditions during the AM peak and remain at relatively the same LOS compared to the 2029 future background. No movements are pushed to failure as a result of the addition of the project trips to this intersection.

2034

At 2034 total traffic conditions with the existing intersection configuration and timing plan, the intersection of Highway No. 16 & Zimmerman Road is expected to remain at acceptable conditions during the AM peak and continue to operate at failing LOS during the PM peak. Eastbound left turn movements are expected to worsen yet remain at LOS F. The overall intersection is expected to worsen from LOS E to LOS F in 2034 with the addition of the project trips.

2039

At 2039 total traffic conditions with the existing intersection configuration and timing plan, the intersection of Highway No. 16 & Zimmerman Road is expected to remain at acceptable conditions during the AM peak and deteriorate further to LOS F during the peak PM period. No movements are pushed to failure or further into failure as a result of the addition of the project trips. Eastbound left turns are anticipated to worsen from LOS B to C in the AM peak, and southbound right turns are expected to deteriorate from LOS A to LOS B during the PM peak.

Zimmerman Road & Market Drive

2029

At 2029 total traffic conditions with the anticipated intersection configuration and current timing plan, the intersection of Zimmerman Road & Market Drive is foreseen to continue operating within acceptable conditions during the AM peak but deteriorate to LOS F during the PM peak. All movements are anticipated to continue operating at LOS C or better during the AM peak. No movements are expected to be pushed into failure or further into failure as a result of the project trips. Eastbound and westbound left turn movements are expected to worsen from LOS B to LOS C during the peak hour with addition of project trips.

2034

At 2034 total traffic conditions with the existing intersection configuration and timing plan, the intersection of Zimmerman Road & Market Drive is expected to remain at acceptable conditions during the AM peak and continue to operate at failing LOS during the PM peak. Southbound through movements are expected to deteriorate from LOS C to LOS D during the AM peak. Westbound left turn movements are foreseen to worsen from LOS B to LOS D during the PM peak.

2039

At 2039 total traffic conditions with the existing intersection configuration and timing plan, the intersection of Zimmerman Road & Market Drive is expected to remain at acceptable conditions during the AM peak and

Project No.: 668.057

CLIENT: ARBUTUS PROPERTIES

Solair Development Traffic Impact Assessment

continue to operate at failing LOS during the PM peak. Northbound left and southbound through movements are anticipated to deteriorate from LOS C to LOS E with addition of project trips in the AM peak period.

Zimmerman Road & Meadows Parkway

2029

At 2029 total traffic conditions with the anticipated intersection configuration and current timing plan, the intersection of Zimmerman Road & Meadows Parkway is foreseen to operate within acceptable conditions. LOS is not expected to be pushed to failure as a result of the project trips during both AM and PM peak periods.

2034

At 2034 total traffic conditions with the existing intersection configuration and timing plan, the intersection of Zimmerman Road & Meadows Parkway is expected to remain at acceptable conditions during the AM peak and will further deteriorate in the PM peak. No movements are expected to be pushed further into failing LOS.

2039

At 2039 total traffic conditions with the existing intersection configuration and timing plan, the intersection of Zimmerman Road & Meadows Parkway is expected to remain at acceptable conditions during the AM peak and remain at failing LOS at the 2039 horizon. The same concerns on will be present at this horizon in comparison to the 2029 and 2034 horizon but not as a result of the project trips.

Zimmerman Road & 8th Street East

2029, 2034, & 2039

The intersection of Zimmerman Road & 8th Street East is expected to operate at acceptable conditions at all three of the total traffic horizons. LOS A for all movements and the intersection is foreseen to be the condition of this intersection.

Zimmerman Road & Taylor Street East

2029, 2034, & 2039

The intersection of Zimmerman Road & Taylor Street East is expected to operate at acceptable conditions at all three of the total traffic horizons given the configuration of solely a westbound, northbound, and southbound leg at the intersection. At 2039 total traffic it's expected that the westbound movements will operate at LOS D.

Project No.: 668.057

CLIENT: ARBUTUS PROPERTIES

Solair Development Traffic Impact Assessment

Road 394 & Proposed North-South Road

2029, 2034, & 2039

The intersection of Road 394 & the proposed north-south road along the east boundary of the development is expected to operate at LOS A at all three total traffic horizons. Queueing and capacity are not a concern.

Site Accesses

2029, 2034, & 2039

All site accesses, both along the north side of the development and along the east boundary of the development is expected to operate at LOS A at all three total traffic horizons. Queueing and capacity are not a concern.

5.7 MITIGATION STRATEGY

Based on existing intersection geometrics outside of the Solair Concept Plan, an array of failing movements is present both at future background and at total traffic conditions, mitigating these failing movements are in the best interest of the development and surrounding City and RM infrastructure. The following recommendations align with previously completed studies and preliminary designs completed for the region:

At or before 2029:

- Removal of existing jersey barriers to allow for provision of an additional left turn lane for the northbound movement at the intersection of **Zimmerman Road & Market Drive (double left turn lane)**. It is important to note that future background conditions are the main cause of the reduced LOS. The additional trips generated by the Solair Development provide minimal change to the LOS result.

At or before 2039:

- Construction of previously proposed lane additions in northbound and southbound movements at the intersection of **Zimmerman Road & Market Drive** (3 lanes in each direction). It is important to note that future background conditions are the main cause of the reduced LOS. The additional trips generated by the Solair Development provide minimal change to the LOS result.

Construction of the previously proposed interchange at the intersection of **Highway 16 & Zimmerman Road** should be considered by the City. It is important to note that future background conditions are the driving cause of the reduced LOS. The additional trips generated by the Solair Development provides minimal change to the LOS results.

The following recommendation is being made to address the failing movements at Meadows Parkway & Zimmerman Road.

Project No.: 668.057

CLIENT: ARBUTUS PROPERTIES

Solair Development Traffic Impact Assessment

At or before 2039:

- Construction of an additional westbound left turn lane at the intersection of **Zimmerman Road & Meadows Parking** (double left turn). During our analysis of the previous background traffic projections, we determined that an additional left turn lane could be considered for the westbound turn at the intersection of Meadows Parkway and Zimmerman Road. This potential improvement is not driven by any additional traffic flows generated by the Solair development but instead a direct result of additional traffic flows generated by the City's Holmwood development considered in the analysis.

These mitigations options were modelled for the 2039 total traffic to determine their viability in improving LOS. Signal timing plans were also optimized during this exercise to increase LOS as necessary. These results are shown in **Table 12**.

Table 13 – 2039 Total Traffic Condition Analysis Results After Mitigation

			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	INT
AM Peak Hour			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	INT
Zimmerman Road & Highway 16															
2039	Mitigation	LOS	C	C	A	B	B	A	D	C	A	C	C	B	B
		Delay (s)	27.0	27.0	0.0	15.8	17.2	0.1	36.7	28.5	0.0	31.4	28.5	14.7	17.8
		V/C	0.39	0.39	0	0.02	0.25	0.10	0.04	0.07	0.00	0.45	0.04	0.83	0.83
		95th% Queue (m)	33.3	33.3	0	2.6	27.8	0.0	4.8	5.6	0.0	m29.2	m2.8	194	-
Zimmerman Road & Market Drive															
2039	Mitigation	LOS	B	C	D	C	C	A	C	C	A	B	C	A	C
		Delay (s)	19.5	25.7	41.6	24.8	26.7	0.0	23.3	27.4	0.4	17.2	33.4	0.4	26.4
		V/C	0.33	0.17	0.9	0.5	0.08	0.01	0.52	0.41	0.27	0.02	0.69	0.1	0.9
		95th% Queue (m)	26.7	20.9	#100.8	26.2	11.2	0.0	16.5	35.9	0.0	2.7	59.2	0	-
Zimmerman Road & Meadows Parkway															
2039	Mitigation	LOS	B	C	B	B	C	A	B	C	A	B	C	A	C
		Delay (s)	18.5	27.5	12.3	15.9	24.3	0.1	18.0	20.5	0.0	14.7	28.7	4.5	20.4
		V/C	0.2	0.46	0.68	0.07	0.19	0.03	0.44	0.00	0.01	0.08	0.58	0.31	0.68
		95th% Queue (m)	14.1	36.7	32	4.4	16.6	0.0	17.3	5.0	0.0	6.9	47.2	8.4	-
PM Peak Hour			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	INT
Zimmerman Road & Highway 16															
2039	Mitigation	LOS	C	C	A	B	C	A	D	C	A	D	C	B	C
		Delay (s)	33.7	33.7	0.0	19.2	22.3	0.4	44.8	34.9	0.0	37.9	32.1	15.0	20.4
		V/C	0.51	0.51	0	0.05	0.4	0.26	0.35	0.14	0.00	0.5	0.04	0.94	0.94
		95th% Queue (m)	50.8	50.8	0	5	48.8	0.0	26.1	12.0	0.0	40.4	6.7	#6.5	-
Zimmerman Road & Market Drive															
2039	Mitigation	LOS	C	D	B	D	D	A	D	C	A	C	D	A	C
		Delay (s)	28.3	45.7	15.4	54.9	42.0	6.2	42.6	26.1	1.1	20.1	42.1	2.8	30.8
		V/C	0.36	0.5	0.65	0.9	0.48	0.39	0.89	0.07	0.49	0.36	0.76	0.3	0.9
		95th% Queue (m)	28.5	51	32.7	#80.9	54.5	11.2	#65.3	9.3	0.0	30.7	79	3.6	-
Zimmerman Road & Meadows Parkway															
2039	Mitigation	LOS	D	D	C	C	D	A	D	C	A	C	D	A	C
		Delay (s)	36.9	41.8	22.7	31.4	40.9	0.5	35.0	31.5	5.6	24.6	50.8	3.0	33.8
		V/C	0.68	0.74	0.82	0.67	0.67	0.13	0.84	0.32	0.27	0.23	0.67	0.3	0.89
		95th% Queue (m)	39	102.1	84.7	26.5	87	0.0	69.3	42.7	12.2	15.7	63	1.7	-

In reviewing the mitigation condition analysis results, all of the signalized intersections were able to provide LOS that was acceptable at the intersection level of locale. All movements were better than LOS D.

Another approach to mitigate the impacts to the transportation system and potentially lessen the improvements required at the intersections of Zimmerman Road & Market Drive and Zimmerman Road & Meadows Parkway is through the construction of Taylor Street between Zimmerman Road to the west where the existing Taylor Street currently terminates. Again, it is important to note that the forecasted background is the governing factor for the warranted improvements which aligns with all previously completed studies for the region.

This option was not modelled in detail, however, if all other improvements were to be implemented the extension of this portion of Taylor Street would be recommended to be completed by or before 2039.

6 COLLISION REVIEW

Five-year historical collision data was requested from the Ministry along Highway in the vicinity of the study area. From the data provided, a total of eight (8) collisions were observed at Highway 16, four of which were at the Highway 16 and Zimmerman Drive Roadway, the other four were near this vicinity.

Three (3) collisions were injury collisions, and five (5) collisions were Property Damage Only (PDO) at Highway 16. A breakdown of the collisions including severity of the collisions as reported by authorities is illustrated in **Table 14**.

Table 14 – 5-year Collision Summary

Collision Date	Severity	Natural Light
At Intersection		
March 22, 2019	Injury	Daylight
June 13, 2019	Injury	Daylight
November 11, 2019	PDO	Dark
April 28, 2022	PDO	Daylight
Near Intersection		
October 10, 2019	PDO	Daylight
January 8, 2020	PDO	Dark
May 2, 2022	Injury	Daylight
May 23, 2022	PDO	Dark

As the accidents are sporadic in nature and area lighting is already provided at the Highway No. 16 intersection, no recommendations are being made from the collision review completed.

7 RAIL CROSSING REVIEW

Zimmerman Road has a Canadian Pacific (CP) rail line crossing immediately southeast of the proposed development area.

Road Exposure Index can be used to assess the merit of a grade separated road and rail crossing. Road Exposure index = Total number of train crossings per day x AADT in passenger car units.

In Canada, most municipalities use a minimum of cross-product of 200,000 to determine whether grade separation should be considered. The Government of Canada's grade crossing inventory was used to review the number of trains at this crossing per day, however, this database indicated that this specific crossing has 0 trains through it per day.

Based on the assumption that peak hour typically accounts for 10% of the daily trip traffic, and the estimated volumes within **Figure 18**, the 2039 potential AADT at this crossing could be 12,800 vehicles per day. Given the 200,000 cross product warrant mentioned prior, this crossing would need to experience 15 trains per day with the 12,800 projected vehicles per day in order to qualify for being considered as a grade separated crossing. It is likely this warrant was met as the Holmwood Sector Plan prepared by the City of Saskatoon calls for a grade separated crossing at this location.

8 CONCLUSION AND RECOMMENDATIONS

The purpose of the Traffic Impact Assessment was to ensure that the existing and proposed study intersections would operate at a satisfactory Level of Service for existing and future traffic conditions at the three staged horizons of the project which aligns closely to that of all previous transportation studies completed in the area.

The following roadways and intersection geometry were analyzed and is recommended to service traffic efficiently and safely within the study area:

- At the onset of construction for Stage 1 of the Solair Development, it is recommended that there is an upgrade to Zimmerman Road between Meadows Parkway and the Taylor Street East Extension to the City of Saskatoon's two lane arterial initial staging cross section. This will include an allocation for expansion to a divided 6 lane cross section.
- At the onset of construction of Stage 1 of the Solair Development, it is recommended that Taylor Street East within the extents of Solair is constructed to the City of Saskatoon's two lane arterial initial staging cross section. This will include an allocation for expansion to a divided four lane roadway in the future.
- At the onset of construction of Stage 1 of the Solair Development, it is recommended that the north-south collector roadway on the east side of Solair between Taylor Street East and Patience Lake Road be constructed to a two-lane undivided cross section.
- Stop control all intersections surrounding the development with the following roadways operating as free flow:

Project No.: 668.057

CLIENT: ARBUTUS PROPERTIES

Solair Development Traffic Impact Assessment

- Zimmerman Road (Intersection of Taylor Street East & Zimmerman Road)
- Taylor Street East (Intersections of Taylor Street East and Solair Collector Roadways)
- North-South Road (Intersection of North-South Road and Solair Collector Roadways)
- Patience Lake Road (Intersection of North-South Road and Patience Lake Road)

The timing of previously proposed improvements recommended for the region should be reviewed by the respective municipalities. Background traffic generated (not including Solair) at the various design horizons warrants the previously proposed improvements:

At or before 2029:

- Removal of existing jersey barriers to allow for provision of an additional left turn lane for the northbound movement at the intersection of **Zimmerman Road & Market Drive (double left turn lane)**. It is important to note that future background conditions are the main cause of the reduced LOS.

At or before 2039:

- Construction of previously proposed lane additions in northbound and southbound movements at the intersection of **Zimmerman Road & Market Drive** (3 lanes in each direction). It is important to note that future background conditions are the main cause of the reduced LOS.
- Review and possible construction of the previously proposed Taylor Street East extension between current terminus and Zimmerman Road.

Background traffic generated (not including Solair) at the various design horizons warrants additional improvements. It is recommended that surrounding municipalities coordinate following improvement and timing with the Solair Development:

At or before 2039:

- City's consideration for construction of the previously proposed interchange at the intersection of **Highway 16 & Zimmerman Road**. It is important to note that future background conditions are the driving cause of the reduced LOS.
- City's consideration for construction of an additional westbound left turn lane at the intersection of **Zimmerman Road & Meadows Parking** (double left turn). It is important to note that future background conditions are the cause for the reduced LOS. The additional trips generation by the Solair Development does not provide any additional traffic in the recommended improvement movement.

Project No.: 668.057

CLIENT: ARBUTUS PROPERTIES

Solair Development Traffic Impact Assessment

9 CLOSURE

We trust that we have provided sufficient information in this report in determining the impacts that may become apparent with the proposed development. We would be pleased to discuss any aspect of this report and invite all reasonable comments from the interested parties.

Yours truly,

A handwritten signature in black ink, appearing to read 'B. Williams', written over a circular stamp or mark.

Brandon Williams, P.Eng.
Project Engineer

Project No.: 668.057

CLIENT: ARBUTUS PROPERTIES

Solair Development Traffic Impact Assessment

10 REFERENCES

City of Saskatoon. (2021). *Saskatoon Transportation Master Plan*.

City of Saskatoon. (2012). *Holmwood Sector Plan*.

Lateral Office. (2024). *Solair Development Application Report*.

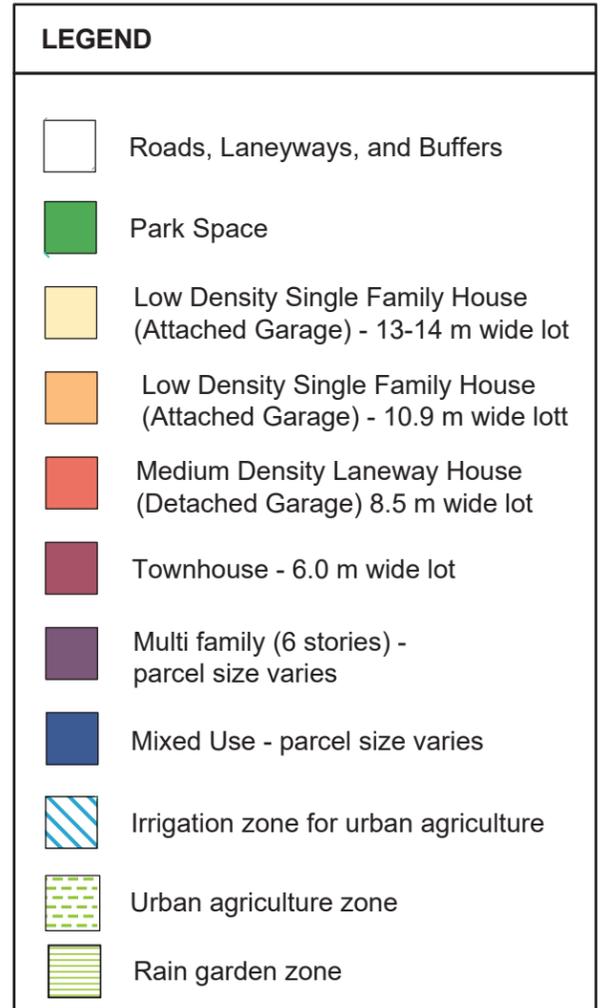
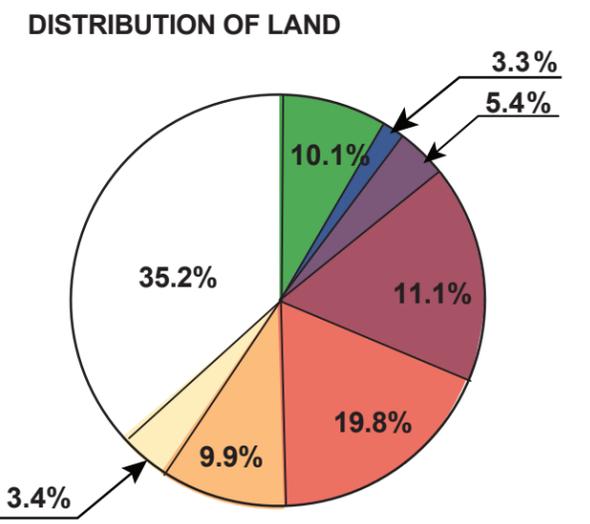
Stantec Consulting Ltd. (2014). *Amendment to Rosewood Concept Plan: Traffic Impact Study*.

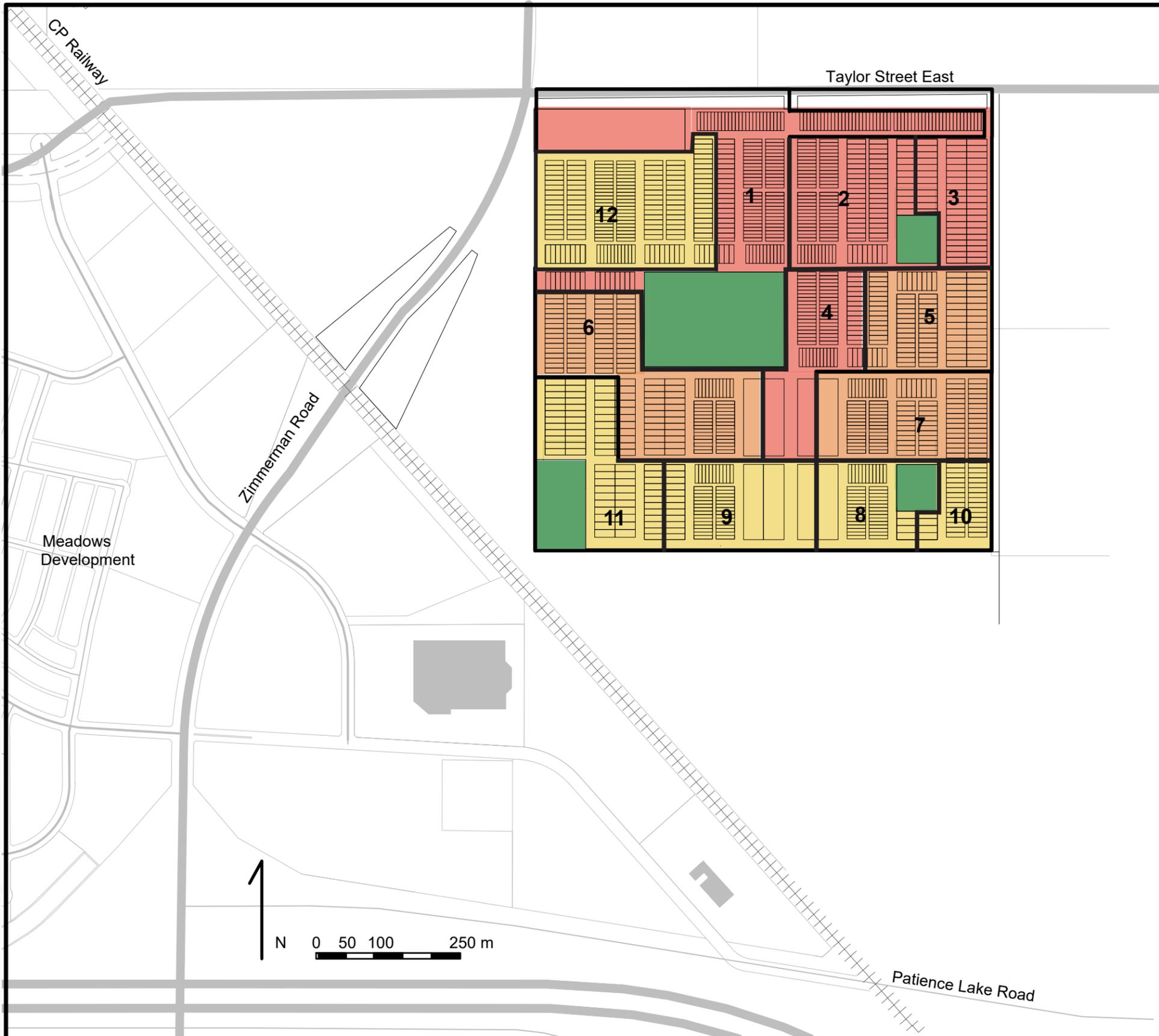
Project No. 668.057

Arbutus Properties

Solair Development Traffic Impact Assessment

Appendix A CONCEPT PLAN OF PROPOSED DEVELOPMENT





LEGEND	
■	Development Phase 1-4
■	Development Phase 5-7
■	Development Phase 8-12

Project No. 668.057

Arbutus Properties

Solair Development Traffic Impact Assessment

Appendix B PROPOSED ZIMMERMAN ROAD & HIGHWAY 16
INTERCHANGE CONFIGURATION

Project No. 668.057

Arbutus Properties

Solair Development Traffic Impact Assessment

Appendix C TRAFFIC COUNTS

Catterall & Wright
1221 - 8th Street East

Saskatoon, Saskatchewan, Canada S7H 0S5
306.343.7280 n.hyder@cwce.ca

Count Name: 8th St E & Zimmerman Rd - TMC -
Data Collection
Site Code: 668.057
Start Date: 11/07/2023
Page No: 1

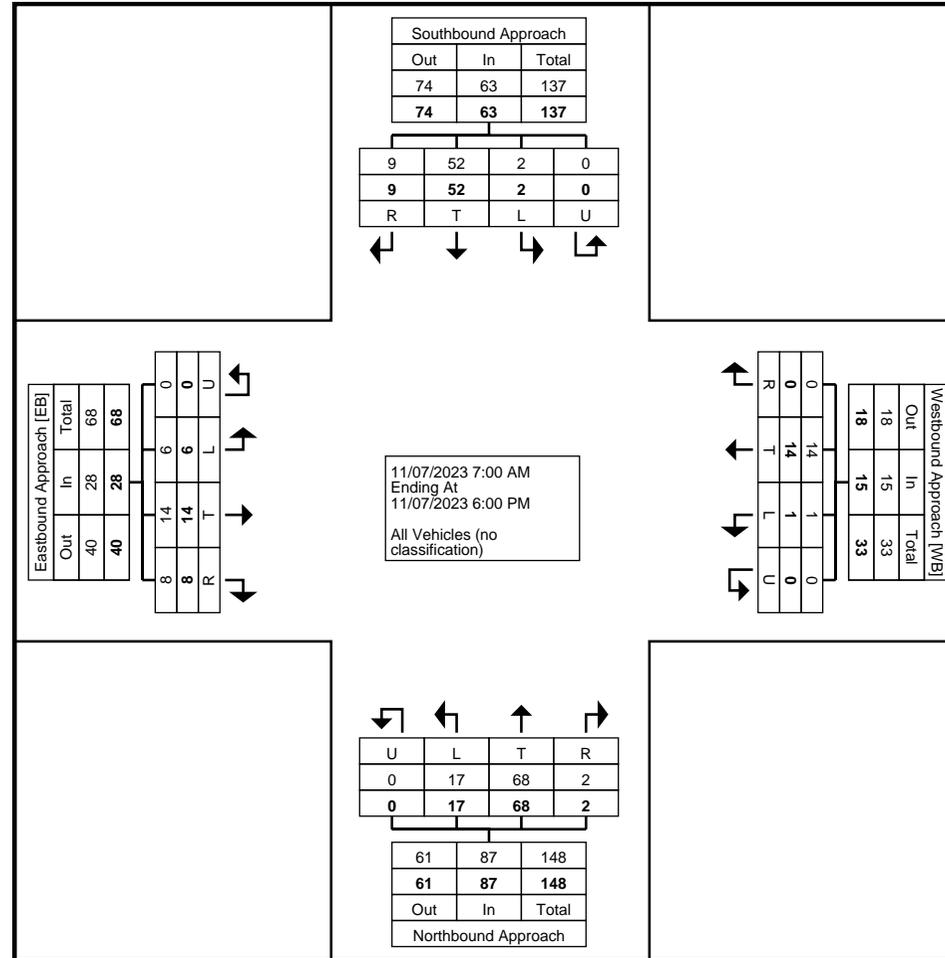
Turning Movement Data

Start Time	Southbound Approach Southbound					Westbound Approach Westbound					Northbound Approach Northbound					Eastbound Approach Eastbound					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0
7:30 AM	0	2	2	0	4	0	1	0	0	1	0	4	0	0	4	0	1	0	0	1	10
7:45 AM	1	1	0	0	2	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	3
Hourly Total	1	3	2	0	6	0	1	0	0	1	0	6	0	0	6	0	1	0	0	1	14
8:00 AM	0	3	0	0	3	0	1	1	0	2	0	0	0	0	0	0	0	0	0	0	5
8:15 AM	0	3	0	0	3	0	1	0	0	1	0	0	0	0	0	0	1	1	0	2	6
8:30 AM	0	3	0	0	3	0	2	0	0	2	0	1	0	0	1	0	2	0	0	2	8
8:45 AM	0	2	0	0	2	0	1	0	0	1	1	1	0	0	2	0	0	0	0	0	5
Hourly Total	0	11	0	0	11	0	5	1	0	6	1	2	0	0	3	0	3	1	0	4	24
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4:00 PM	0	4	0	0	4	0	2	0	0	2	0	9	3	0	12	2	0	0	0	2	20
4:15 PM	2	7	0	0	9	0	3	0	0	3	0	8	3	0	11	2	2	0	0	4	27
4:30 PM	0	2	0	0	2	0	0	0	0	0	0	6	2	0	8	0	1	3	0	4	14
4:45 PM	1	7	0	0	8	0	0	0	0	0	0	7	3	0	10	1	1	0	0	2	20
Hourly Total	3	20	0	0	23	0	5	0	0	5	0	30	11	0	41	5	4	3	0	12	81
5:00 PM	1	6	0	0	7	0	1	0	0	1	0	3	0	0	3	0	2	0	0	2	13
5:15 PM	1	5	0	0	6	0	1	0	0	1	0	7	0	0	7	2	1	1	0	4	18
5:30 PM	2	4	0	0	6	0	1	0	0	1	1	11	3	0	15	1	2	1	0	4	26
5:45 PM	1	3	0	0	4	0	0	0	0	0	0	9	3	0	12	0	1	0	0	1	17
Hourly Total	5	18	0	0	23	0	3	0	0	3	1	30	6	0	37	3	6	2	0	11	74
Grand Total	9	52	2	0	63	0	14	1	0	15	2	68	17	0	87	8	14	6	0	28	193
Approach %	14.3	82.5	3.2	0.0	-	0.0	93.3	6.7	0.0	-	2.3	78.2	19.5	0.0	-	28.6	50.0	21.4	0.0	-	-
Total %	4.7	26.9	1.0	0.0	32.6	0.0	7.3	0.5	0.0	7.8	1.0	35.2	8.8	0.0	45.1	4.1	7.3	3.1	0.0	14.5	-
All Vehicles (no classification)	9	52	2	0	63	0	14	1	0	15	2	68	17	0	87	8	14	6	0	28	193
% All Vehicles (no classification)	100.0	100.0	100.0	-	100.0	-	100.0	100.0	-	100.0	100.0	100.0	100.0	-	100.0	100.0	100.0	100.0	-	100.0	100.0

Catterall & Wright
1221 - 8th Street East

Saskatoon, Saskatchewan, Canada S7H 0S5
306.343.7280 n.hyder@cwce.ca

Count Name: 8th St E & Zimmerman Rd - TMC -
Data Collection
Site Code: 668.057
Start Date: 11/07/2023
Page No: 2



Turning Movement Data Plot

Catterall & Wright
1221 - 8th Street East

Saskatoon, Saskatchewan, Canada S7H 0S5
306.343.7280 n.hyder@cwce.ca

Count Name: 8th St E & Zimmerman Rd - TMC -
Data Collection
Site Code: 668.057
Start Date: 11/07/2023
Page No: 3

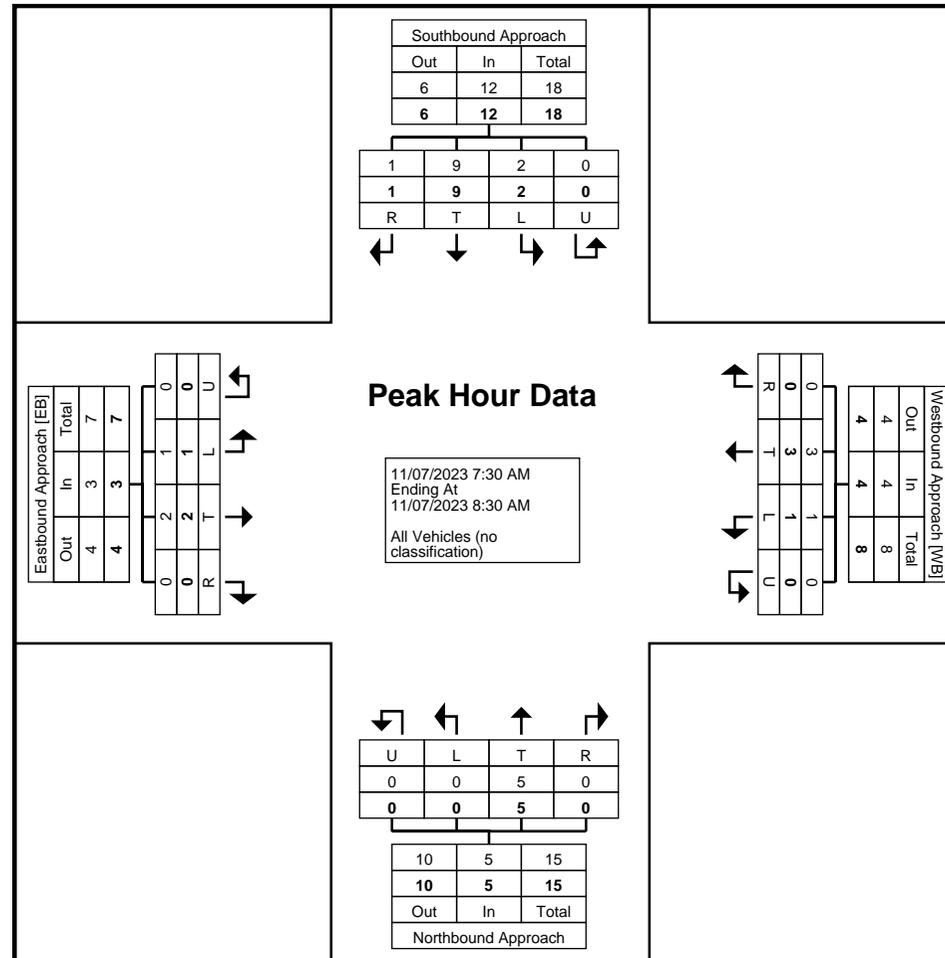
Turning Movement Peak Hour Data (7:30 AM)

Start Time	Southbound Approach Southbound					Westbound Approach Westbound					Northbound Approach Northbound					Eastbound Approach Eastbound					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
7:30 AM	0	2	2	0	4	0	1	0	0	1	0	4	0	0	4	0	1	0	0	1	10
7:45 AM	1	1	0	0	2	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	3
8:00 AM	0	3	0	0	3	0	1	1	0	2	0	0	0	0	0	0	0	0	0	0	5
8:15 AM	0	3	0	0	3	0	1	0	0	1	0	0	0	0	0	0	1	1	0	2	6
Total	1	9	2	0	12	0	3	1	0	4	0	5	0	0	5	0	2	1	0	3	24
Approach %	8.3	75.0	16.7	0.0	-	0.0	75.0	25.0	0.0	-	0.0	100.0	0.0	0.0	-	0.0	66.7	33.3	0.0	-	-
Total %	4.2	37.5	8.3	0.0	50.0	0.0	12.5	4.2	0.0	16.7	0.0	20.8	0.0	0.0	20.8	0.0	8.3	4.2	0.0	12.5	-
PHF	0.250	0.750	0.250	0.000	0.750	0.000	0.750	0.250	0.000	0.500	0.000	0.313	0.000	0.000	0.313	0.000	0.500	0.250	0.000	0.375	0.600
All Vehicles (no classification)	1	9	2	0	12	0	3	1	0	4	0	5	0	0	5	0	2	1	0	3	24
% All Vehicles (no classification)	100.0	100.0	100.0	-	100.0	-	100.0	100.0	-	100.0	-	100.0	-	-	100.0	-	100.0	100.0	-	100.0	100.0

Catterall & Wright
1221 - 8th Street East

Saskatoon, Saskatchewan, Canada S7H 0S5
306.343.7280 n.hyder@cwce.ca

Count Name: 8th St E & Zimmerman Rd - TMC -
Data Collection
Site Code: 668.057
Start Date: 11/07/2023
Page No: 4



Turning Movement Peak Hour Data Plot (7:30 AM)

Catterall & Wright
1221 - 8th Street East

Saskatoon, Saskatchewan, Canada S7H 0S5
306.343.7280 n.hyder@cwce.ca

Count Name: 8th St E & Zimmerman Rd - TMC -
Data Collection
Site Code: 668.057
Start Date: 11/07/2023
Page No: 5

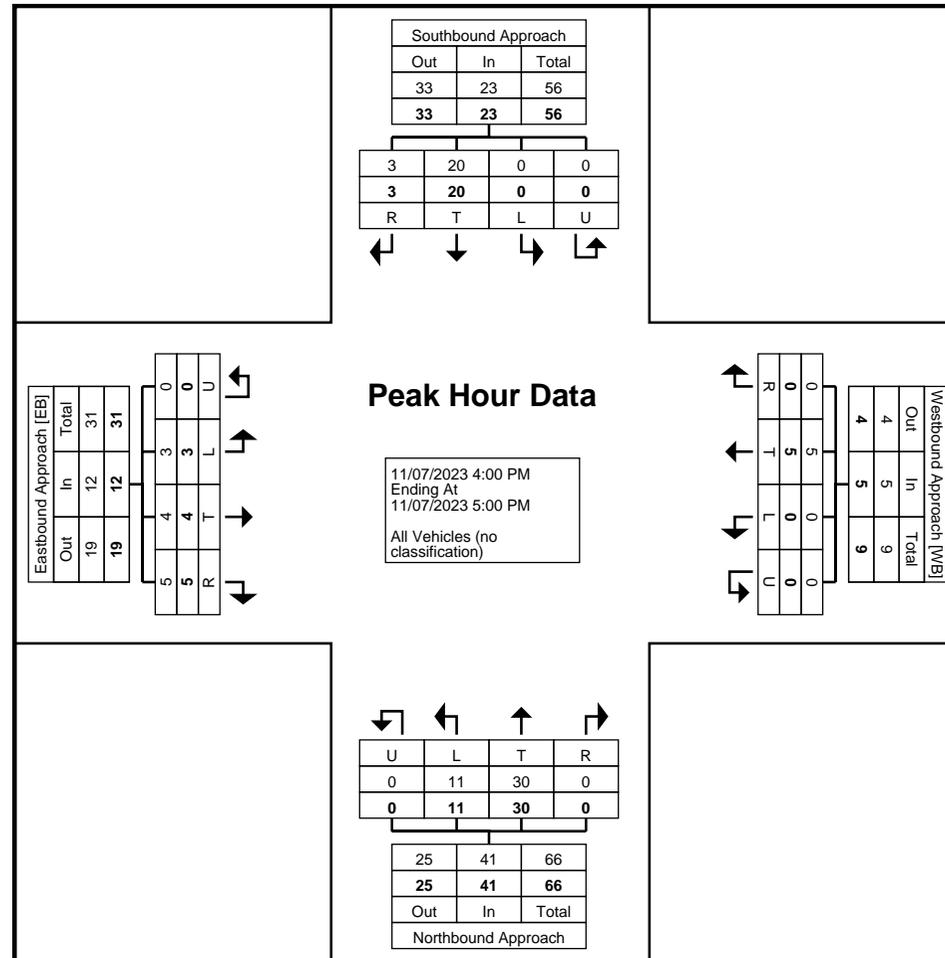
Turning Movement Peak Hour Data (4:00 PM)

Start Time	Southbound Approach Southbound					Westbound Approach Westbound					Northbound Approach Northbound					Eastbound Approach Eastbound					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
4:00 PM	0	4	0	0	4	0	2	0	0	2	0	9	3	0	12	2	0	0	0	2	20
4:15 PM	2	7	0	0	9	0	3	0	0	3	0	8	3	0	11	2	2	0	0	4	27
4:30 PM	0	2	0	0	2	0	0	0	0	0	0	6	2	0	8	0	1	3	0	4	14
4:45 PM	1	7	0	0	8	0	0	0	0	0	0	7	3	0	10	1	1	0	0	2	20
Total	3	20	0	0	23	0	5	0	0	5	0	30	11	0	41	5	4	3	0	12	81
Approach %	13.0	87.0	0.0	0.0	-	0.0	100.0	0.0	0.0	-	0.0	73.2	26.8	0.0	-	41.7	33.3	25.0	0.0	-	-
Total %	3.7	24.7	0.0	0.0	28.4	0.0	6.2	0.0	0.0	6.2	0.0	37.0	13.6	0.0	50.6	6.2	4.9	3.7	0.0	14.8	-
PHF	0.375	0.714	0.000	0.000	0.639	0.000	0.417	0.000	0.000	0.417	0.000	0.833	0.917	0.000	0.854	0.625	0.500	0.250	0.000	0.750	0.750
All Vehicles (no classification)	3	20	0	0	23	0	5	0	0	5	0	30	11	0	41	5	4	3	0	12	81
% All Vehicles (no classification)	100.0	100.0	-	-	100.0	-	100.0	-	-	100.0	-	100.0	100.0	-	100.0	100.0	100.0	100.0	-	100.0	100.0

Catterall & Wright
1221 - 8th Street East

Saskatoon, Saskatchewan, Canada S7H 0S5
306.343.7280 n.hyder@cwce.ca

Count Name: 8th St E & Zimmerman Rd - TMC -
Data Collection
Site Code: 668.057
Start Date: 11/07/2023
Page No: 6

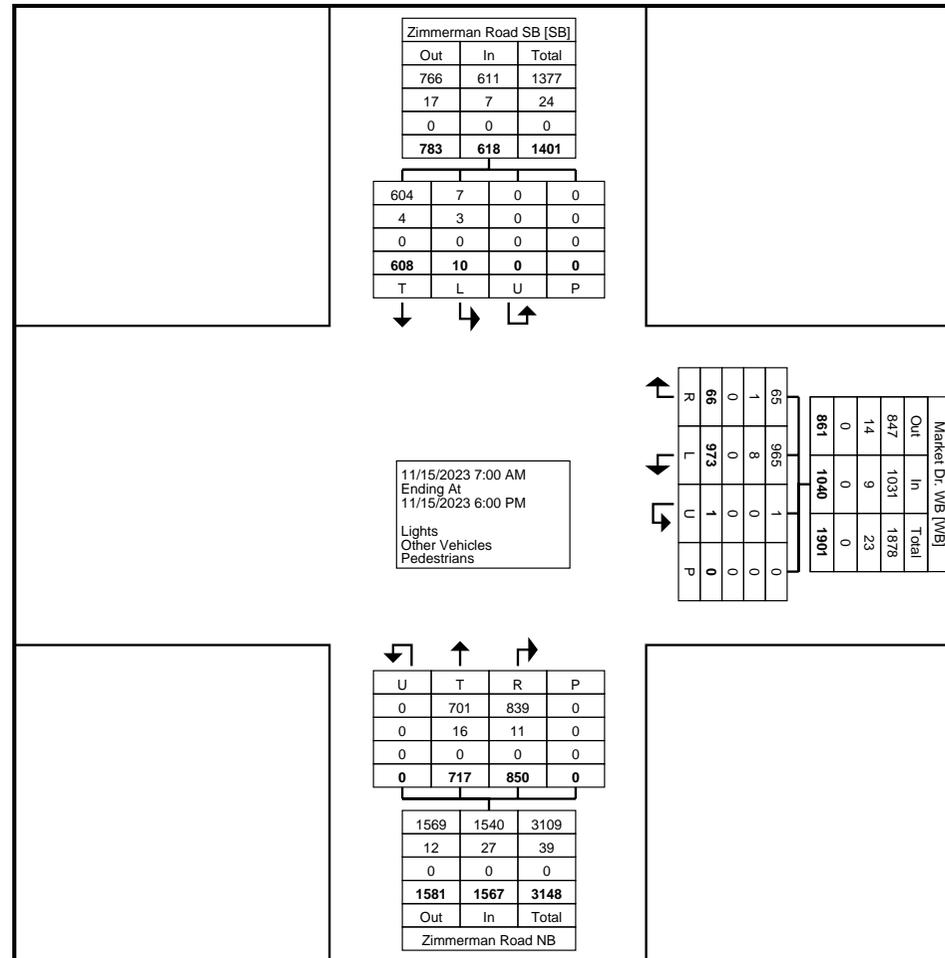


Turning Movement Peak Hour Data Plot (4:00 PM)

Catterall & Wright
1221 - 8th Street East

Saskatoon, Saskatchewan, Canada S7H 0S5
306.343.7280 n.hyder@cwce.ca

Count Name: Zimmerman Road & Market Drive -
Data Collection
Site Code: 668.057
Start Date: 11/15/2023
Page No: 2

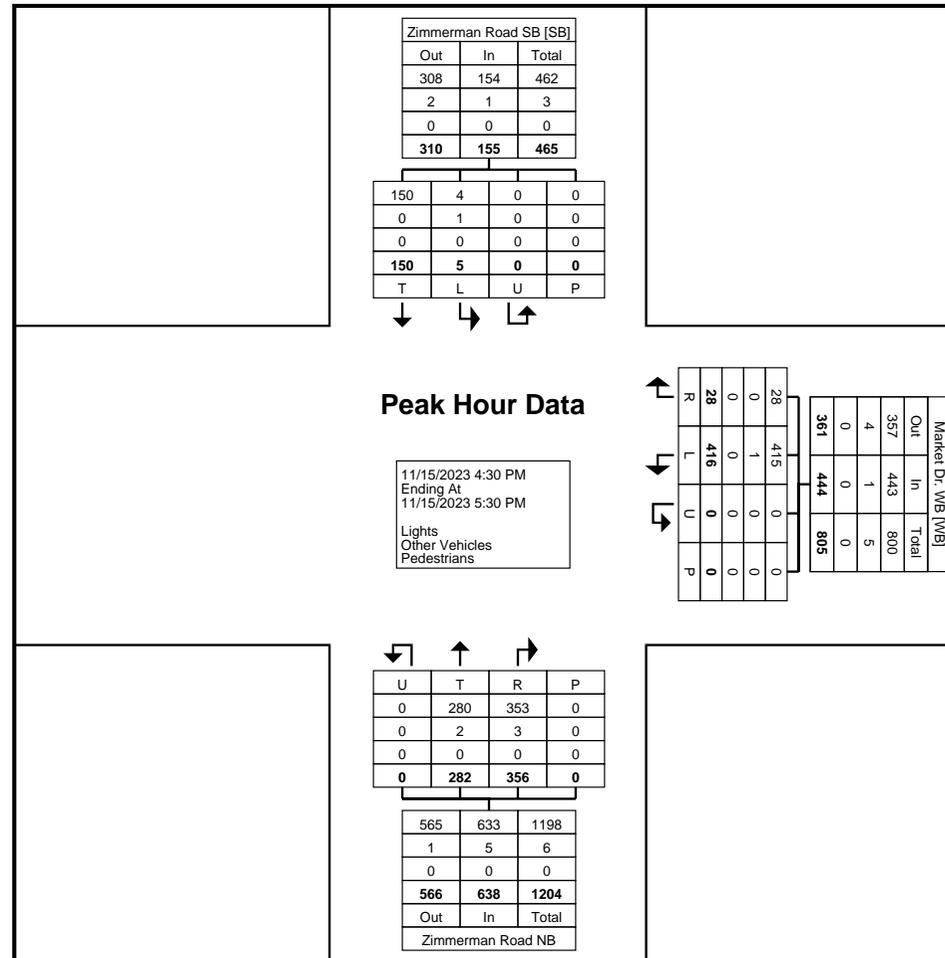


Turning Movement Data Plot

Catterall & Wright
1221 - 8th Street East

Saskatoon, Saskatchewan, Canada S7H 0S5
306.343.7280 n.hyder@cwce.ca

Count Name: Zimmerman Road & Market Drive -
Data Collection
Site Code: 668.057
Start Date: 11/15/2023
Page No: 6



Turning Movement Peak Hour Data Plot (4:30 PM)

Catterall & Wright
1221 - 8th Street East

Saskatoon, Saskatchewan, Canada S7H 0S5
306.343.7280 n.hyder@cwce.ca

Count Name: Hwy 16 & Zimmerman Rd TMC -
Data Collection
Site Code: 668.057
Start Date: 11/09/2023
Page No: 1

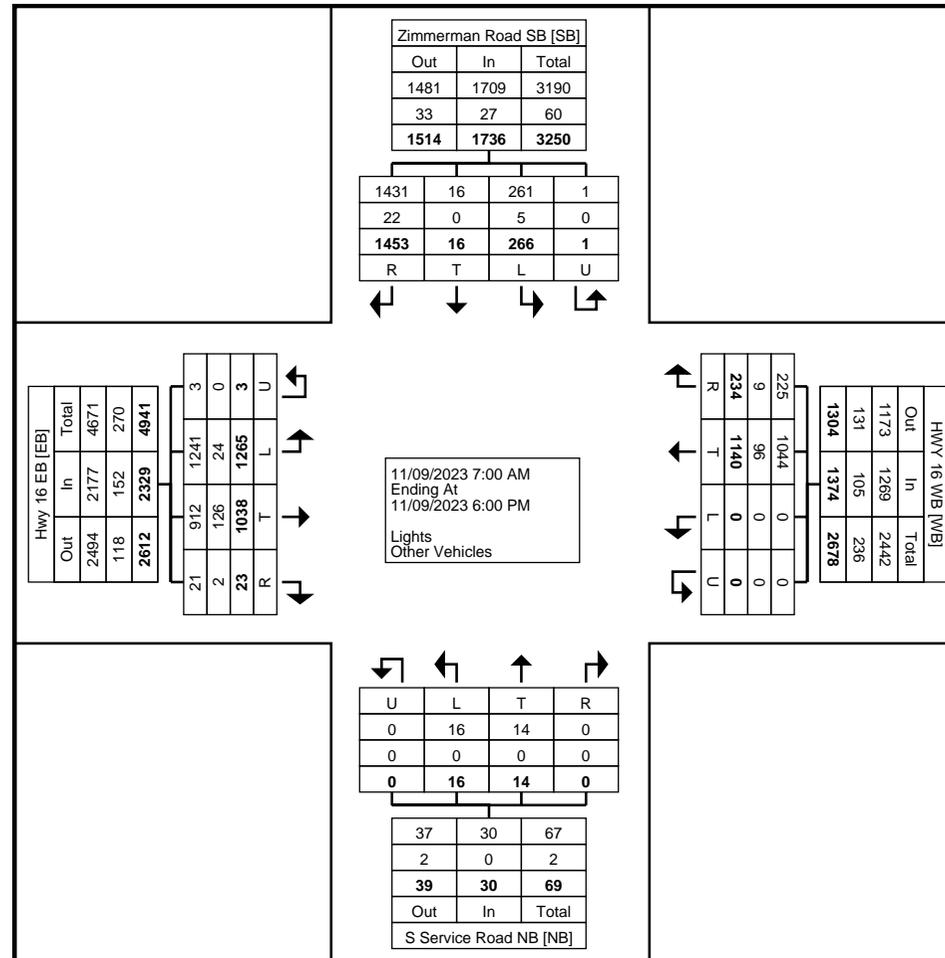
Turning Movement Data

Start Time	Zimmerman Road SB Southbound					HWY 16 WB Westbound					S Service Road NB Northbound					Hwy 16 EB Eastbound					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
7:00 AM	38	0	9	0	47	8	49	0	0	57	0	1	0	0	1	0	47	16	0	63	168
7:15 AM	58	1	3	0	62	10	64	0	0	74	0	0	1	0	1	2	61	28	0	91	228
7:30 AM	76	0	10	0	86	13	80	0	0	93	0	1	1	0	2	4	70	32	0	106	287
7:45 AM	81	1	13	0	95	12	57	0	0	69	0	2	5	0	7	1	66	52	0	119	290
Hourly Total	253	2	35	0	290	43	250	0	0	293	0	4	7	0	11	7	244	128	0	379	973
8:00 AM	67	0	9	0	76	5	54	0	0	59	0	0	1	0	1	1	45	28	0	74	210
8:15 AM	75	1	14	0	90	11	56	0	0	67	0	2	2	0	4	1	65	34	0	100	261
8:30 AM	51	2	12	0	65	13	70	0	0	83	0	0	0	0	0	3	49	48	0	100	248
8:45 AM	61	0	11	1	73	9	56	0	0	65	0	2	0	0	2	0	56	59	0	115	255
Hourly Total	254	3	46	1	304	38	236	0	0	274	0	4	3	0	7	5	215	169	0	389	974
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4:00 PM	122	1	20	0	143	20	67	0	0	87	0	0	1	0	1	1	77	113	0	191	422
4:15 PM	112	1	30	0	143	18	73	0	0	91	0	2	1	0	3	1	79	139	0	219	456
4:30 PM	117	2	19	0	138	30	110	0	0	140	0	1	2	0	3	0	69	128	0	197	478
4:45 PM	127	1	27	0	155	26	87	0	0	113	0	2	1	0	3	2	72	132	2	208	479
Hourly Total	478	5	96	0	579	94	337	0	0	431	0	5	5	0	10	4	297	512	2	815	1835
5:00 PM	130	5	27	0	162	13	102	0	0	115	0	0	1	0	1	1	69	116	0	186	464
5:15 PM	133	0	28	0	161	10	69	0	0	79	0	1	0	0	1	1	73	106	1	181	422
5:30 PM	113	0	19	0	132	24	74	0	0	98	0	0	0	0	0	2	70	103	0	175	405
5:45 PM	92	1	15	0	108	12	72	0	0	84	0	0	0	0	0	3	70	131	0	204	396
Hourly Total	468	6	89	0	563	59	317	0	0	376	0	1	1	0	2	7	282	456	1	746	1687
Grand Total	1453	16	266	1	1736	234	1140	0	0	1374	0	14	16	0	30	23	1038	1265	3	2329	5469
Approach %	83.7	0.9	15.3	0.1	-	17.0	83.0	0.0	0.0	-	0.0	46.7	53.3	0.0	-	1.0	44.6	54.3	0.1	-	-
Total %	26.6	0.3	4.9	0.0	31.7	4.3	20.8	0.0	0.0	25.1	0.0	0.3	0.3	0.0	0.5	0.4	19.0	23.1	0.1	42.6	-
Lights	1431	16	261	1	1709	225	1044	0	0	1269	0	14	16	0	30	21	912	1241	3	2177	5185
% Lights	98.5	100.0	98.1	100.0	98.4	96.2	91.6	-	-	92.4	-	100.0	100.0	-	100.0	91.3	87.9	98.1	100.0	93.5	94.8
Other Vehicles	22	0	5	0	27	9	96	0	0	105	0	0	0	0	0	2	126	24	0	152	284
% Other Vehicles	1.5	0.0	1.9	0.0	1.6	3.8	8.4	-	-	7.6	-	0.0	0.0	-	0.0	8.7	12.1	1.9	0.0	6.5	5.2

Catterall & Wright
1221 - 8th Street East

Saskatoon, Saskatchewan, Canada S7H 0S5
306.343.7280 n.hyder@cwce.ca

Count Name: Hwy 16 & Zimmerman Rd TMC -
Data Collection
Site Code: 668.057
Start Date: 11/09/2023
Page No: 2



Turning Movement Data Plot

Catterall & Wright
1221 - 8th Street East

Saskatoon, Saskatchewan, Canada S7H 0S5
306.343.7280 n.hyder@cwce.ca

Count Name: Hwy 16 & Zimmerman Rd TMC -
Data Collection
Site Code: 668.057
Start Date: 11/09/2023
Page No: 3

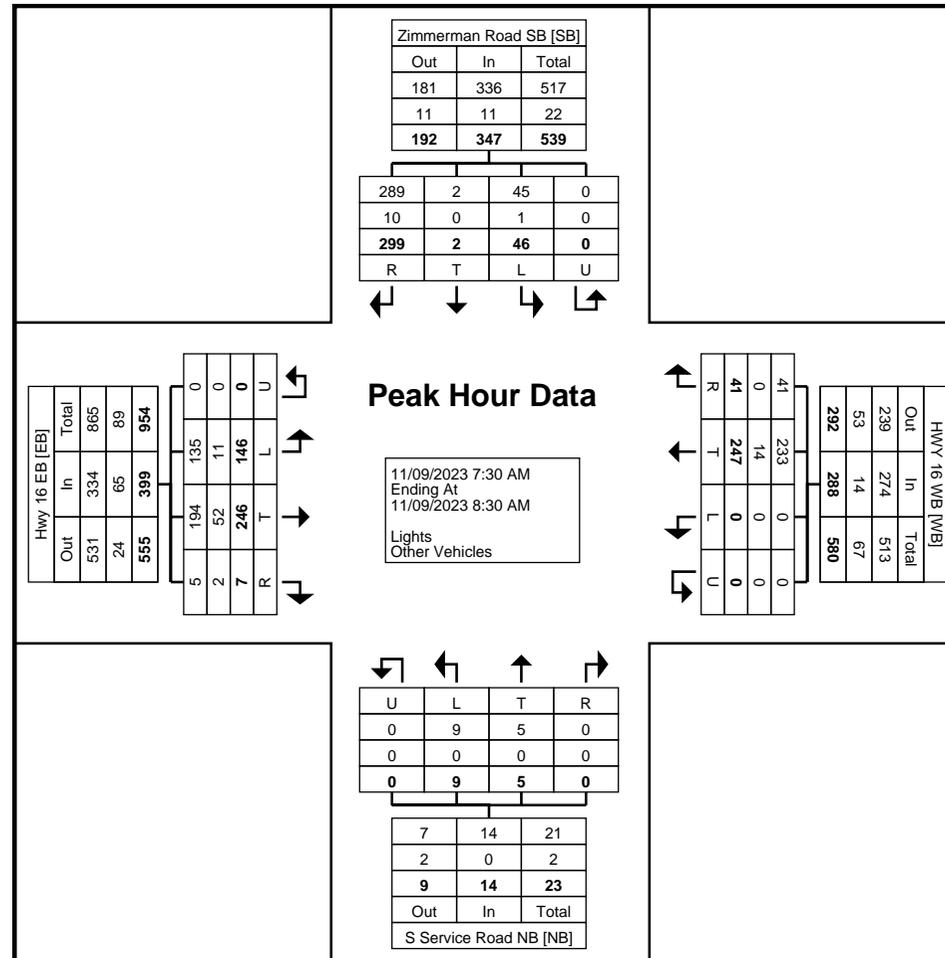
Turning Movement Peak Hour Data (7:30 AM)

Start Time	Zimmerman Road SB Southbound					HWY 16 WB Westbound					S Service Road NB Northbound					Hwy 16 EB Eastbound					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
7:30 AM	76	0	10	0	86	13	80	0	0	93	0	1	1	0	2	4	70	32	0	106	287
7:45 AM	81	1	13	0	95	12	57	0	0	69	0	2	5	0	7	1	66	52	0	119	290
8:00 AM	67	0	9	0	76	5	54	0	0	59	0	0	1	0	1	1	45	28	0	74	210
8:15 AM	75	1	14	0	90	11	56	0	0	67	0	2	2	0	4	1	65	34	0	100	261
Total	299	2	46	0	347	41	247	0	0	288	0	5	9	0	14	7	246	146	0	399	1048
Approach %	86.2	0.6	13.3	0.0	-	14.2	85.8	0.0	0.0	-	0.0	35.7	64.3	0.0	-	1.8	61.7	36.6	0.0	-	-
Total %	28.5	0.2	4.4	0.0	33.1	3.9	23.6	0.0	0.0	27.5	0.0	0.5	0.9	0.0	1.3	0.7	23.5	13.9	0.0	38.1	-
PHF	0.923	0.500	0.821	0.000	0.913	0.788	0.772	0.000	0.000	0.774	0.000	0.625	0.450	0.000	0.500	0.438	0.879	0.702	0.000	0.838	0.903
Lights	289	2	45	0	336	41	233	0	0	274	0	5	9	0	14	5	194	135	0	334	958
% Lights	96.7	100.0	97.8	-	96.8	100.0	94.3	-	-	95.1	-	100.0	100.0	-	100.0	71.4	78.9	92.5	-	83.7	91.4
Other Vehicles	10	0	1	0	11	0	14	0	0	14	0	0	0	0	0	2	52	11	0	65	90
% Other Vehicles	3.3	0.0	2.2	-	3.2	0.0	5.7	-	-	4.9	-	0.0	0.0	-	0.0	28.6	21.1	7.5	-	16.3	8.6

Catterall & Wright
1221 - 8th Street East

Saskatoon, Saskatchewan, Canada S7H 0S5
306.343.7280 n.hyder@cwce.ca

Count Name: Hwy 16 & Zimmerman Rd TMC -
Data Collection
Site Code: 668.057
Start Date: 11/09/2023
Page No: 4



Turning Movement Peak Hour Data Plot (7:30 AM)

Catterall & Wright
1221 - 8th Street East

Saskatoon, Saskatchewan, Canada S7H 0S5
306.343.7280 n.hyder@cwce.ca

Count Name: Hwy 16 & Zimmerman Rd TMC -
Data Collection
Site Code: 668.057
Start Date: 11/09/2023
Page No: 5

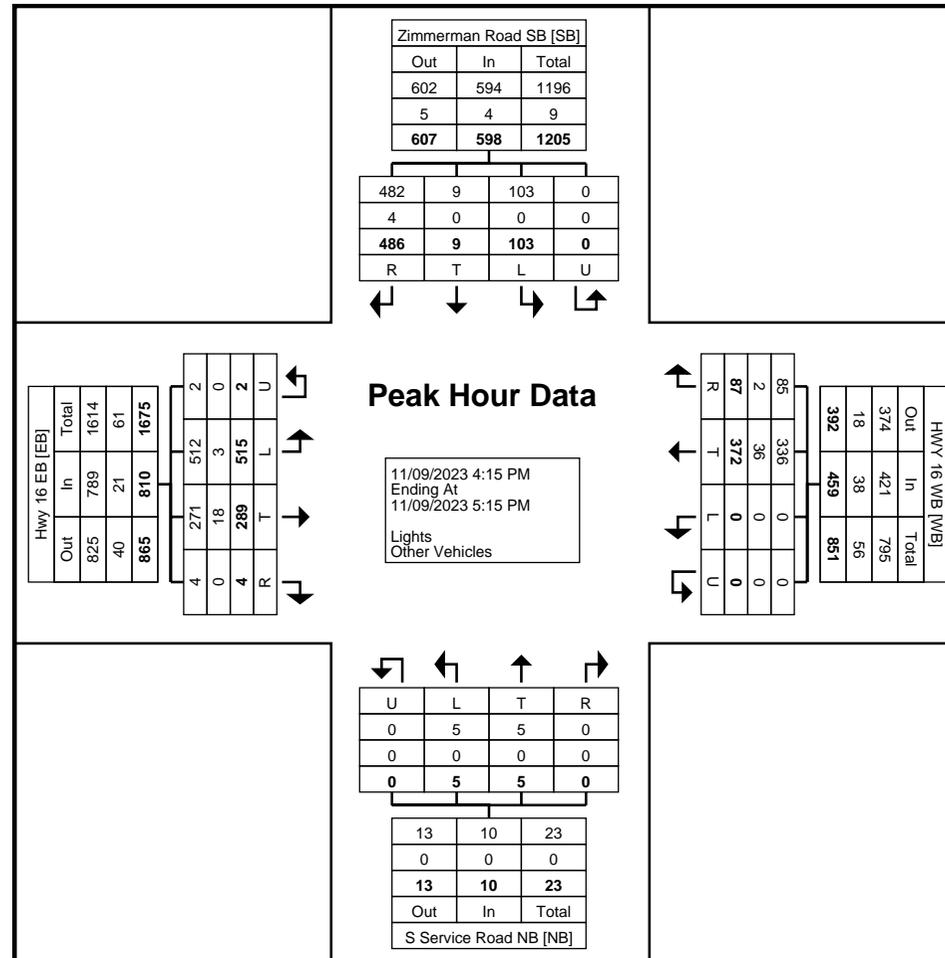
Turning Movement Peak Hour Data (4:15 PM)

Start Time	Zimmerman Road SB Southbound					HWY 16 WB Westbound					S Service Road NB Northbound					Hwy 16 EB Eastbound					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
4:15 PM	112	1	30	0	143	18	73	0	0	91	0	2	1	0	3	1	79	139	0	219	456
4:30 PM	117	2	19	0	138	30	110	0	0	140	0	1	2	0	3	0	69	128	0	197	478
4:45 PM	127	1	27	0	155	26	87	0	0	113	0	2	1	0	3	2	72	132	2	208	479
5:00 PM	130	5	27	0	162	13	102	0	0	115	0	0	1	0	1	1	69	116	0	186	464
Total	486	9	103	0	598	87	372	0	0	459	0	5	5	0	10	4	289	515	2	810	1877
Approach %	81.3	1.5	17.2	0.0	-	19.0	81.0	0.0	0.0	-	0.0	50.0	50.0	0.0	-	0.5	35.7	63.6	0.2	-	-
Total %	25.9	0.5	5.5	0.0	31.9	4.6	19.8	0.0	0.0	24.5	0.0	0.3	0.3	0.0	0.5	0.2	15.4	27.4	0.1	43.2	-
PHF	0.935	0.450	0.858	0.000	0.923	0.725	0.845	0.000	0.000	0.820	0.000	0.625	0.625	0.000	0.833	0.500	0.915	0.926	0.250	0.925	0.980
Lights	482	9	103	0	594	85	336	0	0	421	0	5	5	0	10	4	271	512	2	789	1814
% Lights	99.2	100.0	100.0	-	99.3	97.7	90.3	-	-	91.7	-	100.0	100.0	-	100.0	100.0	93.8	99.4	100.0	97.4	96.6
Other Vehicles	4	0	0	0	4	2	36	0	0	38	0	0	0	0	0	0	18	3	0	21	63
% Other Vehicles	0.8	0.0	0.0	-	0.7	2.3	9.7	-	-	8.3	-	0.0	0.0	-	0.0	0.0	6.2	0.6	0.0	2.6	3.4

Catterall & Wright
1221 - 8th Street East

Saskatoon, Saskatchewan, Canada S7H 0S5
306.343.7280 n.hyder@cwce.ca

Count Name: Hwy 16 & Zimmerman Rd TMC -
Data Collection
Site Code: 668.057
Start Date: 11/09/2023
Page No: 6



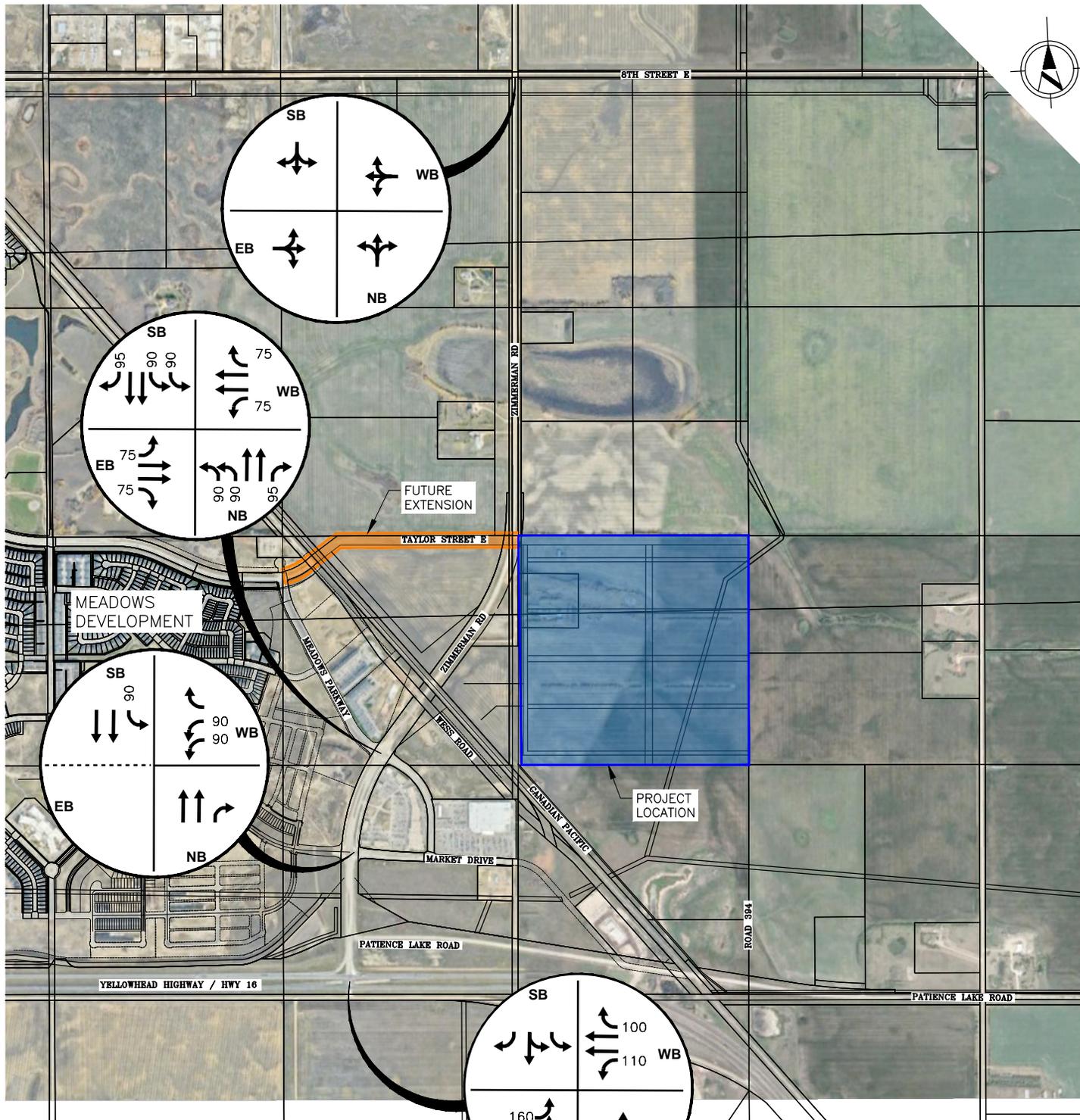
Turning Movement Peak Hour Data Plot (4:15 PM)

Project No. 668.057

Arbutus Properties

Solair Development Traffic Impact Assessment

Appendix D INTERSECTION LANE CONFIGURATION (EXISTING,
PLANNED, & MITIGATION)



LEGEND:

20 BAY LENGTH STORAGE VOLUME (m)

PRELIMINARY
NOT FOR CONSTRUCTION

DATE	REVISION

SCALE VERIFICATION

 WHEN DRAWING IS PLOTTED FULL SIZE
 THIS LINE IS 30mm IN LENGTH.

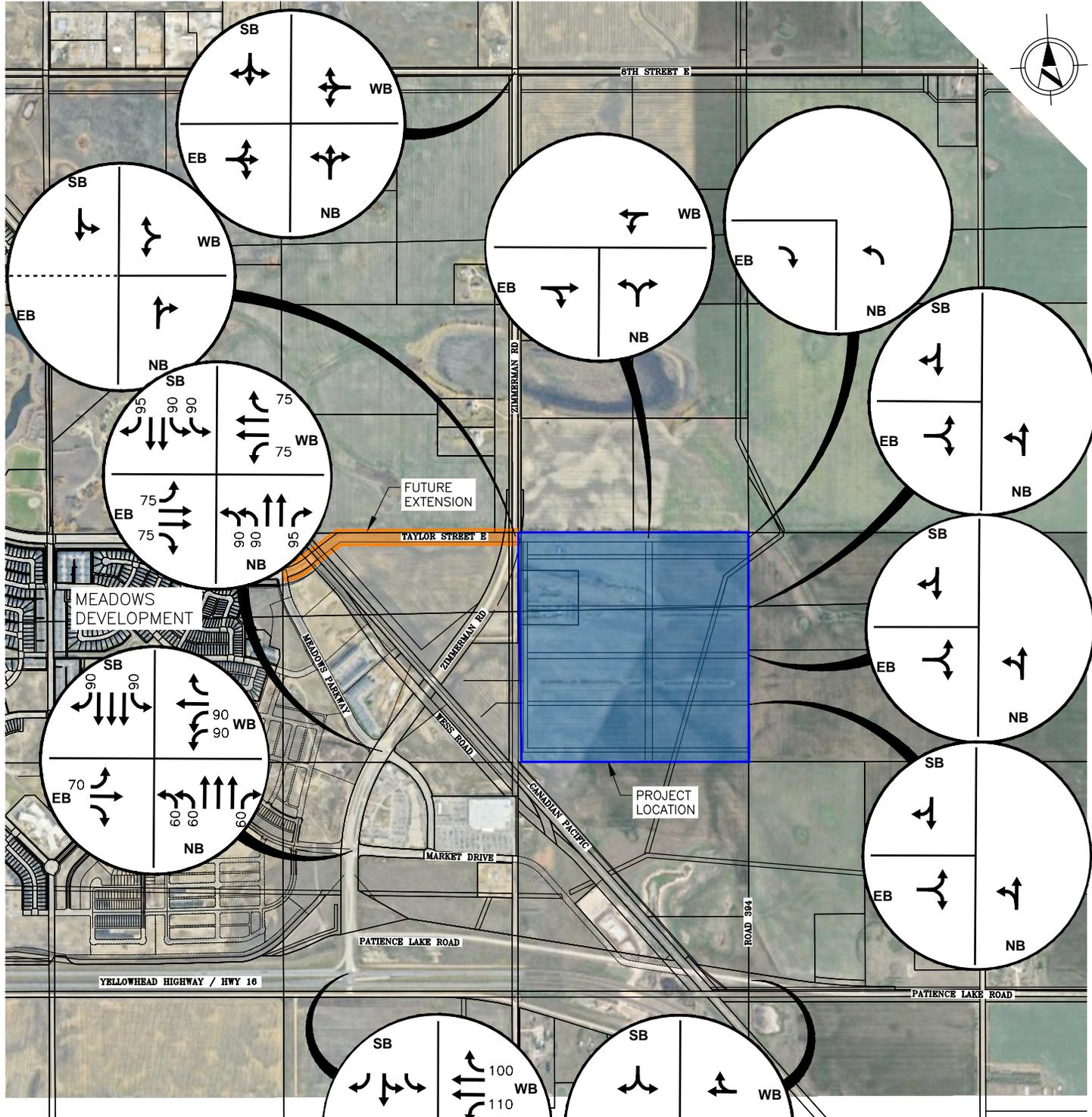
SCALE	NTS	DESIGNED	BW
DRAWN	DL	CHECKED	
DATE	23/11/08	SHEET	1 of 1
DRAWING NUMBER	APPENDIX D1		

OWNER/CLIENT
ARBUTUS PROPERTIES

LOCATION
 SASKATOON, SK

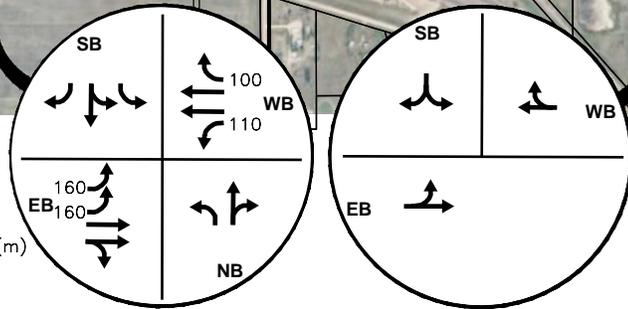
PROJECT
SOLAIR TRAFFIC IMPACT ASSESSMENT

SHEET TITLE
EXISTING INTERSECTION LANE CONFIGURATION



LEGEND:

20 BAY LENGTH STORAGE VOLUME (m)



PRELIMINARY
NOT FOR CONSTRUCTION

DATE	REVISION

SCALE VERIFICATION
WHEN DRAWING IS PLOTTED FULL SIZE
THIS LINE IS 30mm IN LENGTH.

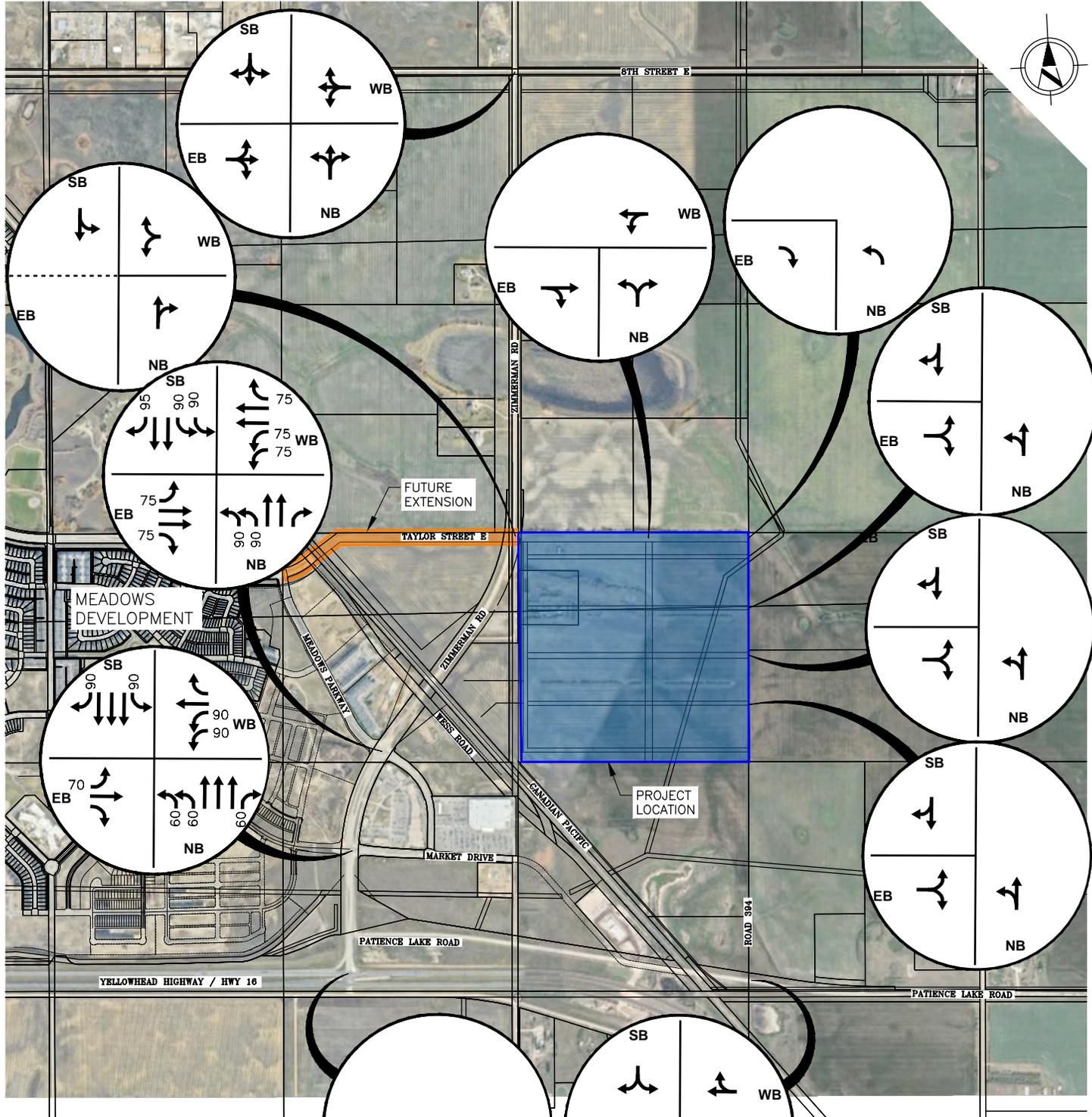
SCALE	NTS	DESIGNED	BW
DRAWN	DL	CHECKED	
DATE	23/11/08	SHEET	1 of 1
DRAWING NUMBER	APPENDIX D2		

OWNER/CLIENT
ARBUTUS PROPERTIES

PROJECT
SOLAIR TRAFFIC IMPACT ASSESSMENT

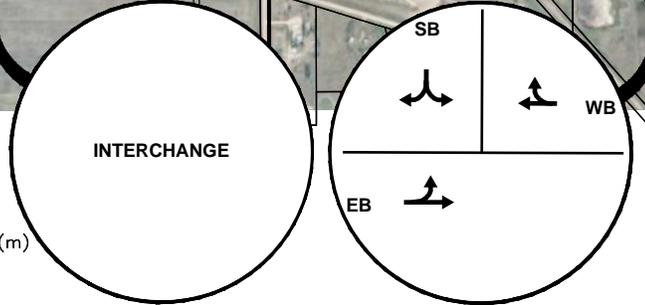
LOCATION
SASKATOON, SK

SHEET TITLE
MODELLING INTERSECTION LANE CONFIGURATION



LEGEND:

20 BAY LENGTH STORAGE VOLUME (m)



PRELIMINARY
NOT FOR CONSTRUCTION

OWNER/CLIENT
ARBUTUS PROPERTIES

PROJECT
SOLAIR TRAFFIC IMPACT ASSESSMENT

LOCATION
SASKATOON, SK

SHEET TITLE
2039 RECOMMENDED MITIGATION INTERSECTION LANE CONFIGURATION

DATE	REVISION

SCALE VERIFICATION	
WHEN DRAWING IS PLOTTED FULL SIZE THIS LINE IS 30mm IN LENGTH.	
SCALE NTS	DESIGNED BW
DRAWN DL	CHECKED
DATE 23/11/08	SHEET 1 of 1
DRAWING NUMBER	APPENDIX D3

Project No. 668.057

Arbutus Properties

Solair Development Traffic Impact Assessment

Appendix E SYNCHRO ANALYSIS FOR EXISTING, BACKGROUND,
& TOTAL CONDITIONS

2024 EXISTING - AM

Lanes, Volumes, Timings
2: Zimmerman Rd & Market Dr

Timing Plan: AM
02-26-2024

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	 		 			 
Traffic Volume (vph)	96	2	117	117	3	179
Future Volume (vph)	96	2	117	117	3	179
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)	90.0	0.0		0.0	90.0	
Storage Lanes	2	1		1	1	
Taper Length (m)	25.0				25.0	
Lane Util. Factor	0.97	1.00	0.95	1.00	1.00	0.95
Ped Bike Factor	0.99	0.98		0.99	1.00	
Fr _t		0.850		0.850		
Fl _t Protected	0.950				0.950	
Satd. Flow (prot)	3288	1517	3390	1517	1695	3390
Fl _t Permitted	0.950				0.515	
Satd. Flow (perm)	3261	1491	3390	1495	918	3390
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		2		138		
Link Speed (k/h)	40		40			40
Link Distance (m)	162.6		138.4			264.3
Travel Time (s)	14.6		12.5			23.8
Confl. Peds. (#/hr)	2	2		2	2	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	113	2	138	138	4	211
Shared Lane Traffic (%)						
Lane Group Flow (vph)	113	2	138	138	4	211
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	7.4		7.4			7.4
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	1.6		1.6			1.6
Two way Left Turn Lane						
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	25	15		15	25	
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	3		2		1	6
Permitted Phases	3	3		2	6	
Minimum Split (s)	11.8	11.8	25.7	25.7	11.2	25.7
Total Split (s)	17.0	17.0	36.0	36.0	16.0	52.0
Total Split (%)	24.6%	24.6%	52.2%	52.2%	23.2%	75.4%
Maximum Green (s)	10.2	10.2	30.3	30.3	9.8	46.3
Yellow Time (s)	3.5	3.5	3.8	3.8	3.2	3.8
All-Red Time (s)	3.3	3.3	1.9	1.9	3.0	1.9
Lost Time Adjust (s)	2.0	2.0	2.0	2.0	2.0	2.0
Total Lost Time (s)	8.8	8.8	7.7	7.7	8.2	7.7
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Walk Time (s)			7.0	7.0		7.0
Flash Dont Walk (s)			13.0	13.0		13.0
Pedestrian Calls (#/hr)			2	2		2
Act Effct Green (s)	8.2	8.2	28.3	28.3	43.8	44.3

Lanes, Volumes, Timings
2: Zimmerman Rd & Market Dr

Timing Plan: AM
02-26-2024

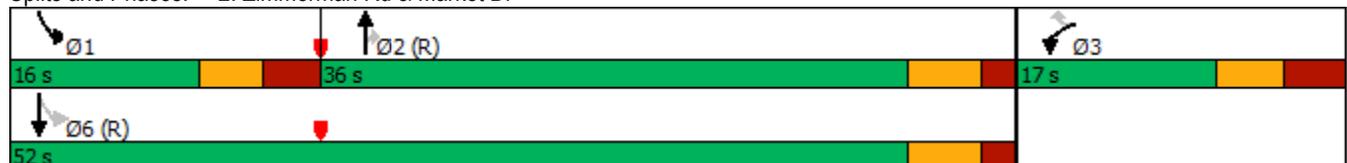


Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Actuated g/C Ratio	0.12	0.12	0.41	0.41	0.63	0.64
v/c Ratio	0.29	0.01	0.10	0.20	0.01	0.10
Control Delay	29.9	20.5	12.8	3.5	4.7	4.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.9	20.5	12.8	3.5	4.7	4.9
LOS	C	C	B	A	A	A
Approach Delay	29.8		8.2			4.9
Approach LOS	C		A			A
Queue Length 50th (m)	6.9	0.0	5.5	0.0	0.2	4.6
Queue Length 95th (m)	12.9	1.6	9.7	7.7	1.0	7.5
Internal Link Dist (m)	138.6		114.4			240.3
Turn Bay Length (m)	90.0				90.0	
Base Capacity (vph)	390	178	1390	694	670	2176
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.29	0.01	0.10	0.20	0.01	0.10

Intersection Summary

Area Type:	Other
Cycle Length:	69
Actuated Cycle Length:	69
Offset:	0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle:	50
Control Type:	Pretimed
Maximum v/c Ratio:	0.29
Intersection Signal Delay:	11.1
Intersection LOS:	B
Intersection Capacity Utilization	34.6%
ICU Level of Service	A
Analysis Period (min)	15

Splits and Phases: 2: Zimmerman Rd & Market Dr



Lanes, Volumes, Timings
7: Zimmerman Rd & Highway 16

Timing Plan: AM
02-26-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 	 		 	 			 		 	 	 
Traffic Volume (vph)	146	246	7	2	247	41	9	5	2	46	2	299
Future Volume (vph)	146	246	7	2	247	41	9	5	2	46	2	299
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	160.0		0.0	110.0		100.0	0.0		0.0	0.0		25.0
Storage Lanes	2		0	1		1	1		0	1		1
Taper Length (m)	75.0			75.0			2.5			2.5		
Lane Util. Factor	0.97	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Ped Bike Factor	0.90	1.00		1.00		0.99	0.98	0.99		0.89	0.89	0.99
Fr _t		0.996				0.850		0.962				0.850
Fl _t Protected	0.950			0.950			0.950			0.950	0.956	
Satd. Flow (prot)	3288	3369	0	1695	3390	1517	1695	1704	0	1610	1621	1517
Fl _t Permitted	0.358			0.570			0.000			0.000	0.000	
Satd. Flow (perm)	1113	3369	0	1013	3390	1498	0	1704	0	0	0	1495
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3				336		2				352
Link Speed (k/h)		40			40			40				40
Link Distance (m)		234.1			261.1			116.7				138.4
Travel Time (s)		21.1			23.5			10.5				12.5
Confl. Peds. (#/hr)	91		12	1		1	5		5	35		8
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	172	289	8	2	291	48	11	6	2	54	2	352
Shared Lane Traffic (%)										48%		
Lane Group Flow (vph)	172	297	0	2	291	48	11	8	0	28	28	352
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			5.0			5.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA		pm+pt	NA	Free	pm+pt	NA		pm+pt	NA	Free
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6		Free	8			4		Free
Minimum Split (s)	12.8	16.7		12.8	23.0		17.3	17.3		17.3	17.3	
Total Split (s)	40.0	45.0		20.0	25.0		20.0	20.0		25.0	25.0	
Total Split (%)	36.4%	40.9%		18.2%	22.7%		18.2%	18.2%		22.7%	22.7%	
Maximum Green (s)	32.2	38.3		12.2	18.3		12.7	12.7		17.7	17.7	
Yellow Time (s)	4.3	5.2		4.3	5.2		3.5	3.5		3.8	3.8	
All-Red Time (s)	3.5	1.5		3.5	1.5		3.8	3.8		3.5	3.5	
Lost Time Adjust (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Total Lost Time (s)	9.8	8.7		9.8	8.7		9.3	9.3		9.3	9.3	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag		Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Walk Time (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Flash Dont Walk (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Pedestrian Calls (#/hr)		2			2		2	2		2	2	
Act Effct Green (s)	55.2	36.3		25.4	16.3	110.0	10.7	10.7		15.7	15.7	110.0

Lanes, Volumes, Timings
10: Zimmerman Rd & Meadows Pkwy

Timing Plan: AM
02-26-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	51	208	135	27	85	2	90	20	9	3	9	2
Future Volume (vph)	51	208	135	27	85	2	90	20	9	3	9	2
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	75.0		75.0	75.0		75.0	90.0		95.0	90.0		95.0
Storage Lanes	1		1	1		1	2		1	2		1
Taper Length (m)	35.0			35.0			45.0			45.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Ped Bike Factor	1.00		0.99	1.00		0.98	1.00		0.99	1.00		0.99
Fr _t			0.850			0.850			0.850			0.850
Fl _t Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	3390	1517	1695	3390	1517	3288	3390	1517	3288	3390	1517
Fl _t Permitted	0.689			0.600			0.750			0.741		
Satd. Flow (perm)	1225	3390	1495	1069	3390	1481	2585	3390	1495	2554	3390	1495
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			182			182			186			186
Link Speed (k/h)		40			40			40			40	
Link Distance (m)		172.9			198.7			264.3			329.6	
Travel Time (s)		15.6			17.9			23.8			29.7	
Confl. Peds. (#/hr)	2		2	2		2	2		2	2		2
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	60	245	159	32	100	2	106	24	11	4	11	2
Shared Lane Traffic (%)												
Lane Group Flow (vph)	60	245	159	32	100	2	106	24	11	4	11	2
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			7.4			7.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Minimum Split (s)	10.4	27.9	27.9	10.4	27.9	27.9	11.2	25.6	25.6	10.6	25.6	25.6
Total Split (s)	16.0	30.0	30.0	16.0	30.0	30.0	12.0	27.0	27.0	12.0	27.0	27.0
Total Split (%)	18.8%	35.3%	35.3%	18.8%	35.3%	35.3%	14.1%	31.8%	31.8%	14.1%	31.8%	31.8%
Maximum Green (s)	10.6	24.1	24.1	10.6	24.1	24.1	5.8	21.4	21.4	6.4	21.4	21.4
Yellow Time (s)	3.0	3.5	3.5	3.0	3.5	3.5	3.2	3.8	3.8	3.2	3.8	3.8
All-Red Time (s)	2.4	2.4	2.4	2.4	2.4	2.4	3.0	1.8	1.8	2.4	1.8	1.8
Lost Time Adjust (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Total Lost Time (s)	7.4	7.9	7.9	7.4	7.9	7.9	8.2	7.6	7.6	7.6	7.6	7.6
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		15.0	15.0		15.0	15.0		13.0	13.0		13.0	13.0
Pedestrian Calls (#/hr)		2	2		2	2		2	2		2	2
Act Effct Green (s)	31.2	22.1	22.1	31.2	22.1	22.1	22.6	19.4	19.4	23.8	19.4	19.4

HCM Unsignalized Intersection Capacity Analysis
 13: Zimmerman Rd & 8 St E

Timing Plan: AM
 02-26-2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	2	2	1	3	2	2	5	2	2	9	1
Future Volume (Veh/h)	1	2	2	1	3	2	2	5	2	2	9	1
Sign Control		Free			Free			Yield			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	1	2	2	1	4	2	2	6	2	2	11	1
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	6			4			18	13	3	17	13	5
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	6			4			18	13	3	17	13	5
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	99	100	100	99	100
cM capacity (veh/h)	1615			1618			984	880	1081	990	880	1078
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	5	7	10	14								
Volume Left	1	1	2	2								
Volume Right	2	2	2	1								
cSH	1615	1618	935	907								
Volume to Capacity	0.00	0.00	0.01	0.02								
Queue Length 95th (m)	0.0	0.0	0.2	0.4								
Control Delay (s)	1.4	1.0	8.9	9.0								
Lane LOS	A	A	A	A								
Approach Delay (s)	1.4	1.0	8.9	9.0								
Approach LOS			A	A								
Intersection Summary												
Average Delay			6.4									
Intersection Capacity Utilization			16.7%		ICU Level of Service				A			
Analysis Period (min)			15									

2024 EXISTING - PM

Lanes, Volumes, Timings
2: Zimmerman Rd & Market Dr

Timing Plan: PM
02-26-2024

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	 		 			 
Traffic Volume (vph)	416	28	282	356	5	150
Future Volume (vph)	416	28	282	356	5	150
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)	90.0	0.0		0.0	90.0	
Storage Lanes	2	1		1	1	
Taper Length (m)	25.0				25.0	
Lane Util. Factor	0.97	1.00	0.95	1.00	1.00	0.95
Ped Bike Factor	1.00	0.99		0.99	1.00	
Fr _t		0.850		0.850		
Fl _t Protected	0.950				0.950	
Satd. Flow (prot)	3288	1517	3390	1517	1695	3390
Fl _t Permitted	0.950				0.412	
Satd. Flow (perm)	3278	1496	3390	1495	734	3390
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		33		419		
Link Speed (k/h)	40		40			40
Link Distance (m)	162.6		138.4			264.3
Travel Time (s)	14.6		12.5			23.8
Confl. Peds. (#/hr)	2	2		2	2	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	489	33	332	419	6	176
Shared Lane Traffic (%)						
Lane Group Flow (vph)	489	33	332	419	6	176
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	7.4		7.4			7.4
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	1.6		1.6			1.6
Two way Left Turn Lane						
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	25	15		15	25	
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	3		2		1	6
Permitted Phases	3	3		2	6	
Minimum Split (s)	11.8	11.8	25.7	25.7	11.2	25.7
Total Split (s)	36.0	36.0	32.0	32.0	16.0	48.0
Total Split (%)	42.9%	42.9%	38.1%	38.1%	19.0%	57.1%
Maximum Green (s)	29.2	29.2	26.3	26.3	9.8	42.3
Yellow Time (s)	3.5	3.5	3.8	3.8	3.2	3.8
All-Red Time (s)	3.3	3.3	1.9	1.9	3.0	1.9
Lost Time Adjust (s)	2.0	2.0	2.0	2.0	2.0	2.0
Total Lost Time (s)	8.8	8.8	7.7	7.7	8.2	7.7
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Walk Time (s)			7.0	7.0		7.0
Flash Dont Walk (s)			13.0	13.0		13.0
Pedestrian Calls (#/hr)			2	2		2
Act Effct Green (s)	27.2	27.2	24.3	24.3	39.8	40.3

Lanes, Volumes, Timings
2: Zimmerman Rd & Market Dr

Timing Plan: PM
02-26-2024

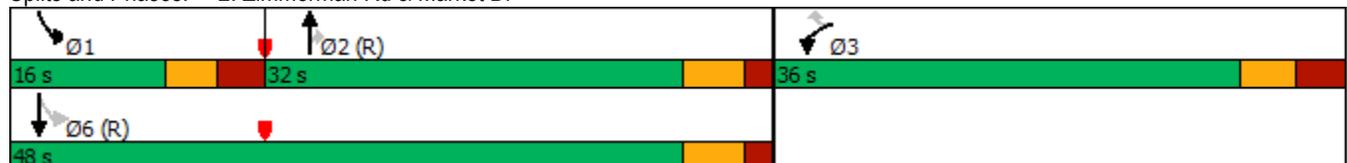


Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Actuated g/C Ratio	0.32	0.32	0.29	0.29	0.47	0.48
v/c Ratio	0.46	0.07	0.34	0.57	0.01	0.11
Control Delay	24.3	7.7	24.7	6.1	11.8	12.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.3	7.7	24.7	6.1	11.8	12.2
LOS	C	A	C	A	B	B
Approach Delay	23.2		14.3			12.2
Approach LOS	C		B			B
Queue Length 50th (m)	31.8	0.0	21.9	0.0	0.5	7.7
Queue Length 95th (m)	42.0	5.3	30.8	15.3	2.2	12.3
Internal Link Dist (m)	138.6		114.4			240.3
Turn Bay Length (m)	90.0				90.0	
Base Capacity (vph)	1064	506	980	730	437	1626
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.46	0.07	0.34	0.57	0.01	0.11

Intersection Summary

Area Type:	Other
Cycle Length:	84
Actuated Cycle Length:	84
Offset:	0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle:	60
Control Type:	Pretimed
Maximum v/c Ratio:	0.57
Intersection Signal Delay:	17.3
Intersection LOS:	B
Intersection Capacity Utilization:	42.9%
ICU Level of Service:	A
Analysis Period (min):	15

Splits and Phases: 2: Zimmerman Rd & Market Dr



Lanes, Volumes, Timings
7: Zimmerman Rd & Highway 16

Timing Plan: PM
02-26-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	515	289	4	2	372	87	5	5	2	103	9	486
Future Volume (vph)	515	289	4	2	372	87	5	5	2	103	9	486
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	160.0		0.0	110.0		100.0	0.0		0.0	0.0		25.0
Storage Lanes	2		0	1		1	1		0	1		1
Taper Length (m)	75.0			75.0			2.5			2.5		
Lane Util. Factor	0.97	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Ped Bike Factor		1.00		1.00		0.99	0.98	0.99		0.89	0.90	0.99
Fr _t		0.998				0.850		0.962				0.850
Fl _t Protected	0.950			0.950			0.950			0.950	0.960	
Satd. Flow (prot)	3288	3379	0	1695	3390	1517	1695	1704	0	1610	1627	1517
Fl _t Permitted	0.214			0.545			0.000			0.000	0.000	
Satd. Flow (perm)	741	3379	0	969	3390	1498	0	1704	0	0	0	1495
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				336		2				572
Link Speed (k/h)		40			40			40				40
Link Distance (m)		234.1			261.1			116.7				138.4
Travel Time (s)		21.1			23.5			10.5				12.5
Confl. Peds. (#/hr)	91		12	1		1	5		5	35		8
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	606	340	5	2	438	102	6	6	2	121	11	572
Shared Lane Traffic (%)										46%		
Lane Group Flow (vph)	606	345	0	2	438	102	6	8	0	65	67	572
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			5.0			5.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA		pm+pt	NA	Free	pm+pt	NA		pm+pt	NA	Free
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6		Free	8			4		Free
Minimum Split (s)	12.8	16.7		12.8	23.0		17.3	17.3		17.3	17.3	
Total Split (s)	40.0	45.0		20.0	25.0		20.0	20.0		25.0	25.0	
Total Split (%)	36.4%	40.9%		18.2%	22.7%		18.2%	18.2%		22.7%	22.7%	
Maximum Green (s)	32.2	38.3		12.2	18.3		12.7	12.7		17.7	17.7	
Yellow Time (s)	4.3	5.2		4.3	5.2		3.5	3.5		3.8	3.8	
All-Red Time (s)	3.5	1.5		3.5	1.5		3.8	3.8		3.5	3.5	
Lost Time Adjust (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Total Lost Time (s)	9.8	8.7		9.8	8.7		9.3	9.3		9.3	9.3	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag		Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Walk Time (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Flash Dont Walk (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Pedestrian Calls (#/hr)		2			2		2	2		2	2	
Act Effct Green (s)	55.2	36.3		25.4	16.3	110.0	10.7	10.7		15.7	15.7	110.0

Lanes, Volumes, Timings
10: Zimmerman Rd & Meadows Pkwy

Timing Plan: PM
02-26-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 		 	 		 	 	
Traffic Volume (vph)	64	420	116	17	360	7	233	47	31	7	16	3
Future Volume (vph)	64	420	116	17	360	7	233	47	31	7	16	3
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	75.0		75.0	75.0		75.0	90.0		95.0	90.0		95.0
Storage Lanes	1		1	1		1	2		1	2		1
Taper Length (m)	35.0			35.0			45.0			45.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Ped Bike Factor	1.00		0.99	1.00		0.98	1.00		0.99	1.00		0.99
Fr _t			0.850			0.850			0.850			0.850
Fl _t Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	3390	1517	1695	3390	1517	3288	3390	1517	3288	3390	1517
Fl _t Permitted	0.482			0.413			0.744			0.719		
Satd. Flow (perm)	858	3390	1495	736	3390	1481	2565	3390	1495	2479	3390	1495
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			182			182			186			186
Link Speed (k/h)		40			40			40			40	
Link Distance (m)		172.9			198.7			264.3			329.6	
Travel Time (s)		15.6			17.9			23.8			29.7	
Confl. Peds. (#/hr)	2		2	2		2	2		2	2		2
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	75	494	136	20	424	8	274	55	36	8	19	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	75	494	136	20	424	8	274	55	36	8	19	4
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			7.4			7.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Minimum Split (s)	10.4	27.9	27.9	10.4	27.9	27.9	11.2	25.6	25.6	10.6	25.6	25.6
Total Split (s)	16.0	30.0	30.0	16.0	30.0	30.0	12.0	27.0	27.0	12.0	27.0	27.0
Total Split (%)	18.8%	35.3%	35.3%	18.8%	35.3%	35.3%	14.1%	31.8%	31.8%	14.1%	31.8%	31.8%
Maximum Green (s)	10.6	24.1	24.1	10.6	24.1	24.1	5.8	21.4	21.4	6.4	21.4	21.4
Yellow Time (s)	3.0	3.5	3.5	3.0	3.5	3.5	3.2	3.8	3.8	3.2	3.8	3.8
All-Red Time (s)	2.4	2.4	2.4	2.4	2.4	2.4	3.0	1.8	1.8	2.4	1.8	1.8
Lost Time Adjust (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Total Lost Time (s)	7.4	7.9	7.9	7.4	7.9	7.9	8.2	7.6	7.6	7.6	7.6	7.6
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		15.0	15.0		15.0	15.0		13.0	13.0		13.0	13.0
Pedestrian Calls (#/hr)		2	2		2	2		2	2		2	2
Act Effct Green (s)	31.2	22.1	22.1	31.2	22.1	22.1	22.6	19.4	19.4	23.8	19.4	19.4

Lanes, Volumes, Timings
 10: Zimmerman Rd & Meadows Pkwy

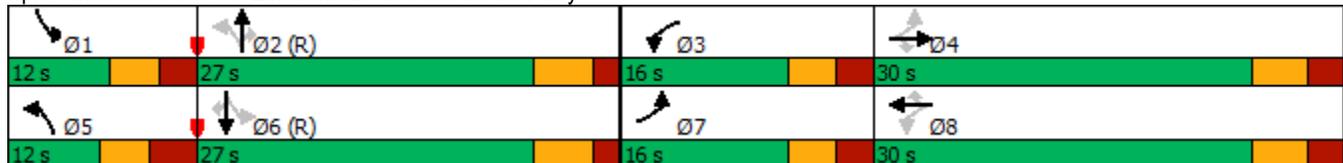
Timing Plan: PM
 02-26-2024

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Actuated g/C Ratio	0.37	0.26	0.26	0.37	0.26	0.26	0.27	0.23	0.23	0.28	0.23	0.23
v/c Ratio	0.19	0.56	0.26	0.05	0.48	0.02	0.38	0.07	0.07	0.01	0.02	0.01
Control Delay	14.9	30.2	3.0	13.6	28.8	0.0	22.9	26.1	0.3	17.4	25.6	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.9	30.2	3.0	13.6	28.8	0.0	22.9	26.1	0.3	17.4	25.6	0.0
LOS	B	C	A	B	C	A	C	C	A	B	C	A
Approach Delay	23.3			27.6			21.2			20.2		
Approach LOS	C			C			C			C		
Queue Length 50th (m)	6.7	36.5	0.0	1.7	30.6	0.0	15.7	3.6	0.0	0.4	1.2	0.0
Queue Length 95th (m)	13.3	48.2	5.0	5.1	41.2	0.0	22.7	7.7	0.0	1.7	3.7	0.0
Internal Link Dist (m)	148.9			174.7			240.3			305.6		
Turn Bay Length (m)	75.0		75.0	75.0		75.0	90.0		95.0	90.0		95.0
Base Capacity (vph)	399	881	523	367	881	519	714	773	484	735	773	484
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.19	0.56	0.26	0.05	0.48	0.02	0.38	0.07	0.07	0.01	0.02	0.01

Intersection Summary

Area Type: Other
 Cycle Length: 85
 Actuated Cycle Length: 85
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 80
 Control Type: Pretimed
 Maximum v/c Ratio: 0.56
 Intersection Signal Delay: 24.0
 Intersection LOS: C
 Intersection Capacity Utilization 61.8%
 ICU Level of Service B
 Analysis Period (min) 15

Splits and Phases: 10: Zimmerman Rd & Meadows Pkwy



HCM Unsignalized Intersection Capacity Analysis
 13: Zimmerman Rd & 8 St E

Timing Plan: PM
 02-26-2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	4	5	2	5	2	11	30	2	2	20	3
Future Volume (Veh/h)	3	4	5	2	5	2	11	30	2	2	20	3
Sign Control		Free			Free			Yield			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	4	5	6	2	6	2	13	35	2	2	24	4
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	8			11			43	28	8	46	30	7
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	8			11			43	28	8	46	30	7
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			99	96	100	100	97	100
cM capacity (veh/h)	1612			1608			933	862	1074	921	860	1075
Direction, Lane #												
	EB 1	WB 1	NB 1	SB 1								
Volume Total	15	10	50	30								
Volume Left	4	2	13	2								
Volume Right	6	2	2	4								
cSH	1612	1608	886	887								
Volume to Capacity	0.00	0.00	0.06	0.03								
Queue Length 95th (m)	0.1	0.0	1.4	0.8								
Control Delay (s)	1.9	1.5	9.3	9.2								
Lane LOS	A	A	A	A								
Approach Delay (s)	1.9	1.5	9.3	9.2								
Approach LOS			A	A								
Intersection Summary												
Average Delay			7.5									
Intersection Capacity Utilization			18.7%		ICU Level of Service				A			
Analysis Period (min)			15									

**2029 FUTURE
BACKGROUND- AM**

Lanes, Volumes, Timings
2: Zimmerman Rd & Market Dr

Timing Plan: AM
02-26-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	115	65	388	80	27	2	150	276	256	2	357	43
Future Volume (vph)	115	65	388	80	27	2	150	276	256	2	357	43
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	70.0		0.0	90.0		0.0	0.0		0.0	90.0		0.0
Storage Lanes	1		1	2		1	1		1	1		1
Taper Length (m)	25.0			25.0			2.5			25.0		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	1.00		0.99	1.00		0.99	1.00		0.99	1.00		0.99
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	1784	1517	3288	1784	1517	1695	3390	1517	1695	3390	1517
Flt Permitted	0.736			0.708			0.465			0.555		
Satd. Flow (perm)	1310	1784	1495	2441	1784	1495	828	3390	1494	988	3390	1494
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			440			171			301			183
Link Speed (k/h)		40			40			40			40	
Link Distance (m)		152.9			162.6			138.4			264.3	
Travel Time (s)		13.8			14.6			12.5			23.8	
Confl. Peds. (#/hr)	2		2	2		2	2		2	2		2
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	135	76	456	94	32	2	176	325	301	2	420	51
Shared Lane Traffic (%)												
Lane Group Flow (vph)	135	76	456	94	32	2	176	325	301	2	420	51
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			7.4			7.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Minimum Split (s)	11.2	29.8	29.8	11.8	29.8	29.8	11.2	25.7	25.7	11.2	25.7	25.7
Total Split (s)	17.0	31.0	31.0	17.0	31.0	31.0	16.0	36.0	36.0	16.0	36.0	36.0
Total Split (%)	17.0%	31.0%	31.0%	17.0%	31.0%	31.0%	16.0%	36.0%	36.0%	16.0%	36.0%	36.0%
Maximum Green (s)	10.8	24.2	24.2	10.2	24.2	24.2	9.8	30.3	30.3	9.8	30.3	30.3
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.2	3.8	3.8	3.2	3.8	3.8
All-Red Time (s)	2.7	3.3	3.3	3.3	3.3	3.3	3.0	1.9	1.9	3.0	1.9	1.9
Lost Time Adjust (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Total Lost Time (s)	8.2	8.8	8.8	8.8	8.8	8.8	8.2	7.7	7.7	8.2	7.7	7.7
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		16.0	16.0		16.0	16.0		13.0	13.0		13.0	13.0
Pedestrian Calls (#/hr)		2	2		2	2		2	2		2	2
Act Effct Green (s)	31.6	22.2	22.2	30.4	22.2	22.2	35.6	28.3	28.3	35.6	28.3	28.3

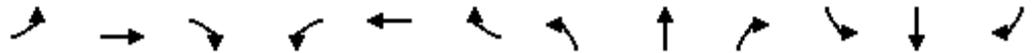
Lanes, Volumes, Timings
7: Zimmerman Rd & Highway 16

Timing Plan: AM
02-26-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 	 		 	 	 	 				 	 
Traffic Volume (vph)	463	220	44	4	278	100	5	2	2	128	10	638
Future Volume (vph)	463	220	44	4	278	100	5	2	2	128	10	638
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	160.0		0.0	110.0		100.0	0.0		0.0	0.0		25.0
Storage Lanes	2		0	1		1	1		0	1		1
Taper Length (m)	75.0			75.0			2.5			2.5		
Lane Util. Factor	0.97	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Ped Bike Factor		0.99		1.00		0.99	0.99	0.99		0.89	0.90	0.99
Fr _t		0.975				0.850		0.925				0.850
Fl _t Protected	0.950			0.950			0.950			0.950	0.959	
Satd. Flow (prot)	3288	3259	0	1695	3390	1517	1695	1627	0	1610	1626	1517
Fl _t Permitted	0.320			0.563			0.000			0.000	0.000	
Satd. Flow (perm)	1108	3259	0	1001	3390	1498	0	1627	0	0	0	1495
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		23				336		2				751
Link Speed (k/h)		40			40			40				40
Link Distance (m)		234.1			261.1			116.7				138.4
Travel Time (s)		21.1			23.5			10.5				12.5
Confl. Peds. (#/hr)	91		12	1		1	5		5	35		8
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	545	259	52	5	327	118	6	2	2	151	12	751
Shared Lane Traffic (%)										46%		
Lane Group Flow (vph)	545	311	0	5	327	118	6	4	0	82	81	751
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			5.0			5.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA		pm+pt	NA	Free	pm+pt	NA		pm+pt	NA	Free
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6		Free	8			4		Free
Minimum Split (s)	12.8	16.7		12.8	23.0		17.3	17.3		17.3	17.3	
Total Split (s)	40.0	45.0		20.0	25.0		20.0	20.0		25.0	25.0	
Total Split (%)	36.4%	40.9%		18.2%	22.7%		18.2%	18.2%		22.7%	22.7%	
Maximum Green (s)	32.2	38.3		12.2	18.3		12.7	12.7		17.7	17.7	
Yellow Time (s)	4.3	5.2		4.3	5.2		3.5	3.5		3.8	3.8	
All-Red Time (s)	3.5	1.5		3.5	1.5		3.8	3.8		3.5	3.5	
Lost Time Adjust (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Total Lost Time (s)	9.8	8.7		9.8	8.7		9.3	9.3		9.3	9.3	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag		Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Walk Time (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Flash Dont Walk (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Pedestrian Calls (#/hr)		2			2		2	2		2	2	
Act Effct Green (s)	55.2	36.3		25.4	16.3	110.0	10.7	10.7		15.7	15.7	110.0

Lanes, Volumes, Timings
7: Zimmerman Rd & Highway 16

Timing Plan: AM
02-26-2024

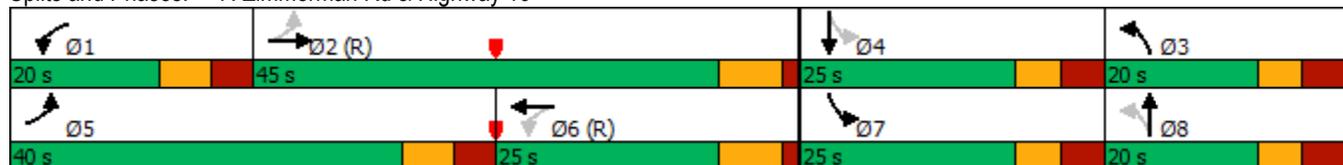


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Actuated g/C Ratio	0.50	0.33		0.23	0.15	1.00	0.10	0.10		0.14	0.14	1.00
v/c Ratio	0.47	0.29		0.02	0.65	0.08	0.04	0.03		0.36	0.35	0.50
Control Delay	17.9	26.0		18.0	51.0	0.1	45.8	37.3		47.6	47.3	1.2
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	17.9	26.0		18.0	51.0	0.1	45.8	37.3		47.6	47.3	1.2
LOS	B	C		B	D	A	D	D		D	D	A
Approach Delay		20.9			37.3			42.4			9.5	
Approach LOS		C			D			D			A	
Queue Length 50th (m)	34.6	23.7		0.5	35.3	0.0	1.2	0.4		16.9	16.7	0.0
Queue Length 95th (m)	43.0	32.6		2.3	47.0	0.0	5.0	3.6		30.5	30.3	0.0
Internal Link Dist (m)		210.1			237.1			92.7			114.4	
Turn Bay Length (m)	160.0			110.0		100.0						25.0
Base Capacity (vph)	1154	1090		295	502	1498	164	160		229	232	1495
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.47	0.29		0.02	0.65	0.08	0.04	0.03		0.36	0.35	0.50

Intersection Summary

Area Type: Other
 Cycle Length: 110
 Actuated Cycle Length: 110
 Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 75
 Control Type: Pretimed
 Maximum v/c Ratio: 0.65
 Intersection Signal Delay: 19.6
 Intersection LOS: B
 Intersection Capacity Utilization 55.2%
 ICU Level of Service B
 Analysis Period (min) 15

Splits and Phases: 7: Zimmerman Rd & Highway 16



Lanes, Volumes, Timings
10: Zimmerman Rd & Meadows Pkwy

Timing Plan: AM
02-26-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	260	285	26	108	5	160	114	2	13	105	5
Future Volume (vph)	10	260	285	26	108	5	160	114	2	13	105	5
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	75.0		75.0	75.0		75.0	90.0		95.0	90.0		95.0
Storage Lanes	1		1	1		1	2		1	2		1
Taper Length (m)	35.0			35.0			45.0			45.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Ped Bike Factor	1.00		0.99	1.00		0.98	1.00		0.99	1.00		0.99
Fr _t			0.850			0.850			0.850			0.850
Fl _t Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	3390	1517	1695	3390	1517	3288	3390	1517	3288	3390	1517
Fl _t Permitted	0.671			0.565			0.673			0.667		
Satd. Flow (perm)	1193	3390	1495	1007	3390	1481	2321	3390	1495	2301	3390	1495
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			335			182			186			186
Link Speed (k/h)		40			40			40			40	
Link Distance (m)		172.9			198.7			264.3			329.6	
Travel Time (s)		15.6			17.9			23.8			29.7	
Confl. Peds. (#/hr)	2		2	2		2	2		2	2		2
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	12	306	335	31	127	6	188	134	2	15	124	6
Shared Lane Traffic (%)												
Lane Group Flow (vph)	12	306	335	31	127	6	188	134	2	15	124	6
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			7.4			7.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Minimum Split (s)	10.4	27.9	27.9	10.4	27.9	27.9	11.2	25.6	25.6	10.6	25.6	25.6
Total Split (s)	16.0	30.0	30.0	16.0	30.0	30.0	12.0	27.0	27.0	12.0	27.0	27.0
Total Split (%)	18.8%	35.3%	35.3%	18.8%	35.3%	35.3%	14.1%	31.8%	31.8%	14.1%	31.8%	31.8%
Maximum Green (s)	10.6	24.1	24.1	10.6	24.1	24.1	5.8	21.4	21.4	6.4	21.4	21.4
Yellow Time (s)	3.0	3.5	3.5	3.0	3.5	3.5	3.2	3.8	3.8	3.2	3.8	3.8
All-Red Time (s)	2.4	2.4	2.4	2.4	2.4	2.4	3.0	1.8	1.8	2.4	1.8	1.8
Lost Time Adjust (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Total Lost Time (s)	7.4	7.9	7.9	7.4	7.9	7.9	8.2	7.6	7.6	7.6	7.6	7.6
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		15.0	15.0		15.0	15.0		13.0	13.0		13.0	13.0
Pedestrian Calls (#/hr)		2	2		2	2		2	2		2	2
Act Effct Green (s)	31.2	22.1	22.1	31.2	22.1	22.1	22.6	19.4	19.4	23.8	19.4	19.4

HCM Unsignalized Intersection Capacity Analysis
 13: Zimmerman Rd & 8 St E

Timing Plan: AM
 02-26-2024



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	1	2	2	1	3	2	2	6	2	2	10	1
Future Volume (Veh/h)	1	2	2	1	3	2	2	6	2	2	10	1
Sign Control		Free			Free			Yield			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	1	2	2	1	4	2	2	7	2	2	12	1
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	6			4			19	13	3	18	13	5
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	6			4			19	13	3	18	13	5
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	99	100	100	99	100
cM capacity (veh/h)	1615			1618			983	880	1081	988	880	1078
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	5	7	11	15								
Volume Left	1	1	2	2								
Volume Right	2	2	2	1								
cSH	1615	1618	929	905								
Volume to Capacity	0.00	0.00	0.01	0.02								
Queue Length 95th (m)	0.0	0.0	0.3	0.4								
Control Delay (s)	1.4	1.0	8.9	9.0								
Lane LOS	A	A	A	A								
Approach Delay (s)	1.4	1.0	8.9	9.0								
Approach LOS			A	A								
Intersection Summary												
Average Delay			6.5									
Intersection Capacity Utilization			16.7%		ICU Level of Service				A			
Analysis Period (min)			15									

**2029 FUTURE
BACKGROUND- PM**

Lanes, Volumes, Timings
2: Zimmerman Rd & Market Dr

Timing Plan: PM
02-26-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	92	132	252	417	149	149	447	428	394	128	467	128
Future Volume (vph)	92	132	252	417	149	149	447	428	394	128	467	128
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	70.0		0.0	90.0		0.0	0.0		0.0	90.0		0.0
Storage Lanes	1		1	2		1	1		1	1		1
Taper Length (m)	25.0			25.0			2.5			25.0		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	1.00		0.99	1.00		0.99	1.00		0.98	1.00		0.98
Fr _t			0.850			0.850			0.850			0.850
Fl _t Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	1784	1517	3288	1784	1517	1695	3390	1517	1695	3390	1517
Fl _t Permitted	0.647			0.538			0.269			0.314		
Satd. Flow (perm)	1152	1784	1494	1856	1784	1494	479	3390	1493	560	3390	1493
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			267			175			464			154
Link Speed (k/h)		40			40			40			40	
Link Distance (m)		152.9			162.6			138.4			264.3	
Travel Time (s)		13.8			14.6			12.5			23.8	
Confl. Peds. (#/hr)	2		2	2		2	2		2	2		2
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	108	155	296	491	175	175	526	504	464	151	549	151
Shared Lane Traffic (%)												
Lane Group Flow (vph)	108	155	296	491	175	175	526	504	464	151	549	151
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			7.4			7.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Minimum Split (s)	11.2	29.8	29.8	11.8	29.8	29.8	11.2	25.7	25.7	11.2	25.7	25.7
Total Split (s)	31.0	31.0	31.0	36.0	36.0	36.0	16.0	32.0	32.0	16.0	32.0	32.0
Total Split (%)	27.0%	27.0%	27.0%	31.3%	31.3%	31.3%	13.9%	27.8%	27.8%	13.9%	27.8%	27.8%
Maximum Green (s)	24.8	24.2	24.2	29.2	29.2	29.2	9.8	26.3	26.3	9.8	26.3	26.3
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.2	3.8	3.8	3.2	3.8	3.8
All-Red Time (s)	2.7	3.3	3.3	3.3	3.3	3.3	3.0	1.9	1.9	3.0	1.9	1.9
Lost Time Adjust (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Total Lost Time (s)	8.2	8.8	8.8	8.8	8.8	8.8	8.2	7.7	7.7	8.2	7.7	7.7
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		16.0	16.0		16.0	16.0		13.0	13.0		13.0	13.0
Pedestrian Calls (#/hr)		2	2		2	2		2	2		2	2
Act Effct Green (s)	45.6	22.2	22.2	54.4	27.2	27.2	31.6	24.3	24.3	31.6	24.3	24.3

Lanes, Volumes, Timings
2: Zimmerman Rd & Market Dr

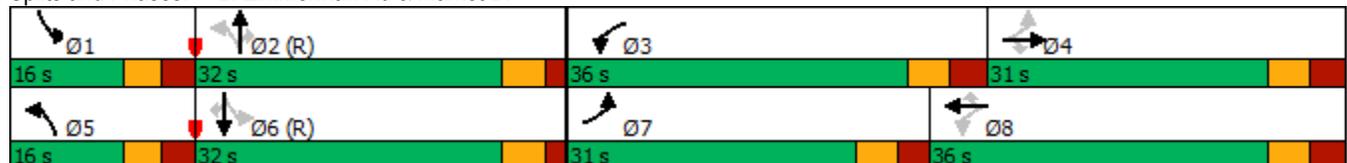
Timing Plan: PM
02-26-2024

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Actuated g/C Ratio	0.40	0.19	0.19	0.47	0.24	0.24	0.27	0.21	0.21	0.27	0.21	0.21
v/c Ratio	0.19	0.45	0.59	0.40	0.42	0.36	2.46	0.70	0.68	0.66	0.77	0.35
Control Delay	16.5	45.9	12.3	17.7	40.8	7.5	689.9	48.1	9.3	43.7	50.8	8.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.5	45.9	12.3	17.7	40.8	7.5	689.9	48.1	9.3	43.7	50.8	8.1
LOS	B	D	B	B	D	A	F	D	A	D	D	A
Approach Delay	22.4			20.4			262.0			42.0		
Approach LOS	C			C			F			D		
Queue Length 50th (m)	12.2	31.1	5.4	31.9	33.5	0.0	~175.0	55.7	0.0	24.2	61.6	0.0
Queue Length 95th (m)	20.4	48.4	24.8	39.8	50.7	14.0	#222.7	69.1	19.0	37.7	75.7	13.2
Internal Link Dist (m)	128.9			138.6			114.4			240.3		
Turn Bay Length (m)	70.0			90.0			90.0			90.0		
Base Capacity (vph)	564	344	503	1216	421	486	214	716	681	230	716	436
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.19	0.45	0.59	0.40	0.42	0.36	2.46	0.70	0.68	0.66	0.77	0.35

Intersection Summary

Area Type: Other
 Cycle Length: 115
 Actuated Cycle Length: 115
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 110
 Control Type: Pretimed
 Maximum v/c Ratio: 2.46
 Intersection Signal Delay: 122.0 Intersection LOS: F
 Intersection Capacity Utilization 102.0% ICU Level of Service G
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 2: Zimmerman Rd & Market Dr



Lanes, Volumes, Timings
7: Zimmerman Rd & Highway 16

Timing Plan: PM
02-26-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1042	345	5	10	421	249	60	19	2	224	10	892
Future Volume (vph)	1042	345	5	10	421	249	60	19	2	224	10	892
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	160.0		0.0	110.0		100.0	0.0		0.0	0.0		25.0
Storage Lanes	2		0	1		1	1		0	1		1
Taper Length (m)	75.0			75.0			2.5			2.5		
Lane Util. Factor	0.97	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Ped Bike Factor		1.00		1.00		0.99	0.99	1.00		0.89	0.90	0.99
Fr _t		0.998				0.850		0.987				0.850
Fl _t Protected	0.950			0.950			0.950			0.950	0.956	
Satd. Flow (prot)	3288	3379	0	1695	3390	1517	1695	1757	0	1610	1621	1517
Fl _t Permitted	0.165			0.510			0.000			0.000	0.000	
Satd. Flow (perm)	571	3379	0	907	3390	1498	0	1757	0	0	0	1495
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				336		2				705
Link Speed (k/h)		40			40			40				40
Link Distance (m)		234.1			261.1			116.7				138.4
Travel Time (s)		21.1			23.5			10.5				12.5
Confl. Peds. (#/hr)	91		12	1		1	5		5	35		8
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	1226	406	6	12	495	293	71	22	2	264	12	1049
Shared Lane Traffic (%)										48%		
Lane Group Flow (vph)	1226	412	0	12	495	293	71	24	0	137	139	1049
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			5.0			5.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA		pm+pt	NA	Free	pm+pt	NA		pm+pt	NA	Free
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6		Free	8			4		Free
Minimum Split (s)	12.8	16.7		12.8	23.0		17.3	17.3		17.3	17.3	
Total Split (s)	40.0	45.0		20.0	25.0		20.0	20.0		25.0	25.0	
Total Split (%)	36.4%	40.9%		18.2%	22.7%		18.2%	18.2%		22.7%	22.7%	
Maximum Green (s)	32.2	38.3		12.2	18.3		12.7	12.7		17.7	17.7	
Yellow Time (s)	4.3	5.2		4.3	5.2		3.5	3.5		3.8	3.8	
All-Red Time (s)	3.5	1.5		3.5	1.5		3.8	3.8		3.5	3.5	
Lost Time Adjust (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Total Lost Time (s)	9.8	8.7		9.8	8.7		9.3	9.3		9.3	9.3	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag		Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Walk Time (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Flash Dont Walk (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Pedestrian Calls (#/hr)		2			2		2	2		2	2	
Act Effct Green (s)	55.2	36.3		25.4	16.3	110.0	10.7	10.7		15.7	15.7	110.0

Lanes, Volumes, Timings
7: Zimmerman Rd & Highway 16

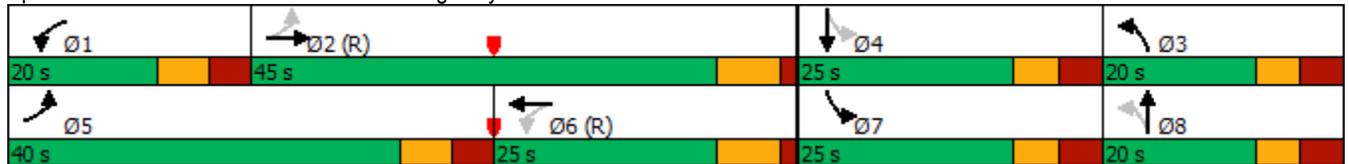
Timing Plan: PM
02-26-2024

	↖	→	↘	↙	←	↖	↙	↑	↘	↘	↓	↙
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Actuated g/C Ratio	0.50	0.33		0.23	0.15	1.00	0.10	0.10		0.14	0.14	1.00
v/c Ratio	1.19	0.37		0.04	0.99	0.20	0.43	0.14		0.60	0.60	0.70
Control Delay	123.4	29.2		18.3	84.3	0.3	55.6	44.8		56.0	56.1	2.8
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	123.4	29.2		18.3	84.3	0.3	55.6	44.8		56.0	56.1	2.8
LOS	F	C		B	F	A	E	D		E	E	A
Approach Delay		99.7			52.5			52.9			13.9	
Approach LOS		F			D			D			B	
Queue Length 50th (m)	~149.1	35.2		1.2	56.5	0.0	14.6	4.4		29.3	29.7	0.0
Queue Length 95th (m)	#171.9	45.3		4.0	#81.7	0.0	27.3	11.8		47.3	48.1	0.0
Internal Link Dist (m)		210.1			237.1			92.7			114.4	
Turn Bay Length (m)	160.0			110.0		100.0						25.0
Base Capacity (vph)	1032	1115		282	502	1498	164	172		229	231	1495
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio	1.19	0.37		0.04	0.99	0.20	0.43	0.14		0.60	0.60	0.70

Intersection Summary

Area Type: Other
 Cycle Length: 110
 Actuated Cycle Length: 110
 Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 100
 Control Type: Pretimed
 Maximum v/c Ratio: 1.19
 Intersection Signal Delay: 59.3 Intersection LOS: E
 Intersection Capacity Utilization 79.4% ICU Level of Service D
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 7: Zimmerman Rd & Highway 16



Lanes, Volumes, Timings
10: Zimmerman Rd & Meadows Pkwy

Timing Plan: PM
02-26-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 		 	 		 	 	
Traffic Volume (vph)	13	526	411	179	447	30	553	101	132	26	115	14
Future Volume (vph)	13	526	411	179	447	30	553	101	132	26	115	14
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	75.0		75.0	75.0		75.0	90.0		95.0	90.0		95.0
Storage Lanes	1		1	1		1	2		1	2		1
Taper Length (m)	35.0			35.0			45.0			45.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Ped Bike Factor	1.00		0.99	1.00		0.98	1.00		0.99	1.00		0.99
Fr _t			0.850			0.850			0.850			0.850
Fl _t Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	3390	1517	1695	3390	1517	3288	3390	1517	3288	3390	1517
Fl _t Permitted	0.384			0.304			0.666			0.677		
Satd. Flow (perm)	684	3390	1495	542	3390	1481	2297	3390	1495	2335	3390	1495
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			484			182			186			186
Link Speed (k/h)		40			40			40			40	
Link Distance (m)		172.9			198.7			264.3			329.6	
Travel Time (s)		15.6			17.9			23.8			29.7	
Confl. Peds. (#/hr)	2		2	2		2	2		2	2		2
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	15	619	484	211	526	35	651	119	155	31	135	16
Shared Lane Traffic (%)												
Lane Group Flow (vph)	15	619	484	211	526	35	651	119	155	31	135	16
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			7.4			7.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Minimum Split (s)	10.4	27.9	27.9	10.4	27.9	27.9	11.2	25.6	25.6	10.6	25.6	25.6
Total Split (s)	16.0	30.0	30.0	16.0	30.0	30.0	12.0	27.0	27.0	12.0	27.0	27.0
Total Split (%)	18.8%	35.3%	35.3%	18.8%	35.3%	35.3%	14.1%	31.8%	31.8%	14.1%	31.8%	31.8%
Maximum Green (s)	10.6	24.1	24.1	10.6	24.1	24.1	5.8	21.4	21.4	6.4	21.4	21.4
Yellow Time (s)	3.0	3.5	3.5	3.0	3.5	3.5	3.2	3.8	3.8	3.2	3.8	3.8
All-Red Time (s)	2.4	2.4	2.4	2.4	2.4	2.4	3.0	1.8	1.8	2.4	1.8	1.8
Lost Time Adjust (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Total Lost Time (s)	7.4	7.9	7.9	7.4	7.9	7.9	8.2	7.6	7.6	7.6	7.6	7.6
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		15.0	15.0		15.0	15.0		13.0	13.0		13.0	13.0
Pedestrian Calls (#/hr)		2	2		2	2		2	2		2	2
Act Effct Green (s)	31.2	22.1	22.1	31.2	22.1	22.1	22.6	19.4	19.4	23.8	19.4	19.4

HCM Unsignalized Intersection Capacity Analysis
 13: Zimmerman Rd & 8 St E

Timing Plan: PM
 02-26-2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	4	6	2	6	2	12	34	2	2	22	3
Future Volume (Veh/h)	3	4	6	2	6	2	12	34	2	2	22	3
Sign Control		Free			Free			Yield			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	4	5	7	2	7	2	14	40	2	2	26	4
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	9			12			46	30	8	50	32	8
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	9			12			46	30	8	50	32	8
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			98	95	100	100	97	100
cM capacity (veh/h)	1611			1607			928	860	1073	911	858	1074
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	16	11	56	32								
Volume Left	4	2	14	2								
Volume Right	7	2	2	4								
cSH	1611	1607	883	883								
Volume to Capacity	0.00	0.00	0.06	0.04								
Queue Length 95th (m)	0.1	0.0	1.5	0.9								
Control Delay (s)	1.8	1.3	9.4	9.2								
Lane LOS	A	A	A	A								
Approach Delay (s)	1.8	1.3	9.4	9.2								
Approach LOS			A	A								
Intersection Summary												
Average Delay			7.5									
Intersection Capacity Utilization			19.4%		ICU Level of Service				A			
Analysis Period (min)			15									

**2034 FUTURE
BACKGROUND- AM**

Lanes, Volumes, Timings
2: Zimmerman Rd & Market Dr

Timing Plan: AM
02-26-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	121	68	407	84	28	5	158	337	269	5	436	45
Future Volume (vph)	121	68	407	84	28	5	158	337	269	5	436	45
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	70.0		0.0	90.0		0.0	0.0		0.0	90.0		0.0
Storage Lanes	1		1	2		1	1		1	1		1
Taper Length (m)	25.0			25.0			2.5			25.0		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	1.00		0.99	1.00		0.99	1.00		0.99	1.00		0.99
Fr _t			0.850			0.850			0.850			0.850
Fl _t Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	1784	1517	3288	1784	1517	1695	3390	1517	1695	3390	1517
Fl _t Permitted	0.736			0.705			0.382			0.487		
Satd. Flow (perm)	1310	1784	1495	2431	1784	1495	681	3390	1494	868	3390	1494
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			403			171			316			183
Link Speed (k/h)		40			40			40			40	
Link Distance (m)		152.9			162.6			138.4			264.3	
Travel Time (s)		13.8			14.6			12.5			23.8	
Confl. Peds. (#/hr)	2		2	2		2	2		2	2		2
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	142	80	479	99	33	6	186	396	316	6	513	53
Shared Lane Traffic (%)												
Lane Group Flow (vph)	142	80	479	99	33	6	186	396	316	6	513	53
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			7.4			7.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Minimum Split (s)	11.2	29.8	29.8	11.8	29.8	29.8	11.2	25.7	25.7	11.2	25.7	25.7
Total Split (s)	17.0	31.0	31.0	17.0	31.0	31.0	16.0	36.0	36.0	16.0	36.0	36.0
Total Split (%)	17.0%	31.0%	31.0%	17.0%	31.0%	31.0%	16.0%	36.0%	36.0%	16.0%	36.0%	36.0%
Maximum Green (s)	10.8	24.2	24.2	10.2	24.2	24.2	9.8	30.3	30.3	9.8	30.3	30.3
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.2	3.8	3.8	3.2	3.8	3.8
All-Red Time (s)	2.7	3.3	3.3	3.3	3.3	3.3	3.0	1.9	1.9	3.0	1.9	1.9
Lost Time Adjust (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Total Lost Time (s)	8.2	8.8	8.8	8.8	8.8	8.8	8.2	7.7	7.7	8.2	7.7	7.7
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		16.0	16.0		16.0	16.0		13.0	13.0		13.0	13.0
Pedestrian Calls (#/hr)		2	2		2	2		2	2		2	2
Act Effct Green (s)	31.6	22.2	22.2	30.4	22.2	22.2	35.6	28.3	28.3	35.6	28.3	28.3

Lanes, Volumes, Timings
2: Zimmerman Rd & Market Dr

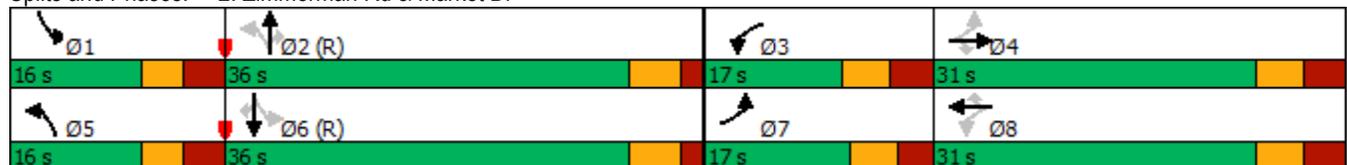
Timing Plan: AM
02-26-2024

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Actuated g/C Ratio	0.32	0.22	0.22	0.30	0.22	0.22	0.36	0.28	0.28	0.36	0.28	0.28
v/c Ratio	0.32	0.20	0.74	0.12	0.08	0.01	0.58	0.41	0.49	0.02	0.53	0.10
Control Delay	22.6	33.4	14.8	19.9	31.6	0.0	27.4	30.7	6.1	16.4	32.8	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.6	33.4	14.8	19.9	31.6	0.0	27.4	30.7	6.1	16.4	32.8	0.3
LOS	C	C	B	B	C	A	C	C	A	B	C	A
Approach Delay	18.5			21.9			21.3			29.6		
Approach LOS	B			C			C			C		
Queue Length 50th (m)	17.8	12.7	12.1	6.0	5.1	0.0	22.2	32.7	0.0	0.6	44.1	0.0
Queue Length 95th (m)	29.1	23.6	38.7	10.5	12.2	0.0	34.5	43.1	15.1	2.8	56.0	0.0
Internal Link Dist (m)	128.9			138.6			114.4			240.3		
Turn Bay Length (m)	70.0			90.0			90.0			90.0		
Base Capacity (vph)	447	396	645	809	396	464	321	959	649	373	959	554
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.32	0.20	0.74	0.12	0.08	0.01	0.58	0.41	0.49	0.02	0.53	0.10

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 80
 Control Type: Pretimed
 Maximum v/c Ratio: 0.74
 Intersection Signal Delay: 22.5
 Intersection LOS: C
 Intersection Capacity Utilization 68.7%
 ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 2: Zimmerman Rd & Market Dr



Lanes, Volumes, Timings
7: Zimmerman Rd & Highway 16

Timing Plan: AM
02-26-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 	 		 	 		 			 	 	 
Traffic Volume (vph)	486	231	46	4	292	5	5	2	2	5	11	670
Future Volume (vph)	486	231	46	4	292	5	5	2	2	5	11	670
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	160.0		0.0	110.0		100.0	0.0		0.0	0.0		25.0
Storage Lanes	2		0	1		1	1		0	1		1
Taper Length (m)	75.0			75.0			2.5			2.5		
Lane Util. Factor	0.97	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Ped Bike Factor		0.99		1.00		0.99	0.98	0.99		0.89	0.99	0.99
Fr _t		0.975				0.850		0.925				0.850
Fl _t Protected	0.950			0.950			0.950			0.950	0.996	
Satd. Flow (prot)	3288	3259	0	1695	3390	1517	1695	1627	0	1610	1688	1517
Fl _t Permitted	0.303			0.555			0.000			0.000	0.000	
Satd. Flow (perm)	1049	3259	0	987	3390	1498	0	1627	0	0	0	1495
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		22				336		2				788
Link Speed (k/h)		40			40			40				40
Link Distance (m)		234.1			261.1			116.7				138.4
Travel Time (s)		21.1			23.5			10.5				12.5
Confl. Peds. (#/hr)	91		12	1		1	5		5	35		8
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	572	272	54	5	344	6	6	2	2	6	13	788
Shared Lane Traffic (%)										10%		
Lane Group Flow (vph)	572	326	0	5	344	6	6	4	0	5	14	788
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			5.0			5.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA		pm+pt	NA	Free	pm+pt	NA		pm+pt	NA	Free
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6		Free	8			4		Free
Minimum Split (s)	12.8	16.7		12.8	23.0		17.3	17.3		17.3	17.3	
Total Split (s)	40.0	45.0		20.0	25.0		20.0	20.0		25.0	25.0	
Total Split (%)	36.4%	40.9%		18.2%	22.7%		18.2%	18.2%		22.7%	22.7%	
Maximum Green (s)	32.2	38.3		12.2	18.3		12.7	12.7		17.7	17.7	
Yellow Time (s)	4.3	5.2		4.3	5.2		3.5	3.5		3.8	3.8	
All-Red Time (s)	3.5	1.5		3.5	1.5		3.8	3.8		3.5	3.5	
Lost Time Adjust (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Total Lost Time (s)	9.8	8.7		9.8	8.7		9.3	9.3		9.3	9.3	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag		Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Walk Time (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Flash Dont Walk (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Pedestrian Calls (#/hr)		2			2		2	2		2	2	
Act Effct Green (s)	55.2	36.3		25.4	16.3	110.0	10.7	10.7		15.7	15.7	110.0

Lanes, Volumes, Timings
7: Zimmerman Rd & Highway 16

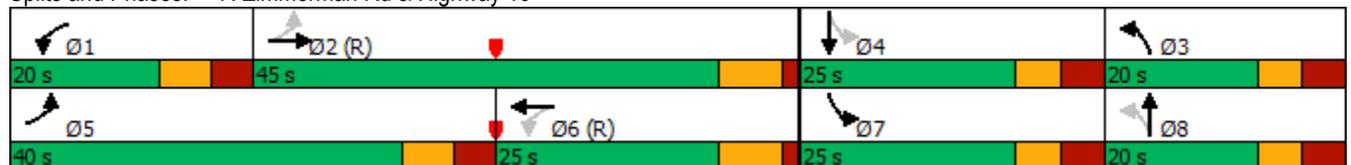
Timing Plan: AM
02-26-2024

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Actuated g/C Ratio	0.50	0.33		0.23	0.15	1.00	0.10	0.10		0.14	0.14	1.00
v/c Ratio	0.50	0.30		0.02	0.69	0.00	0.04	0.03		0.02	0.06	0.53
Control Delay	18.3	26.4		18.0	52.2	0.0	45.8	37.3		41.0	41.6	1.3
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	18.3	26.4		18.0	52.2	0.0	45.8	37.3		41.0	41.6	1.3
LOS	B	C		B	D	A	D	D		D	D	A
Approach Delay		21.2			50.9			42.4				2.3
Approach LOS		C			D			D				A
Queue Length 50th (m)	36.8	25.2		0.5	37.3	0.0	1.2	0.4		1.0	2.7	0.0
Queue Length 95th (m)	45.3	34.3		2.3	49.4	0.0	5.0	3.6		4.4	8.4	0.0
Internal Link Dist (m)		210.1			237.1			92.7				114.4
Turn Bay Length (m)	160.0			110.0		100.0						25.0
Base Capacity (vph)	1141	1090		293	502	1498	164	160		229	240	1495
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.50	0.30		0.02	0.69	0.00	0.04	0.03		0.02	0.06	0.53

Intersection Summary

Area Type: Other
 Cycle Length: 110
 Actuated Cycle Length: 110
 Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 75
 Control Type: Pretimed
 Maximum v/c Ratio: 0.69
 Intersection Signal Delay: 19.0
 Intersection LOS: B
 Intersection Capacity Utilization 53.7%
 ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 7: Zimmerman Rd & Highway 16



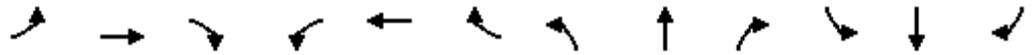
Lanes, Volumes, Timings
10: Zimmerman Rd & Meadows Pkwy

Timing Plan: AM
02-26-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	273	299	27	113	8	168	170	5	20	158	8
Future Volume (vph)	15	273	299	27	113	8	168	170	5	20	158	8
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	75.0		75.0	75.0		75.0	90.0		95.0	90.0		95.0
Storage Lanes	1		1	1		1	2		1	2		1
Taper Length (m)	35.0			35.0			45.0			45.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Ped Bike Factor	1.00		0.99	1.00		0.98	1.00		0.99	1.00		0.99
Fr _t			0.850			0.850			0.850			0.850
Fl _t Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	3390	1517	1695	3390	1517	3288	3390	1517	3288	3390	1517
Fl _t Permitted	0.668			0.557			0.635			0.626		
Satd. Flow (perm)	1188	3390	1495	992	3390	1481	2191	3390	1495	2160	3390	1495
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			352			182			186			186
Link Speed (k/h)		40			40			40			40	
Link Distance (m)		172.9			198.7			264.3			329.6	
Travel Time (s)		15.6			17.9			23.8			29.7	
Confl. Peds. (#/hr)	2		2	2		2	2		2	2		2
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	18	321	352	32	133	9	198	200	6	24	186	9
Shared Lane Traffic (%)												
Lane Group Flow (vph)	18	321	352	32	133	9	198	200	6	24	186	9
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			7.4			7.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Minimum Split (s)	10.4	27.9	27.9	10.4	27.9	27.9	11.2	25.6	25.6	10.6	25.6	25.6
Total Split (s)	16.0	30.0	30.0	16.0	30.0	30.0	12.0	27.0	27.0	12.0	27.0	27.0
Total Split (%)	18.8%	35.3%	35.3%	18.8%	35.3%	35.3%	14.1%	31.8%	31.8%	14.1%	31.8%	31.8%
Maximum Green (s)	10.6	24.1	24.1	10.6	24.1	24.1	5.8	21.4	21.4	6.4	21.4	21.4
Yellow Time (s)	3.0	3.5	3.5	3.0	3.5	3.5	3.2	3.8	3.8	3.2	3.8	3.8
All-Red Time (s)	2.4	2.4	2.4	2.4	2.4	2.4	3.0	1.8	1.8	2.4	1.8	1.8
Lost Time Adjust (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Total Lost Time (s)	7.4	7.9	7.9	7.4	7.9	7.9	8.2	7.6	7.6	7.6	7.6	7.6
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		15.0	15.0		15.0	15.0		13.0	13.0		13.0	13.0
Pedestrian Calls (#/hr)		2	2		2	2		2	2		2	2
Act Effct Green (s)	31.2	22.1	22.1	31.2	22.1	22.1	22.6	19.4	19.4	23.8	19.4	19.4

HCM Unsignalized Intersection Capacity Analysis
 13: Zimmerman Rd & 8 St E

Timing Plan: AM
 02-26-2024



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (veh/h)	1	2	2	1	4	2	2	6	2	2	11	1
Future Volume (Veh/h)	1	2	2	1	4	2	2	6	2	2	11	1
Sign Control		Free			Free			Yield			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	1	2	2	1	5	2	2	7	2	2	13	1
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	7			4			20	14	3	18	14	6
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	7			4			20	14	3	18	14	6
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	99	100	100	99	100
cM capacity (veh/h)	1614			1618			979	879	1081	987	879	1077
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	5	8	11	16								
Volume Left	1	1	2	2								
Volume Right	2	2	2	1								
cSH	1614	1618	928	902								
Volume to Capacity	0.00	0.00	0.01	0.02								
Queue Length 95th (m)	0.0	0.0	0.3	0.4								
Control Delay (s)	1.5	0.9	8.9	9.1								
Lane LOS	A	A	A	A								
Approach Delay (s)	1.5	0.9	8.9	9.1								
Approach LOS			A	A								
Intersection Summary												
Average Delay			6.4									
Intersection Capacity Utilization			16.7%		ICU Level of Service				A			
Analysis Period (min)			15									

**2034 FUTURE
BACKGROUND- PM**

Lanes, Volumes, Timings
2: Zimmerman Rd & Market Dr

Timing Plan: PM
02-26-2024

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	97	139	265	438	156	156	469	523	414	134	570	134
Future Volume (vph)	97	139	265	438	156	156	469	523	414	134	570	134
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	70.0		0.0	90.0		0.0	0.0		0.0	90.0		0.0
Storage Lanes	1		1	2		1	1		1	1		1
Taper Length (m)	25.0			25.0			2.5			25.0		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	1.00		0.99	1.00		0.99	1.00		0.98	1.00		0.98
Fr _t			0.850			0.850			0.850			0.850
Fl _t Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	1784	1517	3288	1784	1517	1695	3390	1517	1695	3390	1517
Fl _t Permitted	0.641			0.521			0.165			0.209		
Satd. Flow (perm)	1141	1784	1494	1797	1784	1494	294	3390	1493	373	3390	1493
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			251			184			487			158
Link Speed (k/h)		40			40			40			40	
Link Distance (m)		152.9			162.6			138.4			264.3	
Travel Time (s)		13.8			14.6			12.5			23.8	
Confl. Peds. (#/hr)	2		2	2		2	2		2	2		2
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	114	164	312	515	184	184	552	615	487	158	671	158
Shared Lane Traffic (%)												
Lane Group Flow (vph)	114	164	312	515	184	184	552	615	487	158	671	158
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			7.4			7.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Minimum Split (s)	11.2	29.8	29.8	11.8	29.8	29.8	11.2	25.7	25.7	11.2	25.7	25.7
Total Split (s)	31.0	31.0	31.0	36.0	36.0	36.0	16.0	32.0	32.0	16.0	32.0	32.0
Total Split (%)	27.0%	27.0%	27.0%	31.3%	31.3%	31.3%	13.9%	27.8%	27.8%	13.9%	27.8%	27.8%
Maximum Green (s)	24.8	24.2	24.2	29.2	29.2	29.2	9.8	26.3	26.3	9.8	26.3	26.3
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.2	3.8	3.8	3.2	3.8	3.8
All-Red Time (s)	2.7	3.3	3.3	3.3	3.3	3.3	3.0	1.9	1.9	3.0	1.9	1.9
Lost Time Adjust (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Total Lost Time (s)	8.2	8.8	8.8	8.8	8.8	8.8	8.2	7.7	7.7	8.2	7.7	7.7
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		16.0	16.0		16.0	16.0		13.0	13.0		13.0	13.0
Pedestrian Calls (#/hr)		2	2		2	2		2	2		2	2
Act Effct Green (s)	45.6	22.2	22.2	54.4	27.2	27.2	31.6	24.3	24.3	31.6	24.3	24.3

Lanes, Volumes, Timings
2: Zimmerman Rd & Market Dr

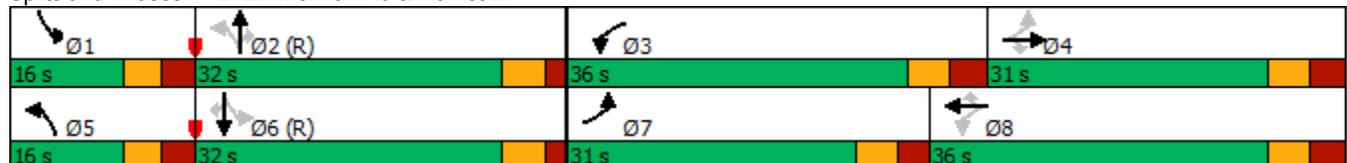
Timing Plan: PM
02-26-2024

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Actuated g/C Ratio	0.40	0.19	0.19	0.47	0.24	0.24	0.27	0.21	0.21	0.27	0.21	0.21
v/c Ratio	0.20	0.48	0.64	0.43	0.44	0.37	3.15	0.86	0.70	0.82	0.94	0.36
Control Delay	16.6	46.6	16.3	18.0	41.3	7.5	1000.2	56.9	9.4	62.8	66.4	8.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.6	46.6	16.3	18.0	41.3	7.5	1000.2	56.9	9.4	62.8	66.4	8.4
LOS	B	D	B	B	D	A	F	E	A	E	E	A
Approach Delay	24.8			20.7			357.8			56.5		
Approach LOS	C			C			F			E		
Queue Length 50th (m)	13.0	33.1	11.7	33.7	35.4	0.0	~206.0	70.7	0.0	25.5	78.6	0.0
Queue Length 95th (m)	21.4	50.9	34.1	41.8	53.3	14.4	#254.2	#85.7	19.5	#45.5	#102.3	14.1
Internal Link Dist (m)	128.9			138.6			114.4			240.3		
Turn Bay Length (m)	70.0			90.0			90.0					
Base Capacity (vph)	562	344	490	1202	421	493	175	716	699	192	716	440
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.48	0.64	0.43	0.44	0.37	3.15	0.86	0.70	0.82	0.94	0.36

Intersection Summary

Area Type: Other
 Cycle Length: 115
 Actuated Cycle Length: 115
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 130
 Control Type: Pretimed
 Maximum v/c Ratio: 3.15
 Intersection Signal Delay: 165.4 Intersection LOS: F
 Intersection Capacity Utilization 103.9% ICU Level of Service G
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 2: Zimmerman Rd & Market Dr



Lanes, Volumes, Timings
7: Zimmerman Rd & Highway 16

Timing Plan: PM
02-26-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 	 			 					 	 	
Traffic Volume (vph)	1094	362	5	11	442	261	63	20	2	235	11	937
Future Volume (vph)	1094	362	5	11	442	261	63	20	2	235	11	937
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	160.0		0.0	110.0		100.0	0.0		0.0	0.0		25.0
Storage Lanes	2		0	1		1	1		0	1		1
Taper Length (m)	75.0			75.0			2.5			2.5		
Lane Util. Factor	0.97	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Ped Bike Factor		1.00		1.00		0.99	0.99	1.00		0.89	0.90	0.99
Fr _t		0.998				0.850		0.988				0.850
Fl _t Protected	0.950			0.950			0.950			0.950	0.956	
Satd. Flow (prot)	3288	3379	0	1695	3390	1517	1695	1759	0	1610	1621	1517
Fl _t Permitted	0.153			0.501			0.000			0.000	0.000	
Satd. Flow (perm)	530	3379	0	891	3390	1498	0	1759	0	0	0	1495
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				336		2				701
Link Speed (k/h)		40			40			40				40
Link Distance (m)		234.1			261.1			116.7				138.4
Travel Time (s)		21.1			23.5			10.5				12.5
Confl. Peds. (#/hr)	91		12	1		1	5		5	35		8
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	1287	426	6	13	520	307	74	24	2	276	13	1102
Shared Lane Traffic (%)										48%		
Lane Group Flow (vph)	1287	432	0	13	520	307	74	26	0	144	145	1102
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			5.0			5.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA		pm+pt	NA	Free	pm+pt	NA		pm+pt	NA	Free
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6		Free	8			4		Free
Minimum Split (s)	12.8	16.7		12.8	23.0		17.3	17.3		17.3	17.3	
Total Split (s)	40.0	45.0		20.0	25.0		20.0	20.0		25.0	25.0	
Total Split (%)	36.4%	40.9%		18.2%	22.7%		18.2%	18.2%		22.7%	22.7%	
Maximum Green (s)	32.2	38.3		12.2	18.3		12.7	12.7		17.7	17.7	
Yellow Time (s)	4.3	5.2		4.3	5.2		3.5	3.5		3.8	3.8	
All-Red Time (s)	3.5	1.5		3.5	1.5		3.8	3.8		3.5	3.5	
Lost Time Adjust (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Total Lost Time (s)	9.8	8.7		9.8	8.7		9.3	9.3		9.3	9.3	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag		Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Walk Time (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Flash Dont Walk (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Pedestrian Calls (#/hr)		2			2		2	2		2	2	
Act Effct Green (s)	55.2	36.3		25.4	16.3	110.0	10.7	10.7		15.7	15.7	110.0

Lanes, Volumes, Timings
10: Zimmerman Rd & Meadows Pkwy

Timing Plan: PM
02-26-2024

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	552	432	188	469	45	581	152	139	40	173	20
Future Volume (vph)	19	552	432	188	469	45	581	152	139	40	173	20
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	75.0		75.0	75.0		75.0	90.0		95.0	90.0		95.0
Storage Lanes	1		1	1		1	2		1	2		1
Taper Length (m)	35.0			35.0			45.0			45.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Ped Bike Factor	1.00		0.99	1.00		0.98	1.00		0.99	1.00		0.99
Fr _t			0.850			0.850			0.850			0.850
Fl _t Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	3390	1517	1695	3390	1517	3288	3390	1517	3288	3390	1517
Fl _t Permitted	0.361			0.280			0.624			0.639		
Satd. Flow (perm)	643	3390	1495	499	3390	1481	2153	3390	1495	2205	3390	1495
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			418			182			186			186
Link Speed (k/h)		40			40			40			40	
Link Distance (m)		172.9			198.7			264.3			329.6	
Travel Time (s)		15.6			17.9			23.8			29.7	
Confl. Peds. (#/hr)	2		2	2		2	2		2	2		2
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	22	649	508	221	552	53	684	179	164	47	204	24
Shared Lane Traffic (%)												
Lane Group Flow (vph)	22	649	508	221	552	53	684	179	164	47	204	24
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			7.4			7.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Minimum Split (s)	10.4	27.9	27.9	10.4	27.9	27.9	11.2	25.6	25.6	10.6	25.6	25.6
Total Split (s)	16.0	30.0	30.0	16.0	30.0	30.0	12.0	27.0	27.0	12.0	27.0	27.0
Total Split (%)	18.8%	35.3%	35.3%	18.8%	35.3%	35.3%	14.1%	31.8%	31.8%	14.1%	31.8%	31.8%
Maximum Green (s)	10.6	24.1	24.1	10.6	24.1	24.1	5.8	21.4	21.4	6.4	21.4	21.4
Yellow Time (s)	3.0	3.5	3.5	3.0	3.5	3.5	3.2	3.8	3.8	3.2	3.8	3.8
All-Red Time (s)	2.4	2.4	2.4	2.4	2.4	2.4	3.0	1.8	1.8	2.4	1.8	1.8
Lost Time Adjust (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Total Lost Time (s)	7.4	7.9	7.9	7.4	7.9	7.9	8.2	7.6	7.6	7.6	7.6	7.6
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		15.0	15.0		15.0	15.0		13.0	13.0		13.0	13.0
Pedestrian Calls (#/hr)		2	2		2	2		2	2		2	2
Act Effct Green (s)	31.2	22.1	22.1	31.2	22.1	22.1	22.6	19.4	19.4	23.8	19.4	19.4

Lanes, Volumes, Timings
10: Zimmerman Rd & Meadows Pkwy

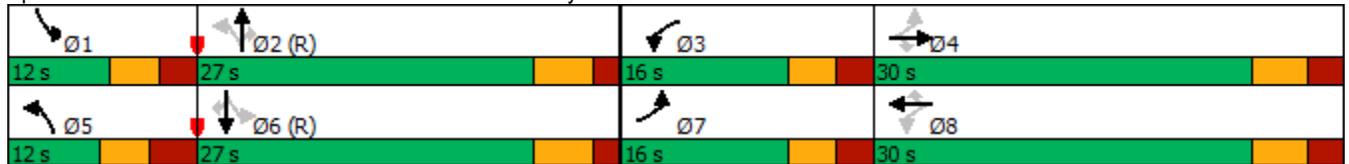
Timing Plan: PM
02-26-2024

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Actuated g/C Ratio	0.37	0.26	0.26	0.37	0.26	0.26	0.27	0.23	0.23	0.28	0.23	0.23
v/c Ratio	0.06	0.74	0.73	0.73	0.63	0.10	1.10	0.23	0.34	0.07	0.26	0.05
Control Delay	13.7	34.6	12.8	31.8	31.5	0.4	95.3	27.7	5.4	17.8	28.0	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.7	34.6	12.8	31.8	31.5	0.4	95.3	27.7	5.4	17.8	28.0	0.2
LOS	B	C	B	C	C	A	F	C	A	B	C	A
Approach Delay	24.8			29.6			69.2			23.9		
Approach LOS	C			C			E			C		
Queue Length 50th (m)	1.9	50.7	11.5	21.7	41.7	0.0	~51.6	12.5	0.0	2.4	14.3	0.0
Queue Length 95th (m)	5.4	64.5	36.7	#34.8	54.0	0.0	#78.7	19.7	9.2	5.4	22.0	0.0
Internal Link Dist (m)	148.9			174.7			240.3			305.6		
Turn Bay Length (m)	75.0		75.0	75.0		75.0	90.0		95.0	90.0		95.0
Base Capacity (vph)	342	881	698	304	881	519	623	773	484	673	773	484
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.74	0.73	0.73	0.63	0.10	1.10	0.23	0.34	0.07	0.26	0.05

Intersection Summary

Area Type: Other
 Cycle Length: 85
 Actuated Cycle Length: 85
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 90
 Control Type: Pretimed
 Maximum v/c Ratio: 1.10
 Intersection Signal Delay: 39.7 Intersection LOS: D
 Intersection Capacity Utilization 88.9% ICU Level of Service E
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 10: Zimmerman Rd & Meadows Pkwy



HCM Unsignalized Intersection Capacity Analysis
 13: Zimmerman Rd & 8 St E

Timing Plan: PM
 02-26-2024



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	4	5	6	2	6	2	13	37	2	2	24	4
Future Volume (Veh/h)	4	5	6	2	6	2	13	37	2	2	24	4
Sign Control		Free			Free			Yield			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	5	6	7	2	7	2	15	44	2	2	28	5
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	9			13			50	32	10	56	35	8
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	9			13			50	32	10	56	35	8
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			98	95	100	100	97	100
cM capacity (veh/h)	1611			1606			918	856	1072	900	854	1074
Direction, Lane #												
	EB 1	WB 1	NB 1	SB 1								
Volume Total	18	11	61	35								
Volume Left	5	2	15	2								
Volume Right	7	2	2	5								
cSH	1611	1606	877	882								
Volume to Capacity	0.00	0.00	0.07	0.04								
Queue Length 95th (m)	0.1	0.0	1.7	0.9								
Control Delay (s)	2.0	1.3	9.4	9.2								
Lane LOS	A	A	A	A								
Approach Delay (s)	2.0	1.3	9.4	9.2								
Approach LOS			A	A								
Intersection Summary												
Average Delay			7.6									
Intersection Capacity Utilization			20.2%		ICU Level of Service				A			
Analysis Period (min)			15									

**2039 FUTURE
BACKGROUND- AM**

Lanes, Volumes, Timings
2: Zimmerman Rd & Market Dr

Timing Plan: AM
02-26-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	127	72	427	88	30	2	165	398	282	2	515	47
Future Volume (vph)	127	72	427	88	30	2	165	398	282	2	515	47
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	70.0		0.0	90.0		0.0	0.0		0.0	90.0		0.0
Storage Lanes	1		1	2		1	1		1	1		1
Taper Length (m)	25.0			25.0			2.5			25.0		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	1.00		0.99	1.00		0.99	1.00		0.99	1.00		0.99
Fr _t			0.850			0.850			0.850			0.850
Fl _t Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	1784	1517	3288	1784	1517	1695	3390	1517	1695	3390	1517
Fl _t Permitted	0.734			0.702			0.307			0.421		
Satd. Flow (perm)	1306	1784	1495	2421	1784	1495	547	3390	1494	750	3390	1494
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			378			171			332			183
Link Speed (k/h)		40			40			40			40	
Link Distance (m)		152.9			162.6			138.4			264.3	
Travel Time (s)		13.8			14.6			12.5			23.8	
Confl. Peds. (#/hr)	2		2	2		2	2		2	2		2
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	149	85	502	104	35	2	194	468	332	2	606	55
Shared Lane Traffic (%)												
Lane Group Flow (vph)	149	85	502	104	35	2	194	468	332	2	606	55
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			7.4			7.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Minimum Split (s)	11.2	29.8	29.8	11.8	29.8	29.8	11.2	25.7	25.7	11.2	25.7	25.7
Total Split (s)	17.0	31.0	31.0	17.0	31.0	31.0	16.0	36.0	36.0	16.0	36.0	36.0
Total Split (%)	17.0%	31.0%	31.0%	17.0%	31.0%	31.0%	16.0%	36.0%	36.0%	16.0%	36.0%	36.0%
Maximum Green (s)	10.8	24.2	24.2	10.2	24.2	24.2	9.8	30.3	30.3	9.8	30.3	30.3
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.2	3.8	3.8	3.2	3.8	3.8
All-Red Time (s)	2.7	3.3	3.3	3.3	3.3	3.3	3.0	1.9	1.9	3.0	1.9	1.9
Lost Time Adjust (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Total Lost Time (s)	8.2	8.8	8.8	8.8	8.8	8.8	8.2	7.7	7.7	8.2	7.7	7.7
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		16.0	16.0		16.0	16.0		13.0	13.0		13.0	13.0
Pedestrian Calls (#/hr)		2	2		2	2		2	2		2	2
Act Effct Green (s)	31.6	22.2	22.2	30.4	22.2	22.2	35.6	28.3	28.3	35.6	28.3	28.3

Lanes, Volumes, Timings
7: Zimmerman Rd & Highway 16

Timing Plan: AM
02-26-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	509	242	48	4	306	110	6	2	2	141	11	702
Future Volume (vph)	509	242	48	4	306	110	6	2	2	141	11	702
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	160.0		0.0	110.0		100.0	0.0		0.0	0.0		25.0
Storage Lanes	2		0	1		1	1		0	1		1
Taper Length (m)	75.0			75.0			2.5			2.5		
Lane Util. Factor	0.97	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Ped Bike Factor		0.99		1.00		0.99	0.99	0.99		0.89	0.90	0.99
Fr _t		0.975				0.850		0.925				0.850
Fl _t Protected	0.950			0.950			0.950			0.950	0.959	
Satd. Flow (prot)	3288	3259	0	1695	3390	1517	1695	1627	0	1610	1626	1517
Fl _t Permitted	0.287			0.547			0.000			0.000	0.000	
Satd. Flow (perm)	993	3259	0	973	3390	1498	0	1627	0	0	0	1495
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		22				336		2				811
Link Speed (k/h)		40			40			40				40
Link Distance (m)		234.1			261.1			116.7				138.4
Travel Time (s)		21.1			23.5			10.5				12.5
Confl. Peds. (#/hr)	91		12	1		1	5		5	35		8
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	599	285	56	5	360	129	7	2	2	166	13	826
Shared Lane Traffic (%)										46%		
Lane Group Flow (vph)	599	341	0	5	360	129	7	4	0	90	89	826
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			5.0			5.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA		pm+pt	NA	Free	pm+pt	NA		pm+pt	NA	Free
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6		Free	8			4		Free
Minimum Split (s)	12.8	16.7		12.8	23.0		17.3	17.3		17.3	17.3	
Total Split (s)	40.0	45.0		20.0	25.0		20.0	20.0		25.0	25.0	
Total Split (%)	36.4%	40.9%		18.2%	22.7%		18.2%	18.2%		22.7%	22.7%	
Maximum Green (s)	32.2	38.3		12.2	18.3		12.7	12.7		17.7	17.7	
Yellow Time (s)	4.3	5.2		4.3	5.2		3.5	3.5		3.8	3.8	
All-Red Time (s)	3.5	1.5		3.5	1.5		3.8	3.8		3.5	3.5	
Lost Time Adjust (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Total Lost Time (s)	9.8	8.7		9.8	8.7		9.3	9.3		9.3	9.3	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag		Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Walk Time (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Flash Dont Walk (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Pedestrian Calls (#/hr)		2			2		2	2		2	2	
Act Effct Green (s)	55.2	36.3		25.4	16.3	110.0	10.7	10.7		15.7	15.7	110.0

Lanes, Volumes, Timings
7: Zimmerman Rd & Highway 16

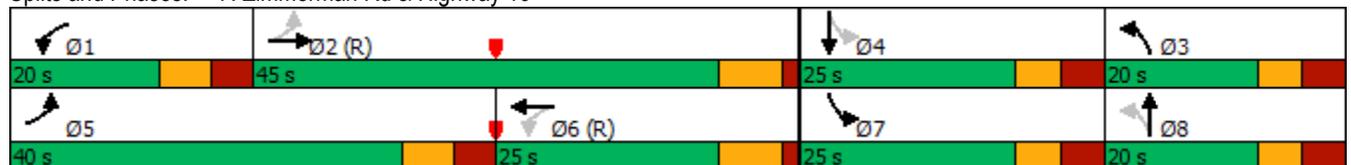
Timing Plan: AM
02-26-2024

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Actuated g/C Ratio	0.50	0.33		0.23	0.15	1.00	0.10	0.10		0.14	0.14	1.00
v/c Ratio	0.53	0.31		0.02	0.72	0.09	0.04	0.03		0.39	0.38	0.55
Control Delay	18.7	26.6		18.0	53.6	0.1	45.8	37.3		48.6	48.2	1.5
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	18.7	26.6		18.0	53.6	0.1	45.8	37.3		48.6	48.2	1.5
LOS	B	C		B	D	A	D	D		D	D	A
Approach Delay		21.6			39.2			42.7				9.8
Approach LOS		C			D			D				A
Queue Length 50th (m)	38.9	26.6		0.5	39.2	0.0	1.4	0.4		18.7	18.5	0.0
Queue Length 95th (m)	47.6	36.0		2.3	51.6	0.0	5.4	3.6		32.9	32.7	0.0
Internal Link Dist (m)		210.1			237.1			92.7				114.4
Turn Bay Length (m)	160.0			110.0		100.0						25.0
Base Capacity (vph)	1128	1090		291	502	1498	164	160		229	232	1495
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.53	0.31		0.02	0.72	0.09	0.04	0.03		0.39	0.38	0.55

Intersection Summary

Area Type: Other
 Cycle Length: 110
 Actuated Cycle Length: 110
 Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 75
 Control Type: Pretimed
 Maximum v/c Ratio: 0.72
 Intersection Signal Delay: 20.4
 Intersection LOS: C
 Intersection Capacity Utilization 57.6%
 ICU Level of Service B
 Analysis Period (min) 15

Splits and Phases: 7: Zimmerman Rd & Highway 16



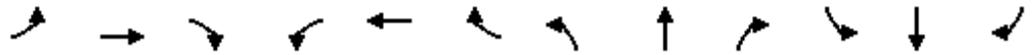
Lanes, Volumes, Timings
10: Zimmerman Rd & Meadows Pkwy

Timing Plan: AM
02-26-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	330	214	43	135	11	143	227	14	26	210	10
Future Volume (vph)	20	330	214	43	135	11	143	227	14	26	210	10
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	75.0		75.0	75.0		75.0	90.0		95.0	90.0		95.0
Storage Lanes	1		1	1		1	2		1	2		1
Taper Length (m)	35.0			35.0			45.0			45.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Ped Bike Factor	1.00		0.99	1.00		0.98	1.00		0.99	1.00		0.99
Fr _t			0.850			0.850			0.850			0.850
Fl _t Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	3390	1517	1695	3390	1517	3288	3390	1517	3288	3390	1517
Fl _t Permitted	0.651			0.519			0.599			0.587		
Satd. Flow (perm)	1158	3390	1495	925	3390	1481	2067	3390	1495	2026	3390	1495
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			252			182			186			186
Link Speed (k/h)		40			40			40			40	
Link Distance (m)		172.9			198.7			264.3			329.6	
Travel Time (s)		15.6			17.9			23.8			29.7	
Confl. Peds. (#/hr)	2		2	2		2	2		2	2		2
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	24	388	252	51	159	13	168	267	16	31	247	12
Shared Lane Traffic (%)												
Lane Group Flow (vph)	24	388	252	51	159	13	168	267	16	31	247	12
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			7.4			7.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Minimum Split (s)	10.4	27.9	27.9	10.4	27.9	27.9	11.2	25.6	25.6	10.6	25.6	25.6
Total Split (s)	16.0	30.0	30.0	16.0	30.0	30.0	12.0	27.0	27.0	12.0	27.0	27.0
Total Split (%)	18.8%	35.3%	35.3%	18.8%	35.3%	35.3%	14.1%	31.8%	31.8%	14.1%	31.8%	31.8%
Maximum Green (s)	10.6	24.1	24.1	10.6	24.1	24.1	5.8	21.4	21.4	6.4	21.4	21.4
Yellow Time (s)	3.0	3.5	3.5	3.0	3.5	3.5	3.2	3.8	3.8	3.2	3.8	3.8
All-Red Time (s)	2.4	2.4	2.4	2.4	2.4	2.4	3.0	1.8	1.8	2.4	1.8	1.8
Lost Time Adjust (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Total Lost Time (s)	7.4	7.9	7.9	7.4	7.9	7.9	8.2	7.6	7.6	7.6	7.6	7.6
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		15.0	15.0		15.0	15.0		13.0	13.0		13.0	13.0
Pedestrian Calls (#/hr)		2	2		2	2		2	2		2	2
Act Effct Green (s)	31.2	22.1	22.1	31.2	22.1	22.1	22.6	19.4	19.4	23.8	19.4	19.4

HCM Unsignalized Intersection Capacity Analysis
 13: Zimmerman Rd & 8 St E

Timing Plan: AM
 02-26-2024



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	1	3	2	1	4	2	2	7	2	3	12	1
Future Volume (Veh/h)	1	3	2	1	4	2	2	7	2	3	12	1
Sign Control		Free			Free			Yield			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	1	4	2	1	5	2	2	8	2	4	14	1
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	7			6			23	16	5	21	16	6
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	7			6			23	16	5	21	16	6
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	99	100	100	98	100
cM capacity (veh/h)	1614			1615			975	877	1078	982	877	1077
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	7	8	12	19								
Volume Left	1	1	2	4								
Volume Right	2	2	2	1								
cSH	1614	1615	921	906								
Volume to Capacity	0.00	0.00	0.01	0.02								
Queue Length 95th (m)	0.0	0.0	0.3	0.5								
Control Delay (s)	1.0	0.9	9.0	9.1								
Lane LOS	A	A	A	A								
Approach Delay (s)	1.0	0.9	9.0	9.1								
Approach LOS			A	A								
Intersection Summary												
Average Delay			6.4									
Intersection Capacity Utilization			16.7%		ICU Level of Service				A			
Analysis Period (min)			15									

**2039 FUTURE
BACKGROUND- PM**

Lanes, Volumes, Timings
2: Zimmerman Rd & Market Dr

Timing Plan: PM
02-27-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	101	145	277	459	164	164	492	618	433	141	674	141
Future Volume (vph)	101	145	277	459	164	164	492	618	433	141	674	141
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	70.0		0.0	90.0		0.0	0.0		0.0	90.0		0.0
Storage Lanes	1		1	2		1	1		1	1		1
Taper Length (m)	25.0			25.0			2.5			25.0		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	1.00		0.99	1.00		0.99	1.00		0.98	1.00		0.98
Fr _t			0.850			0.850			0.850			0.850
Fl _t Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	1784	1517	3288	1784	1517	1695	3390	1517	1695	3390	1517
Fl _t Permitted	0.636			0.507			0.165			0.165		
Satd. Flow (perm)	1132	1784	1494	1749	1784	1494	294	3390	1493	294	3390	1493
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			241			193			509			166
Link Speed (k/h)		40			40			40			40	
Link Distance (m)		152.9			162.6			138.4			264.3	
Travel Time (s)		13.8			14.6			12.5			23.8	
Confl. Peds. (#/hr)	2		2	2		2	2		2	2		2
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	119	171	326	540	193	193	579	727	509	166	793	166
Shared Lane Traffic (%)												
Lane Group Flow (vph)	119	171	326	540	193	193	579	727	509	166	793	166
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			7.4			7.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Minimum Split (s)	11.2	29.8	29.8	11.8	29.8	29.8	11.2	25.7	25.7	11.2	25.7	25.7
Total Split (s)	31.0	31.0	31.0	36.0	36.0	36.0	16.0	32.0	32.0	16.0	32.0	32.0
Total Split (%)	27.0%	27.0%	27.0%	31.3%	31.3%	31.3%	13.9%	27.8%	27.8%	13.9%	27.8%	27.8%
Maximum Green (s)	24.8	24.2	24.2	29.2	29.2	29.2	9.8	26.3	26.3	9.8	26.3	26.3
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.2	3.8	3.8	3.2	3.8	3.8
All-Red Time (s)	2.7	3.3	3.3	3.3	3.3	3.3	3.0	1.9	1.9	3.0	1.9	1.9
Lost Time Adjust (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Total Lost Time (s)	8.2	8.8	8.8	8.8	8.8	8.8	8.2	7.7	7.7	8.2	7.7	7.7
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		16.0	16.0		16.0	16.0		13.0	13.0		13.0	13.0
Pedestrian Calls (#/hr)		2	2		2	2		2	2		2	2
Act Effct Green (s)	45.6	22.2	22.2	54.4	27.2	27.2	31.6	24.3	24.3	31.6	24.3	24.3

Lanes, Volumes, Timings
2: Zimmerman Rd & Market Dr

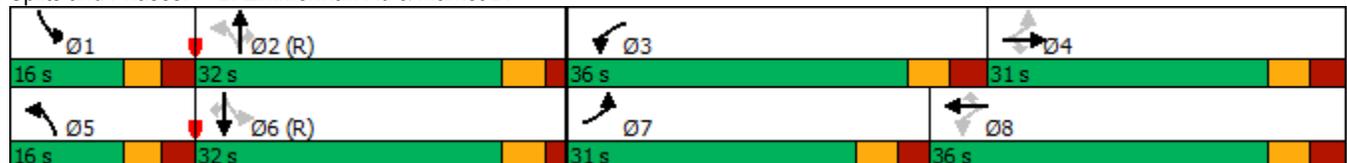
Timing Plan: PM
02-27-2024

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Actuated g/C Ratio	0.40	0.19	0.19	0.47	0.24	0.24	0.27	0.21	0.21	0.27	0.21	0.21
v/c Ratio	0.21	0.50	0.68	0.45	0.46	0.39	3.31	1.02	0.71	0.95	1.11	0.37
Control Delay	16.7	47.1	19.8	18.3	41.8	7.5	1068.8	82.8	9.6	88.6	109.4	8.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.7	47.1	19.8	18.3	41.8	7.5	1068.8	82.8	9.6	88.6	109.4	8.3
LOS	B	D	B	B	D	A	F	F	A	F	F	A
Approach Delay	26.8			20.9			376.8			91.4		
Approach LOS	C			C			F			F		
Queue Length 50th (m)	13.6	34.7	16.5	35.7	37.4	0.0	~218.9	~88.7	0.0	26.9	~107.3	0.0
Queue Length 95th (m)	22.2	52.5	40.8	44.0	55.7	14.6	#267.1	#116.2	19.4	#57.2	#132.2	14.3
Internal Link Dist (m)	128.9			138.6			114.4			240.3		
Turn Bay Length (m)	70.0			90.0			90.0			90.0		
Base Capacity (vph)	560	344	482	1191	421	500	175	716	716	175	716	446
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.21	0.50	0.68	0.45	0.46	0.39	3.31	1.02	0.71	0.95	1.11	0.37

Intersection Summary

Area Type: Other
 Cycle Length: 115
 Actuated Cycle Length: 115
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 140
 Control Type: Pretimed
 Maximum v/c Ratio: 3.31
 Intersection Signal Delay: 183.5 Intersection LOS: F
 Intersection Capacity Utilization 108.9% ICU Level of Service G
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 2: Zimmerman Rd & Market Dr



Lanes, Volumes, Timings
7: Zimmerman Rd & Highway 16

Timing Plan: PM
02-27-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1146	380	6	11	463	274	66	21	2	246	11	981
Future Volume (vph)	1146	380	6	11	463	274	66	21	2	246	11	981
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	160.0		0.0	110.0		100.0	0.0		0.0	0.0		25.0
Storage Lanes	2		0	1		1	1		0	1		1
Taper Length (m)	75.0			75.0			2.5			2.5		
Lane Util. Factor	0.97	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Ped Bike Factor		1.00		1.00		0.99	0.99	1.00		0.89	0.90	0.99
Frt		0.998				0.850		0.989				0.850
Flt Protected	0.950			0.950			0.950			0.950	0.956	
Satd. Flow (prot)	3288	3379	0	1695	3390	1517	1695	1761	0	1610	1621	1517
Flt Permitted	0.153			0.490			0.000			0.000	0.000	
Satd. Flow (perm)	530	3379	0	872	3390	1498	0	1761	0	0	0	1495
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				336		2				697
Link Speed (k/h)		40			40			40				40
Link Distance (m)		234.1			261.1			116.7				138.4
Travel Time (s)		21.1			23.5			10.5				12.5
Confl. Peds. (#/hr)	91		12	1		1	5		5	35		8
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	1348	447	7	13	545	322	78	25	2	289	13	1154
Shared Lane Traffic (%)										48%		
Lane Group Flow (vph)	1348	454	0	13	545	322	78	27	0	150	152	1154
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			5.0			5.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA		pm+pt	NA	Free	pm+pt	NA		pm+pt	NA	Free
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6		Free	8			4		Free
Minimum Split (s)	12.8	16.7		12.8	23.0		17.3	17.3		17.3	17.3	
Total Split (s)	40.0	45.0		20.0	25.0		20.0	20.0		25.0	25.0	
Total Split (%)	36.4%	40.9%		18.2%	22.7%		18.2%	18.2%		22.7%	22.7%	
Maximum Green (s)	32.2	38.3		12.2	18.3		12.7	12.7		17.7	17.7	
Yellow Time (s)	4.3	5.2		4.3	5.2		3.5	3.5		3.8	3.8	
All-Red Time (s)	3.5	1.5		3.5	1.5		3.8	3.8		3.5	3.5	
Lost Time Adjust (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Total Lost Time (s)	9.8	8.7		9.8	8.7		9.3	9.3		9.3	9.3	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag		Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Walk Time (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Flash Dont Walk (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Pedestrian Calls (#/hr)		2			2		2	2		2	2	
Act Effct Green (s)	55.2	36.3		25.4	16.3	110.0	10.7	10.7		15.7	15.7	110.0

Lanes, Volumes, Timings
10: Zimmerman Rd & Meadows Pkwy

Timing Plan: PM
02-27-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	26	667	184	27	571	60	370	202	49	53	230	27
Future Volume (vph)	26	667	184	27	571	60	370	202	49	53	230	27
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	75.0		75.0	75.0		75.0	90.0		95.0	90.0		95.0
Storage Lanes	1		1	1		1	2		1	2		1
Taper Length (m)	35.0			35.0			45.0			45.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Ped Bike Factor	1.00		0.99	1.00		0.98	1.00		0.99	1.00		0.99
Fr _t			0.850			0.850			0.850			0.850
Fl _t Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	3390	1517	1695	3390	1517	3288	3390	1517	3288	3390	1517
Fl _t Permitted	0.262			0.181			0.585			0.604		
Satd. Flow (perm)	467	3390	1495	323	3390	1481	2019	3390	1495	2084	3390	1495
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			216			182			186			186
Link Speed (k/h)		40			40			40			40	
Link Distance (m)		172.9			198.7			264.3			329.6	
Travel Time (s)		15.6			17.9			23.8			29.7	
Confl. Peds. (#/hr)	2		2	2		2	2		2	2		2
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	31	785	216	32	672	71	435	238	58	62	271	32
Shared Lane Traffic (%)												
Lane Group Flow (vph)	31	785	216	32	672	71	435	238	58	62	271	32
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			7.4			7.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Minimum Split (s)	10.4	27.9	27.9	10.4	27.9	27.9	11.2	25.6	25.6	10.6	25.6	25.6
Total Split (s)	16.0	30.0	30.0	16.0	30.0	30.0	12.0	27.0	27.0	12.0	27.0	27.0
Total Split (%)	18.8%	35.3%	35.3%	18.8%	35.3%	35.3%	14.1%	31.8%	31.8%	14.1%	31.8%	31.8%
Maximum Green (s)	10.6	24.1	24.1	10.6	24.1	24.1	5.8	21.4	21.4	6.4	21.4	21.4
Yellow Time (s)	3.0	3.5	3.5	3.0	3.5	3.5	3.2	3.8	3.8	3.2	3.8	3.8
All-Red Time (s)	2.4	2.4	2.4	2.4	2.4	2.4	3.0	1.8	1.8	2.4	1.8	1.8
Lost Time Adjust (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Total Lost Time (s)	7.4	7.9	7.9	7.4	7.9	7.9	8.2	7.6	7.6	7.6	7.6	7.6
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		15.0	15.0		15.0	15.0		13.0	13.0		13.0	13.0
Pedestrian Calls (#/hr)		2	2		2	2		2	2		2	2
Act Effct Green (s)	31.2	22.1	22.1	31.2	22.1	22.1	22.6	19.4	19.4	23.8	19.4	19.4

HCM Unsignalized Intersection Capacity Analysis
 13: Zimmerman Rd & 8 St E

Timing Plan: PM
 02-27-2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	5	7	2	7	2	15	40	2	2	26	4
Future Volume (Veh/h)	4	5	7	2	7	2	15	40	2	2	26	4
Sign Control		Free			Free			Yield			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	5	6	8	2	8	2	18	47	2	2	31	5
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	10			14			54	34	10	58	37	9
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	10			14			54	34	10	58	37	9
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			98	95	100	100	96	100
cM capacity (veh/h)	1610			1604			911	855	1071	894	852	1073
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	19	12	67	38								
Volume Left	5	2	18	2								
Volume Right	8	2	2	5								
cSH	1610	1604	875	878								
Volume to Capacity	0.00	0.00	0.08	0.04								
Queue Length 95th (m)	0.1	0.0	1.9	1.0								
Control Delay (s)	1.9	1.2	9.5	9.3								
Lane LOS	A	A	A	A								
Approach Delay (s)	1.9	1.2	9.5	9.3								
Approach LOS			A	A								
Intersection Summary												
Average Delay			7.6									
Intersection Capacity Utilization			21.3%		ICU Level of Service				A			
Analysis Period (min)			15									

**2029 TOTAL
CONDITIONS - AM**

Lanes, Volumes, Timings
2: Zimmerman Rd & Market Dr

Timing Plan: AM
03-21-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	115	65	388	160	27	5	150	306	282	5	450	43
Future Volume (vph)	115	65	388	160	27	5	150	306	282	5	450	43
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	70.0		0.0	90.0		0.0	0.0		0.0	90.0		0.0
Storage Lanes	1		1	2		1	1		1	1		1
Taper Length (m)	25.0			25.0			2.5			25.0		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	1.00		0.99	1.00		0.99	1.00		0.99	1.00		0.99
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	1784	1517	3288	1784	1517	1695	3390	1517	1695	3390	1517
Flt Permitted	0.736			0.708			0.368			0.523		
Satd. Flow (perm)	1310	1784	1495	2441	1784	1495	656	3390	1494	932	3390	1494
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			349			171			332			183
Link Speed (k/h)		40			40			40			40	
Link Distance (m)		152.9			162.6			138.4			264.3	
Travel Time (s)		13.8			14.6			12.5			23.8	
Confl. Peds. (#/hr)	2		2	2		2	2		2	2		2
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	135	76	456	188	32	6	176	360	332	6	529	51
Shared Lane Traffic (%)												
Lane Group Flow (vph)	135	76	456	188	32	6	176	360	332	6	529	51
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			7.4			7.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Minimum Split (s)	11.2	29.8	29.8	11.8	29.8	29.8	11.2	25.7	25.7	11.2	25.7	25.7
Total Split (s)	17.0	31.0	31.0	17.0	31.0	31.0	16.0	36.0	36.0	16.0	36.0	36.0
Total Split (%)	17.0%	31.0%	31.0%	17.0%	31.0%	31.0%	16.0%	36.0%	36.0%	16.0%	36.0%	36.0%
Maximum Green (s)	10.8	24.2	24.2	10.2	24.2	24.2	9.8	30.3	30.3	9.8	30.3	30.3
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.2	3.8	3.8	3.2	3.8	3.8
All-Red Time (s)	2.7	3.3	3.3	3.3	3.3	3.3	3.0	1.9	1.9	3.0	1.9	1.9
Lost Time Adjust (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Total Lost Time (s)	8.2	8.8	8.8	8.8	8.8	8.8	8.2	7.7	7.7	8.2	7.7	7.7
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		16.0	16.0		16.0	16.0		13.0	13.0		13.0	13.0
Pedestrian Calls (#/hr)		2	2		2	2		2	2		2	2
Act Effect Green (s)	31.6	22.2	22.2	30.4	22.2	22.2	35.6	28.3	28.3	35.6	28.3	28.3

Lanes, Volumes, Timings
7: Zimmerman Rd & Highway 16

Timing Plan: AM
03-21-2024

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	510	220	44	5	278	109	5	2	2	155	10	784
Future Volume (vph)	510	220	44	5	278	109	5	2	2	155	10	784
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	160.0		0.0	110.0		100.0	0.0		0.0	0.0		25.0
Storage Lanes	2		0	1		1	1		0	1		1
Taper Length (m)	75.0			75.0			2.5			2.5		
Lane Util. Factor	0.97	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Ped Bike Factor		0.99		1.00		0.99	0.99	0.99		0.89	0.90	0.99
Frt		0.975				0.850		0.925				0.850
Flt Protected	0.950			0.950			0.950			0.950	0.958	
Satd. Flow (prot)	3288	3259	0	1695	3390	1517	1695	1627	0	1610	1624	1517
Flt Permitted	0.320			0.563			0.000			0.000	0.000	
Satd. Flow (perm)	1108	3259	0	1001	3390	1498	0	1627	0	0	0	1495
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		23				336		2				817
Link Speed (k/h)		40			40			40				40
Link Distance (m)		234.1			261.1			116.7				138.4
Travel Time (s)		21.1			23.5			10.5				12.5
Confl. Peds. (#/hr)	91		12	1		1	5		5	35		8
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	600	259	52	6	327	128	6	2	2	182	12	922
Shared Lane Traffic (%)										47%		
Lane Group Flow (vph)	600	311	0	6	327	128	6	4	0	96	98	922
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			5.0			5.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA		pm+pt	NA	Free	pm+pt	NA		pm+pt	NA	Free
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6		Free	8			4		Free
Minimum Split (s)	12.8	16.7		12.8	23.0		17.3	17.3		17.3	17.3	
Total Split (s)	40.0	45.0		20.0	25.0		20.0	20.0		25.0	25.0	
Total Split (%)	36.4%	40.9%		18.2%	22.7%		18.2%	18.2%		22.7%	22.7%	
Maximum Green (s)	32.2	38.3		12.2	18.3		12.7	12.7		17.7	17.7	
Yellow Time (s)	4.3	5.2		4.3	5.2		3.5	3.5		3.8	3.8	
All-Red Time (s)	3.5	1.5		3.5	1.5		3.8	3.8		3.5	3.5	
Lost Time Adjust (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Total Lost Time (s)	9.8	8.7		9.8	8.7		9.3	9.3		9.3	9.3	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag		Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Walk Time (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Flash Dont Walk (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Pedestrian Calls (#/hr)		2			2		2	2		2	2	
Act Effect Green (s)	55.2	36.3		25.4	16.3	110.0	10.7	10.7		15.7	15.7	110.0

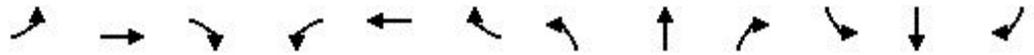
Lanes, Volumes, Timings
10: Zimmerman Rd & Meadows Pkwy

Timing Plan: AM
03-21-2024

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	27	260	285	26	108	5	160	144	5	13	198	58
Future Volume (vph)	27	260	285	26	108	5	160	144	5	13	198	58
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	75.0		75.0	75.0		75.0	90.0		95.0	90.0		95.0
Storage Lanes	1		1	1		1	2		1	2		1
Taper Length (m)	35.0			35.0			45.0			45.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Ped Bike Factor	1.00		0.99	1.00		0.98	1.00		0.99	1.00		0.99
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	3390	1517	1695	3390	1517	3288	3390	1517	3288	3390	1517
Flt Permitted	0.564			0.565			0.518			0.645		
Satd. Flow (perm)	1003	3390	1495	1007	3390	1480	1788	3390	1494	2225	3390	1494
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			335			165			168			168
Link Speed (k/h)		40			40			40			40	
Link Distance (m)		172.9			198.7			264.3			329.6	
Travel Time (s)		15.6			17.9			23.8			29.7	
Confl. Peds. (#/hr)	2		2	2		2	2		2	2		2
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	32	306	335	31	127	6	188	169	6	15	233	68
Shared Lane Traffic (%)												
Lane Group Flow (vph)	32	306	335	31	127	6	188	169	6	15	233	68
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			7.4			7.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Minimum Split (s)	10.4	27.9	27.9	10.4	27.9	27.9	11.2	25.6	25.6	10.6	25.6	25.6
Total Split (s)	15.0	33.0	33.0	11.0	29.0	29.0	15.0	35.0	35.0	11.0	31.0	31.0
Total Split (%)	16.7%	36.7%	36.7%	12.2%	32.2%	32.2%	16.7%	38.9%	38.9%	12.2%	34.4%	34.4%
Maximum Green (s)	9.6	27.1	27.1	5.6	23.1	23.1	8.8	29.4	29.4	5.4	25.4	25.4
Yellow Time (s)	3.0	3.5	3.5	3.0	3.5	3.5	3.2	3.8	3.8	3.2	3.8	3.8
All-Red Time (s)	2.4	2.4	2.4	2.4	2.4	2.4	3.0	1.8	1.8	2.4	1.8	1.8
Lost Time Adjust (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Total Lost Time (s)	7.4	7.9	7.9	7.4	7.9	7.9	8.2	7.6	7.6	7.6	7.6	7.6
Lead/Lag	Lead	Lag	Lag									
Lead-Lag Optimize?	Yes											
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		15.0	15.0		15.0	15.0		13.0	13.0		13.0	13.0
Pedestrian Calls (#/hr)		2	2		2	2		2	2		2	2
Act Efect Green (s)	33.2	25.1	25.1	25.2	21.1	21.1	33.6	27.4	27.4	26.8	23.4	23.4

Lanes, Volumes, Timings
 10: Zimmerman Rd & Meadows Pkwy

Timing Plan: AM
 03-21-2024

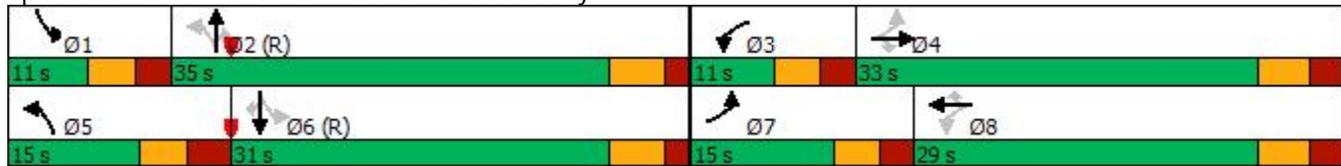


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Actuated g/C Ratio	0.37	0.28	0.28	0.28	0.23	0.23	0.37	0.30	0.30	0.30	0.26	0.26
v/c Ratio	0.07	0.32	0.51	0.10	0.16	0.01	0.24	0.16	0.01	0.02	0.26	0.13
Control Delay	16.8	26.9	6.1	17.8	28.1	0.0	17.1	23.5	0.0	15.8	27.5	0.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.8	26.9	6.1	17.8	28.1	0.0	17.1	23.5	0.0	15.8	27.5	0.5
LOS	B	C	A	B	C	A	B	C	A	B	C	A
Approach Delay	16.0			25.1			19.8			21.1		
Approach LOS	B			C			B			C		
Queue Length 50th (m)	3.3	22.0	0.0	3.2	9.2	0.0	10.0	11.2	0.0	0.7	16.8	0.0
Queue Length 95th (m)	8.1	30.9	14.9	8.0	15.4	0.0	15.4	17.5	0.0	2.3	24.8	0.0
Internal Link Dist (m)	148.9			174.7			240.3			305.6		
Turn Bay Length (m)	75.0		75.0	75.0		75.0	90.0		95.0	90.0		95.0
Base Capacity (vph)	428	945	658	309	794	473	780	1032	571	702	881	512
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.32	0.51	0.10	0.16	0.01	0.24	0.16	0.01	0.02	0.26	0.13

Intersection Summary

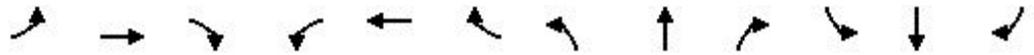
Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 80
 Control Type: Pretimed
 Maximum v/c Ratio: 0.51
 Intersection Signal Delay: 19.0
 Intersection LOS: B
 Intersection Capacity Utilization 64.0%
 ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 10: Zimmerman Rd & Meadows Pkwy



HCM Unsignalized Intersection Capacity Analysis
 13: Zimmerman Rd & 8 St E

Timing Plan: AM
 03-25-2024



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	5	5	13	5	5	2	40	6	5	5	10	5
Future Volume (Veh/h)	5	5	13	5	5	2	40	6	5	5	10	5
Sign Control		Free			Free			Yield			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	6	6	15	6	6	2	47	7	6	6	12	6
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	8			21			56	46	14	54	52	7
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	8			21			56	46	14	54	52	7
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			95	99	99	99	99	99
cM capacity (veh/h)	1612			1595			920	840	1067	928	833	1075
Direction, Lane #												
	EB 1	WB 1	NB 1	SB 1								
Volume Total	27	14	60	24								
Volume Left	6	6	47	6								
Volume Right	15	2	6	6								
cSH	1612	1595	922	907								
Volume to Capacity	0.00	0.00	0.07	0.03								
Queue Length 95th (m)	0.1	0.1	1.6	0.6								
Control Delay (s)	1.6	3.1	9.2	9.1								
Lane LOS	A	A	A	A								
Approach Delay (s)	1.6	3.1	9.2	9.1								
Approach LOS			A	A								
Intersection Summary												
Average Delay			6.8									
Intersection Capacity Utilization			21.1%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 9: Zimmerman Rd & Taylor St

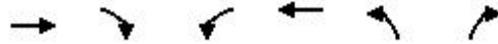
Timing Plan: AM
 03-25-2024



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	146	40	6	47	13	11
Future Volume (Veh/h)	146	40	6	47	13	11
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	172	47	7	55	15	13
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (m)	329					
pX, platoon unblocked						
vC, conflicting volume	78	34			62	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	78	34			62	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	81	95			99	
cM capacity (veh/h)	916	1039			1541	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	219	62	28			
Volume Left	172	0	15			
Volume Right	47	55	0			
cSH	940	1700	1541			
Volume to Capacity	0.23	0.04	0.01			
Queue Length 95th (m)	6.9	0.0	0.2			
Control Delay (s)	10.0	0.0	4.0			
Lane LOS	A		A			
Approach Delay (s)	10.0	0.0	4.0			
Approach LOS	A					
Intersection Summary						
Average Delay			7.4			
Intersection Capacity Utilization			29.2%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 12: Future North Access & Taylor St

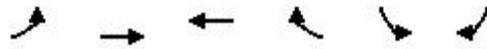
Timing Plan: AM
 03-25-2024



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↻			↻	↻	
Traffic Volume (veh/h)	5	60	5	5	186	5
Future Volume (Veh/h)	5	60	5	5	186	5
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	6	71	6	6	219	6
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			77		60	42
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			77		60	42
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		77	99
cM capacity (veh/h)			1522		944	1029
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	77	12	225			
Volume Left	0	6	219			
Volume Right	71	0	6			
cSH	1700	1522	946			
Volume to Capacity	0.05	0.00	0.24			
Queue Length 95th (m)	0.0	0.1	7.0			
Control Delay (s)	0.0	3.7	10.0			
Lane LOS		A	A			
Approach Delay (s)	0.0	3.7	10.0			
Approach LOS			A			
Intersection Summary						
Average Delay			7.3			
Intersection Capacity Utilization			26.2%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 19: Road 394 & Proposed N-S Rd

Timing Plan: AM
 03-25-2024



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↶	↷		↶	↷
Traffic Volume (veh/h)	26	5	5	5	5	80
Future Volume (Veh/h)	26	5	5	5	5	80
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	31	6	6	6	6	94
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	12				77	9
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	12				77	9
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				99	91
cM capacity (veh/h)	1607				908	1073
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	37	12	100			
Volume Left	31	0	6			
Volume Right	0	6	94			
cSH	1607	1700	1061			
Volume to Capacity	0.02	0.01	0.09			
Queue Length 95th (m)	0.4	0.0	2.4			
Control Delay (s)	6.1	0.0	8.7			
Lane LOS	A		A			
Approach Delay (s)	6.1	0.0	8.7			
Approach LOS			A			
Intersection Summary						
Average Delay			7.4			
Intersection Capacity Utilization		24.0%		ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 23: Proposed N-S Rd & East Access - North

Timing Plan: AM
 03-25-2024



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	80	26	5	5	5
Future Volume (Veh/h)	5	80	26	5	5	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	6	94	31	6	6	6
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	77	9	12			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	77	9	12			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	91	98			
cM capacity (veh/h)	908	1073	1607			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	100	37	12			
Volume Left	6	31	0			
Volume Right	94	0	6			
cSH	1061	1607	1700			
Volume to Capacity	0.09	0.02	0.01			
Queue Length 95th (m)	2.4	0.4	0.0			
Control Delay (s)	8.7	6.1	0.0			
Lane LOS	A	A				
Approach Delay (s)	8.7	6.1	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			7.4			
Intersection Capacity Utilization			24.0%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 21: Proposed N-S Rd & East Access - Central

Timing Plan: AM
 03-25-2024



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	26	80	0
Future Volume (Veh/h)	0	0	0	26	80	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	0	0	0	31	94	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	125	94	94			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	125	94	94			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	870	963	1500			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	0	31	94			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1500	1700			
Volume to Capacity	0.00	0.00	0.06			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay	0.0					
Intersection Capacity Utilization	9.4%			ICU Level of Service	A	
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
 27: Proposed N-S Rd & East Access - South

Timing Plan: AM
 03-25-2024



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	26	80	0
Future Volume (Veh/h)	0	0	0	26	80	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	0	0	0	31	94	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	125	94	94			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	125	94	94			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	870	963	1500			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	0	31	94			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1500	1700			
Volume to Capacity	0.00	0.00	0.06			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay	0.0					
Intersection Capacity Utilization	9.4%			ICU Level of Service	A	
Analysis Period (min)	15					

**2029 TOTAL
CONDITIONS - PM**

Lanes, Volumes, Timings
2: Zimmerman Rd & Market Dr

Timing Plan: PM
03-21-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	92	132	252	464	149	149	447	515	469	128	522	128
Future Volume (vph)	92	132	252	464	149	149	447	515	469	128	522	128
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	70.0		0.0	90.0		0.0	0.0		0.0	90.0		0.0
Storage Lanes	1		1	2		1	1		1	1		1
Taper Length (m)	25.0			25.0			2.5			25.0		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	1.00		0.99	1.00		0.99	1.00		0.99	1.00		0.99
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	1784	1517	3288	1784	1517	1695	3390	1517	1695	3390	1517
Flt Permitted	0.647			0.659			0.301			0.307		
Satd. Flow (perm)	1152	1784	1495	2273	1784	1495	537	3390	1494	547	3390	1494
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			258			175			552			183
Link Speed (k/h)		40			40			40			40	
Link Distance (m)		152.9			162.6			138.4			264.3	
Travel Time (s)		13.8			14.6			12.5			23.8	
Confl. Peds. (#/hr)	2		2	2		2	2		2	2		2
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	108	155	296	546	175	175	526	606	552	151	614	151
Shared Lane Traffic (%)												
Lane Group Flow (vph)	108	155	296	546	175	175	526	606	552	151	614	151
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			7.4			7.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Minimum Split (s)	11.2	29.8	29.8	11.8	29.8	29.8	11.2	25.7	25.7	11.2	25.7	25.7
Total Split (s)	17.0	31.0	31.0	17.0	31.0	31.0	16.0	36.0	36.0	16.0	36.0	36.0
Total Split (%)	17.0%	31.0%	31.0%	17.0%	31.0%	31.0%	16.0%	36.0%	36.0%	16.0%	36.0%	36.0%
Maximum Green (s)	10.8	24.2	24.2	10.2	24.2	24.2	9.8	30.3	30.3	9.8	30.3	30.3
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.2	3.8	3.8	3.2	3.8	3.8
All-Red Time (s)	2.7	3.3	3.3	3.3	3.3	3.3	3.0	1.9	1.9	3.0	1.9	1.9
Lost Time Adjust (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Total Lost Time (s)	8.2	8.8	8.8	8.8	8.8	8.8	8.2	7.7	7.7	8.2	7.7	7.7
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		16.0	16.0		16.0	16.0		13.0	13.0		13.0	13.0
Pedestrian Calls (#/hr)		2	2		2	2		2	2		2	2
Act Effect Green (s)	31.6	22.2	22.2	30.4	22.2	22.2	35.6	28.3	28.3	35.6	28.3	28.3

Lanes, Volumes, Timings
2: Zimmerman Rd & Market Dr

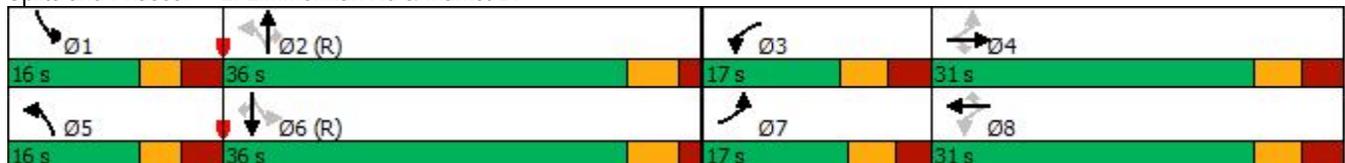
Timing Plan: PM
03-21-2024

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Actuated g/C Ratio	0.32	0.22	0.22	0.30	0.22	0.22	0.36	0.28	0.28	0.36	0.28	0.28
v/c Ratio	0.26	0.39	0.56	0.71	0.44	0.37	1.87	0.63	0.67	0.53	0.64	0.27
Control Delay	21.6	36.6	11.0	31.2	37.7	7.6	427.4	34.8	7.3	25.8	35.0	3.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.6	36.6	11.0	31.2	37.7	7.6	427.4	34.8	7.3	25.8	35.0	3.7
LOS	C	D	B	C	D	A	F	C	A	C	D	A
Approach Delay	20.2			27.9			148.4			28.3		
Approach LOS	C			C			F			C		
Queue Length 50th (m)	13.2	25.7	5.9	39.0	29.4	0.0	-149.9	53.8	0.0	17.6	54.7	0.0
Queue Length 95th (m)	22.9	41.2	24.1	49.2	46.1	13.7	#202.1	67.0	17.1	28.4	67.9	6.9
Internal Link Dist (m)	128.9			138.6			114.4			240.3		
Turn Bay Length (m)	70.0			90.0			90.0			90.0		
Base Capacity (vph)	411	396	532	774	396	468	281	959	818	284	959	554
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.39	0.56	0.71	0.44	0.37	1.87	0.63	0.67	0.53	0.64	0.27

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 120
 Control Type: Pretimed
 Maximum v/c Ratio: 1.87
 Intersection Signal Delay: 77.0 Intersection LOS: E
 Intersection Capacity Utilization 103.4% ICU Level of Service G
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 2: Zimmerman Rd & Market Dr



Lanes, Volumes, Timings
7: Zimmerman Rd & Highway 16

Timing Plan: PM
03-21-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1179	345	5	10	421	274	60	19	2	240	10	979
Future Volume (vph)	1179	345	5	10	421	274	60	19	2	240	10	979
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	160.0		0.0	110.0		100.0	0.0		0.0	0.0		25.0
Storage Lanes	2		0	1		1	1		0	1		1
Taper Length (m)	75.0			75.0			2.5			2.5		
Lane Util. Factor	0.97	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Ped Bike Factor		1.00		1.00		0.99	0.99	1.00		0.89	0.90	0.99
Frt		0.998				0.850		0.987				0.850
Flt Protected	0.950			0.950			0.950			0.950	0.956	
Satd. Flow (prot)	3288	3379	0	1695	3390	1517	1695	1757	0	1610	1621	1517
Flt Permitted	0.165			0.510			0.000			0.000	0.000	
Satd. Flow (perm)	571	3379	0	907	3390	1498	0	1757	0	0	0	1495
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				336		2				705
Link Speed (k/h)		40			40			40				40
Link Distance (m)		234.1			261.1			116.7				138.4
Travel Time (s)		21.1			23.5			10.5				12.5
Confl. Peds. (#/hr)	91		12	1		1	5		5	35		8
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	1387	406	6	12	495	322	71	22	2	282	12	1152
Shared Lane Traffic (%)										48%		
Lane Group Flow (vph)	1387	412	0	12	495	322	71	24	0	147	147	1152
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			5.0				5.0
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA		pm+pt	NA	Free	pm+pt	NA		pm+pt	NA	Free
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6		Free	8			4		Free
Minimum Split (s)	12.8	16.7		12.8	23.0		17.3	17.3		17.3	17.3	
Total Split (s)	40.0	45.0		20.0	25.0		20.0	20.0		25.0	25.0	
Total Split (%)	36.4%	40.9%		18.2%	22.7%		18.2%	18.2%		22.7%	22.7%	
Maximum Green (s)	32.2	38.3		12.2	18.3		12.7	12.7		17.7	17.7	
Yellow Time (s)	4.3	5.2		4.3	5.2		3.5	3.5		3.8	3.8	
All-Red Time (s)	3.5	1.5		3.5	1.5		3.8	3.8		3.5	3.5	
Lost Time Adjust (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Total Lost Time (s)	9.8	8.7		9.8	8.7		9.3	9.3		9.3	9.3	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag		Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Walk Time (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Flash Dont Walk (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Pedestrian Calls (#/hr)		2			2		2	2		2	2	
Act Effect Green (s)	55.2	36.3		25.4	16.3	110.0	10.7	10.7		15.7	15.7	110.0

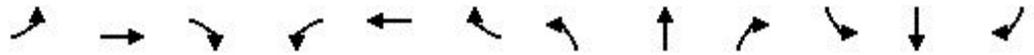
Lanes, Volumes, Timings
10: Zimmerman Rd & Meadows Pkwy

Timing Plan: PM
03-21-2024

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	63	526	411	179	447	30	553	188	132	26	170	46
Future Volume (vph)	63	526	411	179	447	30	553	188	132	26	170	46
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	75.0		75.0	75.0		75.0	90.0		95.0	90.0		95.0
Storage Lanes	1		1	1		1	2		1	2		1
Taper Length (m)	35.0			35.0			45.0			45.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Ped Bike Factor	1.00		0.99	1.00		0.98	1.00		0.99	1.00		0.99
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	3390	1517	1695	3390	1517	3288	3390	1517	3288	3390	1517
Flt Permitted	0.391			0.241			0.440			0.614		
Satd. Flow (perm)	696	3390	1495	430	3390	1480	1519	3390	1494	2118	3390	1494
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			437			240			168			244
Link Speed (k/h)		40			40			40			40	
Link Distance (m)		172.9			198.7			264.3			329.6	
Travel Time (s)		15.6			17.9			23.8			29.7	
Confl. Peds. (#/hr)	2		2	2		2	2		2	2		2
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	74	619	484	211	526	35	651	221	155	31	200	54
Shared Lane Traffic (%)												
Lane Group Flow (vph)	74	619	484	211	526	35	651	221	155	31	200	54
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			7.4			7.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Minimum Split (s)	10.4	27.9	27.9	10.4	27.9	27.9	11.2	25.6	25.6	10.6	25.6	25.6
Total Split (s)	14.4	28.0	28.0	16.0	29.6	29.6	19.0	35.4	35.4	10.6	27.0	27.0
Total Split (%)	16.0%	31.1%	31.1%	17.8%	32.9%	32.9%	21.1%	39.3%	39.3%	11.8%	30.0%	30.0%
Maximum Green (s)	9.0	22.1	22.1	10.6	23.7	23.7	12.8	29.8	29.8	5.0	21.4	21.4
Yellow Time (s)	3.0	3.5	3.5	3.0	3.5	3.5	3.2	3.8	3.8	3.2	3.8	3.8
All-Red Time (s)	2.4	2.4	2.4	2.4	2.4	2.4	3.0	1.8	1.8	2.4	1.8	1.8
Lost Time Adjust (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Total Lost Time (s)	7.4	7.9	7.9	7.4	7.9	7.9	8.2	7.6	7.6	7.6	7.6	7.6
Lead/Lag	Lead	Lag	Lag									
Lead-Lag Optimize?	Yes											
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		15.0	15.0		15.0	15.0		13.0	13.0		13.0	13.0
Pedestrian Calls (#/hr)		2	2		2	2		2	2		2	2
Act Efect Green (s)	27.6	20.1	20.1	30.8	21.7	21.7	37.8	27.8	27.8	22.4	19.4	19.4

Lanes, Volumes, Timings
10: Zimmerman Rd & Meadows Pkwy

Timing Plan: PM
03-21-2024

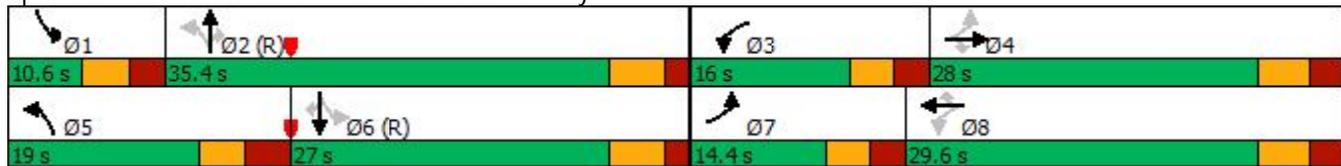


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Actuated g/C Ratio	0.31	0.22	0.22	0.34	0.24	0.24	0.42	0.31	0.31	0.25	0.22	0.22
v/c Ratio	0.25	0.82	0.72	0.79	0.64	0.07	0.77	0.21	0.27	0.05	0.27	0.11
Control Delay	19.5	43.5	11.8	42.2	34.9	0.2	26.6	23.7	4.5	16.7	30.6	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.5	43.5	11.8	42.2	34.9	0.2	26.6	23.7	4.5	16.7	30.6	0.4
LOS	B	D	B	D	C	A	C	C	A	B	C	A
Approach Delay	28.9			35.4			22.6			23.4		
Approach LOS	C			D			C			C		
Queue Length 50th (m)	7.7	53.8	6.6	24.1	43.1	0.0	40.8	14.7	0.0	1.5	15.2	0.0
Queue Length 95th (m)	15.2	67.9	29.1	#43.0	55.7	0.0	51.4	22.0	9.3	3.8	23.2	0.0
Internal Link Dist (m)	148.9			174.7			240.3			305.6		
Turn Bay Length (m)	75.0		75.0	75.0		75.0	90.0		95.0	90.0		95.0
Base Capacity (vph)	291	757	673	268	817	538	850	1047	577	566	730	513
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.25	0.82	0.72	0.79	0.64	0.07	0.77	0.21	0.27	0.05	0.27	0.11

Intersection Summary

Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 90
 Control Type: Pretimed
 Maximum v/c Ratio: 0.82
 Intersection Signal Delay: 28.0 Intersection LOS: C
 Intersection Capacity Utilization 87.6% ICU Level of Service E
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 10: Zimmerman Rd & Meadows Pkwy



HCM Unsignalized Intersection Capacity Analysis
 13: Zimmerman Rd & 8 St E

Timing Plan: PM
 03-25-2024



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	5	5	43	5	6	5	36	34	5	5	22	5
Future Volume (Veh/h)	5	5	43	5	6	5	36	34	5	5	22	5
Sign Control		Free			Free			Yield			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	6	6	51	6	7	6	42	40	6	6	26	6
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	13			57			84	68	32	92	91	10
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	13			57			84	68	32	92	91	10
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			95	95	99	99	97	99
cM capacity (veh/h)	1606			1547			870	816	1043	849	793	1071
Direction, Lane #												
	EB 1	WB 1	NB 1	SB 1								
Volume Total	63	19	88	38								
Volume Left	6	6	42	6								
Volume Right	51	6	6	6								
cSH	1606	1547	854	836								
Volume to Capacity	0.00	0.00	0.10	0.05								
Queue Length 95th (m)	0.1	0.1	2.6	1.1								
Control Delay (s)	0.7	2.3	9.7	9.5								
Lane LOS	A	A	A	A								
Approach Delay (s)	0.7	2.3	9.7	9.5								
Approach LOS			A	A								
Intersection Summary												
Average Delay			6.3									
Intersection Capacity Utilization			24.0%	ICU Level of Service	A							
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 9: Zimmerman Rd & Taylor St

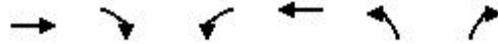
Timing Plan: PM
 03-25-2024



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	87	24	46	137	37	28
Future Volume (Veh/h)	87	24	46	137	37	28
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	102	28	54	161	44	33
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)	329					
pX, platoon unblocked						
vC, conflicting volume	256	134			215	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	256	134			215	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	86	97			97	
cM capacity (veh/h)	709	914			1355	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	130	215	77			
Volume Left	102	0	44			
Volume Right	28	161	0			
cSH	745	1700	1355			
Volume to Capacity	0.17	0.13	0.03			
Queue Length 95th (m)	4.8	0.0	0.8			
Control Delay (s)	10.8	0.0	4.5			
Lane LOS	B		A			
Approach Delay (s)	10.8	0.0	4.5			
Approach LOS	B					
Intersection Summary						
Average Delay	4.2					
Intersection Capacity Utilization	36.8%		ICU Level of Service		A	
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
 12: Future North Access & Taylor St

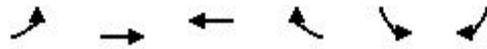
Timing Plan: PM
 03-25-2024



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↩			↩	↩	
Traffic Volume (veh/h)	5	174	5	5	186	5
Future Volume (Veh/h)	5	174	5	5	186	5
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	6	205	6	6	219	6
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			211		126	108
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			211		126	108
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		75	99
cM capacity (veh/h)			1360		864	945
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	211	12	225			
Volume Left	0	6	219			
Volume Right	205	0	6			
cSH	1700	1360	866			
Volume to Capacity	0.12	0.00	0.26			
Queue Length 95th (m)	0.0	0.1	7.9			
Control Delay (s)	0.0	3.8	10.6			
Lane LOS		A	B			
Approach Delay (s)	0.0	3.8	10.6			
Approach LOS			B			
Intersection Summary						
Average Delay			5.4			
Intersection Capacity Utilization			32.8%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 19: Road 394 & Proposed N-S Rd

Timing Plan: PM
 03-25-2024



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔	↔		↔	
Traffic Volume (veh/h)	75	5	5	5	5	47
Future Volume (Veh/h)	75	5	5	5	5	47
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	88	6	6	6	6	55
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	12			191	9	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	12			191	9	
tC, single (s)	4.1			6.4	6.2	
tC, 2 stage (s)						
tF (s)	2.2			3.5	3.3	
p0 queue free %	95			99	95	
cM capacity (veh/h)	1607			754	1073	
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	94	12	61			
Volume Left	88	0	6			
Volume Right	0	6	55			
cSH	1607	1700	1030			
Volume to Capacity	0.05	0.01	0.06			
Queue Length 95th (m)	1.3	0.0	1.4			
Control Delay (s)	6.9	0.0	8.7			
Lane LOS	A		A			
Approach Delay (s)	6.9	0.0	8.7			
Approach LOS			A			
Intersection Summary						
Average Delay			7.1			
Intersection Capacity Utilization			24.7%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 23: Proposed N-S Rd & East Access - North

Timing Plan: PM
 03-25-2024



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	47	75	5	5	5
Future Volume (Veh/h)	5	47	75	5	5	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	6	55	88	6	6	6
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	191	9	12			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	191	9	12			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	95	95			
cM capacity (veh/h)	754	1073	1607			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	61	94	12			
Volume Left	6	88	0			
Volume Right	55	0	6			
cSH	1030	1607	1700			
Volume to Capacity	0.06	0.05	0.01			
Queue Length 95th (m)	1.4	1.3	0.0			
Control Delay (s)	8.7	6.9	0.0			
Lane LOS	A	A				
Approach Delay (s)	8.7	6.9	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			7.1			
Intersection Capacity Utilization			24.7%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 21: Proposed N-S Rd & East Access - Central

Timing Plan: PM
 03-25-2024



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	75	47	0
Future Volume (Veh/h)	0	0	0	75	47	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	0	0	0	88	55	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	143	55	55			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	143	55	55			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	850	1012	1550			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	0	88	55			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1550	1700			
Volume to Capacity	0.00	0.00	0.03			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay	0.0					
Intersection Capacity Utilization	9.2%			ICU Level of Service	A	
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
 27: Proposed N-S Rd & East Access - South

Timing Plan: PM
 03-25-2024



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	75	47	0
Future Volume (Veh/h)	0	0	0	75	47	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	0	0	0	88	55	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	143	55	55			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	143	55	55			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	850	1012	1550			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	0	88	55			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1550	1700			
Volume to Capacity	0.00	0.00	0.03			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay	0.0					
Intersection Capacity Utilization	9.2%			ICU Level of Service	A	
Analysis Period (min)	15					

**2034 TOTAL
CONDITIONS - AM**

Lanes, Volumes, Timings
2: Zimmerman Rd & Market Dr

Timing Plan: AM
03-22-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	121	68	407	217	28	5	158	387	312	5	591	45
Future Volume (vph)	121	68	407	217	28	5	158	387	312	5	591	45
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	70.0		0.0	90.0		0.0	0.0		0.0	90.0		0.0
Storage Lanes	1		1	2		1	2		1	1		1
Taper Length (m)	25.0			25.0			2.5			25.0		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.97	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	1.00		0.99	1.00		0.99	1.00		0.99	1.00		0.99
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	1784	1517	3288	1784	1517	3288	3390	1517	1695	3390	1517
Flt Permitted	0.663			0.705			0.242			0.467		
Satd. Flow (perm)	1180	1784	1495	2431	1784	1495	837	3390	1494	832	3390	1494
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			196			171			367			183
Link Speed (k/h)		40			40			40			40	
Link Distance (m)		152.9			162.6			138.4			264.3	
Travel Time (s)		13.8			14.6			12.5			23.8	
Confl. Peds. (#/hr)	2		2	2		2	2		2	2		2
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	142	80	479	255	33	6	186	455	367	6	695	53
Shared Lane Traffic (%)												
Lane Group Flow (vph)	142	80	479	255	33	6	186	455	367	6	695	53
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			7.4			7.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Minimum Split (s)	11.2	29.8	29.8	11.8	29.8	29.8	11.2	25.7	25.7	11.2	25.7	25.7
Total Split (s)	14.8	38.0	38.0	11.9	35.1	35.1	12.7	38.9	38.9	11.2	37.4	37.4
Total Split (%)	14.8%	38.0%	38.0%	11.9%	35.1%	35.1%	12.7%	38.9%	38.9%	11.2%	37.4%	37.4%
Maximum Green (s)	8.6	31.2	31.2	5.1	28.3	28.3	6.5	33.2	33.2	5.0	31.7	31.7
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.2	3.8	3.8	3.2	3.8	3.8
All-Red Time (s)	2.7	3.3	3.3	3.3	3.3	3.3	3.0	1.9	1.9	3.0	1.9	1.9
Lost Time Adjust (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Total Lost Time (s)	8.2	8.8	8.8	8.8	8.8	8.8	8.2	7.7	7.7	8.2	7.7	7.7
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		16.0	16.0		16.0	16.0		13.0	13.0		13.0	13.0
Pedestrian Calls (#/hr)		2	2		2	2		2	2		2	2
Act Efect Green (s)	36.4	29.2	29.2	29.4	26.3	26.3	35.2	31.2	31.2	32.2	29.7	29.7

Lanes, Volumes, Timings
7: Zimmerman Rd & Highway 16

Timing Plan: AM
03-22-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	565	231	46	4	292	19	5	5	5	49	11	913
Future Volume (vph)	565	231	46	4	292	19	5	5	5	49	11	913
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	160.0		0.0	110.0		100.0	0.0		0.0	0.0		25.0
Storage Lanes	2		0	1		1	1		0	1		1
Taper Length (m)	75.0			75.0			2.5			2.5		
Lane Util. Factor	0.97	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Ped Bike Factor		0.99		1.00		0.99	0.98	0.99		0.89	0.93	0.99
Frt		0.975				0.850		0.925				0.850
Flt Protected	0.950			0.950			0.950			0.950	0.969	
Satd. Flow (prot)	3288	3259	0	1695	3390	1517	1695	1627	0	1610	1643	1517
Flt Permitted	0.303			0.555			0.000			0.000	0.000	
Satd. Flow (perm)	1049	3259	0	987	3390	1498	0	1627	0	0	0	1495
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		22				336		6				815
Link Speed (k/h)		40			40			40				40
Link Distance (m)		234.1			261.1			116.7				138.4
Travel Time (s)		21.1			23.5			10.5				12.5
Confl. Peds. (#/hr)	91		12	1		1	5		5	35		8
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	665	272	54	5	344	22	6	6	6	58	13	1074
Shared Lane Traffic (%)										39%		
Lane Group Flow (vph)	665	326	0	5	344	22	6	12	0	35	36	1074
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			5.0			5.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA		pm+pt	NA	Free	pm+pt	NA		pm+pt	NA	Free
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6		Free	8			4		Free
Minimum Split (s)	12.8	16.7		12.8	23.0		17.3	17.3		17.3	17.3	
Total Split (s)	40.0	45.0		20.0	25.0		20.0	20.0		25.0	25.0	
Total Split (%)	36.4%	40.9%		18.2%	22.7%		18.2%	18.2%		22.7%	22.7%	
Maximum Green (s)	32.2	38.3		12.2	18.3		12.7	12.7		17.7	17.7	
Yellow Time (s)	4.3	5.2		4.3	5.2		3.5	3.5		3.8	3.8	
All-Red Time (s)	3.5	1.5		3.5	1.5		3.8	3.8		3.5	3.5	
Lost Time Adjust (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Total Lost Time (s)	9.8	8.7		9.8	8.7		9.3	9.3		9.3	9.3	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag		Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Walk Time (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Flash Dont Walk (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Pedestrian Calls (#/hr)		2			2		2	2		2	2	
Act Effect Green (s)	55.2	36.3		25.4	16.3	110.0	10.7	10.7		15.7	15.7	110.0

Lanes, Volumes, Timings
10: Zimmerman Rd & Meadows Pkwy

Timing Plan: AM
03-22-2024

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	44	273	299	27	113	8	168	220	5	20	313	96
Future Volume (vph)	44	273	299	27	113	8	168	220	5	20	313	96
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	75.0		75.0	75.0		75.0	90.0		95.0	90.0		95.0
Storage Lanes	1		1	1		1	2		1	2		1
Taper Length (m)	35.0			35.0			45.0			45.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Ped Bike Factor	1.00		0.99	1.00		0.98	1.00		0.99	1.00		0.99
Fr't			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	3390	1517	1695	3390	1517	3288	3390	1517	3288	3390	1517
Flt Permitted	0.585			0.557			0.452			0.592		
Satd. Flow (perm)	1041	3390	1495	992	3390	1480	1561	3390	1494	2043	3390	1494
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			352			165			168			168
Link Speed (k/h)		40			40			40			40	
Link Distance (m)		172.9			198.7			264.3			329.6	
Travel Time (s)		15.6			17.9			23.8			29.7	
Confl. Peds. (#/hr)	2		2	2		2	2		2	2		2
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	52	321	352	32	133	9	198	259	6	24	368	113
Shared Lane Traffic (%)												
Lane Group Flow (vph)	52	321	352	32	133	9	198	259	6	24	368	113
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			7.4			7.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Minimum Split (s)	10.4	27.9	27.9	10.4	27.9	27.9	11.2	25.6	25.6	10.6	25.6	25.6
Total Split (s)	14.0	32.0	32.0	11.0	29.0	29.0	15.0	36.0	36.0	11.0	32.0	32.0
Total Split (%)	15.6%	35.6%	35.6%	12.2%	32.2%	32.2%	16.7%	40.0%	40.0%	12.2%	35.6%	35.6%
Maximum Green (s)	8.6	26.1	26.1	5.6	23.1	23.1	8.8	30.4	30.4	5.4	26.4	26.4
Yellow Time (s)	3.0	3.5	3.5	3.0	3.5	3.5	3.2	3.8	3.8	3.2	3.8	3.8
All-Red Time (s)	2.4	2.4	2.4	2.4	2.4	2.4	3.0	1.8	1.8	2.4	1.8	1.8
Lost Time Adjust (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Total Lost Time (s)	7.4	7.9	7.9	7.4	7.9	7.9	8.2	7.6	7.6	7.6	7.6	7.6
Lead/Lag	Lead	Lag	Lag									
Lead-Lag Optimize?	Yes											
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		15.0	15.0		15.0	15.0		13.0	13.0		13.0	13.0
Pedestrian Calls (#/hr)		2	2		2	2		2	2		2	2
Act Efect Green (s)	31.2	24.1	24.1	25.2	21.1	21.1	34.6	28.4	28.4	27.8	24.4	24.4

Lanes, Volumes, Timings
 10: Zimmerman Rd & Meadows Pkwy

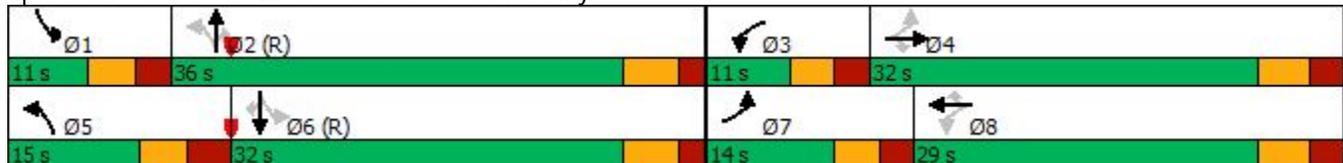
Timing Plan: AM
 03-22-2024

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Actuated g/C Ratio	0.35	0.27	0.27	0.28	0.23	0.23	0.38	0.32	0.32	0.31	0.27	0.27
v/c Ratio	0.13	0.35	0.53	0.10	0.17	0.02	0.27	0.24	0.01	0.04	0.40	0.21
Control Delay	18.0	28.0	6.4	18.3	28.2	0.1	16.7	23.6	0.0	15.3	28.4	2.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.0	28.0	6.4	18.3	28.2	0.1	16.7	23.6	0.0	15.3	28.4	2.3
LOS	B	C	A	B	C	A	B	C	A	B	C	A
Approach Delay	16.8			24.9			20.3			21.9		
Approach LOS	B			C			C			C		
Queue Length 50th (m)	5.5	23.5	0.0	3.3	9.6	0.0	10.3	17.3	0.0	1.1	27.3	0.0
Queue Length 95th (m)	11.8	32.8	15.5	8.2	16.0	0.0	15.7	25.0	0.0	3.1	37.2	2.8
Internal Link Dist (m)	148.9			174.7			240.3			305.6		
Turn Bay Length (m)	75.0		75.0	75.0		75.0	90.0		95.0	90.0		95.0
Base Capacity (vph)	408	907	658	305	794	473	730	1069	586	678	919	527
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.35	0.53	0.10	0.17	0.02	0.27	0.24	0.01	0.04	0.40	0.21

Intersection Summary

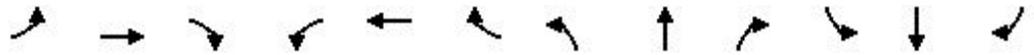
Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 80
 Control Type: Pretimed
 Maximum v/c Ratio: 0.53
 Intersection Signal Delay: 19.8
 Intersection LOS: B
 Intersection Capacity Utilization 65.2%
 ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 10: Zimmerman Rd & Meadows Pkwy



HCM Unsignalized Intersection Capacity Analysis
 13: Zimmerman Rd & 8 St E

Timing Plan: AM
 03-25-2024



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	5	5	15	5	5	5	45	27	5	5	17	5
Future Volume (Veh/h)	5	5	15	5	5	5	45	27	5	5	17	5
Sign Control		Free			Free			Yield			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	6	6	18	6	6	6	53	32	6	6	20	6
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	12			24			64	51	15	70	57	9
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	12			24			64	51	15	70	57	9
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			94	96	99	99	98	99
cM capacity (veh/h)	1607			1591			903	834	1065	885	828	1073
Direction, Lane #												
	EB 1	WB 1	NB 1	SB 1								
Volume Total	30	18	91	32								
Volume Left	6	6	53	6								
Volume Right	18	6	6	6								
cSH	1607	1591	886	876								
Volume to Capacity	0.00	0.00	0.10	0.04								
Queue Length 95th (m)	0.1	0.1	2.6	0.9								
Control Delay (s)	1.5	2.4	9.5	9.3								
Lane LOS	A	A	A	A								
Approach Delay (s)	1.5	2.4	9.5	9.3								
Approach LOS			A	A								
Intersection Summary												
Average Delay			7.3									
Intersection Capacity Utilization			24.4%	ICU Level of Service	A							
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 9: Zimmerman Rd & Taylor St

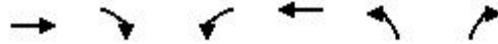
Timing Plan: AM
 03-25-2024



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	243	66	6	79	21	12
Future Volume (Veh/h)	243	66	6	79	21	12
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	286	78	7	93	25	14
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)			329			
pX, platoon unblocked						
vC, conflicting volume	118	54			100	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	118	54			100	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	67	92			98	
cM capacity (veh/h)	864	1014			1493	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	364	100	39			
Volume Left	286	0	25			
Volume Right	78	93	0			
cSH	892	1700	1493			
Volume to Capacity	0.41	0.06	0.02			
Queue Length 95th (m)	15.3	0.0	0.4			
Control Delay (s)	11.8	0.0	4.8			
Lane LOS	B		A			
Approach Delay (s)	11.8	0.0	4.8			
Approach LOS	B					
Intersection Summary						
Average Delay			8.9			
Intersection Capacity Utilization			37.0%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 12: Future North Access & Taylor St

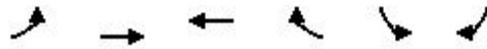
Timing Plan: AM
 03-25-2024



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↻			↻	↻	
Traffic Volume (veh/h)	5	100	5	5	309	5
Future Volume (Veh/h)	5	100	5	5	309	5
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	6	118	6	6	364	6
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			124		83	65
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			124		83	65
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		60	99
cM capacity (veh/h)			1463		915	999
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	124	12	370			
Volume Left	0	6	364			
Volume Right	118	0	6			
cSH	1700	1463	916			
Volume to Capacity	0.07	0.00	0.40			
Queue Length 95th (m)	0.0	0.1	15.0			
Control Delay (s)	0.0	3.8	11.6			
Lane LOS		A	B			
Approach Delay (s)	0.0	3.8	11.6			
Approach LOS			B			
Intersection Summary						
Average Delay			8.5			
Intersection Capacity Utilization			35.2%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 19: Road 394 & Proposed N-S Rd

Timing Plan: AM
 03-25-2024



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↶	↷		↶	↷
Traffic Volume (veh/h)	43	5	5	5	5	133
Future Volume (Veh/h)	43	5	5	5	5	133
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	51	6	6	6	6	156
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	12				117	9
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	12				117	9
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				99	85
cM capacity (veh/h)	1607				851	1073
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	57	12	162			
Volume Left	51	0	6			
Volume Right	0	6	156			
cSH	1607	1700	1062			
Volume to Capacity	0.03	0.01	0.15			
Queue Length 95th (m)	0.7	0.0	4.1			
Control Delay (s)	6.6	0.0	9.0			
Lane LOS	A		A			
Approach Delay (s)	6.6	0.0	9.0			
Approach LOS			A			
Intersection Summary						
Average Delay			7.9			
Intersection Capacity Utilization		28.4%		ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 23: Proposed N-S Rd & East Access - North

Timing Plan: AM
 03-25-2024



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	80	26	5	5	5
Future Volume (Veh/h)	5	80	26	5	5	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	6	94	31	6	6	6
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	77	9	12			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	77	9	12			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	91	98			
cM capacity (veh/h)	908	1073	1607			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	100	37	12			
Volume Left	6	31	0			
Volume Right	94	0	6			
cSH	1061	1607	1700			
Volume to Capacity	0.09	0.02	0.01			
Queue Length 95th (m)	2.4	0.4	0.0			
Control Delay (s)	8.7	6.1	0.0			
Lane LOS	A	A				
Approach Delay (s)	8.7	6.1	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			7.4			
Intersection Capacity Utilization			24.0%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 21: Proposed N-S Rd & East Access - Central

Timing Plan: AM
 03-25-2024



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	53	17	26	80	5
Future Volume (Veh/h)	5	53	17	26	80	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	6	62	20	31	94	6
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	168	97	100			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	168	97	100			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	94	99			
cM capacity (veh/h)	811	959	1493			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	68	51	100			
Volume Left	6	20	0			
Volume Right	62	0	6			
cSH	944	1493	1700			
Volume to Capacity	0.07	0.01	0.06			
Queue Length 95th (m)	1.8	0.3	0.0			
Control Delay (s)	9.1	3.0	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.1	3.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			3.5			
Intersection Capacity Utilization			22.9%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 27: Proposed N-S Rd & East Access - South

Timing Plan: AM
 03-25-2024



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	43	133	0
Future Volume (Veh/h)	0	0	0	43	133	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	0	0	0	51	156	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	207	156	156			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	207	156	156			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	781	890	1424			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	0	51	156			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1424	1700			
Volume to Capacity	0.00	0.00	0.09			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay	0.0					
Intersection Capacity Utilization	12.4%			ICU Level of Service	A	
Analysis Period (min)	15					

**2034 TOTAL
CONDITIONS - PM**

Lanes, Volumes, Timings
2: Zimmerman Rd & Market Dr

Timing Plan: PM
03-22-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	97	139	265	519	156	156	469	673	542	134	664	134
Future Volume (vph)	97	139	265	519	156	156	469	673	542	134	664	134
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	70.0		0.0	90.0		0.0	0.0		0.0	90.0		0.0
Storage Lanes	1		1	2		1	2		1	1		1
Taper Length (m)	25.0			25.0			2.5			25.0		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.97	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	1.00		0.99	1.00		0.99			0.98	1.00		0.98
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	1784	1517	3288	1784	1517	3288	3390	1517	1695	3390	1517
Flt Permitted	0.641			0.588			0.154			0.265		
Satd. Flow (perm)	1141	1784	1494	2028	1784	1494	533	3390	1494	472	3390	1494
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			242			184			493			161
Link Speed (k/h)		40			40			40			40	
Link Distance (m)		152.9			162.6			138.4			264.3	
Travel Time (s)		13.8			14.6			12.5			23.8	
Confl. Peds. (#/hr)	2		2	2		2	2		2	2		2
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	114	164	312	611	184	184	552	792	638	158	781	158
Shared Lane Traffic (%)												
Lane Group Flow (vph)	114	164	312	611	184	184	552	792	638	158	781	158
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			7.4			7.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Minimum Split (s)	11.2	29.8	29.8	11.8	29.8	29.8	11.2	25.7	25.7	11.2	25.7	25.7
Total Split (s)	15.2	29.8	29.8	17.4	32.0	32.0	23.2	45.7	45.7	17.1	39.6	39.6
Total Split (%)	13.8%	27.1%	27.1%	15.8%	29.1%	29.1%	21.1%	41.5%	41.5%	15.5%	36.0%	36.0%
Maximum Green (s)	9.0	23.0	23.0	10.6	25.2	25.2	17.0	40.0	40.0	10.9	33.9	33.9
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.2	3.8	3.8	3.2	3.8	3.8
All-Red Time (s)	2.7	3.3	3.3	3.3	3.3	3.3	3.0	1.9	1.9	3.0	1.9	1.9
Lost Time Adjust (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Total Lost Time (s)	8.2	8.8	8.8	8.8	8.8	8.8	8.2	7.7	7.7	8.2	7.7	7.7
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		16.0	16.0		16.0	16.0		13.0	13.0		13.0	13.0
Pedestrian Calls (#/hr)		2	2		2	2		2	2		2	2
Act Effect Green (s)	28.6	21.0	21.0	31.8	23.2	23.2	52.5	38.0	38.0	40.3	31.9	31.9

Lanes, Volumes, Timings
7: Zimmerman Rd & Highway 16

Timing Plan: PM
03-22-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 	 		 	 	 	 	 		 	 	 
Traffic Volume (vph)	1329	362	5	11	442	304	63	20	5	262	11	1085
Future Volume (vph)	1329	362	5	11	442	304	63	20	5	262	11	1085
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	160.0		0.0	110.0		100.0	0.0		0.0	0.0		25.0
Storage Lanes	2		0	1		1	1		0	1		1
Taper Length (m)	75.0			75.0			2.5			2.5		
Lane Util. Factor	0.97	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Ped Bike Factor		1.00		1.00		0.99	0.99	0.99		0.89	0.90	0.99
Frt		0.998				0.850		0.970				0.850
Flt Protected	0.950			0.950			0.950			0.950	0.956	
Satd. Flow (prot)	3288	3379	0	1695	3390	1517	1695	1721	0	1610	1621	1517
Flt Permitted	0.153			0.501			0.000			0.000	0.000	
Satd. Flow (perm)	530	3379	0	891	3390	1498	0	1721	0	0	0	1495
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				358		6				701
Link Speed (k/h)		40			40			40				40
Link Distance (m)		234.1			261.1			116.7				138.4
Travel Time (s)		21.1			23.5			10.5				12.5
Confl. Peds. (#/hr)	91		12	1		1	5		5	35		8
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	1564	426	6	13	520	358	74	24	6	308	13	1276
Shared Lane Traffic (%)										48%		
Lane Group Flow (vph)	1564	432	0	13	520	358	74	30	0	160	161	1276
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			5.0			5.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA		pm+pt	NA	Free	pm+pt	NA		pm+pt	NA	Free
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6		Free	8			4		Free
Minimum Split (s)	12.8	16.7		12.8	23.0		17.3	17.3		17.3	17.3	
Total Split (s)	40.0	45.0		20.0	25.0		20.0	20.0		25.0	25.0	
Total Split (%)	36.4%	40.9%		18.2%	22.7%		18.2%	18.2%		22.7%	22.7%	
Maximum Green (s)	32.2	38.3		12.2	18.3		12.7	12.7		17.7	17.7	
Yellow Time (s)	4.3	5.2		4.3	5.2		3.5	3.5		3.8	3.8	
All-Red Time (s)	3.5	1.5		3.5	1.5		3.8	3.8		3.5	3.5	
Lost Time Adjust (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Total Lost Time (s)	9.8	8.7		9.8	8.7		9.3	9.3		9.3	9.3	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag		Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Walk Time (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Flash Dont Walk (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Pedestrian Calls (#/hr)		2			2		2	2		2	2	
Act Effect Green (s)	55.2	36.3		25.4	16.3	110.0	10.7	10.7		15.7	15.7	110.0

Lanes, Volumes, Timings
7: Zimmerman Rd & Highway 16

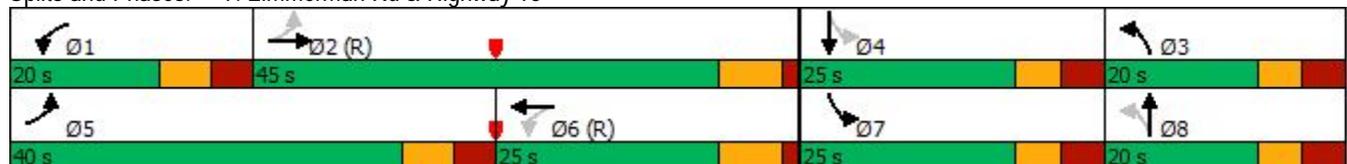
Timing Plan: PM
03-22-2024

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Actuated g/C Ratio	0.50	0.33		0.23	0.15	1.00	0.10	0.10		0.14	0.14	1.00
v/c Ratio	1.53	0.39		0.05	1.04	0.24	0.45	0.17		0.70	0.70	0.85
Control Delay	269.4	29.5		18.4	95.9	0.4	56.3	41.3		50.7	50.5	15.5
Queue Delay	0.1	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	269.5	29.5		18.4	95.9	0.4	56.3	41.3		50.7	50.5	15.5
LOS	F	C		B	F	A	E	D		D	D	B
Approach Delay		217.6			56.4			52.0			22.5	
Approach LOS		F			E			D			C	
Queue Length 50th (m)	~230.8	37.1		1.4	~63.3	0.0	15.2	4.8		32.2	32.3	213.2
Queue Length 95th (m)	#250.1	47.6		4.2	#88.1	0.0	28.2	13.1		m41.1	m41.6	213.4
Internal Link Dist (m)		210.1			237.1			92.7			114.4	
Turn Bay Length (m)	160.0			110.0		100.0						25.0
Base Capacity (vph)	1023	1115		280	502	1498	164	172		229	231	1495
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	0
Spillback Cap Reductn	11	0		0	0	26	0	0		0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio	1.55	0.39		0.05	1.04	0.24	0.45	0.17		0.70	0.70	0.85

Intersection Summary

Area Type: Other
 Cycle Length: 110
 Actuated Cycle Length: 110
 Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 140
 Control Type: Pretimed
 Maximum v/c Ratio: 1.53
 Intersection Signal Delay: 114.6 Intersection LOS: F
 Intersection Capacity Utilization 89.8% ICU Level of Service E
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Zimmerman Rd & Highway 16



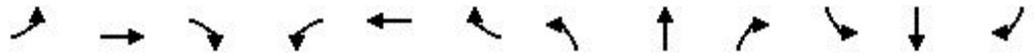
Lanes, Volumes, Timings
10: Zimmerman Rd & Meadows Pkwy

Timing Plan: PM
03-22-2024

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	105	552	432	188	469	45	581	302	139	40	267	74
Future Volume (vph)	105	552	432	188	469	45	581	302	139	40	267	74
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	75.0		75.0	75.0		75.0	90.0		95.0	90.0		95.0
Storage Lanes	1		1	1		1	2		1	2		1
Taper Length (m)	35.0			35.0			45.0			45.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Ped Bike Factor	1.00		0.99	1.00		0.98	1.00		0.99	1.00		0.99
Fr't			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	3390	1517	1695	3390	1517	3288	3390	1517	3288	3390	1517
Flt Permitted	0.386			0.200			0.391			0.539		
Satd. Flow (perm)	687	3390	1494	357	3390	1480	1350	3390	1494	1860	3390	1494
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			397			216			164			219
Link Speed (k/h)		40			40			40			40	
Link Distance (m)		172.9			198.7			264.3			329.6	
Travel Time (s)		15.6			17.9			23.8			29.7	
Confl. Peds. (#/hr)	2		2	2		2	2		2	2		2
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	124	649	508	221	552	53	684	355	164	47	314	87
Shared Lane Traffic (%)												
Lane Group Flow (vph)	124	649	508	221	552	53	684	355	164	47	314	87
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			7.4			7.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Minimum Split (s)	10.4	27.9	27.9	10.4	27.9	27.9	11.2	25.6	25.6	10.6	25.6	25.6
Total Split (s)	14.8	31.0	31.0	18.0	34.2	34.2	23.0	40.4	40.4	10.6	28.0	28.0
Total Split (%)	14.8%	31.0%	31.0%	18.0%	34.2%	34.2%	23.0%	40.4%	40.4%	10.6%	28.0%	28.0%
Maximum Green (s)	9.4	25.1	25.1	12.6	28.3	28.3	16.8	34.8	34.8	5.0	22.4	22.4
Yellow Time (s)	3.0	3.5	3.5	3.0	3.5	3.5	3.2	3.8	3.8	3.2	3.8	3.8
All-Red Time (s)	2.4	2.4	2.4	2.4	2.4	2.4	3.0	1.8	1.8	2.4	1.8	1.8
Lost Time Adjust (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Total Lost Time (s)	7.4	7.9	7.9	7.4	7.9	7.9	8.2	7.6	7.6	7.6	7.6	7.6
Lead/Lag	Lead	Lag	Lag									
Lead-Lag Optimize?	Yes											
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		15.0	15.0		15.0	15.0		13.0	13.0		13.0	13.0
Pedestrian Calls (#/hr)		2	2		2	2		2	2		2	2
Act Efect Green (s)	31.0	23.1	23.1	37.4	26.3	26.3	42.8	32.8	32.8	23.4	20.4	20.4

HCM Unsignalized Intersection Capacity Analysis
 13: Zimmerman Rd & 8 St E

Timing Plan: PM
 03-25-2024



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	5	5	50	5	6	5	43	47	5	5	44	5
Future Volume (Veh/h)	5	5	50	5	6	5	43	47	5	5	44	5
Sign Control		Free			Free			Yield			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	6	6	59	6	7	6	51	55	6	6	52	6
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	13			65			102	72	36	103	99	10
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	13			65			102	72	36	103	99	10
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			94	93	99	99	93	99
cM capacity (veh/h)	1606			1537			825	812	1037	822	785	1071
Direction, Lane #												
	EB 1	WB 1	NB 1	SB 1								
Volume Total	71	19	112	64								
Volume Left	6	6	51	6								
Volume Right	59	6	6	6								
cSH	1606	1537	828	809								
Volume to Capacity	0.00	0.00	0.14	0.08								
Queue Length 95th (m)	0.1	0.1	3.5	2.0								
Control Delay (s)	0.6	2.3	10.0	9.8								
Lane LOS	A	A	B	A								
Approach Delay (s)	0.6	2.3	10.0	9.8								
Approach LOS			B	A								
Intersection Summary												
Average Delay			6.9									
Intersection Capacity Utilization			26.1%	ICU Level of Service	A							
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 9: Zimmerman Rd & Taylor St

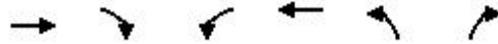
Timing Plan: PM
 03-25-2024



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	148	40	50	235	64	31
Future Volume (Veh/h)	148	40	50	235	64	31
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	174	47	59	276	75	36
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						
Upstream signal (m)	329					
pX, platoon unblocked	0.95	0.95			0.95	
vC, conflicting volume	383	197			335	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	328	133			278	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	71	95			94	
cM capacity (veh/h)	596	873			1225	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	221	335	111			
Volume Left	174	0	75			
Volume Right	47	276	0			
cSH	639	1700	1225			
Volume to Capacity	0.35	0.20	0.06			
Queue Length 95th (m)	11.7	0.0	1.5			
Control Delay (s)	13.6	0.0	5.7			
Lane LOS	B		A			
Approach Delay (s)	13.6	0.0	5.7			
Approach LOS	B					
Intersection Summary						
Average Delay			5.4			
Intersection Capacity Utilization			49.8%	ICU Level of Service		A
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
 12: Future North Access & Taylor St

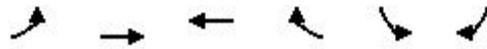
Timing Plan: PM
 03-25-2024



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↩			↩	↩	
Traffic Volume (veh/h)	5	299	5	5	188	5
Future Volume (Veh/h)	5	299	5	5	188	5
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	6	352	6	6	221	6
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			358		200	182
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			358		200	182
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		72	99
cM capacity (veh/h)			1201		785	861
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	358	12	227			
Volume Left	0	6	221			
Volume Right	352	0	6			
cSH	1700	1201	786			
Volume to Capacity	0.21	0.00	0.29			
Queue Length 95th (m)	0.0	0.1	9.1			
Control Delay (s)	0.0	4.0	11.4			
Lane LOS		A	B			
Approach Delay (s)	0.0	4.0	11.4			
Approach LOS			B			
Intersection Summary						
Average Delay			4.4			
Intersection Capacity Utilization			41.1%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 19: Road 394 & Proposed N-S Rd

Timing Plan: PM
 03-25-2024



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↖	↗		↘	
Traffic Volume (veh/h)	128	5	5	5	5	81
Future Volume (Veh/h)	128	5	5	5	5	81
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	151	6	6	6	6	95
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	12				317	9
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	12				317	9
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	91				99	91
cM capacity (veh/h)	1607				613	1073
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	157	12	101			
Volume Left	151	0	6			
Volume Right	0	6	95			
cSH	1607	1700	1027			
Volume to Capacity	0.09	0.01	0.10			
Queue Length 95th (m)	2.4	0.0	2.5			
Control Delay (s)	7.2	0.0	8.9			
Lane LOS	A		A			
Approach Delay (s)	7.2	0.0	8.9			
Approach LOS			A			
Intersection Summary						
Average Delay			7.5			
Intersection Capacity Utilization		30.0%		ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 23: Proposed N-S Rd & East Access - North

Timing Plan: PM
 03-25-2024



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	47	75	5	5	5
Future Volume (Veh/h)	5	47	75	5	5	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	6	55	88	6	6	6
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	191	9	12			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	191	9	12			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	95	95			
cM capacity (veh/h)	754	1073	1607			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	61	94	12			
Volume Left	6	88	0			
Volume Right	55	0	6			
cSH	1030	1607	1700			
Volume to Capacity	0.06	0.05	0.01			
Queue Length 95th (m)	1.4	1.3	0.0			
Control Delay (s)	8.7	6.9	0.0			
Lane LOS	A	A				
Approach Delay (s)	8.7	6.9	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay	7.1					
Intersection Capacity Utilization	24.7%			ICU Level of Service	A	
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
 21: Proposed N-S Rd & East Access - Central

Timing Plan: PM
 03-25-2024



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	34	53	75	47	5
Future Volume (Veh/h)	5	34	53	75	47	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	6	40	62	88	55	6
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	270	58	61			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	270	58	61			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	96	96			
cM capacity (veh/h)	690	1008	1542			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	46	150	61			
Volume Left	6	62	0			
Volume Right	40	0	6			
cSH	951	1542	1700			
Volume to Capacity	0.05	0.04	0.04			
Queue Length 95th (m)	1.2	1.0	0.0			
Control Delay (s)	9.0	3.3	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.0	3.3	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			3.5			
Intersection Capacity Utilization			27.3%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 27: Proposed N-S Rd & East Access - South

Timing Plan: PM
 03-25-2024



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	128	81	0
Future Volume (Veh/h)	0	0	0	128	81	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	0	0	0	151	95	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	246	95	95			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	246	95	95			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	742	962	1499			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	0	151	95			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1499	1700			
Volume to Capacity	0.00	0.00	0.06			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay	0.0					
Intersection Capacity Utilization	12.1%			ICU Level of Service	A	
Analysis Period (min)	15					

**2039 TOTAL
CONDITIONS - AM**

Lanes, Volumes, Timings
2: Zimmerman Rd & Market Dr

Timing Plan: AM
03-22-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	127	72	427	282	30	5	165	472	345	5	742	47
Future Volume (vph)	127	72	427	282	30	5	165	472	345	5	742	47
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	70.0		0.0	90.0		0.0	0.0		0.0	90.0		0.0
Storage Lanes	1		1	2		1	1		1	1		1
Taper Length (m)	25.0			25.0			2.5			25.0		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	1.00		0.99	1.00		0.99			0.99	1.00		0.99
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	1784	1517	3288	1784	1517	1695	3390	1517	1695	3390	1517
Flt Permitted	0.734			0.702			0.141			0.347		
Satd. Flow (perm)	1306	1784	1495	2421	1784	1495	252	3390	1494	618	3390	1494
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			260			171			406			183
Link Speed (k/h)		40			40			40			40	
Link Distance (m)		152.9			162.6			138.4			264.3	
Travel Time (s)		13.8			14.6			12.5			23.8	
Confl. Peds. (#/hr)	2		2	2		2	2		2	2		2
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	149	85	502	332	35	6	194	555	406	6	873	55
Shared Lane Traffic (%)												
Lane Group Flow (vph)	149	85	502	332	35	6	194	555	406	6	873	55
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			7.4			7.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Minimum Split (s)	11.2	29.8	29.8	11.8	29.8	29.8	11.2	25.7	25.7	11.2	25.7	25.7
Total Split (s)	17.0	31.0	31.0	17.0	31.0	31.0	16.0	36.0	36.0	16.0	36.0	36.0
Total Split (%)	17.0%	31.0%	31.0%	17.0%	31.0%	31.0%	16.0%	36.0%	36.0%	16.0%	36.0%	36.0%
Maximum Green (s)	10.8	24.2	24.2	10.2	24.2	24.2	9.8	30.3	30.3	9.8	30.3	30.3
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.2	3.8	3.8	3.2	3.8	3.8
All-Red Time (s)	2.7	3.3	3.3	3.3	3.3	3.3	3.0	1.9	1.9	3.0	1.9	1.9
Lost Time Adjust (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Total Lost Time (s)	8.2	8.8	8.8	8.8	8.8	8.8	8.2	7.7	7.7	8.2	7.7	7.7
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		16.0	16.0		16.0	16.0		13.0	13.0		13.0	13.0
Pedestrian Calls (#/hr)		2	2		2	2		2	2		2	2
Act Effect Green (s)	31.6	22.2	22.2	30.4	22.2	22.2	35.6	28.3	28.3	35.6	28.3	28.3

Lanes, Volumes, Timings
2: Zimmerman Rd & Market Dr

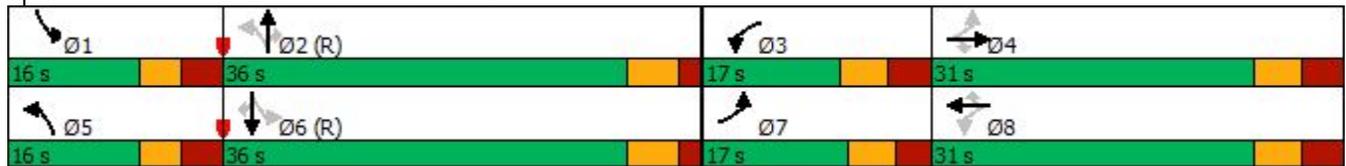
Timing Plan: AM
03-22-2024

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Actuated g/C Ratio	0.32	0.22	0.22	0.30	0.22	0.22	0.36	0.28	0.28	0.36	0.28	0.28
v/c Ratio	0.33	0.21	0.94	0.41	0.09	0.01	0.96	0.58	0.57	0.02	0.91	0.10
Control Delay	22.9	33.5	46.3	23.1	31.7	0.0	78.8	33.6	6.4	16.4	49.5	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.9	33.5	46.3	23.1	31.7	0.0	78.8	33.6	6.4	16.4	49.5	0.4
LOS	C	C	D	C	C	A	E	C	A	B	D	A
Approach Delay	40.1			23.6			31.7			46.4		
Approach LOS	D			C			C			D		
Queue Length 50th (m)	18.7	13.5	50.3	22.0	5.4	0.0	23.2	48.4	0.0	0.6	85.7	0.0
Queue Length 95th (m)	30.4	24.9	#99.1	29.9	12.5	0.0	#58.8	60.9	16.2	2.8	#108.9	0.0
Internal Link Dist (m)	128.9			138.6			114.4			240.3		
Turn Bay Length (m)	70.0			90.0			90.0			90.0		
Base Capacity (vph)	446	396	534	807	396	464	202	959	713	304	959	554
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.33	0.21	0.94	0.41	0.09	0.01	0.96	0.58	0.57	0.02	0.91	0.10

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 90
 Control Type: Pretimed
 Maximum v/c Ratio: 0.96
 Intersection Signal Delay: 36.9
 Intersection LOS: D
 Intersection Capacity Utilization 79.4%
 ICU Level of Service D
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 2: Zimmerman Rd & Market Dr



Lanes, Volumes, Timings
7: Zimmerman Rd & Highway 16

Timing Plan: AM
03-22-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 	 		 	 					 	 	 
Traffic Volume (vph)	625	242	48	5	306	131	6	5	5	206	11	1058
Future Volume (vph)	625	242	48	5	306	131	6	5	5	206	11	1058
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	160.0		0.0	110.0		100.0	0.0		0.0	0.0		25.0
Storage Lanes	2		0	1		1	1		0	1		1
Taper Length (m)	75.0			75.0			2.5			2.5		
Lane Util. Factor	0.97	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Ped Bike Factor		0.99		1.00		0.99	0.99	0.99		0.89	0.90	0.99
Frt		0.975				0.850		0.925				0.850
Flt Protected	0.950			0.950			0.950			0.950	0.957	
Satd. Flow (prot)	3288	3259	0	1695	3390	1517	1695	1627	0	1610	1622	1517
Flt Permitted	0.287			0.547			0.000			0.000	0.000	
Satd. Flow (perm)	993	3259	0	973	3390	1498	0	1627	0	0	0	1495
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		22				336		6				811
Link Speed (k/h)		40			40			40				40
Link Distance (m)		234.1			261.1			116.7				138.4
Travel Time (s)		21.1			23.5			10.5				12.5
Confl. Peds. (#/hr)	91		12	1		1	5		5	35		8
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	735	285	56	6	360	154	7	6	6	242	13	1245
Shared Lane Traffic (%)										47%		
Lane Group Flow (vph)	735	341	0	6	360	154	7	12	0	128	127	1245
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			5.0			5.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA		pm+pt	NA	Free	pm+pt	NA		pm+pt	NA	Free
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6		Free	8			4		Free
Minimum Split (s)	12.8	16.7		12.8	23.0		17.3	17.3		17.3	17.3	
Total Split (s)	40.0	45.0		20.0	25.0		20.0	20.0		25.0	25.0	
Total Split (%)	36.4%	40.9%		18.2%	22.7%		18.2%	18.2%		22.7%	22.7%	
Maximum Green (s)	32.2	38.3		12.2	18.3		12.7	12.7		17.7	17.7	
Yellow Time (s)	4.3	5.2		4.3	5.2		3.5	3.5		3.8	3.8	
All-Red Time (s)	3.5	1.5		3.5	1.5		3.8	3.8		3.5	3.5	
Lost Time Adjust (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Total Lost Time (s)	9.8	8.7		9.8	8.7		9.3	9.3		9.3	9.3	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag		Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Walk Time (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Flash Dont Walk (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Pedestrian Calls (#/hr)		2			2		2	2		2	2	
Act Effect Green (s)	55.2	36.3		25.4	16.3	110.0	10.7	10.7		15.7	15.7	110.0

Lanes, Volumes, Timings
10: Zimmerman Rd & Meadows Pkwy

Timing Plan: AM
03-22-2024

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	62	333	365	33	138	11	205	301	6	26	437	140
Future Volume (vph)	62	333	365	33	138	11	205	301	6	26	437	140
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	75.0		75.0	75.0		75.0	90.0		95.0	90.0		95.0
Storage Lanes	1		1	1		1	2		1	2		1
Taper Length (m)	35.0			35.0			45.0			45.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Ped Bike Factor	1.00		0.99	1.00		0.98	1.00		0.99	1.00		0.99
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	3390	1517	1695	3390	1517	3288	3390	1517	3288	3390	1517
Flt Permitted	0.649			0.515			0.367			0.540		
Satd. Flow (perm)	1154	3390	1495	918	3390	1481	1268	3390	1495	1864	3390	1495
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			429			182			186			186
Link Speed (k/h)		40			40			40			40	
Link Distance (m)		172.9			198.7			264.3			329.6	
Travel Time (s)		15.6			17.9			23.8			29.7	
Confl. Peds. (#/hr)	2		2	2		2	2		2	2		2
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	73	392	429	39	162	13	241	354	7	31	514	165
Shared Lane Traffic (%)												
Lane Group Flow (vph)	73	392	429	39	162	13	241	354	7	31	514	165
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			7.4			7.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Minimum Split (s)	10.4	27.9	27.9	10.4	27.9	27.9	11.2	25.6	25.6	10.6	25.6	25.6
Total Split (s)	16.0	30.0	30.0	16.0	30.0	30.0	12.0	27.0	27.0	12.0	27.0	27.0
Total Split (%)	18.8%	35.3%	35.3%	18.8%	35.3%	35.3%	14.1%	31.8%	31.8%	14.1%	31.8%	31.8%
Maximum Green (s)	10.6	24.1	24.1	10.6	24.1	24.1	5.8	21.4	21.4	6.4	21.4	21.4
Yellow Time (s)	3.0	3.5	3.5	3.0	3.5	3.5	3.2	3.8	3.8	3.2	3.8	3.8
All-Red Time (s)	2.4	2.4	2.4	2.4	2.4	2.4	3.0	1.8	1.8	2.4	1.8	1.8
Lost Time Adjust (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Total Lost Time (s)	7.4	7.9	7.9	7.4	7.9	7.9	8.2	7.6	7.6	7.6	7.6	7.6
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		15.0	15.0		15.0	15.0		13.0	13.0		13.0	13.0
Pedestrian Calls (#/hr)		2	2		2	2		2	2		2	2
Act Efect Green (s)	31.2	22.1	22.1	31.2	22.1	22.1	22.6	19.4	19.4	23.8	19.4	19.4

HCM Unsignalized Intersection Capacity Analysis
 13: Zimmerman Rd & 8 St E

Timing Plan: AM
 03-25-2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	5	25	5	5	5	75	29	5	5	19	5
Future Volume (Veh/h)	5	5	25	5	5	5	75	29	5	5	19	5
Sign Control		Free			Free			Yield			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	6	6	29	6	6	6	88	34	6	6	22	6
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	12			35			70	56	20	76	68	9
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	12			35			70	56	20	76	68	9
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			90	96	99	99	97	99
cM capacity (veh/h)	1607			1576			892	828	1057	874	816	1073
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	41	18	128	34								
Volume Left	6	6	88	6								
Volume Right	29	6	6	6								
cSH	1607	1576	880	863								
Volume to Capacity	0.00	0.00	0.15	0.04								
Queue Length 95th (m)	0.1	0.1	3.9	0.9								
Control Delay (s)	1.1	2.4	9.8	9.3								
Lane LOS	A	A	A	A								
Approach Delay (s)	1.1	2.4	9.8	9.3								
Approach LOS			A	A								
Intersection Summary												
Average Delay			7.5									
Intersection Capacity Utilization			26.3%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 9: Zimmerman Rd & Taylor St

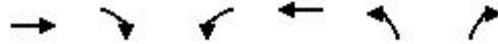
Timing Plan: AM
 03-25-2024



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	357	66	7	116	21	12
Future Volume (Veh/h)	357	66	7	116	21	12
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	420	78	8	136	25	14
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (m)	329					
pX, platoon unblocked						
vC, conflicting volume	140	76			144	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	140	76			144	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	50	92			98	
cM capacity (veh/h)	838	985			1438	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	498	144	39			
Volume Left	420	0	25			
Volume Right	78	136	0			
cSH	858	1700	1438			
Volume to Capacity	0.58	0.08	0.02			
Queue Length 95th (m)	29.1	0.0	0.4			
Control Delay (s)	14.8	0.0	4.9			
Lane LOS	B		A			
Approach Delay (s)	14.8	0.0	4.9			
Approach LOS	B					
Intersection Summary						
Average Delay			11.1			
Intersection Capacity Utilization			51.4%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 12: Future North Access & Taylor St

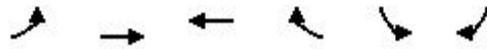
Timing Plan: AM
 03-25-2024



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↻			↻	↻	
Traffic Volume (veh/h)	5	148	5	5	454	5
Future Volume (Veh/h)	5	148	5	5	454	5
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	6	174	6	6	534	6
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			180		111	93
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			180		111	93
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		39	99
cM capacity (veh/h)			1396		882	964
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	180	12	540			
Volume Left	0	6	534			
Volume Right	174	0	6			
cSH	1700	1396	883			
Volume to Capacity	0.11	0.00	0.61			
Queue Length 95th (m)	0.0	0.1	32.6			
Control Delay (s)	0.0	3.8	15.3			
Lane LOS		A	C			
Approach Delay (s)	0.0	3.8	15.3			
Approach LOS			C			
Intersection Summary						
Average Delay			11.3			
Intersection Capacity Utilization			46.8%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 19: Road 394 & Proposed N-S Rd

Timing Plan: AM
 03-25-2024



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↶	↷		↶	↷
Traffic Volume (veh/h)	63	5	5	5	5	194
Future Volume (Veh/h)	63	5	5	5	5	194
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	74	6	6	6	6	228
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	12				163	9
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	12				163	9
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	95				99	79
cM capacity (veh/h)	1607				790	1073
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	80	12	234			
Volume Left	74	0	6			
Volume Right	0	6	228			
cSH	1607	1700	1063			
Volume to Capacity	0.05	0.01	0.22			
Queue Length 95th (m)	1.1	0.0	6.4			
Control Delay (s)	6.8	0.0	9.3			
Lane LOS	A		A			
Approach Delay (s)	6.8	0.0	9.3			
Approach LOS			A			
Intersection Summary						
Average Delay			8.4			
Intersection Capacity Utilization		33.6%		ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 23: Proposed N-S Rd & East Access - North

Timing Plan: AM
 03-25-2024



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	80	26	5	5	5
Future Volume (Veh/h)	5	80	26	5	5	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	6	94	31	6	6	6
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	77	9	12			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	77	9	12			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	91	98			
cM capacity (veh/h)	908	1073	1607			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	100	37	12			
Volume Left	6	31	0			
Volume Right	94	0	6			
cSH	1061	1607	1700			
Volume to Capacity	0.09	0.02	0.01			
Queue Length 95th (m)	2.4	0.4	0.0			
Control Delay (s)	8.7	6.1	0.0			
Lane LOS	A	A				
Approach Delay (s)	8.7	6.1	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			7.4			
Intersection Capacity Utilization			24.0%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 21: Proposed N-S Rd & East Access - Central

Timing Plan: AM
 03-25-2024



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	53	17	26	80	5
Future Volume (Veh/h)	5	53	17	26	80	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	6	62	20	31	94	6
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	168	97	100			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	168	97	100			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	94	99			
cM capacity (veh/h)	811	959	1493			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	68	51	100			
Volume Left	6	20	0			
Volume Right	62	0	6			
cSH	944	1493	1700			
Volume to Capacity	0.07	0.01	0.06			
Queue Length 95th (m)	1.8	0.3	0.0			
Control Delay (s)	9.1	3.0	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.1	3.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			3.5			
Intersection Capacity Utilization			22.9%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 27: Proposed N-S Rd & East Access - South

Timing Plan: AM
 03-25-2024



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	61	20	43	133	5
Future Volume (Veh/h)	5	61	20	43	133	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	6	72	24	51	156	6
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	258	159	162			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	258	159	162			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	92	98			
cM capacity (veh/h)	718	886	1417			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	78	75	162			
Volume Left	6	24	0			
Volume Right	72	0	6			
cSH	871	1417	1700			
Volume to Capacity	0.09	0.02	0.10			
Queue Length 95th (m)	2.2	0.4	0.0			
Control Delay (s)	9.5	2.5	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.5	2.5	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			3.0			
Intersection Capacity Utilization			30.5%	ICU Level of Service	A	
Analysis Period (min)			15			

**2039 TOTAL
CONDITIONS - PM**

Lanes, Volumes, Timings
2: Zimmerman Rd & Market Dr

Timing Plan: PM
03-22-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				 				 			 	
Traffic Volume (vph)	101	145	277	577	164	164	492	838	621	141	811	141
Future Volume (vph)	101	145	277	577	164	164	492	838	621	141	811	141
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	70.0		0.0	90.0		0.0	0.0		0.0	90.0		0.0
Storage Lanes	1		1	2		1	1		1	1		1
Taper Length (m)	25.0			25.0			2.5			25.0		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	1.00		0.99	1.00		0.99			0.99			0.99
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	1784	1517	3288	1784	1517	1695	3390	1517	1695	3390	1517
Flt Permitted	0.621			0.649			0.141			0.141		
Satd. Flow (perm)	1106	1784	1495	2239	1784	1495	252	3390	1494	252	3390	1494
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			223			193			507			183
Link Speed (k/h)		40			40			40			40	
Link Distance (m)		152.9			162.6			138.4			264.3	
Travel Time (s)		13.8			14.6			12.5			23.8	
Confl. Peds. (#/hr)	2		2	2		2	2		2	2		2
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	119	171	326	679	193	193	579	986	731	166	954	166
Shared Lane Traffic (%)												
Lane Group Flow (vph)	119	171	326	679	193	193	579	986	731	166	954	166
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			7.4			7.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Minimum Split (s)	11.2	29.8	29.8	11.8	29.8	29.8	11.2	25.7	25.7	11.2	25.7	25.7
Total Split (s)	17.0	31.0	31.0	17.0	31.0	31.0	16.0	36.0	36.0	16.0	36.0	36.0
Total Split (%)	17.0%	31.0%	31.0%	17.0%	31.0%	31.0%	16.0%	36.0%	36.0%	16.0%	36.0%	36.0%
Maximum Green (s)	10.8	24.2	24.2	10.2	24.2	24.2	9.8	30.3	30.3	9.8	30.3	30.3
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.2	3.8	3.8	3.2	3.8	3.8
All-Red Time (s)	2.7	3.3	3.3	3.3	3.3	3.3	3.0	1.9	1.9	3.0	1.9	1.9
Lost Time Adjust (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Total Lost Time (s)	8.2	8.8	8.8	8.8	8.8	8.8	8.2	7.7	7.7	8.2	7.7	7.7
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		16.0	16.0		16.0	16.0		13.0	13.0		13.0	13.0
Pedestrian Calls (#/hr)		2	2		2	2		2	2		2	2
Act Effect Green (s)	31.6	22.2	22.2	30.4	22.2	22.2	35.6	28.3	28.3	35.6	28.3	28.3

Lanes, Volumes, Timings
7: Zimmerman Rd & Highway 16

Timing Plan: PM
03-22-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 	 		 	 					 	 	 
Traffic Volume (vph)	1491	380	6	11	463	337	66	21	5	285	11	1197
Future Volume (vph)	1491	380	6	11	463	337	66	21	5	285	11	1197
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	160.0		0.0	110.0		100.0	0.0		0.0	0.0		25.0
Storage Lanes	2		0	1		1	1		0	1		1
Taper Length (m)	75.0			75.0			2.5			2.5		
Lane Util. Factor	0.97	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Ped Bike Factor		1.00		1.00		0.99	0.99	0.99		0.89	0.90	0.99
Frt		0.998				0.850		0.971				0.850
Flt Protected	0.950			0.950			0.950			0.950	0.956	
Satd. Flow (prot)	3288	3379	0	1695	3390	1517	1695	1723	0	1610	1621	1517
Flt Permitted	0.153			0.490			0.000			0.000	0.000	
Satd. Flow (perm)	530	3379	0	872	3390	1498	0	1723	0	0	0	1495
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				396		6				697
Link Speed (k/h)		40			40			40				40
Link Distance (m)		234.1			261.1			116.7				138.4
Travel Time (s)		21.1			23.5			10.5				12.5
Confl. Peds. (#/hr)	91		12	1		1	5		5	35		8
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	1754	447	7	13	545	396	78	25	6	335	13	1408
Shared Lane Traffic (%)										48%		
Lane Group Flow (vph)	1754	454	0	13	545	396	78	31	0	174	174	1408
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			5.0				5.0
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA		pm+pt	NA	Free	pm+pt	NA		pm+pt	NA	Free
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6		Free	8			4		Free
Minimum Split (s)	12.8	16.7		12.8	23.0		17.3	17.3		17.3	17.3	
Total Split (s)	40.0	45.0		20.0	25.0		20.0	20.0		25.0	25.0	
Total Split (%)	36.4%	40.9%		18.2%	22.7%		18.2%	18.2%		22.7%	22.7%	
Maximum Green (s)	32.2	38.3		12.2	18.3		12.7	12.7		17.7	17.7	
Yellow Time (s)	4.3	5.2		4.3	5.2		3.5	3.5		3.8	3.8	
All-Red Time (s)	3.5	1.5		3.5	1.5		3.8	3.8		3.5	3.5	
Lost Time Adjust (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Total Lost Time (s)	9.8	8.7		9.8	8.7		9.3	9.3		9.3	9.3	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag		Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Walk Time (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Flash Dont Walk (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Pedestrian Calls (#/hr)		2			2		2	2		2	2	
Act Effect Green (s)	55.2	36.3		25.4	16.3	110.0	10.7	10.7		15.7	15.7	110.0

Lanes, Volumes, Timings
10: Zimmerman Rd & Meadows Pkwy

Timing Plan: PM
03-22-2024

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	152	673	526	229	572	60	581	302	139	53	367	106
Future Volume (vph)	152	673	526	229	572	60	581	302	139	53	367	106
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	75.0		75.0	75.0		75.0	90.0		95.0	90.0		95.0
Storage Lanes	1		1	1		1	2		1	2		1
Taper Length (m)	35.0			35.0			45.0			45.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Ped Bike Factor	1.00		0.99	1.00		0.98	1.00		0.99	1.00		0.99
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	3390	1517	1695	3390	1517	3288	3390	1517	3288	3390	1517
Flt Permitted	0.261			0.181			0.452			0.539		
Satd. Flow (perm)	465	3390	1495	323	3390	1481	1561	3390	1495	1861	3390	1495
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			245			182			186			186
Link Speed (k/h)		40			40			40			40	
Link Distance (m)		172.9			198.7			264.3			329.6	
Travel Time (s)		15.6			17.9			23.8			29.7	
Confl. Peds. (#/hr)	2		2	2		2	2		2	2		2
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	179	792	619	269	673	71	684	355	164	62	432	125
Shared Lane Traffic (%)												
Lane Group Flow (vph)	179	792	619	269	673	71	684	355	164	62	432	125
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			7.4			7.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Minimum Split (s)	10.4	27.9	27.9	10.4	27.9	27.9	11.2	25.6	25.6	10.6	25.6	25.6
Total Split (s)	16.0	30.0	30.0	16.0	30.0	30.0	12.0	27.0	27.0	12.0	27.0	27.0
Total Split (%)	18.8%	35.3%	35.3%	18.8%	35.3%	35.3%	14.1%	31.8%	31.8%	14.1%	31.8%	31.8%
Maximum Green (s)	10.6	24.1	24.1	10.6	24.1	24.1	5.8	21.4	21.4	6.4	21.4	21.4
Yellow Time (s)	3.0	3.5	3.5	3.0	3.5	3.5	3.2	3.8	3.8	3.2	3.8	3.8
All-Red Time (s)	2.4	2.4	2.4	2.4	2.4	2.4	3.0	1.8	1.8	2.4	1.8	1.8
Lost Time Adjust (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Total Lost Time (s)	7.4	7.9	7.9	7.4	7.9	7.9	8.2	7.6	7.6	7.6	7.6	7.6
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		15.0	15.0		15.0	15.0		13.0	13.0		13.0	13.0
Pedestrian Calls (#/hr)		2	2		2	2		2	2		2	2
Act Efect Green (s)	31.2	22.1	22.1	31.2	22.1	22.1	22.6	19.4	19.4	23.8	19.4	19.4

HCM Unsignalized Intersection Capacity Analysis
 13: Zimmerman Rd & 8 St E

Timing Plan: PM
 03-25-2024



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	5	5	80	5	7	5	60	54	5	5	47	5
Future Volume (Veh/h)	5	5	80	5	7	5	60	54	5	5	47	5
Sign Control		Free			Free			Yield			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	6	6	94	6	8	6	71	64	6	6	55	6
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	14			100			122	91	53	126	135	11
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	14			100			122	91	53	126	135	11
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			91	92	99	99	93	99
cM capacity (veh/h)	1604			1493			796	793	1014	786	750	1070
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	106	20	141	67								
Volume Left	6	6	71	6								
Volume Right	94	6	6	6								
cSH	1604	1493	802	774								
Volume to Capacity	0.00	0.00	0.18	0.09								
Queue Length 95th (m)	0.1	0.1	4.8	2.2								
Control Delay (s)	0.4	2.2	10.4	10.1								
Lane LOS	A	A	B	B								
Approach Delay (s)	0.4	2.2	10.4	10.1								
Approach LOS			B	B								
Intersection Summary												
Average Delay			6.7									
Intersection Capacity Utilization			29.5%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 9: Zimmerman Rd & Taylor St

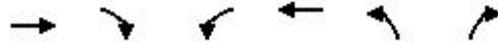
Timing Plan: PM
 03-25-2024



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	216	59	54	345	94	33
Future Volume (Veh/h)	216	59	54	345	94	33
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	254	69	64	406	111	39
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (m)			329			
pX, platoon unblocked	0.90	0.90			0.90	
vC, conflicting volume	528	267			470	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	424	135			360	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	47	92			90	
cM capacity (veh/h)	476	825			1083	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	323	470	150			
Volume Left	254	0	111			
Volume Right	69	406	0			
cSH	523	1700	1083			
Volume to Capacity	0.62	0.28	0.10			
Queue Length 95th (m)	31.6	0.0	2.6			
Control Delay (s)	22.4	0.0	6.7			
Lane LOS	C		A			
Approach Delay (s)	22.4	0.0	6.7			
Approach LOS	C					
Intersection Summary						
Average Delay			8.7			
Intersection Capacity Utilization			64.2%	ICU Level of Service	C	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 12: Future North Access & Taylor St

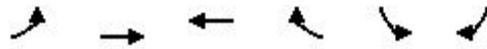
Timing Plan: PM
 03-25-2024



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	
Traffic Volume (veh/h)	5	439	5	5	275	5
Future Volume (Veh/h)	5	439	5	5	275	5
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	6	516	6	6	324	6
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			522		282	264
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			522		282	264
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		54	99
cM capacity (veh/h)			1044		704	775
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	522	12	330			
Volume Left	0	6	324			
Volume Right	516	0	6			
cSH	1700	1044	705			
Volume to Capacity	0.31	0.01	0.47			
Queue Length 95th (m)	0.0	0.1	19.0			
Control Delay (s)	0.0	4.3	14.5			
Lane LOS		A	B			
Approach Delay (s)	0.0	4.3	14.5			
Approach LOS			B			
Intersection Summary						
Average Delay			5.6			
Intersection Capacity Utilization			55.4%	ICU Level of Service		B
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 19: Road 394 & Proposed N-S Rd

Timing Plan: PM
 03-25-2024



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔	↔		↔	
Traffic Volume (veh/h)	188	5	5	5	5	118
Future Volume (Veh/h)	188	5	5	5	5	118
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	221	6	6	6	6	139
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	12			457	9	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	12			457	9	
tC, single (s)	4.1			6.4	6.2	
tC, 2 stage (s)						
tF (s)	2.2			3.5	3.3	
p0 queue free %	86			99	87	
cM capacity (veh/h)	1607			484	1073	
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	227	12	145			
Volume Left	221	0	6			
Volume Right	0	6	139			
cSH	1607	1700	1021			
Volume to Capacity	0.14	0.01	0.14			
Queue Length 95th (m)	3.6	0.0	3.8			
Control Delay (s)	7.4	0.0	9.1			
Lane LOS	A		A			
Approach Delay (s)	7.4	0.0	9.1			
Approach LOS			A			
Intersection Summary						
Average Delay			7.8			
Intersection Capacity Utilization			35.9%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 23: Proposed N-S Rd & East Access - North

Timing Plan: PM
 03-25-2024



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	47	75	5	5	5
Future Volume (Veh/h)	5	47	75	5	5	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	6	55	88	6	6	6
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	191	9	12			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	191	9	12			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	95	95			
cM capacity (veh/h)	754	1073	1607			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	61	94	12			
Volume Left	6	88	0			
Volume Right	55	0	6			
cSH	1030	1607	1700			
Volume to Capacity	0.06	0.05	0.01			
Queue Length 95th (m)	1.4	1.3	0.0			
Control Delay (s)	8.7	6.9	0.0			
Lane LOS	A	A				
Approach Delay (s)	8.7	6.9	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			7.1			
Intersection Capacity Utilization			24.7%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 21: Proposed N-S Rd & East Access - Central

Timing Plan: PM
 03-25-2024



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	34	53	75	47	5
Future Volume (Veh/h)	5	34	53	75	47	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	6	40	62	88	55	6
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	270	58	61			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	270	58	61			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	96	96			
cM capacity (veh/h)	690	1008	1542			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	46	150	61			
Volume Left	6	62	0			
Volume Right	40	0	6			
cSH	951	1542	1700			
Volume to Capacity	0.05	0.04	0.04			
Queue Length 95th (m)	1.2	1.0	0.0			
Control Delay (s)	9.0	3.3	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.0	3.3	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			3.5			
Intersection Capacity Utilization			27.3%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 27: Proposed N-S Rd & East Access - South

Timing Plan: PM
 03-25-2024



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	37	60	128	81	5
Future Volume (Veh/h)	5	37	60	128	81	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	6	44	71	151	95	6
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	391	98	101			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	391	98	101			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	95	95			
cM capacity (veh/h)	584	958	1491			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	50	222	101			
Volume Left	6	71	0			
Volume Right	44	0	6			
cSH	890	1491	1700			
Volume to Capacity	0.06	0.05	0.06			
Queue Length 95th (m)	1.4	1.1	0.0			
Control Delay (s)	9.3	2.7	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.3	2.7	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			2.8			
Intersection Capacity Utilization			30.6%	ICU Level of Service	A	
Analysis Period (min)			15			

Project No. 668.057

Arbutus Properties

Solair Development Traffic Impact Assessment

Appendix F CITY PROVIDED SIGNAL TIMING PLANS

Highway 16 & Zimmerman Rd

(MM.1.3) CONFIGURATION, Load Switch Assignment (MMU Channel)

Load Switch	Phase or Overlap	Type Assignm't	Dimming Disabled	Flash Power	Automatic Flash	Flash Together
1	1	V	.	R	R	X
2	2	O	.	R	R	X
3	3	V	.			.
4	4	V	.	R	R	.
5	5	V	.	R	R	X
6	6	O	.	R	R	X
7	7	V	.			.
8	8	V	.	R	R	.
9		P	.	.	.	.
10		P	.	.	.	.
11		P	.	.	.	.
12		P	.	.	.	.
13	2	V	.	.	.	.
14	6	V	.	.	.	.

(MM.1.4.1) CONFIGURATION, Port 1 (SDLC), SDLC Options (these settings are for TS2 cabinet)

BIU	1	2	3	4	5	6	7	8
Terminal & Facility *	X*	X*						
Detector Rack		X*						

Enable TS2/MMU Type Cabinet	YES*
Enable MMU Extended Status	YES*
Enable SDLC Stop Time	YES
Enable 3 Critical FREs Lockup	YES
MMU to CU SDLC External Start	ENABLED

(MM.1.4.2) CONFIGURATION, Port 1 (SDLC), MMU Programming

Phase Channel	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2
Phase									Ø8	Ø7	Ø6	Ø5	Ø4	Ø3	Ø2
1 (Ø1)											X	X			
2 (Ø2)											X	X			
3 (Ø3)									X						
4 (Ø4)										X					
5 (Ø5)															
6 (Ø6)															
7 (Ø7)															
8 (Ø8)															
13															
14															

(MM.1.4.3) CONFIGURATION, Port 1 (SDLC), Colour Check Enable (TS2 only)

Enable Color Check	X													
Load Switch	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Phase	Ø1	Ø2	Ø3	Ø4	Ø5	Ø6	Ø7	Ø8					(AWF)	
Red	X	X		X	X	X		X						
Yellow	X	X	X	X	X	X	X	X	---	---	---	---		
Green	X	X	X	X	X	X	X	X						

(MM.1.4.4) CONFIGURATION, Port 1 (SDLC), Secondary Stations/Tests (TS2 only)

	1	2	3	4	5	6	7	8	MMU
T & F	.	.	.	.	.	.	.	.	.
	1	2	3	4	5	6	7	8	Diag
D / R	.	.	.	.	.	.	.	.	.

Enable SDLC Diagnostic Test YES

(MM.1.5.1) CONFIGURATION, Communications, Ethernet

Controller IP	10	235	8	1
Subnet Mask	255	255	255	240
Default Gateway IP	10	235	8	14
Server IP	10	70	10	1
Link Speed / Duplex	.....			Auto
Drop-Out Time	.....			300

(MM.1.5.2) CONFIGURATION, Communications, Port 2 / C50S (Terminal)

Enable	NO	Protocol	NTCIP
Data Rate (bps)	38400	(Comm Port) Address	1
Data, Parity, Stop	8, N, 1	Group Address	0
Duplex	HALF	Single Flagged	YES
Flow Control	YES	Drop-out Time	10

(MM.1.5.3) CONFIGURATION, Communications, Port 3A / C21S (Telemetry)

Enable	NO	Protocol	NTCIP
Bit Rate	19200	(Comm Port) Address	0
D/P/S (Data, Parity, Stop)	8, N, 1	Group Address	0
Duplex	FULL	Single Flagged	YES
Flow Control	YES	Drop-out Time	10

(MM.1.5.4) CONFIGURATION, Communications, Port 3B / C22S (FSK Comm Module)

Enable	NO	Protocol	ECPIP
Bit Rate	1200	(Comm Port) Address	0
D/P/S (Data, Parity, Stop)	8, N, 1	TRD (ms)	0.9
Duplex	FULL	Drop-out Time	10
Flow Control	YES		
RTS-CTS Delay	14.0		
RTS Turn Off	2.0		
Early RTS	NO		
FSK Hardware	YES		

(MM.1.5.5) CONFIGURATION, Communications, NTCIP

NTCIP Backup Time (sec)	0
Ethernet UDP Port	501
Ethernet Priority	1
Port 2 Priority	4
Port 3A Priority	2
Port 3B Priority	3

(MM.1.6.1) CONFIGURATION, Enable Logging, Event Logging

All Entries YES

(MM.1.7.1) CONFIGURATION, Display/Access, Administration

Enable CU/Cabinet Interlock CRC	NO
CU/Cabinet Interlock CRC Value	0000
CU/Cabinet Interlock HW Value	0000
Request Download Controller Data	NO
Controller Database CRC	---
Enable Automatic Backup to Data Key	YES

(MM.2.5) CONTROLLER, Start / Flash Data

Start Up

Phase	1	2	3	4	5	6	7	8
Phase Description	WBLT	EB	NBLT	SB	EBLT	WB	SBLT	NB
Power Start Phase Interval		Y				Y		
Overlap	A	B	C	D	E	F	G	H
Power Start Overlap Interval		X				X		
Flash Through CVM	YES	Flash Time			5	ALL RED		5
Power Start Sequence	3	MUTCD -->			NO			

Automatic Flash

Phase	1	2	3	4	5	6	7	8	
Phase Description	WBLT	EB	NBLT	SB	EBLT	WB	SBLT	NB	
Entry Phase				X			X		
Exit Phase		X				X			
Overlap	A	B	C	D	E	F	G	H	
Exit Overlap(s)		X				X			
Flash Through CVM	YES	Exit Flash Interval			Y	Min Auto Flash (sec)		8	
Minimum Recall	NO							Cycle Thru Phase	NO

(MM.2.6.1) CONTROLLER, Option Data, Controller Options

Phase	1	2	3	4	5	6	7	8
Phase Description	WBLT	EB	NBLT	SB	EBLT	WB	SBLT	NB
Ped Clearance Protection	OFF					Unit Red Revert		2.0
						MUTCD 3 Seconds Don't Walk		NO
Flashing Green Phase	F2		F2		F2		F2	
Dual Entry Phases		X	X	X		X	X	X
Rest In Walk								

(MM.2.8) CONTROLLER, Phase Recall Options

Timing Plan Number	1,2,3							
Phase	1	2	3	4	5	6	7	8
Phase Description	WBLT	EB	NBLT	SB	EBLT	WB	SBLT	NB
Lock Detector	X			X	X			X
Vehicle Recall								
Ped Recall								
Max Recall		X				X		
No Rest	X		X	X	X		X	X

(MM.3.1) COORDINATOR, Coordinator Options

Manual Pattern	AUTO	ECPI Coordination	YES
System Source	TBC	System Format	STD
Split in	SECONDS	Offset in	SECONDS
Transition	SMOOTH	Max Selection	MAXINH
Dwell/Add Time	0	Enable Manual Sync	NO
Daily Coord WK-LZ	NO	Force Off	FLOAT
Offset Reference	LEAD	Cal Use Ped Time	YES
Ped Recall	NO	Ped Reservice	NO
Local Zero Override (aka SIW?)	NO	FO Add Initial Green	NO
Resync Count	0	Multisync	NO

(MM.8.7) UTILITIES, Software Modules

Boot File	1.14.03
Application File Version	2.64.00

(MM.9.2.1) DIAGNOSTICS, Warning Checks, Enable Warning Check Categories

Warning Check	ENABLED
All warning items	YES

(MM.6.1) DETECTORS, Vehicle Detector Phase Assignment

** Use of Rack 1 is for VC testing only.*

Vehicle Detector Plan #1		Additional Phases Called							
Detector Ch. #	Assigned Phase	1	2	3	4	5	6	7	8
		WBLT	EB	NBLT	SB	EBLT	WB	SBLT	NB
1									
2									
3									
4									
5									
6									
7									
8									
Radar Detector Channels									
17	1								
18									
19									
20	4							X	
21	5								
22									
23									
24	8			X					

(MM.6.2) DETECTORS, Vehicle Detector Setup

** Use of Rack 1 is for VC testing only.*

Vehicle Detector (number)	1	2	3	4	5	6	7	8
Loop #								
Mode (PR or PL)								
(Detector) Type (S=default)								
TS2 Detector (X=enable)								
Phase Assigned								
Phase Discription								
Additional Phase(s) Called								
Extend Time								
Use Added Initial (X=enable)								
Lock In (NONE=default)								
Vehicle Detector Plan #								
Delay Time								
Cross Switch Phase								
NTCIP Vol Det (X=enable)	---	---	---	---	---	---	---	---
NTCIP Occ Det (X=enable)	---	---	---	---	---	---	---	---
Radar Detector Channels								
Vehicle Detector (number)	17	18	19	20	21	22	23	24
Detection Zone #	1			4	5			8
Mode (PR or PL)	PR			PR	PR			PR
(Detector) Type (S=default)	S			S	S			S
TS2 Detector (X=enable)	X			X	X			X
Phases Called	1			4	5			8
Phase Discription	WBLT			SB	EBLT			NB
Additional Phase(s) Called	0			7	0			3
Extend Time	0.0			0.0	0.0			0.0
Use Added Initial (X=enable)	---	---	---	---	---	---	---	---
Lock In (NONE=default)	NONE			NONE	NONE			NONE
Vehicle Detector Plan #	1			1	1			1
Delay Time	0.0		0.0	0.0	0.0		0.0	0.0
Cross Switch Phase	NO			NO	NO			NO

(MM.1.4.4) CONFIGURATION, Port 1 (SDLC), Secondary Stations/Tests (TS2 only)

	1	2	3	4	5	6	7	8	MMU
T & F	.	.	.	.	.	.	.	.	.
	1	2	3	4	5	6	7	8	Diag
D / R	.	.	.	.	.	.	.	.	.

Enable SDLC Diagnostic Test YES

(MM.1.5.1) CONFIGURATION, Communications, Ethernet

Controller IP	10	235	8	17
Subnet Mask	255	255	255	240
Default Gateway IP	10	235	8	30
Server IP	10	70	10	1
Link Speed / Duplex	.....			Auto
Drop-Out Time	.....			300

(MM.1.5.2) CONFIGURATION, Communications, Port 2 / C50S (Terminal)

Enable	NO	Protocol	NTCIP
Data Rate (bps)	38400	(Comm Port) Address	1
Data, Parity, Stop	8, N, 1	Group Address	0
Duplex	HALF	Single Flagged	YES
Flow Control	YES	Drop-out Time	10

(MM.1.5.3) CONFIGURATION, Communications, Port 3A / C21S (Telemetry)

Enable	NO	Protocol	NTCIP
Bit Rate	19200	(Comm Port) Address	0
D/P/S (Data, Parity, Stop)	8, N, 1	Group Address	0
Duplex	FULL	Single Flagged	YES
Flow Control	YES	Drop-out Time	10

(MM.1.5.4) CONFIGURATION, Communications, Port 3B / C22S (FSK Comm Module)

Enable	NO	Protocol	ECPIP
Bit Rate	1200	(Comm Port) Address	0
D/P/S (Data, Parity, Stop)	8, N, 1	TRD (ms)	0.9
Duplex	FULL	Drop-out Time	10
Flow Control	YES		
RTS-CTS Delay	14.0		
RTS Turn Off	2.0		
Early RTS	NO		
FSK Hardware	YES		

(MM.1.5.5) CONFIGURATION, Communications, NTCIP

NTCIP Backup Time (sec)	0
Ethernet UDP Port	501
Ethernet Priority	1
Port 2 Priority	4
Port 3A Priority	2
Port 3B Priority	3

(MM.1.6.1) CONFIGURATION, Enable Logging, Event Logging

All Entries YES

(MM.1.7.1) CONFIGURATION, Display/Access, Administration

Enable CU/Cabinet Interlock CRC	NO
CU/Cabinet Interlock CRC Value	0000
CU/Cabinet Interlock HW Value	0000
Request Download Controller Data	NO
Controller Database CRC	---
Enable Automatic Backup to Data Key	YES

(MM.2.5) CONTROLLER, Start / Flash Data

Start Up

Phase	1	2	3	4	5	6	7	8
Phase Description	SBLT	NB	WBLT	EB	NBLT	SB	EBLT	WB
Power Start Phase Interval		Y				Y		
Overlap	A	B	C	D	E	F	G	H
Power Start Overlap Interval								
Flash Through CVM	YES	Flash Time		5	ALL RED		5	
Power Start Sequence	1	MUTCD -->			NO			

Automatic Flash

Phase	1	2	3	4	5	6	7	8
Phase Description	SBLT	NB	WBLT	EB	NBLT	SB	EBLT	WB
Entry Phase				X				X
Exit Phase		X				X		
Overlap	A	B	C	D	E	F	G	H
Exit Overlap(s)								
Flash Through CVM	YES	Exit Flash Interval		Y	Min Auto Flash (sec)		8	
Minimum Recall	NO				Cycle Thru Phase		NO	

(MM.2.6.1) CONTROLLER, Option Data, Controller Options

Phase	1	2	3	4	5	6	7	8
Phase Description	SBLT	NB	WBLT	EB	NBLT	SB	EBLT	WB
Ped Clearance Protection	OFF					Unit Red Revert		2.0
					MUTCD 3 Seconds Don't Walk			NO
Flashing Green Phase	F2		F2		F2		F2	
Dual Entry Phases		X	X	X		X	X	X
Rest In Walk		X				X		

(MM.2.8) CONTROLLER, Phase Recall Options

Timing Plan Number	1							
Phase	1	2	3	4	5	6	7	8
Phase Description	SBLT	NB	WBLT	EB	NBLT	SB	EBLT	WB
Lock Detector								
Vehicle Recall								
Ped Recall		X				X		
Max Recall		X				X		
No Rest	X		X	X	X		X	X

(MM.3.1) COORDINATOR, Coordinator Options

Manual Pattern	AUTO	ECPI Coordination	YES
System Source	TBC	System Format	STD
Split in	SECONDS	Offset in	SECONDS
Transition	SMOOTH	Max Selection	MAXINH
Dwell/Add Time	0	Enable Manual Sync	NO
Daily Coord WK-LZ	NO	Force Off	FLOAT
Offset Reference	LEAD	Cal Use Ped Time	YES
Ped Recall	NO	Ped Reservice	NO
Local Zero Override (aka SIW?)	NO	FO Add Initial Green	NO
Resync Count	0	Multisync	NO

(MM.8.7) UTILITIES, Software Modules

Boot File	1.14.03
Application File Version	2.64.00

(MM.9.2.1) DIAGNOSTICS, Warning Checks, Enable Warning Check Categories

Warning Check	ENABLED
All warning items	YES

Zimmerman Rd & Meadows Parkway

Signal ID #: 6874

Econolite ASC/3-2100 Controller (1.14.03 OS & 2.64 SW)

Revision #: 1i

Revision Date: Dec-27-23

(MM.1.2) CONFIGURATION, Phases in Use

Phase	1	2	3	4	5	6	7	8
<i>Phase Description</i>	SBLT	NB	WBLT	EB	NBLT	SB	EBLT	WB
Phases In Use (enabled)	X	X	X	X	X	X	X	X

(MM.1.1.1) CONFIGURATION, Controller Sequence, Phase Ring Sequence and Assignment

Phase Sequence	1	Sequence of Phases				Hardware Alt. Sequ. Enable
Sequence Data Entry Mode		B			B	NO
Ring 1	1	2	3	4		
Ring 2	5	6	7	8		

B = Barrier mode (default setting)

(MM.1.1.2) CONFIGURATION, Controller Sequence, Phase Compatibility only

Compatible with->	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2
<i>Phase</i>					Ø8p	Ø6p	Ø4p	Ø2p	Ø8	Ø7	Ø6	Ø5	Ø4	Ø3	Ø2
1 (Ø1)															
2 (Ø2)															
3 (Ø3)															
4 (Ø4)															
5 (Ø5)															
6 (Ø6)															
7 (Ø7)															
8 (Ø8)															
9 (Ø2 peds)															
10 (Ø4 peds)															
11 (Ø6 peds)															
12 (Ø8 peds)															
13															
14															

(MM.1.1.3) CONFIGURATION, Controller Sequence, Backup Prevent Phases

(X, B, C)

Phase	1	2	3	4	5	6	7	8
<i>Phase Description</i>	SBLT	NB	WBLT	EB	NBLT	SB	EBLT	WB
1								
2	X							
3								
4			X					
5								
6					B			
7								
8							X	

(MM.1.1.4) CONFIGURATION, Controller Sequence, Simultaneous Gap Phases

Phase	1	2	3	4	5	6	7	8
<i>Phase Description</i>	SBLT	NB	WBLT	EB	NBLT	SB	EBLT	WB
1								
2						X		
3								
4								X
5								
6		X						
7								
8				X				

(MM.1.4.4) CONFIGURATION, Port 1 (SDLC), Secondary Stations/Tests (TS2 only)

	1	2	3	4	5	6	7	8	MMU
T & F	.	.	.	.	.	.	.	.	.
	1	2	3	4	5	6	7	8	Diag
D / R	.	.	.	.	.	.	.	.	.

Enable SDLC Diagnostic Test YES

(MM.1.5.1) CONFIGURATION, Communications, Ethernet

Controller IP	10	235	8	33
Subnet Mask	255	255	255	240
Default Gateway IP	10	235	8	46
Server IP	10	70	10	1
Link Speed / Duplex	.....			Auto
Drop-Out Time	.....			300

(MM.1.5.2) CONFIGURATION, Communications, Port 2 / C50S (Terminal)

Enable	NO	Protocol	NTCIP
Data Rate (bps)	38400	(Comm Port) Address	1
Data, Parity, Stop	8, N, 1	Group Address	0
Duplex	HALF	Single Flagged	YES
Flow Control	YES	Drop-out Time	10

(MM.1.5.3) CONFIGURATION, Communications, Port 3A / C21S (Telemetry)

Enable	NO	Protocol	NTCIP
Bit Rate	19200	(Comm Port) Address	0
D/P/S (Data, Parity, Stop)	8, N, 1	Group Address	0
Duplex	FULL	Single Flagged	YES
Flow Control	YES	Drop-out Time	10

(MM.1.5.4) CONFIGURATION, Communications, Port 3B / C22S (FSK Comm Module)

Enable	NO	Protocol	ECPIP
Bit Rate	1200	(Comm Port) Address	0
D/P/S (Data, Parity, Stop)	8, N, 1	TRD (ms)	0.9
Duplex	FULL	Drop-out Time	10
Flow Control	YES		
RTS-CTS Delay	14.0		
RTS Turn Off	2.0		
Early RTS	NO		
FSK Hardware	YES		

(MM.1.5.5) CONFIGURATION, Communications, NTCIP

NTCIP Backup Time (sec)	0
Ethernet UDP Port	501
Ethernet Priority	1
Port 2 Priority	4
Port 3A Priority	2
Port 3B Priority	3

(MM.1.6.1) CONFIGURATION, Enable Logging, Event Logging

All Entries YES

(MM.1.7.1) CONFIGURATION, Display/Access, Administration

Enable CU/Cabinet Interlock CRC	NO
CU/Cabinet Interlock CRC Value	0000
CU/Cabinet Interlock HW Value	0000
Request Download Controller Data	NO
Controller Database CRC	---
Enable Automatic Backup to Data Key	YES

(MM.2.5) CONTROLLER, Start / Flash Data

Start Up

Phase	1	2	3	4	5	6	7	8
Phase Description	SBLT	NB	WBLT	EB	NBLT	SB	EBLT	WB
Power Start Phase Interval		Y				Y		
Overlap	A	B	C	D	E	F	G	H
Power Start Overlap Interval								
Flash Through CVM	YES	Flash Time		5	ALL RED		5	
Power Start Sequence	1	MUTCD -->			NO			

Automatic Flash

Phase	1	2	3	4	5	6	7	8
Phase Description	SBLT	NB	WBLT	EB	NBLT	SB	EBLT	WB
Entry Phase				X				X
Exit Phase		X				X		
Overlap	A	B	C	D	E	F	G	H
Exit Overlap(s)								
Flash Through CVM	YES	Exit Flash Interval		Y	Min Auto Flash (sec)		8	
Minimum Recall	NO				Cycle Thru Phase		NO	

(MM.2.6.1) CONTROLLER, Option Data, Controller Options

Phase	1	2	3	4	5	6	7	8
Phase Description	SBLT	NB	WBLT	EB	NBLT	SB	EBLT	WB
Ped Clearance Protection	OFF					Unit Red Revert		2.0
					MUTCD 3 Seconds Don't Walk			NO
Flashing Green Phase	F2		F2		F2		F2	
Dual Entry Phases		X		X		X		X
Rest In Walk		X				X		

(MM.2.8) CONTROLLER, Phase Recall Options

Timing Plan Number	1							
Phase	1	2	3	4	5	6	7	8
Phase Description	SBLT	NB	WBLT	EB	NBLT	SB	EBLT	WB
Lock Detector					X			
Vehicle Recall								
Ped Recall		X				X		
Max Recall		X				X		
No Rest	X		X	X	X		X	X

(MM.3.1) COORDINATOR, Coordinator Options

Manual Pattern	AUTO	ECPI Coordination	YES
System Source	TBC	System Format	STD
Split in	SECONDS	Offset in	SECONDS
Transition	SMOOTH	Max Selection	MAXINH
Dwell/Add Time	0	Enable Manual Sync	NO
Daily Coord WK-LZ	NO	Force Off	FLOAT
Offset Reference	LEAD	Cal Use Ped Time	YES
Ped Recall	NO	Ped Reservice	NO
Local Zero Override (aka SIW?)	NO	FO Add Initial Green	NO
Resync Count	0	Multisync	NO

(MM.8.7) UTILITIES, Software Modules

Boot File	1.14.03
Application File Version	2.64.00

(MM.9.2.1) DIAGNOSTICS, Warning Checks, Enable Warning Check Categories

Warning Check	ENABLED
All warning items	YES

Project No. 668.057

Arbutus Properties

Solair Development Traffic Impact Assessment

Appendix G SYNCHRO ANALYSIS FOR MITIGATION
RECOMMENDATIONS

2039 MITIGATION - AM

Lanes, Volumes, Timings
2: Zimmerman Rd & Market Dr

Timing Plan: AM
03-22-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	127	72	427	282	30	5	165	472	345	5	742	47
Future Volume (vph)	127	72	427	282	30	5	165	472	345	5	742	47
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	70.0		0.0	90.0		0.0	60.0		60.0	90.0		90.0
Storage Lanes	1		1	2		1	2		1	1		1
Taper Length (m)	25.0			25.0			50.0			25.0		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.97	0.91	1.00	1.00	0.91	1.00
Ped Bike Factor	1.00		0.99	1.00		0.99	1.00		0.99	1.00		0.99
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	1784	1517	3288	1784	1517	3288	4871	1517	1695	4871	1517
Flt Permitted	0.650			0.702			0.208			0.434		
Satd. Flow (perm)	1157	1784	1495	2425	1784	1495	720	4871	1498	773	4871	1494
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			190			190			406			204
Link Speed (k/h)		40			40			40			40	
Link Distance (m)		152.9			162.6			138.4			264.3	
Travel Time (s)		13.8			14.6			12.5			23.8	
Confl. Peds. (#/hr)	2		2	2		2	2		2	2		2
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	149	85	502	332	35	6	194	555	406	6	873	55
Shared Lane Traffic (%)												
Lane Group Flow (vph)	149	85	502	332	35	6	194	555	406	6	873	55
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			7.4			7.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Free	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		Free	6		6
Minimum Split (s)	11.2	29.8	29.8	11.8	29.8	29.8	11.2	25.7		11.2	25.7	25.7
Total Split (s)	14.8	34.0	34.0	11.9	31.1	31.1	13.0	32.9		11.2	31.1	31.1
Total Split (%)	16.4%	37.8%	37.8%	13.2%	34.6%	34.6%	14.4%	36.6%		12.4%	34.6%	34.6%
Maximum Green (s)	8.6	27.2	27.2	5.1	24.3	24.3	6.8	27.2		5.0	25.4	25.4
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.2	3.8		3.2	3.8	3.8
All-Red Time (s)	2.7	3.3	3.3	3.3	3.3	3.3	3.0	1.9		3.0	1.9	1.9
Lost Time Adjust (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0
Total Lost Time (s)	8.2	8.8	8.8	8.8	8.8	8.8	8.2	7.7		8.2	7.7	7.7
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Walk Time (s)		7.0	7.0		7.0	7.0		7.0			7.0	7.0
Flash Dont Walk (s)		16.0	16.0		16.0	16.0		13.0			13.0	13.0
Pedestrian Calls (#/hr)		2	2		2	2		2			2	2
Act Effect Green (s)	32.4	25.2	25.2	25.4	22.3	22.3	29.5	25.2	90.0	25.9	23.4	23.4

Lanes, Volumes, Timings
7: Zimmerman Rd & Highway 16

Timing Plan: AM
03-22-2024



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑		↖	↑↑	↗	↖	↗		↖↗	↑	↗
Traffic Volume (vph)	0	242	48	5	306	131	6	5	5	206	11	1058
Future Volume (vph)	0	242	48	5	306	131	6	5	5	206	11	1058
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	160.0		0.0	110.0		100.0	0.0		0.0	0.0		25.0
Storage Lanes	0		0	1		1	1		0	2		1
Taper Length (m)	75.0			75.0			2.5			50.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Ped Bike Factor		0.99		1.00		0.99	0.99	0.99		0.85		0.99
Frt		0.975				0.850		0.925				0.850
Flt Protected				0.950			0.950			0.950		
Satd. Flow (prot)	0	3266	0	1695	3390	1517	1695	1630	0	3288	1784	1517
Flt Permitted				0.385			0.000			0.000		
Satd. Flow (perm)	0	3266	0	686	3390	1498	0	1630	0	0	1784	1495
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		25				316		6				686
Link Speed (k/h)		40			40			40				40
Link Distance (m)		234.1			261.1			116.7				138.4
Travel Time (s)		21.1			23.5			10.5				12.5
Confl. Peds. (#/hr)	91		12	1		1	5		5	35		8
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	0	285	56	6	360	154	7	6	6	242	13	1245
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	341	0	6	360	154	7	12	0	242	13	1245
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			14.8				14.8
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type		NA		pm+pt	NA	Free	pm+pt	NA		pm+pt	NA	Free
Protected Phases		2		1	6		3	8		7		4
Permitted Phases				6		Free	8			4		Free
Minimum Split (s)		16.7		12.8	23.0		17.3	17.3		17.3		17.3
Total Split (s)		32.0		15.0	47.0		19.0	19.0		24.0		24.0
Total Split (%)		35.6%		16.7%	52.2%		21.1%	21.1%		26.7%		26.7%
Maximum Green (s)		25.3		7.2	40.3		11.7	11.7		16.7		16.7
Yellow Time (s)		5.2		4.3	5.2		3.5	3.5		3.8		3.8
All-Red Time (s)		1.5		3.5	1.5		3.8	3.8		3.5		3.5
Lost Time Adjust (s)		2.0		2.0	2.0		2.0	2.0		2.0		2.0
Total Lost Time (s)		8.7		9.8	8.7		9.3	9.3		9.3		9.3
Lead/Lag		Lag		Lead			Lag	Lag		Lead		Lead
Lead-Lag Optimize?		Yes		Yes			Yes	Yes		Yes		Yes
Walk Time (s)		3.0			3.0		3.0	3.0		3.0		3.0
Flash Dont Walk (s)		7.0			7.0		7.0	7.0		7.0		7.0
Pedestrian Calls (#/hr)		2			2		2	2		2		2
Act Effect Green (s)		23.3		37.2	38.3	90.0	9.7	9.7		14.7	14.7	90.0

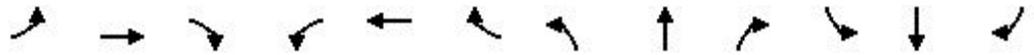
Lanes, Volumes, Timings
10: Zimmerman Rd & Meadows Pkwy

Timing Plan: AM
03-22-2024

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	62	333	365	33	138	11	205	31	6	26	437	140
Future Volume (vph)	62	333	365	33	138	11	205	31	6	26	437	140
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	75.0		75.0	75.0		75.0	90.0		95.0	90.0		95.0
Storage Lanes	1		1	2		1	1		1	1		1
Taper Length (m)	35.0			35.0			45.0			45.0		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	1.00		0.99	1.00		0.98	1.00		0.99	1.00		0.99
Fr't			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	3390	1517	3288	3390	1517	3288	3390	1517	1695	3390	1517
Flt Permitted	0.649			0.520			0.359			0.732		
Satd. Flow (perm)	1155	3390	1495	1798	3390	1481	1241	3390	1495	1303	3390	1495
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			345			185			190			190
Link Speed (k/h)		40			40			40			40	
Link Distance (m)		172.9			198.7			264.3			329.6	
Travel Time (s)		15.6			17.9			23.8			29.7	
Confl. Peds. (#/hr)	2		2	2		2	2		2	2		2
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	73	392	429	39	162	13	241	36	7	31	514	165
Shared Lane Traffic (%)												
Lane Group Flow (vph)	73	392	429	39	162	13	241	36	7	31	514	165
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			7.4			7.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Minimum Split (s)	10.4	27.9	27.9	10.4	27.9	27.9	11.2	25.6	25.6	10.6	25.6	25.6
Total Split (s)	10.4	28.0	28.0	10.4	28.0	28.0	13.0	31.0	31.0	10.6	28.6	28.6
Total Split (%)	13.0%	35.0%	35.0%	13.0%	35.0%	35.0%	16.3%	38.8%	38.8%	13.3%	35.8%	35.8%
Maximum Green (s)	5.0	22.1	22.1	5.0	22.1	22.1	6.8	25.4	25.4	5.0	23.0	23.0
Yellow Time (s)	3.0	3.5	3.5	3.0	3.5	3.5	3.2	3.8	3.8	3.2	3.8	3.8
All-Red Time (s)	2.4	2.4	2.4	2.4	2.4	2.4	3.0	1.8	1.8	2.4	1.8	1.8
Lost Time Adjust (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Total Lost Time (s)	7.4	7.9	7.9	7.4	7.9	7.9	8.2	7.6	7.6	7.6	7.6	7.6
Lead/Lag	Lead	Lag	Lag									
Lead-Lag Optimize?	Yes											
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		15.0	15.0		15.0	15.0		13.0	13.0		13.0	13.0
Pedestrian Calls (#/hr)		2	2		2	2		2	2		2	2
Act Efect Green (s)	23.6	20.1	20.1	23.6	20.1	20.1	27.6	23.4	23.4	24.0	21.0	21.0

Lanes, Volumes, Timings
 10: Zimmerman Rd & Meadows Pkwy

Timing Plan: AM
 03-22-2024



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Actuated g/C Ratio	0.30	0.25	0.25	0.30	0.25	0.25	0.34	0.29	0.29	0.30	0.26	0.26
v/c Ratio	0.20	0.46	0.68	0.07	0.19	0.03	0.44	0.04	0.01	0.08	0.58	0.31
Control Delay	18.5	27.5	12.3	15.9	24.3	0.1	18.0	20.5	0.0	14.7	28.7	4.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.5	27.5	12.3	15.9	24.3	0.1	18.0	20.5	0.0	14.7	28.7	4.5
LOS	B	C	B	B	C	A	B	C	A	B	C	A
Approach Delay	19.4			21.3			17.8			22.5		
Approach LOS	B			C			B			C		
Queue Length 50th (m)	6.9	26.5	10.1	1.8	10.2	0.0	11.4	2.0	0.0	2.7	35.6	0.0
Queue Length 95th (m)	14.1	36.7	32.0	4.4	16.6	0.0	17.3	5.0	0.0	6.9	47.2	8.4
Internal Link Dist (m)	148.9			174.7			240.3			305.6		
Turn Bay Length (m)	75.0		75.0	75.0	75.0		90.0	95.0		90.0	95.0	
Base Capacity (vph)	360	851	633	586	851	510	550	991	571	405	889	532
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.46	0.68	0.07	0.19	0.03	0.44	0.04	0.01	0.08	0.58	0.31

Intersection Summary

Area Type: Other
 Cycle Length: 80
 Actuated Cycle Length: 80
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 80
 Control Type: Pretimed
 Maximum v/c Ratio: 0.68
 Intersection Signal Delay: 20.4
 Intersection LOS: C
 Intersection Capacity Utilization 71.3%
 ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 10: Zimmerman Rd & Meadows Pkwy



HCM Unsignalized Intersection Capacity Analysis
 9: Zimmerman Rd & Taylor St

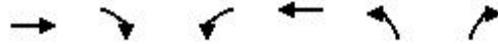
Timing Plan: AM
 03-25-2024



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	357	66	7	116	21	12
Future Volume (Veh/h)	357	66	7	116	21	12
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	420	78	8	136	25	14
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)			329			
pX, platoon unblocked						
vC, conflicting volume	140	76			144	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	140	76			144	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	50	92			98	
cM capacity (veh/h)	838	985			1438	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	498	144	39			
Volume Left	420	0	25			
Volume Right	78	136	0			
cSH	858	1700	1438			
Volume to Capacity	0.58	0.08	0.02			
Queue Length 95th (m)	29.1	0.0	0.4			
Control Delay (s)	14.8	0.0	4.9			
Lane LOS	B		A			
Approach Delay (s)	14.8	0.0	4.9			
Approach LOS	B					
Intersection Summary						
Average Delay			11.1			
Intersection Capacity Utilization			51.4%	ICU Level of Service		A
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
 12: Future North Access & Taylor St

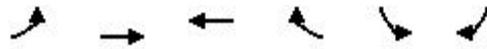
Timing Plan: AM
 03-25-2024



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↻			↻	↻	
Traffic Volume (veh/h)	5	148	5	5	454	5
Future Volume (Veh/h)	5	148	5	5	454	5
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	6	174	6	6	534	6
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			180		111	93
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			180		111	93
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		39	99
cM capacity (veh/h)			1396		882	964
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	180	12	540			
Volume Left	0	6	534			
Volume Right	174	0	6			
cSH	1700	1396	883			
Volume to Capacity	0.11	0.00	0.61			
Queue Length 95th (m)	0.0	0.1	32.6			
Control Delay (s)	0.0	3.8	15.3			
Lane LOS		A	C			
Approach Delay (s)	0.0	3.8	15.3			
Approach LOS			C			
Intersection Summary						
Average Delay			11.3			
Intersection Capacity Utilization			46.8%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 19: Road 394 & Proposed N-S Rd

Timing Plan: AM
 03-25-2024



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↩	↩		↩	
Traffic Volume (veh/h)	63	5	5	5	5	194
Future Volume (Veh/h)	63	5	5	5	5	194
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	74	6	6	6	6	228
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	12				163	9
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	12				163	9
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	95				99	79
cM capacity (veh/h)	1607				790	1073
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	80	12	234			
Volume Left	74	0	6			
Volume Right	0	6	228			
cSH	1607	1700	1063			
Volume to Capacity	0.05	0.01	0.22			
Queue Length 95th (m)	1.1	0.0	6.4			
Control Delay (s)	6.8	0.0	9.3			
Lane LOS	A		A			
Approach Delay (s)	6.8	0.0	9.3			
Approach LOS			A			
Intersection Summary						
Average Delay			8.4			
Intersection Capacity Utilization			33.6%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 23: Proposed N-S Rd & East Access - North

Timing Plan: AM
 03-25-2024



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	80	26	5	5	5
Future Volume (Veh/h)	5	80	26	5	5	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	6	94	31	6	6	6
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	77	9	12			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	77	9	12			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	91	98			
cM capacity (veh/h)	908	1073	1607			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	100	37	12			
Volume Left	6	31	0			
Volume Right	94	0	6			
cSH	1061	1607	1700			
Volume to Capacity	0.09	0.02	0.01			
Queue Length 95th (m)	2.4	0.4	0.0			
Control Delay (s)	8.7	6.1	0.0			
Lane LOS	A	A				
Approach Delay (s)	8.7	6.1	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			7.4			
Intersection Capacity Utilization			24.0%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 21: Proposed N-S Rd & East Access - Central

Timing Plan: AM
 03-25-2024



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	53	17	26	80	5
Future Volume (Veh/h)	5	53	17	26	80	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	6	62	20	31	94	6
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	168	97	100			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	168	97	100			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	94	99			
cM capacity (veh/h)	811	959	1493			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	68	51	100			
Volume Left	6	20	0			
Volume Right	62	0	6			
cSH	944	1493	1700			
Volume to Capacity	0.07	0.01	0.06			
Queue Length 95th (m)	1.8	0.3	0.0			
Control Delay (s)	9.1	3.0	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.1	3.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			3.5			
Intersection Capacity Utilization			22.9%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 27: Proposed N-S Rd & East Access - South

Timing Plan: AM
 03-25-2024



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	61	20	43	133	5
Future Volume (Veh/h)	5	61	20	43	133	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	6	72	24	51	156	6
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	258	159	162			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	258	159	162			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	92	98			
cM capacity (veh/h)	718	886	1417			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	78	75	162			
Volume Left	6	24	0			
Volume Right	72	0	6			
cSH	871	1417	1700			
Volume to Capacity	0.09	0.02	0.10			
Queue Length 95th (m)	2.2	0.4	0.0			
Control Delay (s)	9.5	2.5	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.5	2.5	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			3.0			
Intersection Capacity Utilization			30.5%	ICU Level of Service	A	
Analysis Period (min)			15			

2039 MITIGATION - PM

Lanes, Volumes, Timings
2: Zimmerman Rd & Market Dr

Timing Plan: PM
03-22-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				 			 	 			  	
Traffic Volume (vph)	101	145	277	577	164	164	492	88	621	141	811	141
Future Volume (vph)	101	145	277	577	164	164	492	88	621	141	811	141
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	70.0		0.0	90.0		0.0	60.0		60.0	90.0		90.0
Storage Lanes	1		1	2		1	2		1	1		1
Taper Length (m)	25.0			25.0			50.0			25.0		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.97	0.91	1.00	1.00	0.91	1.00
Ped Bike Factor	1.00		0.99	1.00		0.99	1.00		0.99	1.00		0.98
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	1784	1517	3288	1784	1517	3288	4871	1517	1695	4871	1517
Flt Permitted	0.636			0.540			0.135			0.683		
Satd. Flow (perm)	1132	1784	1494	1865	1784	1494	467	4871	1498	1215	4871	1494
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			269			211			576			222
Link Speed (k/h)		40			40			40			40	
Link Distance (m)		152.9			162.6			138.4			264.3	
Travel Time (s)		13.8			14.6			12.5			23.8	
Confl. Peds. (#/hr)	2		2	2		2	2		2	2		2
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	119	171	326	679	193	193	579	104	731	166	954	166
Shared Lane Traffic (%)												
Lane Group Flow (vph)	119	171	326	679	193	193	579	104	731	166	954	166
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			7.4			7.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Free	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		Free	6		6
Minimum Split (s)	11.2	29.8	29.8	11.8	29.8	29.8	11.2	25.7		11.2	25.7	25.7
Total Split (s)	15.4	29.8	29.8	19.0	33.4	33.4	25.0	43.0		18.2	36.2	36.2
Total Split (%)	14.0%	27.1%	27.1%	17.3%	30.4%	30.4%	22.7%	39.1%		16.5%	32.9%	32.9%
Maximum Green (s)	9.2	23.0	23.0	12.2	26.6	26.6	18.8	37.3		12.0	30.5	30.5
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.2	3.8		3.2	3.8	3.8
All-Red Time (s)	2.7	3.3	3.3	3.3	3.3	3.3	3.0	1.9		3.0	1.9	1.9
Lost Time Adjust (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0
Total Lost Time (s)	8.2	8.8	8.8	8.8	8.8	8.8	8.2	7.7		8.2	7.7	7.7
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Walk Time (s)		7.0	7.0		7.0	7.0		7.0			7.0	7.0
Flash Dont Walk (s)		16.0	16.0		16.0	16.0		13.0			13.0	13.0
Pedestrian Calls (#/hr)		2	2		2	2		2			2	2
Act Effect Green (s)	28.8	21.0	21.0	34.8	24.6	24.6	51.6	35.3	110.0	38.0	28.5	28.5

Lanes, Volumes, Timings
7: Zimmerman Rd & Highway 16

Timing Plan: PM
03-22-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	380	6	11	463	337	66	21	5	285	11	1197
Future Volume (vph)	0	380	6	11	463	337	66	21	5	285	11	1197
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	160.0		0.0	110.0		100.0	0.0		0.0	0.0		25.0
Storage Lanes	0		0	1		1	1		0	2		1
Taper Length (m)	75.0			75.0			2.5			50.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Ped Bike Factor		1.00				0.99	0.99	0.99		0.84		0.99
Frt		0.998				0.850		0.971				0.850
Flt Protected				0.950			0.950			0.950		
Satd. Flow (prot)	0	3379	0	1695	3390	1517	1695	1724	0	3288	1784	1517
Flt Permitted				0.322								
Satd. Flow (perm)	0	3379	0	575	3390	1498	1758	1724	0	2910	1784	1495
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				396		6				527
Link Speed (k/h)		40			40			40				40
Link Distance (m)		234.1			261.1			116.7				138.4
Travel Time (s)		21.1			23.5			10.5				12.5
Confl. Peds. (#/hr)	91		12	1		1	5		5	35		8
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	0	447	7	13	545	396	78	25	6	335	13	1408
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	454	0	13	545	396	78	31	0	335	13	1408
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			14.8				14.8
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type		NA		pm+pt	NA	Free	pm+pt	NA		pm+pt	NA	Free
Protected Phases		2		1	6		3	8		7		4
Permitted Phases				6		Free	8			4		Free
Minimum Split (s)		16.7		12.8	23.0		17.3	17.3		17.3		17.3
Total Split (s)		35.0		14.0	49.0		21.0	22.0		29.0		30.0
Total Split (%)		35.0%		14.0%	49.0%		21.0%	22.0%		29.0%		30.0%
Maximum Green (s)		28.3		6.2	42.3		13.7	14.7		21.7		22.7
Yellow Time (s)		5.2		4.3	5.2		3.5	3.5		3.8		3.8
All-Red Time (s)		1.5		3.5	1.5		3.8	3.8		3.5		3.5
Lost Time Adjust (s)		2.0		2.0	2.0		2.0	2.0		2.0		2.0
Total Lost Time (s)		8.7		9.8	8.7		9.3	9.3		9.3		9.3
Lead/Lag		Lag		Lead			Lag	Lag		Lead		Lead
Lead-Lag Optimize?		Yes		Yes			Yes	Yes		Yes		Yes
Walk Time (s)		3.0			3.0		3.0	3.0		3.0		3.0
Flash Dont Walk (s)		7.0			7.0		7.0	7.0		7.0		7.0
Pedestrian Calls (#/hr)		2			2		2	2		2		2
Act Effect Green (s)		26.3		39.2	40.3	100.0	12.7	12.7		20.7		20.7

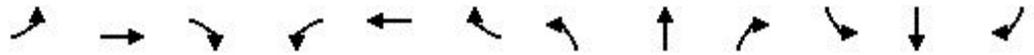
Lanes, Volumes, Timings
10: Zimmerman Rd & Meadows Pkwy

Timing Plan: PM
03-22-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	152	673	526	229	572	60	581	302	139	53	367	106
Future Volume (vph)	152	673	526	229	572	60	581	302	139	53	367	106
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	75.0		75.0	75.0		75.0	90.0		95.0	90.0		95.0
Storage Lanes	1		1	2		1	1		1	1		1
Taper Length (m)	35.0			35.0			45.0			45.0		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	1.00		0.98	1.00		0.97	1.00		0.98	1.00		0.98
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	3390	1517	3288	3390	1517	3288	3390	1517	1695	3390	1517
Flt Permitted	0.239			0.207			0.265			0.539		
Satd. Flow (perm)	426	3390	1494	716	3390	1478	915	3390	1493	960	3390	1493
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			411			180			164			183
Link Speed (k/h)		40			40			40			40	
Link Distance (m)		172.9			198.7			264.3			329.6	
Travel Time (s)		15.6			17.9			23.8			29.7	
Confl. Peds. (#/hr)	2		2	2		2	2		2	2		2
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	179	792	619	269	673	71	684	355	164	62	432	125
Shared Lane Traffic (%)												
Lane Group Flow (vph)	179	792	619	269	673	71	684	355	164	62	432	125
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.4			7.4			7.4			7.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Minimum Split (s)	10.4	27.9	27.9	10.4	27.9	27.9	11.2	25.6	25.6	10.6	25.6	25.6
Total Split (s)	16.4	45.7	45.7	14.2	43.5	43.5	29.6	46.7	46.7	13.4	30.5	30.5
Total Split (%)	13.7%	38.1%	38.1%	11.8%	36.3%	36.3%	24.7%	38.9%	38.9%	11.2%	25.4%	25.4%
Maximum Green (s)	11.0	39.8	39.8	8.8	37.6	37.6	23.4	41.1	41.1	7.8	24.9	24.9
Yellow Time (s)	3.0	3.5	3.5	3.0	3.5	3.5	3.2	3.8	3.8	3.2	3.8	3.8
All-Red Time (s)	2.4	2.4	2.4	2.4	2.4	2.4	3.0	1.8	1.8	2.4	1.8	1.8
Lost Time Adjust (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Total Lost Time (s)	7.4	7.9	7.9	7.4	7.9	7.9	8.2	7.6	7.6	7.6	7.6	7.6
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		15.0	15.0		15.0	15.0		13.0	13.0		13.0	13.0
Pedestrian Calls (#/hr)		2	2		2	2		2	2		2	2
Act Efect Green (s)	47.3	37.8	37.8	42.9	35.6	35.6	51.9	39.1	39.1	28.7	22.9	22.9

Lanes, Volumes, Timings
 10: Zimmerman Rd & Meadows Pkwy

Timing Plan: PM
 03-22-2024

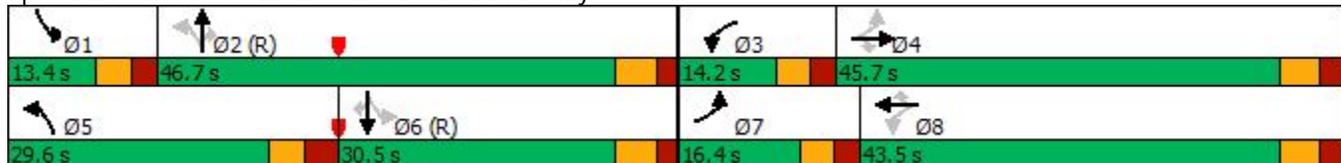


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Actuated g/C Ratio	0.39	0.32	0.32	0.36	0.30	0.30	0.43	0.33	0.33	0.24	0.19	0.19
v/c Ratio	0.68	0.74	0.82	0.67	0.67	0.13	0.84	0.32	0.27	0.23	0.67	0.29
Control Delay	36.9	41.8	22.7	31.4	40.9	0.5	35.0	31.5	5.6	24.6	50.8	3.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.9	41.8	22.7	31.4	40.9	0.5	35.0	31.5	5.6	24.6	50.8	3.0
LOS	D	D	C	C	D	A	D	C	A	C	D	A
Approach Delay	33.8			35.6			30.0			38.6		
Approach LOS	C			D			C			D		
Queue Length 50th (m)	26.0	87.5	48.3	19.6	73.1	0.0	58.4	33.0	0.0	8.4	50.1	0.0
Queue Length 95th (m)	39.0	102.1	84.7	26.5	87.0	0.0	69.3	42.7	12.2	15.7	63.0	1.7
Internal Link Dist (m)	148.9			174.7			240.3			305.6		
Turn Bay Length (m)	75.0		75.0	75.0		75.0	90.0		95.0	90.0		95.0
Base Capacity (vph)	263	1067	752	401	1005	565	818	1104	597	265	646	432
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.68	0.74	0.82	0.67	0.67	0.13	0.84	0.32	0.27	0.23	0.67	0.29

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 90
 Control Type: Pretimed
 Maximum v/c Ratio: 0.84
 Intersection Signal Delay: 33.8
 Intersection LOS: C
 Intersection Capacity Utilization 86.8%
 ICU Level of Service E
 Analysis Period (min) 15

Splits and Phases: 10: Zimmerman Rd & Meadows Pkwy



HCM Unsignalized Intersection Capacity Analysis
 13: Zimmerman Rd & 8 St E

Timing Plan: PM
 03-25-2024



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	5	5	80	5	7	5	60	54	5	5	47	5
Future Volume (Veh/h)	5	5	80	5	7	5	60	54	5	5	47	5
Sign Control		Free			Free			Yield			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	6	6	94	6	8	6	71	64	6	6	55	6
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	14			100			122	91	53	126	135	11
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	14			100			122	91	53	126	135	11
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			91	92	99	99	93	99
cM capacity (veh/h)	1604			1493			796	793	1014	786	750	1070
Direction, Lane #												
	EB 1	WB 1	NB 1	SB 1								
Volume Total	106	20	141	67								
Volume Left	6	6	71	6								
Volume Right	94	6	6	6								
cSH	1604	1493	802	774								
Volume to Capacity	0.00	0.00	0.18	0.09								
Queue Length 95th (m)	0.1	0.1	4.8	2.2								
Control Delay (s)	0.4	2.2	10.4	10.1								
Lane LOS	A	A	B	B								
Approach Delay (s)	0.4	2.2	10.4	10.1								
Approach LOS			B	B								
Intersection Summary												
Average Delay			6.7									
Intersection Capacity Utilization			29.5%	ICU Level of Service	A							
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 9: Zimmerman Rd & Taylor St

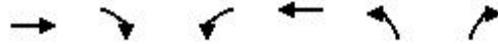
Timing Plan: PM
 03-25-2024



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	216	59	54	345	94	33
Future Volume (Veh/h)	216	59	54	345	94	33
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	254	69	64	406	111	39
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (m)			329			
pX, platoon unblocked	0.91	0.91			0.91	
vC, conflicting volume	528	267			470	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	426	138			362	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	47	92			90	
cM capacity (veh/h)	475	824			1083	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	323	470	150			
Volume Left	254	0	111			
Volume Right	69	406	0			
cSH	523	1700	1083			
Volume to Capacity	0.62	0.28	0.10			
Queue Length 95th (m)	31.6	0.0	2.6			
Control Delay (s)	22.4	0.0	6.7			
Lane LOS	C		A			
Approach Delay (s)	22.4	0.0	6.7			
Approach LOS	C					
Intersection Summary						
Average Delay			8.7			
Intersection Capacity Utilization			64.2%	ICU Level of Service	C	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 12: Future North Access & Taylor St

Timing Plan: PM
 03-25-2024



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	
Traffic Volume (veh/h)	5	439	5	5	275	5
Future Volume (Veh/h)	5	439	5	5	275	5
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	6	516	6	6	324	6
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			522		282	264
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			522		282	264
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		54	99
cM capacity (veh/h)			1044		704	775
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	522	12	330			
Volume Left	0	6	324			
Volume Right	516	0	6			
cSH	1700	1044	705			
Volume to Capacity	0.31	0.01	0.47			
Queue Length 95th (m)	0.0	0.1	19.0			
Control Delay (s)	0.0	4.3	14.5			
Lane LOS		A	B			
Approach Delay (s)	0.0	4.3	14.5			
Approach LOS			B			
Intersection Summary						
Average Delay			5.6			
Intersection Capacity Utilization			55.4%	ICU Level of Service		B
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 19: Road 394 & Proposed N-S Rd

Timing Plan: PM
 03-25-2024



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↶	↶		↶	
Traffic Volume (veh/h)	188	5	5	5	5	118
Future Volume (Veh/h)	188	5	5	5	5	118
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	221	6	6	6	6	139
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	12			457	9	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	12			457	9	
tC, single (s)	4.1			6.4	6.2	
tC, 2 stage (s)						
tF (s)	2.2			3.5	3.3	
p0 queue free %	86			99	87	
cM capacity (veh/h)	1607			484	1073	
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	227	12	145			
Volume Left	221	0	6			
Volume Right	0	6	139			
cSH	1607	1700	1021			
Volume to Capacity	0.14	0.01	0.14			
Queue Length 95th (m)	3.6	0.0	3.8			
Control Delay (s)	7.4	0.0	9.1			
Lane LOS	A		A			
Approach Delay (s)	7.4	0.0	9.1			
Approach LOS			A			
Intersection Summary						
Average Delay			7.8			
Intersection Capacity Utilization			35.9%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 23: Proposed N-S Rd & East Access - North

Timing Plan: PM
 03-25-2024



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	47	75	5	5	5
Future Volume (Veh/h)	5	47	75	5	5	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	6	55	88	6	6	6
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	191	9	12			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	191	9	12			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	95	95			
cM capacity (veh/h)	754	1073	1607			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	61	94	12			
Volume Left	6	88	0			
Volume Right	55	0	6			
cSH	1030	1607	1700			
Volume to Capacity	0.06	0.05	0.01			
Queue Length 95th (m)	1.4	1.3	0.0			
Control Delay (s)	8.7	6.9	0.0			
Lane LOS	A	A				
Approach Delay (s)	8.7	6.9	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			7.1			
Intersection Capacity Utilization			24.7%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 21: Proposed N-S Rd & East Access - Central

Timing Plan: PM
 03-25-2024



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	34	53	75	47	5
Future Volume (Veh/h)	5	34	53	75	47	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	6	40	62	88	55	6
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	270	58	61			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	270	58	61			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	96	96			
cM capacity (veh/h)	690	1008	1542			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	46	150	61			
Volume Left	6	62	0			
Volume Right	40	0	6			
cSH	951	1542	1700			
Volume to Capacity	0.05	0.04	0.04			
Queue Length 95th (m)	1.2	1.0	0.0			
Control Delay (s)	9.0	3.3	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.0	3.3	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			3.5			
Intersection Capacity Utilization			27.3%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 27: Proposed N-S Rd & East Access - South

Timing Plan: PM
 03-25-2024



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	37	60	128	81	5
Future Volume (Veh/h)	5	37	60	128	81	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	6	44	71	151	95	6
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	391	98	101			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	391	98	101			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	95	95			
cM capacity (veh/h)	584	958	1491			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	50	222	101			
Volume Left	6	71	0			
Volume Right	44	0	6			
cSH	890	1491	1700			
Volume to Capacity	0.06	0.05	0.06			
Queue Length 95th (m)	1.4	1.1	0.0			
Control Delay (s)	9.3	2.7	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.3	2.7	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			2.8			
Intersection Capacity Utilization			30.6%	ICU Level of Service	A	
Analysis Period (min)			15			