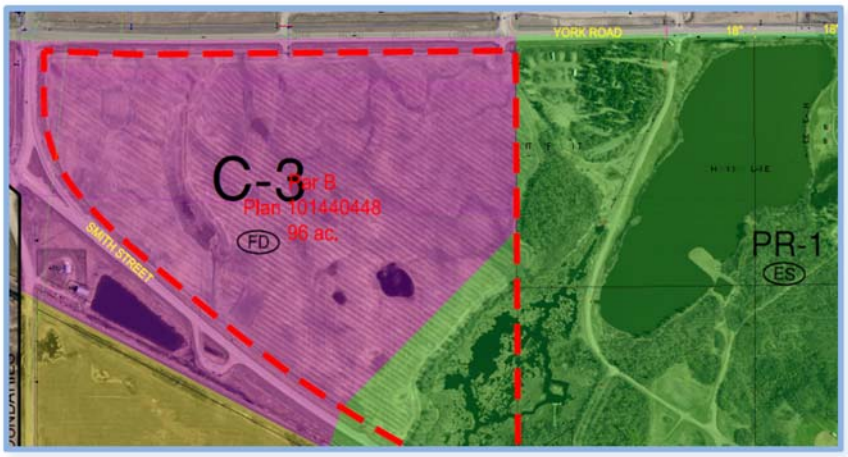
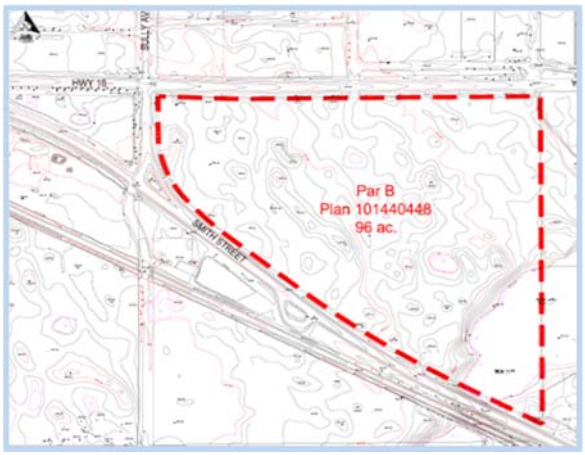
CONCEPT PLAN
COMMERCIAL DEVELOPMENT-YORKTON, SK
JIM PATTISON DEVELOPMENTS LTD.





PREPARED BY

TRUE CONSULTING
203 – 570 Raymer Avenue
Kelowna, British Columbia
V1Y 4Z5

SUBMITTED TO

THE CITY OF YORKTON
37 Third Avenue North
Yorkton, SK S3N 2W3

January 30, 2015
#1123-011

TRUE CONSULTING

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EXECUTIVE SUMMARY

TRUE Consulting was retained by Jim Pattison Developments Ltd. to prepare a Concept Plan in support of current development applications for their proposed commercial development within the City of Yorkton, Saskatchewan.

The subject lands comprise approximately 38.85 hectares (96.00 acres), located in the north west of the City of Yorkton and are bounded by Hwy 16 (York Road) to the north, Sully Avenue to the west, Smith Street to the south and wetlands to the east.

Planning for the future development of the subject lands requires a thorough analysis of site servicing and infrastructure requirements. In broad terms, the objective of this Concept Plan is to reconcile overall land use and development plans with their accompanying servicing needs.

This Concept Plan was developed to advance JPDL's interests within a framework of the greater public interest, and in accordance with City of Yorkton planning and engineering guidance documents. The plan is intended to establish a long term servicing strategy for the subject lands, and to serve as a guidance document for subsequent detailed engineering design works as development of the lands unfolds over time and in step with market demands.

In addition to providing servicing concepts for all major systems, the Concept Plan is intended as an implementation tool to aid both JPDL and the City of Yorkton in ensuring orderly development of the lands.

Design concepts are presented in both textual and graphical formats for requisite infrastructure systems including transportation (road and pedestrian) networks, potable water, sanitary sewerage, storm drainage, stormwater management, and shallow utilities (hydro, telephone, gas & cable).

1.0 INTRODUCTION

1.1 Background

TRUE Consulting was retained by Jim Pattison Developments Ltd. (JPDL) to provide civil engineering services and to prepare a Concept Plan for their proposed development in the City of Yorkton.

1.2 Concept Plan Area

The subject lands comprise approximately 38.85 hectares (96.00 acres) and are shown bounded in red at right. The lands are located in the north west of the City of Yorkton and are bounded by Hwy 16 (York Road) to the north, Sully Avenue to the west, Smith Street to the south and wetlands to the east.

JPDL's due diligence investigations were completed in late fall 2014 and they have now closed on the property. The project team includes the following professional consultancy firms:

i) TetraTech/EBA Engineering (environmental);

ii) AMEC Environment and Infrastructure (geotechnical);

iii) 20/20 Geomatics (legal and topographic survey works);

iv) CTA (architect);

v.) Stantec Consulting (traffic impact study); and

vi) TRUE Consulting (civil engineers).

1.3 Purpose of Concept Plan

In accordance with the City of Yorkton's Official Community Plan, Concept Plans are required for development approvals within the City.

Concept Plans provide a framework for growth by identifying future land uses, major road networks, and other challenges and opportunities for growth within these areas, while maintaining a balanced approach to planning that addresses the interests of the City.

Concept Plans identify:

- Opportunities and challenges for development
- Environmental and heritage features
- Existing land uses
- Existing and proposed infrastructure and services

Concept Plans are non-statutory plans meaning they are not approved by a bylaw. Instead, they are approved by a council resolution to adopt the plan. Once approved, these plans form the foundation upon which development or subdivision may occur within the subject area.

1.4 Reference Information

The following guidance documents have been reviewed in the course of the preparation of the Concept Plan:

- City of Yorkton Official Community Plan (Our City: Our Future, undated as adopted by City of Yorkton Council on June 9th, 2014 and currently awaiting provincial approvals)
- City of Yorkton Zoning Bylaw #14/2003 dated April 7, 2003
- City of Yorkton Municipal Development Plan Bylaw 15/2003 dated April 7, 2003
- City of Yorkton Guidelines for Greenfield Development Requirements, 2014
- City of Yorkton engineering design criteria (Draft dated October 2012)

2.0 SITE CHARACTERISTICS

2.1 Legal Description

The subject lands are comprised of a single legal lot, legal description:

Block B
Plan No. 101440448
Ext: 3

20/20 Geomatics Professional Land Surveyors (Regina) have been retained for the project's legal survey works. Legal survey plans will be prepared following the City of Yorkton's approval of the subdivision concept plan submitted December 19, 2014.

2.2 Topography

A topographic ground survey plan as prepared by 20/20 Geomatics Professional Land Surveyors (Regina) dated November 21, 2014 is enclosed as **Appendix A**.

As shown, site grades range from high elevations of 513.00m geodetic in the northwest to lows of el. 504.50m at the wetlands in the east of the property.

2.3 Floodplain Considerations

Design drawings for the existing wetlands obtained from the Water Security Agency (WSASK) provide the full supply level (FSL) as el. 504.50m, well below the subject land elevations. A copy of this Ducks Unlimited drawing ("Ravine Ecological Preserve – General & Detail Plan" rev#1 dated January 1990) is enclosed as **Appendix B** for reference.

Given that the subject property's topography sits an average of 5+metres above the wetland FSL, and its proximity to the Hopkins Lake/ Ravine Ecological Preserve drainage course, it is inferred that the site is not situated within a floodplain.

2.4 Geotechnical Considerations

A site specific geotechnical investigation of the subject lands has been completed. A copy of AMEC Environment and Infrastructure Limited's report dated September 12, 2014 is enclosed as **Appendix C**.

The geotechnical report supports the feasibility of developing the subject lands while identifying key site development / site preparation requirements.

2.5 Environmental Considerations

Site specific Phase 1 and 2 Environmental Site Assessment reports have been completed by TetraTech/EBA Engineering Ltd. dated September 24, 2014 and conclude that the property is free of contamination.

3.0 SITE SERVICING CONCEPTS

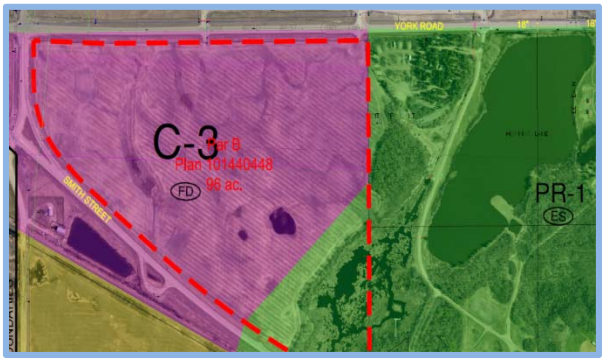
3.1 Introduction

Infrastructure requirements for the plan area include the provision of internal roads, access points to the existing road network, supply and distribution of water, collection and conveyance of sanitary waste water, and storm water management measures.

This section examines the servicing requirements associated with current Conceptual Land Use planning works. Servicing concepts are presented along with a discussion of infrastructure phasing considerations.

3.2 Land Use

The subject lands are currently zoned C-3 (Highway Commercial) and PR-1 (Parks and Recreation).



JPDL proposes to subdivide the lands for development, with the first phase of development proposed as an 8.00Ha (19.77acre) farm equipment dealership located in the area shown shaded red next page. JPDL's schedule contemplates the Phase 1 design and approvals processes being completed through the winter and spring of 2015 to be followed by a summer 2015 construction program.

JPDL intends to develop or sell the remaining lands in step with market demands and opportunities as they unfold; there are no development proposals for the remainder lands at present.

3.3 Transportation

A Traffic Impact Assessment report has been prepared for the project by Stantec Consulting (Regina). A copy of the TIA report dated January 26, 2015 is enclosed as **Appendix D**.

3.4 Roadways

Access to Phase 1 of the development is proposed via Hwy 16 / York Road opposite the existing Fitchner Road intersection as shown on the Subdivision Concept Plan dated December 17, 2014 (copy enclosed as **Appendix E**). A Highway 16/York Road widening and ancillary improvements will be required in order to develop a third (centre turning) lane for opposing left movements at this intersection.

In order to provide maximum flexibility for future (unknown) development of the remainder lands, a roundabout is proposed to be developed in a central site location as shown.

In conjunction with Phase 1 of the project, a 20m wide roadway dedication is proposed from the Hwy 16/York Road intersection to the roundabout, providing road access to both Phase 1 (the farm equipment dealership lot) as well as the remainder lands (lots A, B and C as shown).

Future development of the remainder lands may entail further land subdivision applications and roadway dedications, but this is unknowable at present in the absence of any development proposals.

3.5 Water Servicing

The City of Yorkton has a robust potable water distribution network in the area of the subject lands including a 250mm diameter watermain within Hwy 16 (York Road) and a 500mm diameter watermain within Sully Avenue. Refer to **Figure #1123-011-005** (Water Concept Plan) dated July 30, 2014, enclosed.

The City of Yorkton's Engineering Department has provided the following water network model data confirming the existing network's ability to provide fire flows to the subject lands:

- Residual pressure of 62psi at a modelled flow rate of 1,694 GPM.
- Maximum available flow modeled as 2,402 GPM at bylaw minimum residual pressure of 20psi.

As shown in **Figure #1123-011-005**, water servicing to the subject lands is proposed via connection to the City's 250mm diameter main within Hwy 16 (York Road) at the main site access (Fitchner Road intersection). Servicing within the property is generally proposed as following the internal road network. Subsequent subdivision discussions and plans will establish the need for any water servicing SRWs or easements.

Water metering arrangements remain to be determined and we request the City's feedback on this point.

Subsequent detailed designs will establish watermain sizes, hydrant coverages, valving, appurtenances, etc.

3.6 Sanitary Servicing

As shown on **Figure #1123-011-006** (Sanitary Servicing Concept Plan), the main trunk of the City of Yorkton's sewer network in the area is a 450mm diameter gravity sewer running eastward within Hwy 16 (York Road).

In addition, the City has a 300mm diameter sewer which crosses the westernmost corner of the subject lands adjacent Sully Avenue. It is our understanding that this sewer is not currently protected via statutory right of way in favour of the City of Yorkton on title. As part of the Phase 1 subdivision application, a 3.0m wide SRW centered on the pipe is proposed. Development plans do not conflict with this existing sewer and no relocation is proposed accordingly.

Internal sanitary servicing concepts and flow patterns are presented in **Figure #1123-011-006.** Reflecting the site topography and existing sewer grades within Hwy 16 (York Road), sanitary

servicing of the easternmost lots is envisioned as requiring SRWs or private easements as shown; this is required in order to maximize that portion of the lands able to be serviced via gravity.

Subsequent detailed designs will establish internal sanitary sewer alignments, grades, etc.

3.7 Stormwater Management

Refer to TRUE Consulting's stormwater management design brief dated December 19, 2014 enclosed as **Appendix F**.

3.8 Shallow Utilities

Shallow utilities have been confirmed as available to service the subject lands – refer to correspondence from SaskPower, SaskEnergy and SaskTel enclosed as **Appendix G**.

4.0 CLOSURE

This Concept Plan has been prepared for the exclusive use of Jim Pattison Developments Ltd. and the City of Yorkton. Any unauthorized use or reliance by third parties is strictly prohibited.

Yours truly,

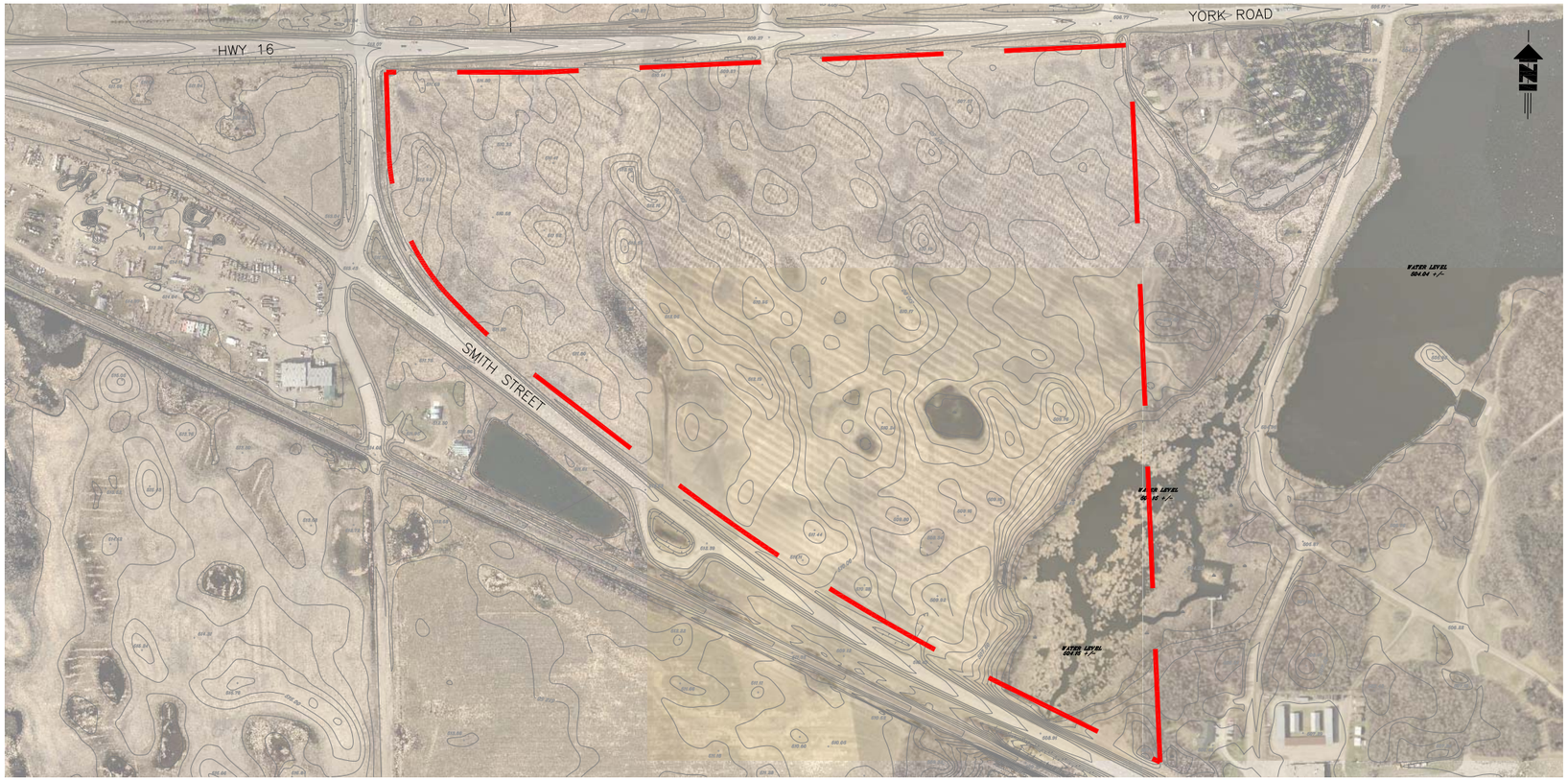
TRUE Consulting

Dave Pritchard, P.Eng.

MAPLE FARM EQUIPMENT DEVELOPMENT
YORKTON, SASKATCHEWAN

MAPLE FARM EQUIPMENT

THE JIM PATTISON GROUP



LOCATION PLAN

TRUE CONSULTING
SUITE 203, 570 RAYMER AVE
KELOWNA, B.C.
PHONE: (250) 861-8783

JULY 2014

TRUE PROJECT
1123-011

ISSUED FOR :
REVIEW

DRAWING LIST

001	SUBJECT LANDS
002	LEGAL PLAN OF SURVEY
003	DEVELOPMENT CONCEPT PLAN
004	EXISTING TOPOGRAPHY & DRAINAGE PATTERNS
005	WATER SERVICING CONCEPT PLAN
006	SANITARY SERVICING CONCEPT PLAN
007	STORM DRAINAGE SERVICING CONCEPT PLAN

No.	DATE	DESCRIPTION	BY	APPD

REVISIONS

CONSULTANT SEAL

ISSUED FOR 7/30/2014

REVIEW

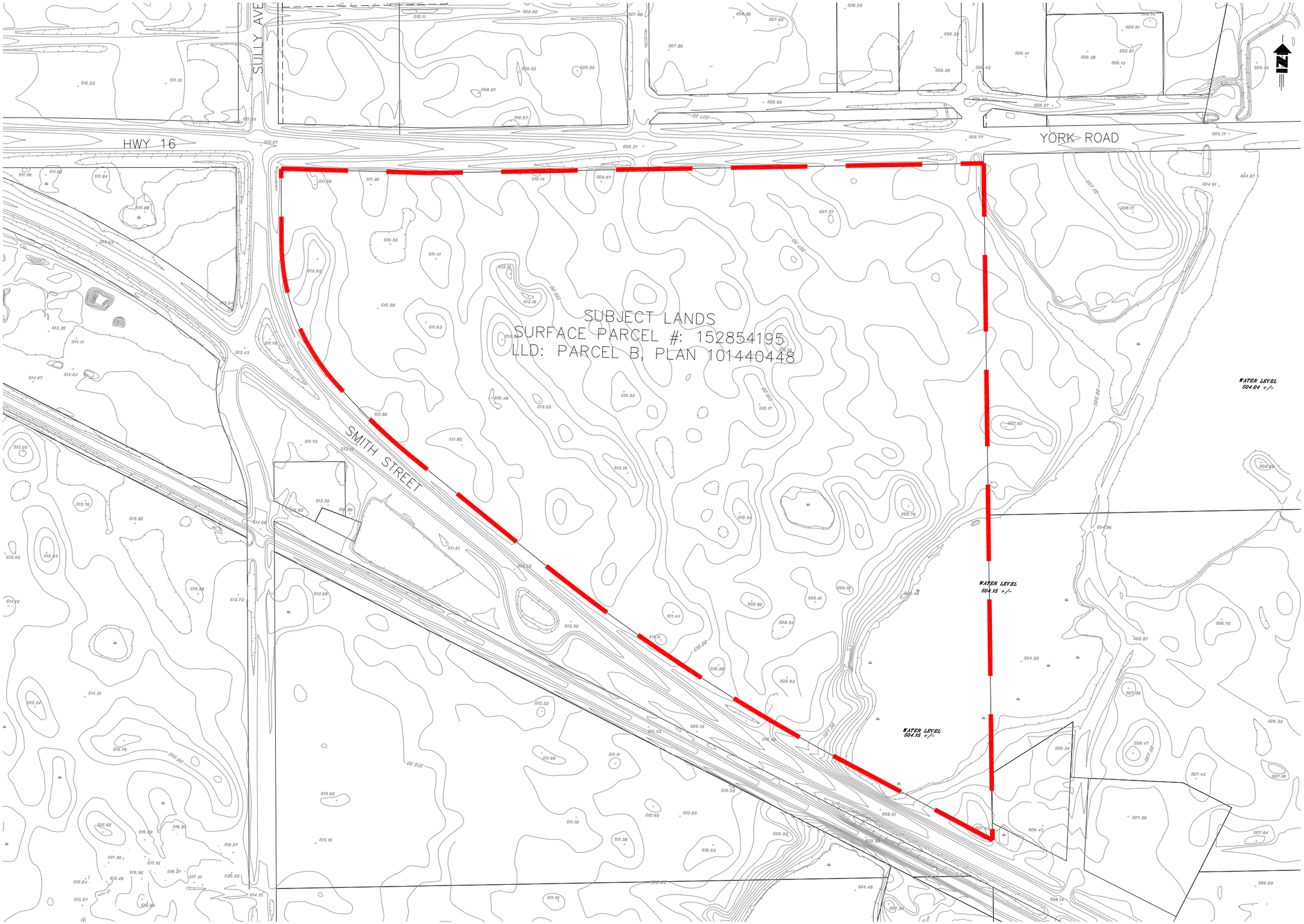
TRUE CONSULTING
SUITE 203, 570 RAYMER AVE
KELOWNA, B.C.
PHONE: (250) 861-8783
info@true.bc.ca

MAPLE FARM EQUIPMENT
THE JIM PATTISON GROUP

MAPLE FARM EQUIPMENT DEALERSHIP YORKTON, SASK.

SUBJECT LANDS

SCALE	1: 2000
DESIGN BY	DLP
DRAWN BY	DWS
DATE	JULY 2014
PROJECT No.	1123-011
ACAD FILE	
DRAWING No.	001
SHEET	1 OF 7
REVISION	0



No.	DATE	DESCRIPTION	BY	APP'D

REVISIONS

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ISSUED FOR 07/30/14

REVIEW

TRUE CONSULTING
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KELOWNA, B.C.
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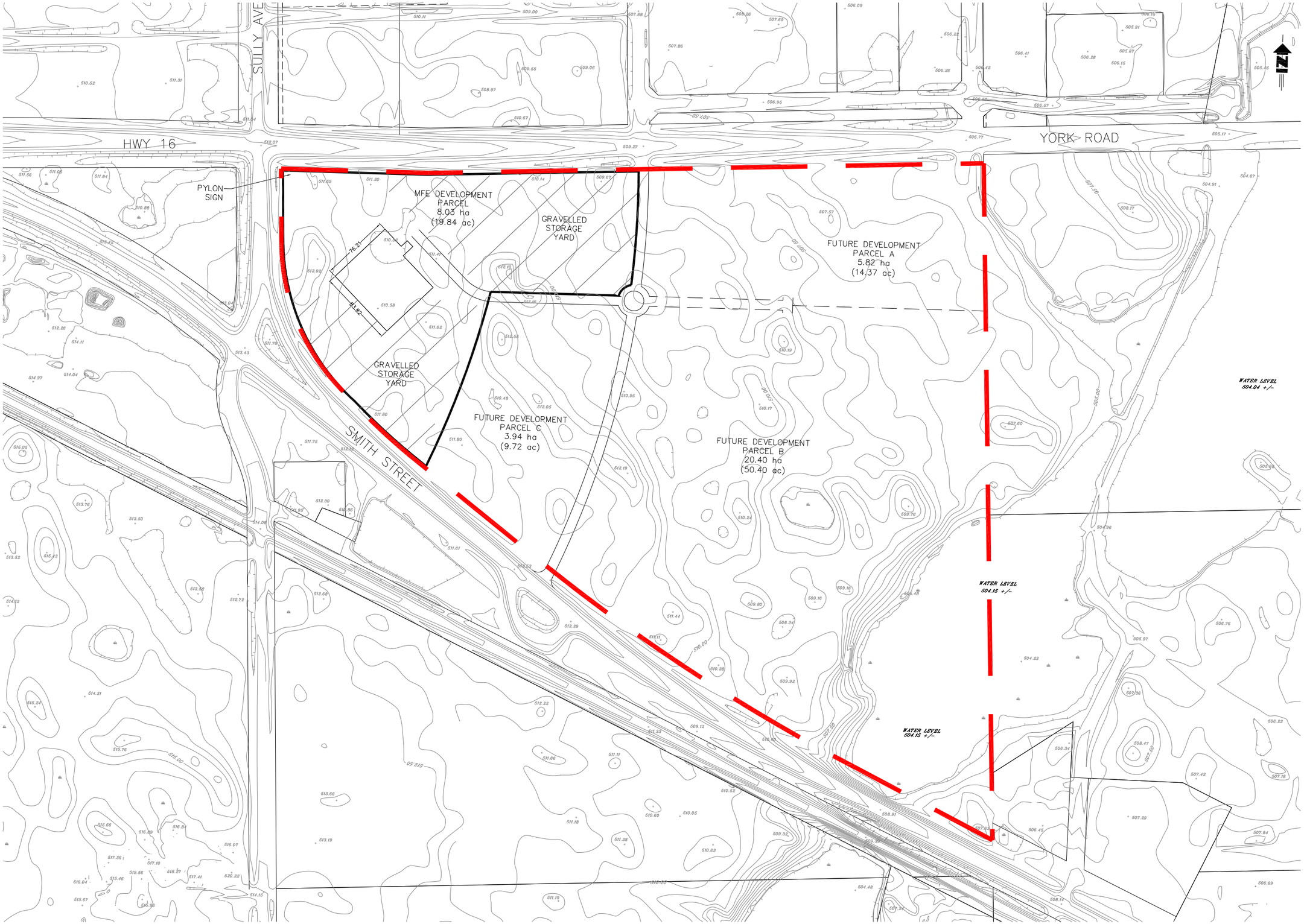
info@true.bc.ca

MAPLE FARM EQUIPMENT
THE JIM PATTISON GROUP

MAPLE FARM EQUIPMENT DEALERSHIP YORKTON, SASK.

LEGAL PLAN OF SURVEY

SCALE	1: 2000
DESIGN BY	DLP
DRAWN BY	DWS
DATE	JULY 2014
PROJECT No.	1123-011
ACAD FILE	
DRAWING No.	002
SHEET	2 OF 7
REVISION	0



No.	DATE	DESCRIPTION	BY	APP'D

REVISIONS

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REVIEW

TRUE CONSULTING

SUITE 203, 570 RAYMER AVE
KELOWNA, B.C.
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info@true.bc.ca

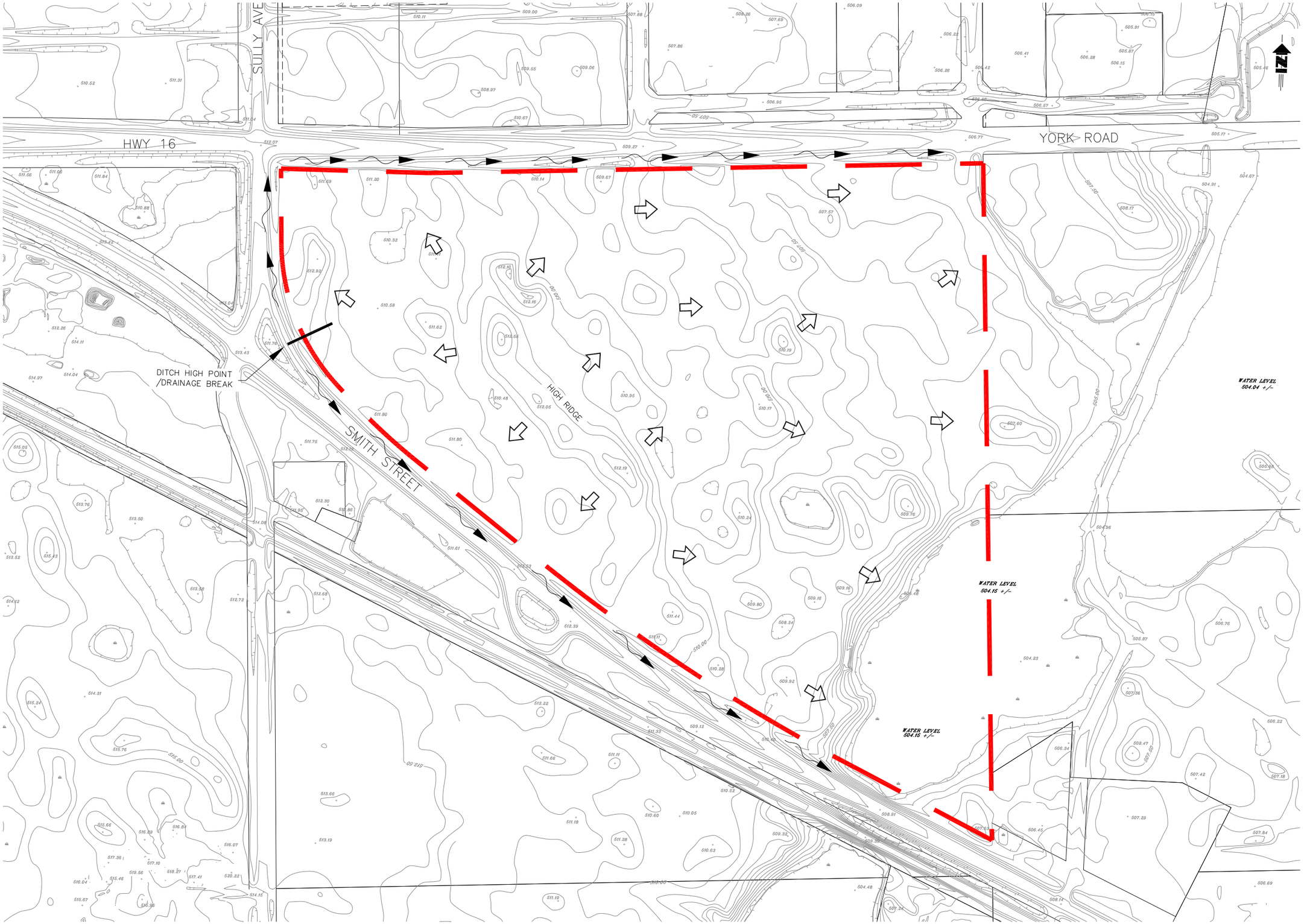
MAPLE FARM EQUIPMENT

THE JIM PATTISON GROUP

MAPLE FARM EQUIPMENT DEALERSHIP YORKTON, SASK.

DEVELOPMENT CONCEPT PLAN

SCALE	1: 2000
DESIGN BY	DLP
DRAWN BY	DWS
DATE	JULY 2014
PROJECT No.	1123-011
ACAD FILE	
DRAWING No.	003
SHEET	3 OF 7
REVISION	0



LEGEND

EXISTING DRAINAGE PATTERN

EXISTING DITCH FLOWS

No.	DATE	DESCRIPTION	BY	APP'D

REVISIONS

CONSULTANT SEAL

ISSUED FOR 7/30/14

REVIEW

TRUE CONSULTING
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KELOWNA, B.C.
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info@true.bc.ca

MAPLE FARM EQUIPMENT — THE JIM PATTISON GROUP

MAPLE FARM EQUIPMENT DEALERSHIP YORKTON, SASK.

EXISTING TOPOGRAPHY & DRAINAGE PATTERNS

SCALE	1: 2000
DESIGN BY	DLP
DRAWN BY	DWS
DATE	JULY 2014
PROJECT No.	1123-011
ACAD FILE	
DRAWING No.	004
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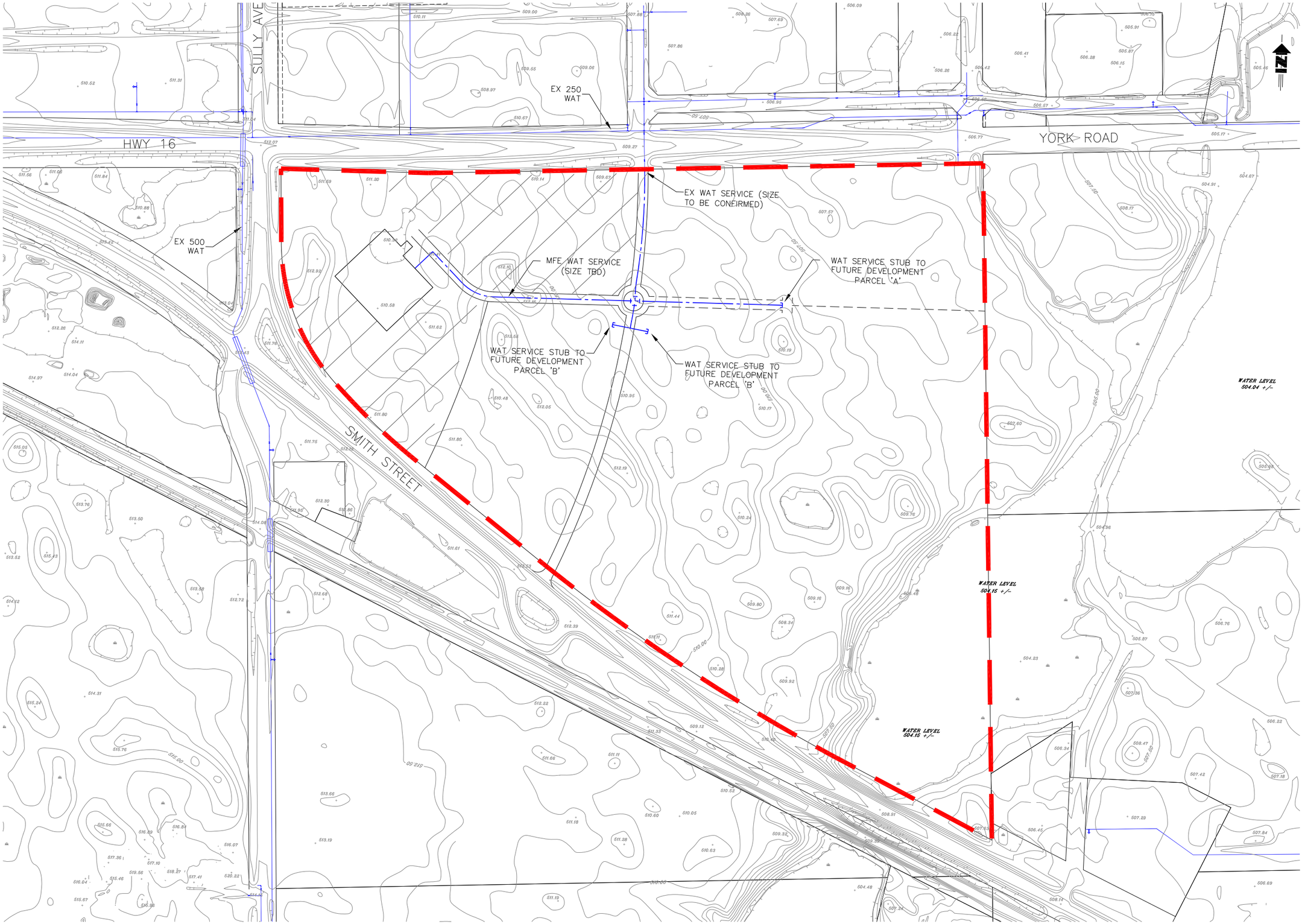
REVISION	0



LEGEND

WATER SERVICING CONCEPT

EXISTING WATER SERVICE

No.	DATE	DESCRIPTION	BY	APP'D

REVISIONS

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ISSUED FOR 7/30/14

REVIEW

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info@true.bc.ca

MAPLE FARM EQUIPMENT

THE JIM PATTISON GROUP

MAPLE FARM EQUIPMENT DEALERSHIP YORKTON, SASK.

WATER SERVICING CONCEPT PLAN

SCALE	1: 2000
DESIGN BY	DLP
DRAWN BY	DWS
DATE	JULY 2014
PROJECT No.	1123-011
ACAD FILE	
DRAWING No.	005
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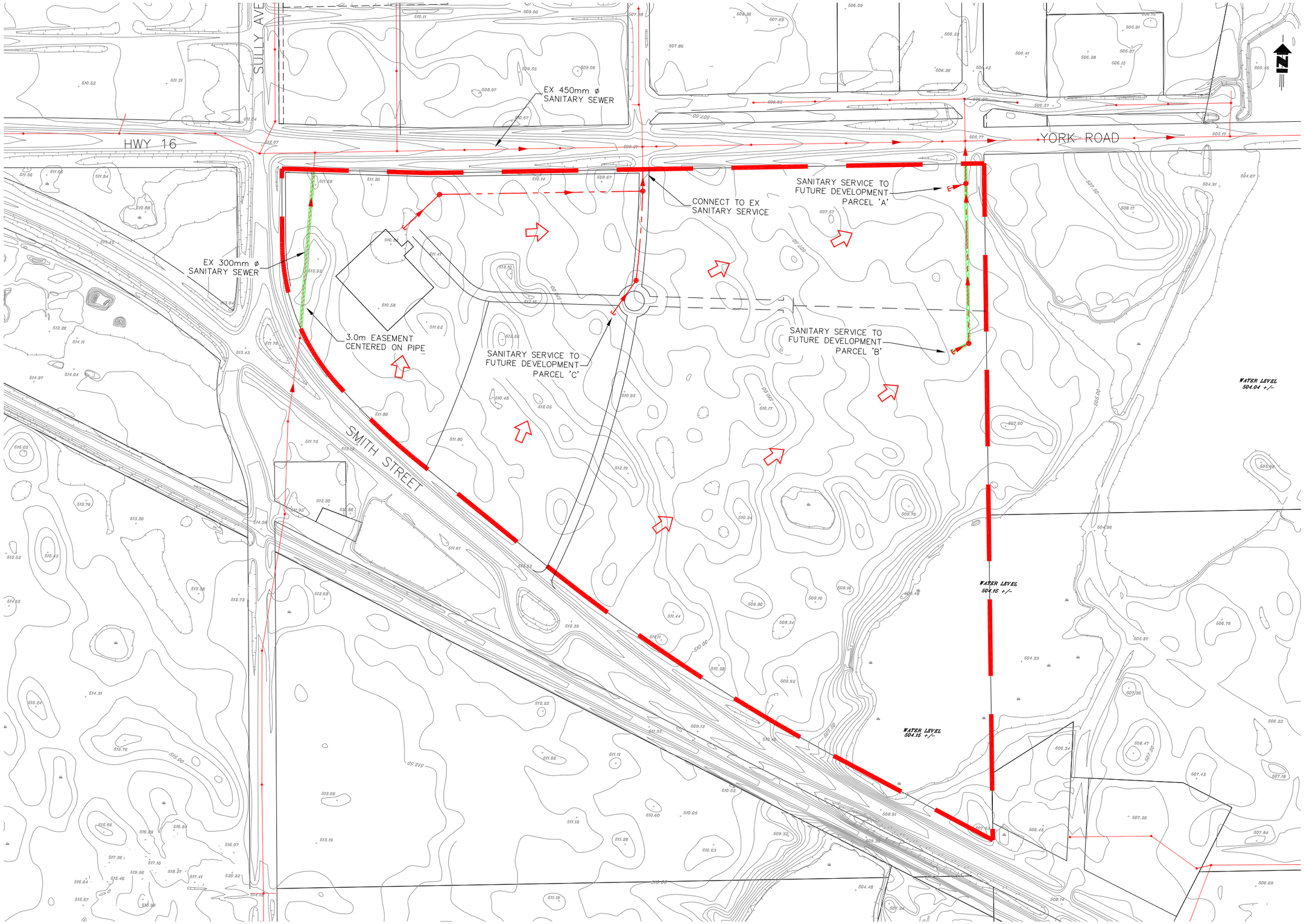
REVISION	0



LEGEND

- SANITARY SERVICING CONCEPT
- EXISTING SANITARY SERVICE
- SANITARY DRAINAGE PATTERN
- SANITARY SEWER EASEMENT

No.	DATE	DESCRIPTION	BY	APP'D

REVISIONS

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ISSUED FOR 7/30/14

REVIEW

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SUITE 203, 570 RAYMER AVE
KELOWNA, B.C.
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Info@true.bc.ca

MAPLE FARM EQUIPMENT

THE JIM PATTISON GROUP

MAPLE FARM EQUIPMENT DEALERSHIP YORKTON, SASK.

SANITARY SERVICING CONCEPT PLAN

SCALE	1: 2000
DESIGN BY	DLP
DRAWN BY	DWS
DATE	JULY 2014
PROJECT No.	1123-011
ACAD FILE	
DRAWING No.	006
SHEET	6 OF 7
REVISION	0

HWY 16

SULLY AVE

YORK ROAD

SMITH STREET

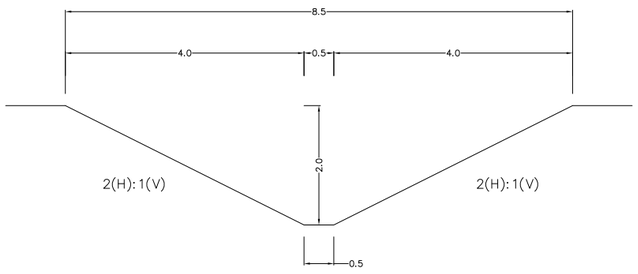
SWM POND

STORM POND OUTFALL

WATER LEVEL 504.04 +/-

WATER LEVEL 504.15 +/-

WATER LEVEL 504.15 +/-



TYPICAL DITCH SECTION
NTS

LEGEND

- EXISTING STORM CULVERT
- PROPOSED STORM CULVERT
- POST DEVELOPMENT DRAINAGE PATTERNS
- STORM DRAINAGE EASEMENT
- OPEN DITCH
- STORM WATER MANAGEMENT POND CONCEPT

No.	DATE	DESCRIPTION	BY	APP'D

REVISIONS

CONSULTANT SEAL

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MAPLE FARM EQUIPMENT

THE JIM PATTISON GROUP

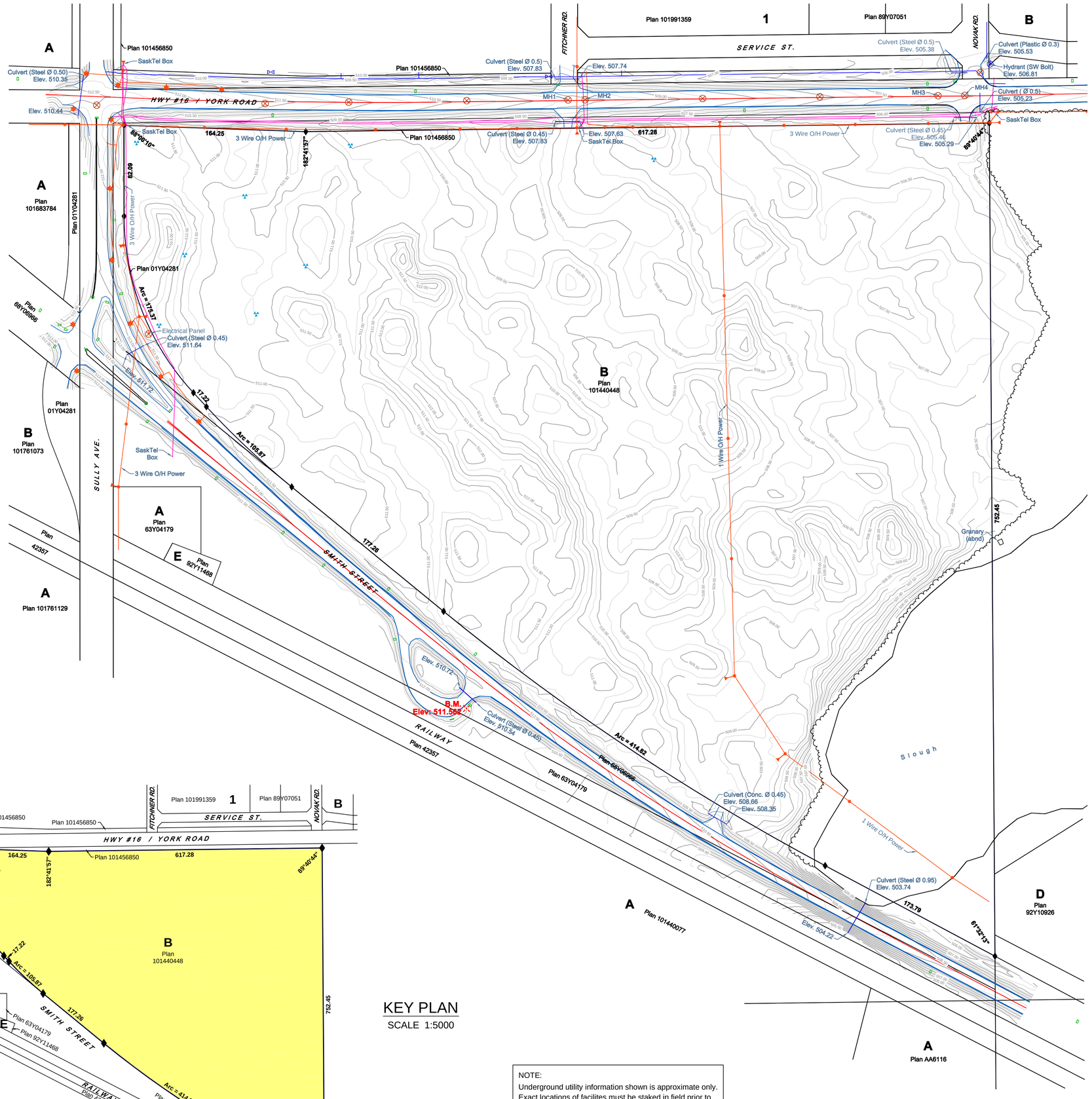
MAPLE FARM EQUIPMENT DEALERSHIP YORKTON, SASK.

STORM SERVICING CONCEPT PLAN

SCALE	1: 2000
DESIGN BY	DLP
DRAWN BY	DWS
DATE	JULY 2014
PROJECT No.	1123-011
ACAD FILE	
DRAWING No.	007
SHEET	7 OF 7
REVISION	0

APPENDIX A
20/20 Geomatics Topographic Ground Survey
dated November 21, 2014

TOPOGRAPHY, UTILITY, & BOUNDARY SURVEY
ALONG
HIGHWAY # 16
& WITHIN
PARCEL B, PLAN 101440448
NW.1/4 SEC.3 - TWP.26 - RGE.4 - W.2M.
YORKTON, SASKATCHEWAN
NOVEMBER, 2014
SCALE : 1:2000



LEGEND

- SURVEY MONUMENT FOUND OR PLANTED
- MANHOLE
- DOMESTIC SEWER
- STORM SEWER
- WATER MAIN
- WATER MAIN VALVE
- HYDRANT
- PIEZOMETER / MONITORING WELL
- SIGNS
- LIGHT STANDARD
- POWER POLE / ANCHOR
- OVERHEAD POWER LINE
- BURIED POWER LINE
- BURIED COMMUNICATIONS LINE
- BURIED GAS LINE
- VEGETATION (BUSH / TREES)

NOTE

MEASUREMENTS ARE IN METRES AND DECIMALS THEREOF.

ELEVATIONS PREFIXED BY 506.00m SHOWN THUS. EXAMPLE: 506.25 - 6.25.

ELEVATIONS SHOWN ARE IN METRIC GEODETIC DATUM AND WERE OBTAINED BY PROCESSING STATIC BASE STATION DATA TO THE NRCAN PPP SERVICE.

BENCH MARK - SASK. GEODETIC BENCH MARK 81V397
EAST EDGE OF N-S ROAD ALLOWANCE ADJACENT TO NW.11-26-04-W2. MARKER POST IS 2.0m EAST OF STATION, 4.2m EAST OF N-S ROAD ALLOWANCE CENTRELINE. APPROX 530m SOUTH OF THE INTERSECTION OF THE CENTRELINES OF THE E-W & N-S ROAD ALLOWANCES. ELEVATION 508.670.

SITE BENCH MARK - B.M. - IRON BAR (0.013m X 0.450m) LOCATED SW OF SMITH STREET, SOUTH SIDE OF TURN AROUND NEAR YORKTON MAP STATION, 3m SE OF PAVEMENT EDGE & 4m SW OF HEAVY TRUCKS SIGN. ELEVATION = 511.562.

INFORMATION SHOWN PERTAINING TO UNDERGROUND SERVICES IS APPROXIMATE ONLY AND IS DERIVED FROM A COMBINATION OF FIELD MEASUREMENTS AND EXISTING AS-BUILT INFORMATION. EXACT LOCATION, DEPTH AND EXTENT OF THE UNDERGROUND SERVICES IS TO BE CONFIRMED ON SITE BY THE CONTRACTOR PRIOR TO ANY CONSTRUCTION OR EXCAVATION.

KEY PLAN
SCALE 1:5000

NOTE:
Underground utility information shown is approximate only. Exact locations of facilites must be staked in field prior to any construction taking place. Underground facilities shown are those that we were aware of at the time of the preparation of the plan. Others may exist that we are unaware of. Call Sask First Call or the owner of the facility for locates.

MH #1
INV 504.99 — INV 505.00
MHR 509.70

MH #2
Unable to Access Inverts, Bolted Down
MHR 509.59

MH #3
INV 503.65 — INV 503.65
MHR 507.20

MH #4
INV 503.58 — INV 503.56
MHR 507.03

INVERTS

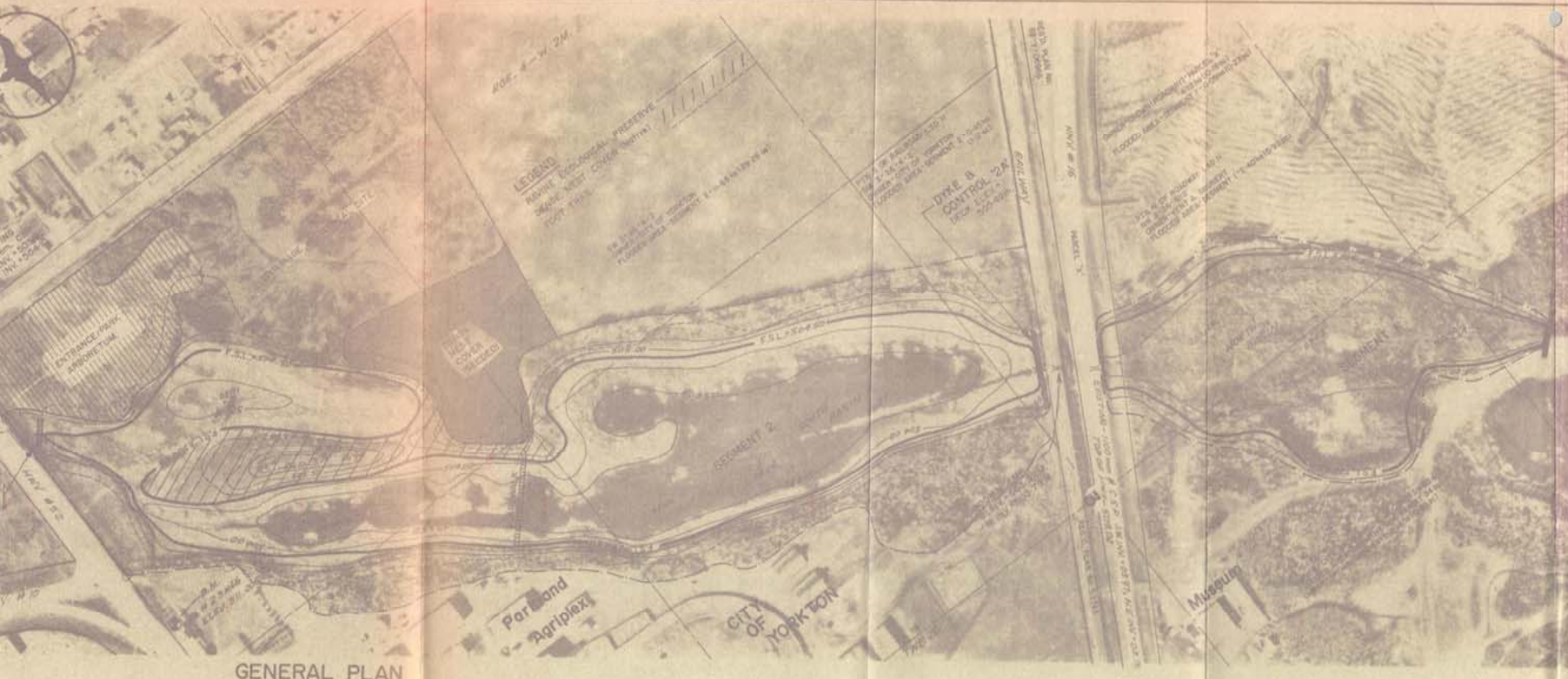
REVISIONS		
NO.	REVISION DESCRIPTION	DATE
0	ISSUED	NOV.21-2014

20/20 GEOMATICS
Phone: 306-569-2020
Fax: 306-569-2026
Regina, SK
www.2020geomatics.com

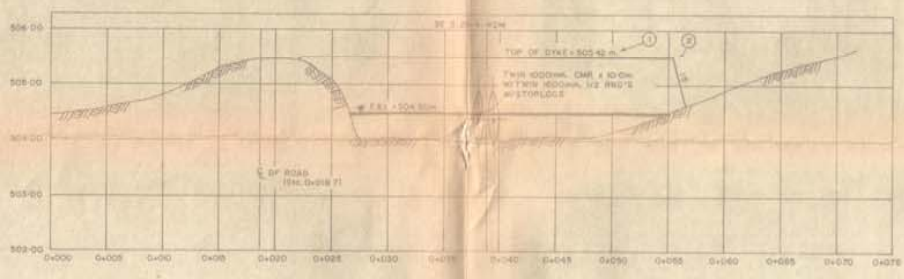
Job # : 10805

10805TP-REV00 (RM244).DWG

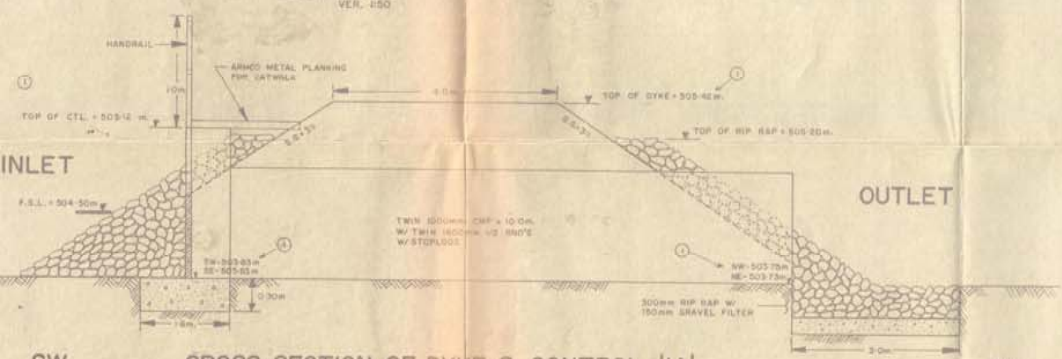
APPENDIX B
Ravine Ecological Preserve
General and Detail Plan rev #1
dated January, 1990



GENERAL PLAN
SCALE-1:2500



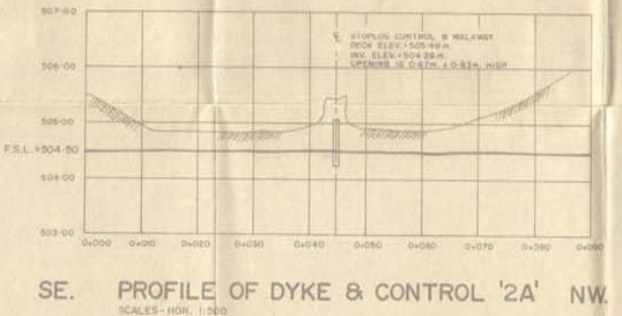
SE. PROFILE OF DYKE & CONTROL '1A' NW.
SCALES- HOR. 1:250
VER. 1:50



SW. CROSS-SECTION OF DYKE & CONTROL '1A' NE.
SCALES-HOR. 1:50
VER. 1:25

SEGMENT 1
(AREA CAPACITY CURVE)

SEGMENT 2
(AREA CAPACITY CURVE)



SE. PROFILE OF DYKE & CONTROL '2A' NW.
SCALES- HOR. 1:500
VER. 1:50

SEGMENT (NO.)	1	2	TOTAL
SHORELINE (KM.)	1.10	2.85	3.95
RESERVOIR CAPACITY (DAM³)	31.54	99.41	130.95
FLOODED AREA (HA.)	3.83	12.30	16.13

RESERVOIR ELEMENTS AT

BENCHMARK DATUM:
BRONZE TABLET CEMENTED INTO FOUNDATION OF YORKTON WATERWORKS AERATION PLANT ON BROADWAY STREET WEST, 14' NORTH OF SOUTH-WEST CORNER OF BUILDING, ONE FOOT BELOW BRICKWORK.

NO.	DATE	DESCRIPTION
2	"	DYKE PROFILE
1	80-01	CONTROL ELEV.'s
No.	DATE	AS BUILT AMENDMENTS

No.	DATE	BY	AS BUILT
1	80-01	JH	AS BUILT
No.	DATE	BY	DESCRIPTION

SCHEDULE 'A'

PROFESSIONAL ENGINEER
E. T. CHERESKI
REGINA
SASKATCHEWAN

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APP'D.		SCALE AS NOTED

APPENDIX C
AMEC Environment & Infrastructure Limited Report
dated September, 2014

APPENDIX D
Stantec Consulting (Regina)
Traffic Impact Assessment Report
dated January 26, 2015

Yorkton Highway Commercial
Traffic Impact Assessment

Prepared for:
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January 26, 2015

Sign-off Sheet

This document entitled Yorkton Highway Commercial Traffic Impact Assessment was prepared by Stantec Consulting Ltd. ("Stantec") for the account of Jim Pattison Developments Ltd. (the "Client"). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

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Association of Professional Engineers & Geoscientists
of Saskatchewan
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STANTEC CONSULTING LTD.
Number C0969
Permission to Consult held by:

Discipline	Sk. Reg. No.	Signature
TRANSPORTATION	13517	

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1.0 INTRODUCTION

1.1 BACKGROUND

Jim Pattison Developments has retained Stantec Consulting Ltd. (Stantec) to complete a Traffic Impact Assessment (TIA) for the planned Highway Commercial development (the proposed development) which is proposed northwest of Yorkton. The purpose of this TIA is to assess the impacts that the additional traffic generated by the proposed development will have on the adjacent transportation system and recommend improvements or solutions to the transportation systems in order to meet those demands. The project location is shown in **Figure 1-1**.

1.2 SCOPE

The purpose of the TIA is to evaluate the impact of the proposed development on the adjacent road network. The principal objectives of the TIA include:

- Determine the total number of new trips generated by the proposed development for the weekday morning and afternoon peak hour time periods;
- Distribute the new trips to expected origins and destinations and assign them to specific routes to and from the proposed development;
- Add the new trips generated by the proposed development to the projected background traffic volumes at the full build-out condition;
- Evaluate traffic operating conditions at key intersections for the combined traffic volumes at full build out of the proposed development for the weekday morning and afternoon peak hour time periods; and
- Identify potential locations of unacceptable congestion and determine roadway, intersection, and access requirements in terms of number of lanes, lane configuration, and intersection control to provide acceptable levels of service and safety.

FIGURE 1.1 | HIGHWAY COMMERCIAL TRAFFIC IMPACT ASSESSMENT

Project Location

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2.0 DEVELOPMENT SITE CONDITIONS

The proposed development is located in the northwest area of the City of Yorkton, SK. The proposed development is bound to the west by Sully Avenue, to the north by York Road and to the south by Smith Street. The east boundary lies directly south from Novak Place to Smith Street. A City-owned campground is located just east of the proposed development. The study area is currently comprised of primarily industrial land uses with the exception of the campground to the east. Initial access to the site is proposed as an extension of Fitchner Road to the south into the proposed development. As development proceeds, Fitchner Road will extend through the development to intersect with Smith Street.

2.1 STUDY AREA ROADWAYS

The study area roadways and adjacent developments are shown in **Figure 2-1**. Roadways adjacent to the proposed development and their characteristics are as follows:

- **York Road / Highway 16** – York Road, where adjacent to the proposed development, is a two lane paved highway with a posted speed limit of 80 km/h. East of Novak Place, closer to the City, the speed limit lowers to 60 km/h. York Road serves as an east-west truck route through the northern part of Yorkton before connecting to Highway 9 to continue north-south. There are no sidewalks and York Road does not accommodate transit west of Gladstone Avenue. There is no on street parking allowed adjacent to the proposed development.
- **Smith Street**– Smith Street originates as an off-ramp for eastbound traffic on Highway 16, west of Sully Avenue. East of Sully Avenue, Smith Street is a paved, two-lane roadway with a speed limit of 100 km/h. The road travels northwest-southeast and continues into Yorkton past Gladstone Avenue, where it transitions to a divided urban arterial road and continues east-west to Highway 9. Adjacent to the proposed development, there are no sidewalks and Smith Street does not accommodate transit. There is no on street parking allowed adjacent to the proposed development.
- **Sully Avenue**– is a north-south paved, three lane roadway which terminates south of Potzus Construction, located just south of Smith Road and extends north past City Limits. The road is paved between Smith Street and York Road, and is gravel outside these limits. Adjacent to the proposed development, the posted speed limit is 50 km/h and there is a curbed median roughly 0.5 meters in width. There are no sidewalks and Sully Avenue does not accommodate transit. There is no on street parking allowed adjacent to the proposed development.
- **Fitchner Road–** is a north/south gravel road which begins at York Road and travels north. This road, serves traffic for Harvest Meats, Pounder Emulsions, and a Co-op Cardlock located north of the proposed development. The speed limit is 50 km/h. Fitchner Road has no sidewalks, on street parking or transit routes along its extents.

- **Novak Place –** is a north/south gravel road which begins at York Road and travels north where it terminates south of the rail spur. This road serves traffic for Harvest Meats, a Co-op Cardlock, and one additional warehouse all located north of the proposed development. The speed limit is 50 km/h. Novak Place has no sidewalks, on street parking or transit routes along its extents.

2.2 STUDY AREA INTERSECTIONS

The study area intersections are as follows:

- Sully Avenue & York Road;
- Sully Avenue & Smith Street; and
- York Road & Fitchner Road.

These intersections will experience the greatest impact with only minor impacts expected on surrounding intersections.

The intersection of **Sully Avenue & York Road** is unsignalized with stop controls on the north and southbound approaches. York Road has a highway bypass lane on the west and eastbound approaches. The northbound approach also has an auxiliary lane.

The intersection of **Sully Avenue & Smith Street** is unsignalized with stop controls on the north and southbound approaches. The eastbound approach of the intersection is a one-way off-ramp from Highway 16. There is a large channelized westbound right turn from Smith Street onto Sully Avenue with a large median ditch. Westbound traffic must turn and left turns are prohibited (as per signage). The only legal option is to turn right into the median lane.

Fitchner Road & York Road is a three-leg, unsignalized intersection with stop control on the southbound approach. The main entrance for the new development is proposed to align with this intersection, creating a northbound approach.

The study area intersections and accesses are shown in **Figure 2-1**.

2.3 BACKGROUND TRAFFIC VOLUMES

Intersection turning movement counts were conducted at the intersections of Sully Avenue & Smith Street and Sully Avenue & York Road in January 2015 during the weekday morning and afternoon peak hours. Traffic volumes and movements at Fitchner Road and York Road were determined by trip generation and confirmed with interviews with the businesses using this access: Harvest Meats and Pounder Emulsions. It is assumed that users of the Co-op Cardlock and the warehouse facility use Novak place exclusively for access and egress to these sites.

Figure 2-2 illustrates the existing weekday traffic volumes in the project area.

Heavy vehicles accounted for 27% of traffic in the morning peak hour and 20% during the weekday afternoon peak hour on York Road. Traffic and heavy vehicles volumes are expected to be higher in the summer months to account for vehicles servicing Pounder Emulsions and additional heavy vehicles entering Louie Dreyfus Commodities to unload harvest grains and canola.

In order to calculate the background traffic volumes at the design horizon, the existing weekday peak hour traffic volumes are expanded to the design year. The City of Yorkton's *Traffic Impact Assessment Guidelines* Report states that a five-year projection is required for the design horizon. According to the City of Yorkton's Official Community Plan, the annual growth rate was estimated to be approximately 2.2%. This number represents a medium rate of growth according to the Official Community Plan.

The existing weekday traffic volumes were expanded to 2020 to estimate the background traffic at the design horizon. Using the equation listed below with a 2.2% annual growth rate; the expansion factor (Ef) for full build-out was calculated to be:

Equation:

$E_f = (1 + G_r)^n$

$E_{f\ (2020)} = (1 + 2.2\%)^5 = \mathbf{1.11}$

where: E_f = expansion factor
G_r = annual growth rate
n = no. of years

Figure 2-3 illustrates the 2020 weekday background traffic volumes expected in the study area.

2.3.1 Background Traffic Observations

During a site visit to the proposed development, traffic queuing and general safety was observed. The following observations were noted as pre-existing queueing and safety-related conditions:

- Northbound semi-trailers entering the Louie Dreyfus Commodities create a long queue on Sully Avenue in the afternoon peak hour. The queue extends south nearly all the way to York Road;
- Vehicle speeds at York Road & Sully Avenue were highly variable along with many slower semi-trailers trying to reach posted speed;
- Some vehicles turning from Sully Avenue onto Smith Street and York Road do so very slowly, seemingly unaware they are turning onto an 80 or 100 km/h roadway; and
- Even though westbound left turns are not permitted at Smith Street & Sully Avenue, many vehicles were observed performing this turn.

2.4 PROPOSED ADJACENT GROWTH

Businesses located adjacent to the proposed development are planning to expand to meet growing market demands. Businesses planning expansions in the vicinity of the proposed development include the Co-op Cardlock and Harvest Meats.

Development Site Conditions
January 26, 2015

Through discussions with City of Yorkton representatives, the Co-op Cardlock Gas Station plans to triple the number of fueling stations in early 2015 from 8 to 24.

Through discussions with a Harvest Meats representative, the business is expecting to add roughly 10,000 square feet to their headquarters which would result in an additional 10-20 heavy vehicle trips per day which will depart between 3:00pm – 7:00pm, and an additional 20 employees with work hours of 8:00am – 5:00pm. This expansion is expected to begin in early 2015.

The additional traffic associated with these expansions will be added to the weekday background traffic for the purposes of this analysis and is discussed further in later sections of this report.

LEGEND

- LOUIS DREYFUS COMMODITIES
- POUNDER'S EMULSIONS
- CO-OP CARD LOCK
- POTZUS CONSTRUCTION
- HARVEST MEATS

FIGURE 2.1 | HIGHWAY COMMERCIAL TRAFFIC IMPACT ASSESSMENT

Study Area Roadways, Intersections and Adjacent Developments

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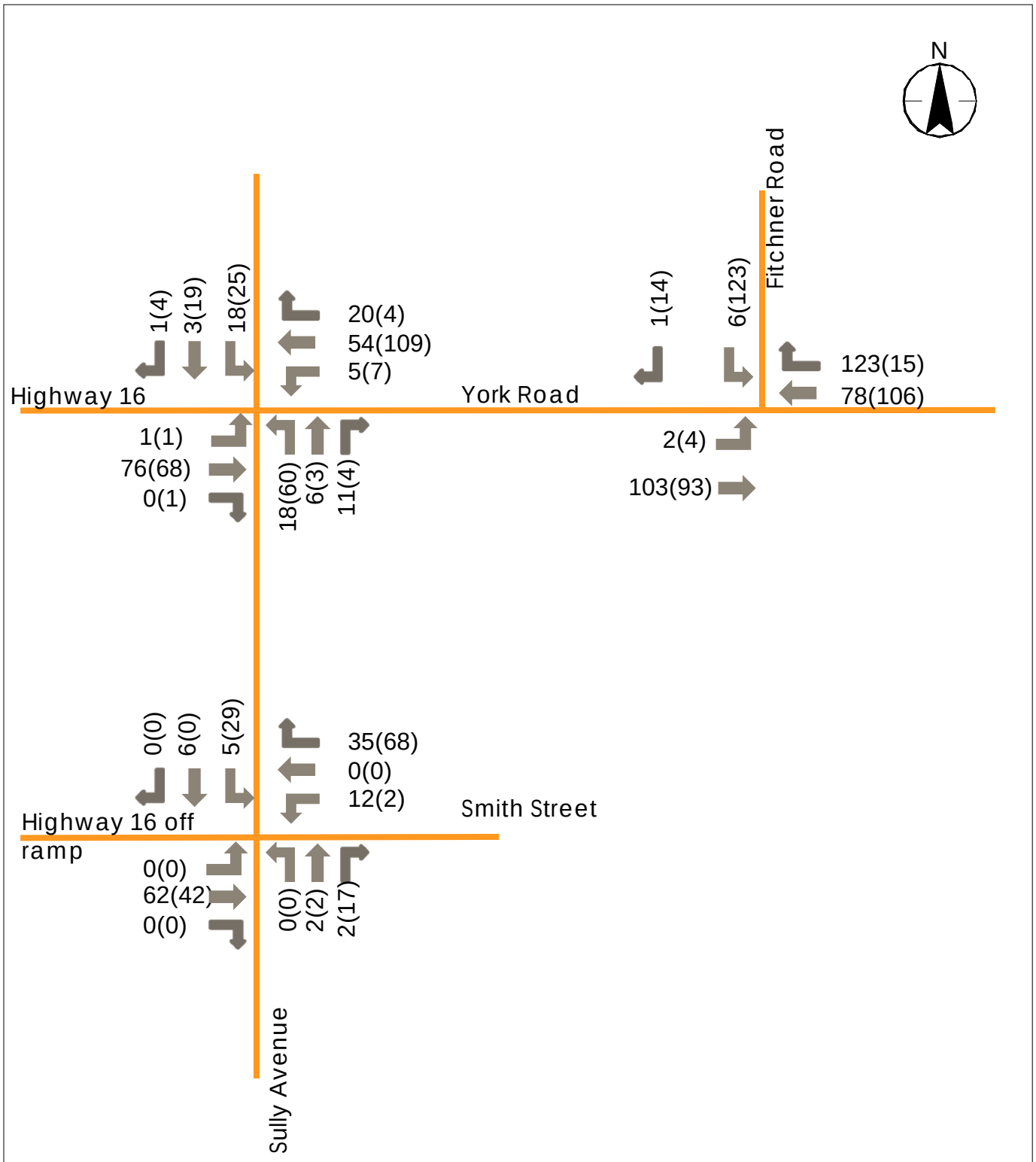

FIGURE 2.2 | HIGHWAY COMMERCIAL TRAFFIC IMPACT ASSESSMENT

Existing Traffic Volumes

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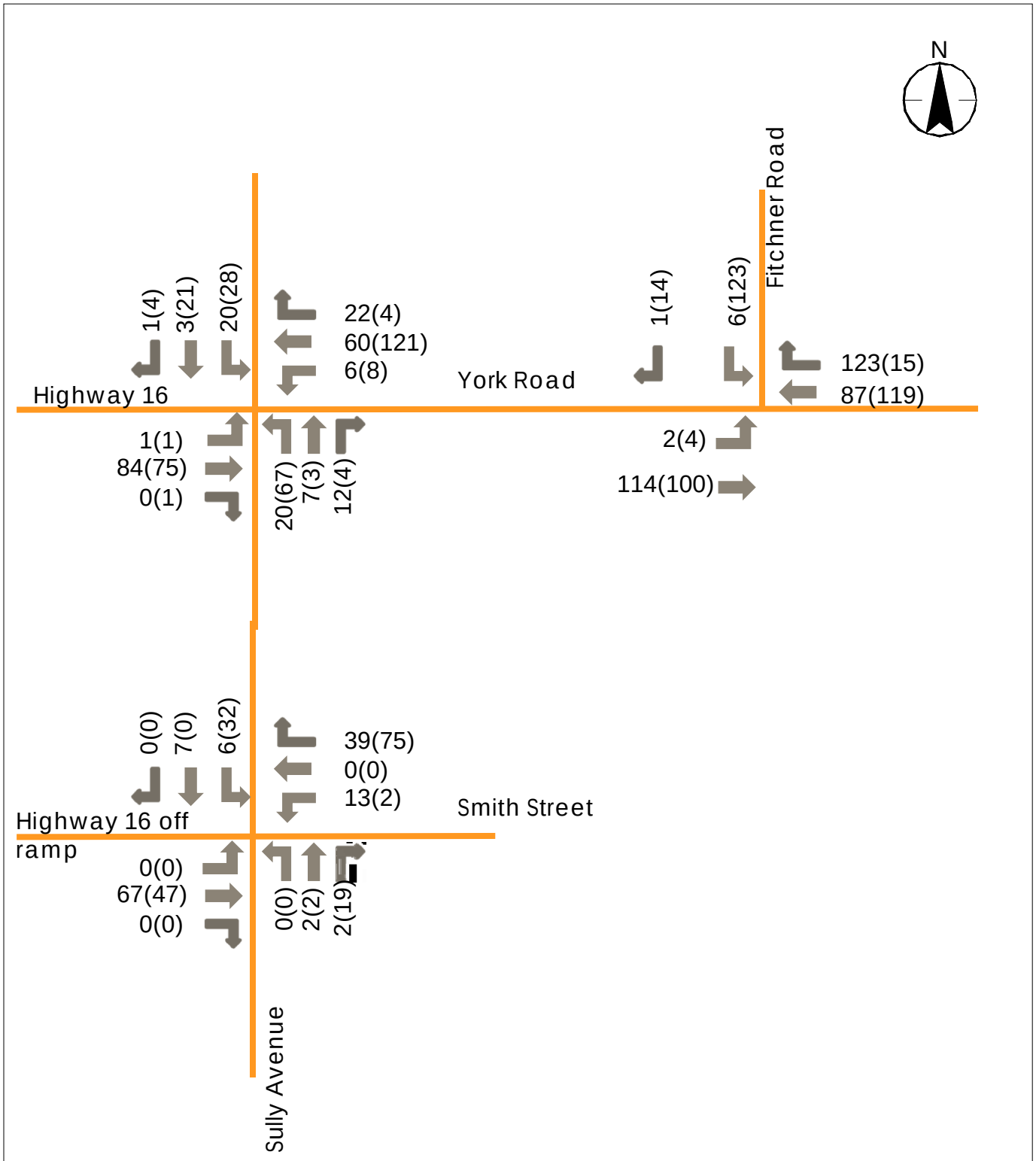

FIGURE 2.3 | HIGHWAY COMMERCIAL TRAFFIC IMPACT ASSESSMENT

2020 Weekday Background Traffic Volumes

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3.0 PROPOSED DEVELOPMENT

3.1 LAND USE

The development site consists of roughly 93 acres (38 ha) of land between Smith Street and York Road. Of this area, 4.2 acres (1.7 ha) is dedicated to stormwater management and 10.6 acres (4.3 ha) to wetlands, leaving 78 acres (32 ha) for development. The area is currently zoned C-3, or Highway Commercial, by the City of Yorkton. No re-zoning is proposed for this development to proceed. A John Deere dealership is expected to fill a parcel roughly 20 acres in area within the proposed development. Similar uses, per zoning, are expected on the remaining land. Figure 3.1 shows the concept plan for the proposed development.

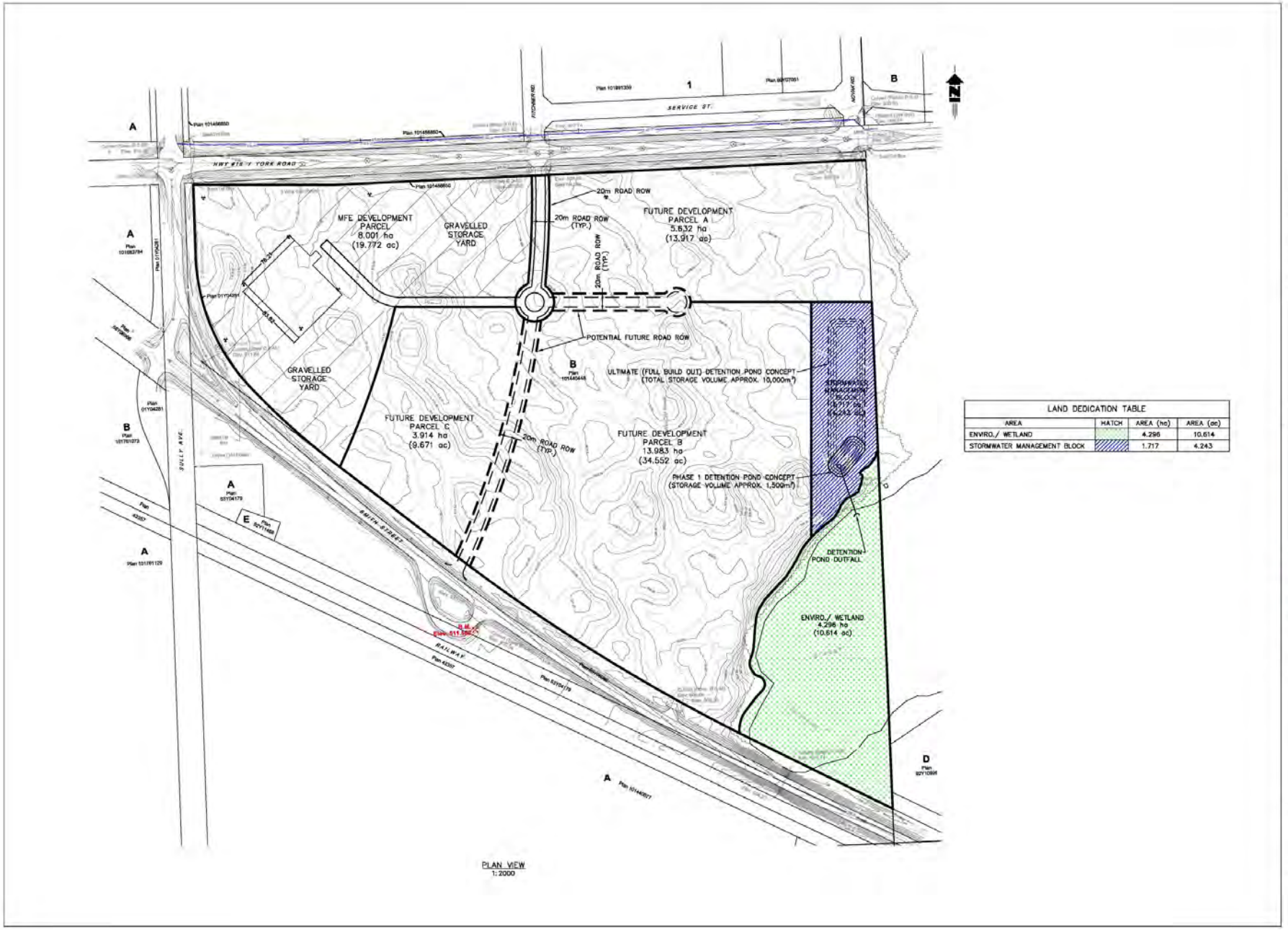
3.2 SITE CONTEXT

The current site layout is located in the southeast corner of the intersection of York Road and Sully Avenue. Currently, this land is greenfield and unoccupied. There are additional adjacent developments north and south of the proposed development. A slough and a City-owned campground border the proposed development to the east. There are two accesses proposed for the development. One is a proposed extension of Fitchner Road which would create a south leg for the current "T" intersection with York Road. The other is continuation of Fitchner Road south until it intersects with Smith Street. This south access is not anticipated to be finalized until development progresses south and the access is required.

3.2.1 On-Site Traffic Flow

As noted in the subdivision application submitted to the City on December 19, 2014, there is one business which has expressed interest in purchasing a lot in the proposed development for construction in 2015. A John Deere dealership is expected to purchase a lot in the northwest corner of the proposed development. Vehicles will access and egress the site via Fitchner Road and turn right into the proposed John Deere development. It is expected that there will be onsite parking for roughly 35-40 vehicles and accommodation for semi-trailer vehicles which will access the proposed development to load and unload merchandise. According to Jim Pattison Developments, internal roadways will be designed to accommodate vehicles expected to access the proposed development, including heavy vehicles.

Figure 3.2 shows the concept plan, with the expected traffic flow depicted with orange arrows.



LAND DEDICATION TABLE			
AREA	HATCH	AREA (ha)	AREA (ac)
ENVIRO./ WETLAND		4.296	10.614
STORMWATER MANAGEMENT BLOCK		1.717	4.243

REVISIONS

ISSUED FOR: SUBDIVISION

TRUE CONSULTING

MAPLE FARM EQUIPMENT

MAPLE FARM EQUIPMENT DEALERSHIP YORKTON, SASK.

SUBDIVISION CONCEPT PLAN

AS NOTED

001

FIGURE 3.1 | HIGHWAY COMMERCIAL TRAFFIC IMPACT ASSESSMENT

Concept Plan

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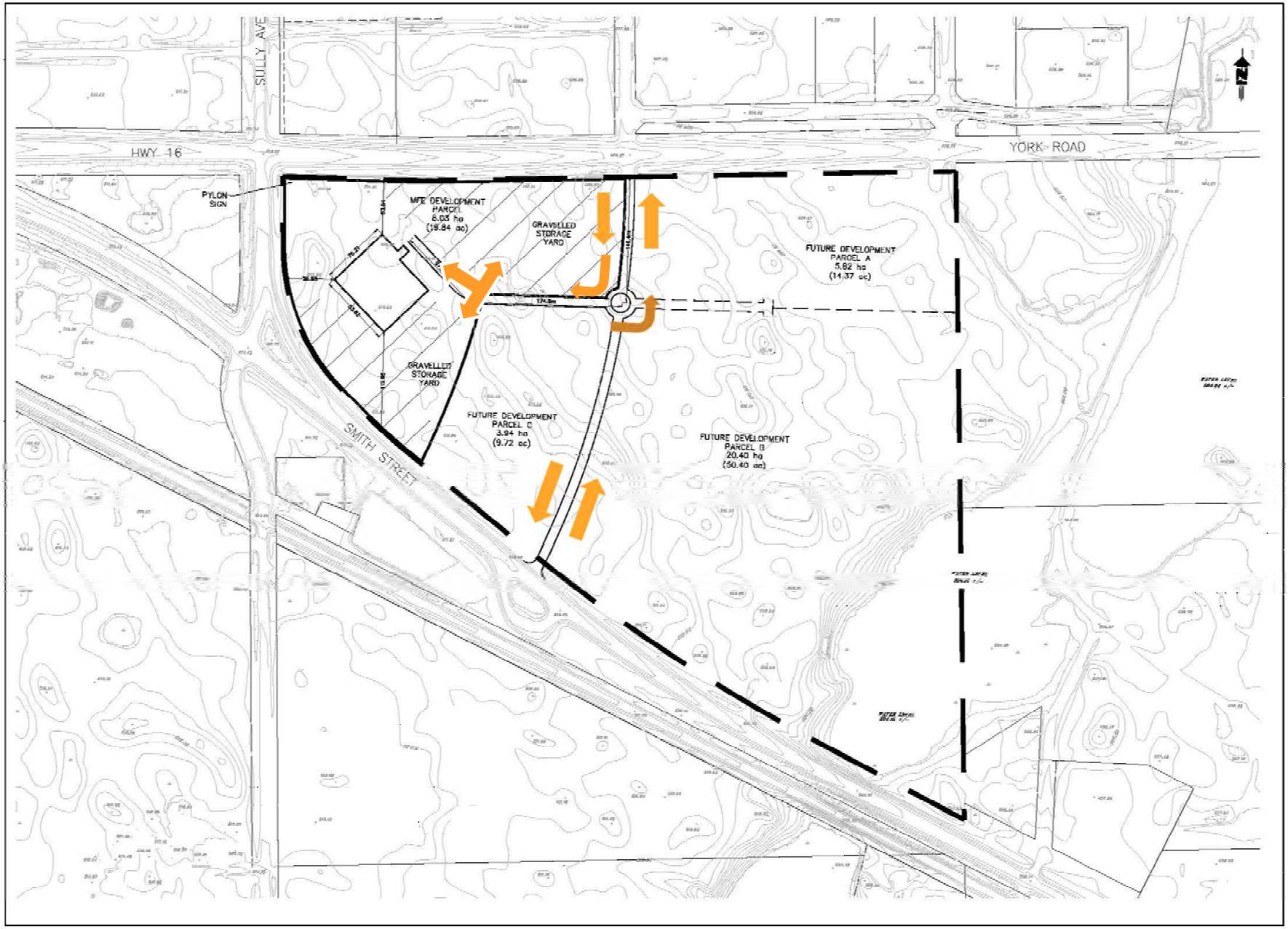

LEGEND

Expected Traffic Flow Direction

FIGURE 3.2 | HIGHWAY COMMERCIAL TRAFFIC IMPACT ASSESSMENT

Expected On-Site Traffic Flow

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4.0 TRAFFIC ANALYSIS

The analysis of traffic conditions related to the proposed development was completed for the weekday morning and afternoon peak hours of adjacent street traffic as these represent the busiest time periods.

4.1 TRIP GENERATION

The John Deere dealership is expected to be roughly 65,000 square feet which includes the parts bay. For the remainder of the proposed development, as shown on the concept plan in **Figure 3.1**, 4.2 acres is dedicated to stormwater management including detention and 10.6 acres is reserved for wetlands. Assuming similar site coverage as the John Deere dealership (roughly 8%) and using the 58.1 remaining acres, the remaining developed floor space is acres or 200,000 square feet of building space.

To determine the additional vehicular trips as a result of the proposed development, the Institute for Transportation Engineers (ITE) Trip Generation Manual (9th Edition) was used. Land use 810, Tractor Supply Store was deemed appropriate for the John Deere Dealership. For the remainder of the undetermined acres, a blended rate using Land uses 810 (Tractor Supply Store), 841 (Automobile Sales) and 811 (Construction Equipment Rental Store) was used. These land uses may not exactly describe the type of commercial retail constructed in the proposed development, but it is believed that the traffic generation rates will be similar to the land uses described. The land uses and trip generation rates for this study are summarized in **Table 4.1** below.

Table 4.1: Trip Generation Rates

Land Use Description	ITE Land Use	AM Generation			PM Generation		
		Rate (per '000 sqft)	Enter	Exit	Rate (per '000 sqft)	Enter	Exit
John Deere Dealership	843 – Tractor Supply Store	1.12*	53%	47%	1.40	47%	53%
Remainder of Developable Land	810 – Tractor Supply Store	1.12*	53%	47%	1.40	47%	53%
	841 – Automobile Sales	1.92	75%	25%	2.62	40%	60%
	811 – Construction Equipment Rental Store	0.79*	72%	28%	0.99	28%	72%

*In some cases, morning peak hour rates were not given and was therefore assumed to be 80% of the PM peak hour rate with a reversal of the directional distribution.

Trip generation was determined for the proposed development for the weekday morning and afternoon peak hours using the trip generation rates in **Table 4.1**. For the remainder of developable land, trip generation rates and trip distributions were averaged to achieve a

representable traffic volume and directional distribution. Trip generation for the proposed development is summarized in **Table 4.2**.

Table 4.2: Generated Trips

	AM Peak Hour			PM Peak Hour		
Land Use	**Entering**	**Exiting**	**Total**	**Entering**	**Exiting**	**Total**
John Deere dealership	39	34	73	43	48	91
Remaining Developable Land	164	81	245	121	199	320
Grand Total	203	115	318	164	247	411

4.1.1 Trip Generation and Distribution for Adjacent Growth

Harvest Meats:

Harvest Meats expansion will result in as many as 20 additional heavy vehicles leaving between 3:00 pm and 7:00pm. It was assumed that these vehicles will be spaced out evenly over time and will travel east and westbound on York Road. Therefore an additional 5 vehicles will be added to the background traffic volumes for the afternoon peak hour, 3 westbound and 2 eastbound. An additional 20 trips entering in the morning peak hour and exiting in the afternoon peak hour will also be added to account for the added employees. The assumption is most employees will live in Yorkton, therefore 75% of traffic is assigned east on York Road and 25% west. Fifteen vehicles will travel from Yorkton and 5 will travel from points west of Yorkton.

Co-op Cardlock

To determine the additional vehicular trips as a result of the Co-op Cardlock expansion, the ITE Trip Generation Manual (9th Edition) was used. Land use 944, Gasoline / Service Station was deemed appropriate for the expansion.

Using the fitted curve equation: T= 10.27(X) + 13.89, where T is the number of new trip ends and X is the number of additional fuelling station positions, there will be 178 new trips in the morning peak hour. Of these trips, 51% are entering and 49% are exiting. Therefore 91 additional vehicles will enter and 87 additional vehicles will leave the Co-op Cardlock.

A fitted curve equation is not given for the afternoon peak hour. However, ITE estimates that for every fueling position, an average rate of 13.87 trips can be used to help determine the number of new trips. Distribution of entering and exiting is 50%/50%. Therefore, it is estimated that 111 additional vehicles will enter and 111 additional vehicles will exit the Co-op Cardlock in the afternoon peak hour.

While the majority of traffic associated with the Cardlock will not travel through any of the study intersections, it is assumed that the distribution for the new trips from the Co-op Cardlock will follow the 75% east / 25% west split, as assumed with Harvest Meats. This additional traffic will be added to the through movements on York Road for analysis purposes.

4.1.2 Reductions in Traffic Volumes

Trips generated by retail/commercial developments are often not "new" trips but rather trips that are already on the transportation network and either diverted from their original route or are passing by and decide to make a stop at the development. The different types of trips are:

- **Primary Trips**: these trips are made for the specific purpose of visiting the site, for which the given traffic generator is the primary reason for the trip.
- **Pass-by Trips**: these trips are intercepted from the stream of traffic passing the site on the way to their destination. While they do contribute to traffic volumes at site accesses, they do not create new traffic loading on the adjacent street system.
- **Diverted Linked Trips**: these trips are made on the way to a destination, however are attracted to study area roadways as a result of the development. This trip type adds traffic to streets adjacent to a development but not to the area's major traveled roadways.
- **Internal Trips (Internal capture):** these trips are made between two or more land uses on a single site. While the primary trip may be made for one land use, auxiliary services provided by the other land use are accessed while on the site. These trips result in an overall reduction in primary trips.

According to ITE, an Automobile Parts Sales store generates 43% pass-by trips. Similarly, a Tire Store generates 28% pass-by trips. Although these land uses are not directly used for generation, it can be assumed that pass-by trips will be roughly similar to an Automobile Parts Sales and Tire Stores. Therefore, 30% of the trips made to the proposed development was assumed to be pass-by traffic and does not increase vehicle volumes on the transportation network.

Interaction between multiple land uses reduces overall traffic to the proposed development because one trip may serve two purposes. This interaction between two land uses is called internal capture. The result is a reduction in overall generated traffic to the proposed development. ITE suggests that the interaction between one commercial development to another commercial development be approximately 20%.

Therefore, an overall reduction in total trips to the proposed development of 50% was used for morning and afternoon peak hours.

No reductions are made to the Harvest Meats expansion as these are real numbers provided by the company. The Co-op Cardlock expansion will incur reductions as a result of pass-by traffic. According to ITE, for a gas/service station, the typical pass-by reduction is 58%. Updated

background traffic volumes are presented in **Figure 4.1** which includes adjacent development expansions with reductions already applied.

4.2 TRIP DISTRIBUTION

Trips generated by the proposed development must be distributed and assigned to the roadway network. Trip distribution refers to the location of origins and destinations of trips generated by the proposed development.

The directional distribution of trips generated by the proposed development was estimated based on knowledge of surrounding residential areas and verified by observing the current directional split of vehicles at the study intersections.

The resulting trip distribution percentages are shown in **Figure 4.2**. With an assumed 65% of the traffic originating in Yorkton and points east of Yorkton, only the remaining 35% is assigned to the study intersection of York Road & Sully Avenue and Smith Street & Sully Avenue as they are located west of the proposed development.

4.3 TRIP ASSIGNMENT

Trip assignment refers to the assignment of generated trips to the roadway network. Trips generated by the proposed development were assigned to the street network using the directional distributions shown above. Routing of trips to and from the proposed development site was based on logical assumptions to minimize overall travel time.

4.4 TRAFFIC VOLUMES

4.4.1 Site Generated Traffic Volumes

The total site generated traffic volumes for the morning and afternoon peak hour time periods are shown in **Figure 4.3**. These volumes are based on the above trip generation, primary and pass-by reductions, internal reductions, trip distribution, and trip assignment.

4.4.2 Combined Traffic Volumes

The combined traffic volumes were derived from the generated traffic volumes added to the projected background traffic volumes shown in **Figure 4.1**. Combined traffic volumes at full build-out for the morning and afternoon peak hour time periods are shown in **Figure 4.4**.

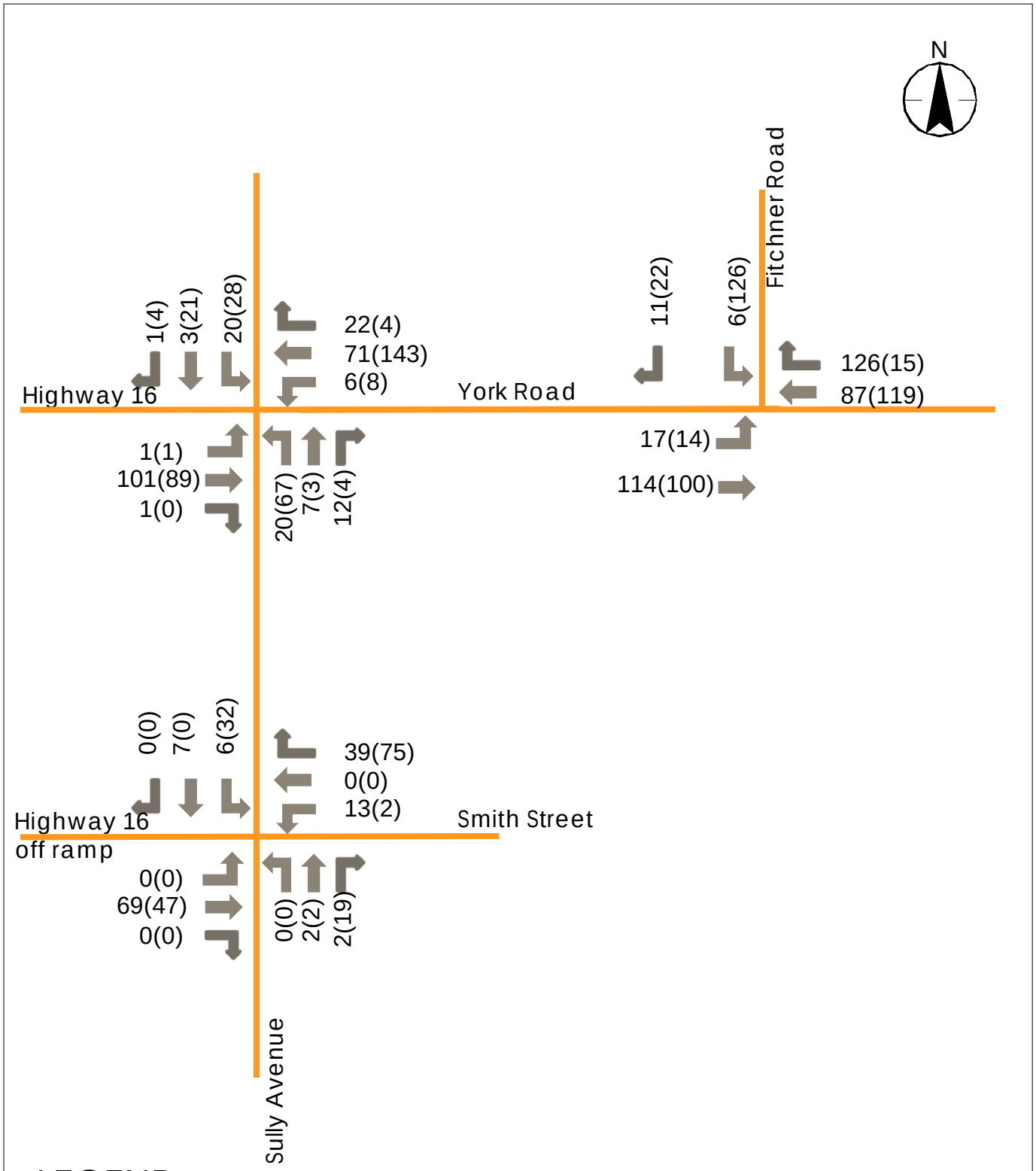

FIGURE 4.1 | HIGHWAY COMMERCIAL TRAFFIC IMPACT ASSESSMENT

2020 Weekday Background Traffic with Adjacent Expansions

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FIGURE 4.2 | HIGHWAY COMMERCIAL TRAFFIC IMPACT ASSESSMENT

Trip Distribution Percentages

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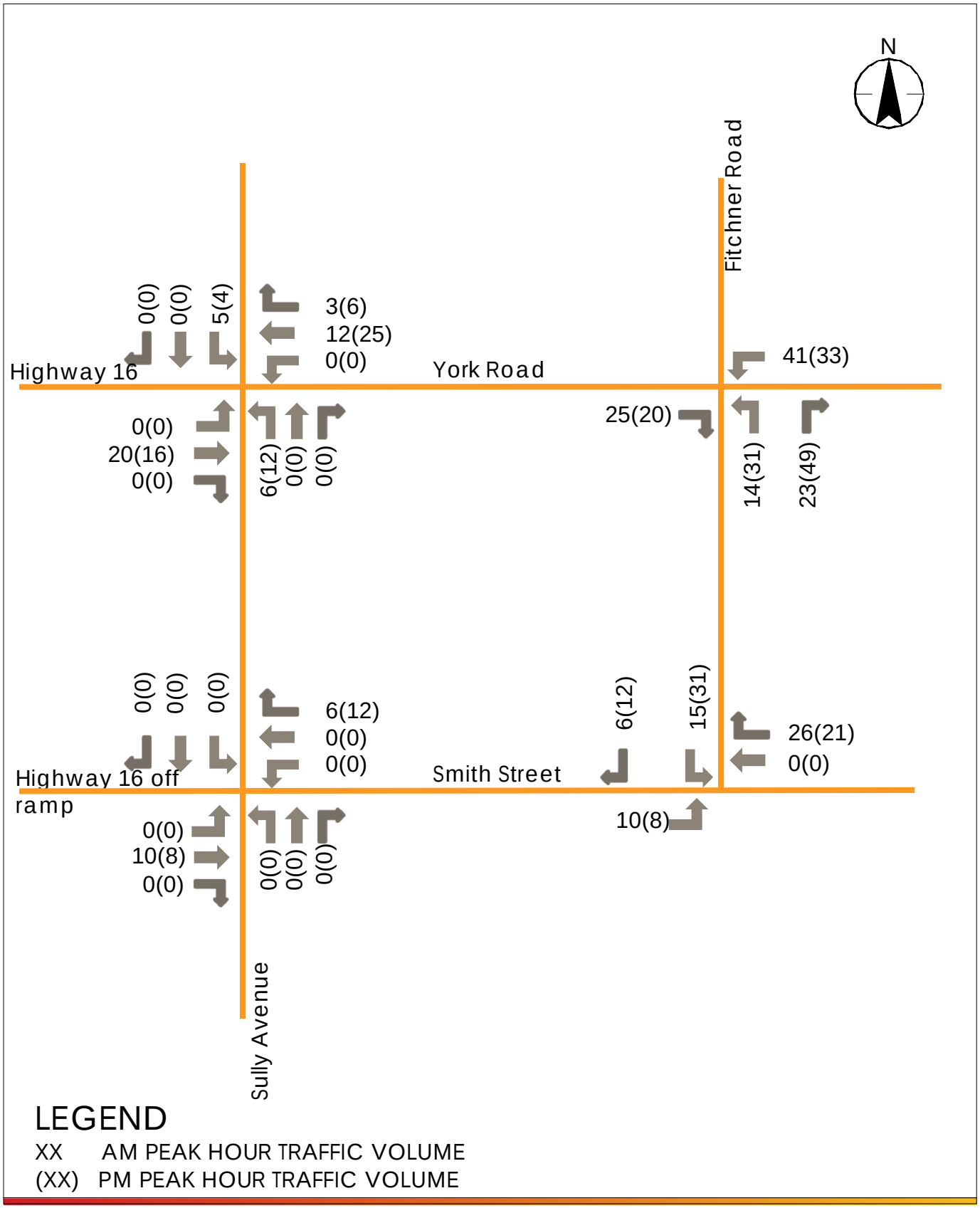

FIGURE 4.3 | HIGHWAY COMMERCIAL TRAFFIC IMPACT ASSESSMENT

Weekday Site Generated Traffic Volumes

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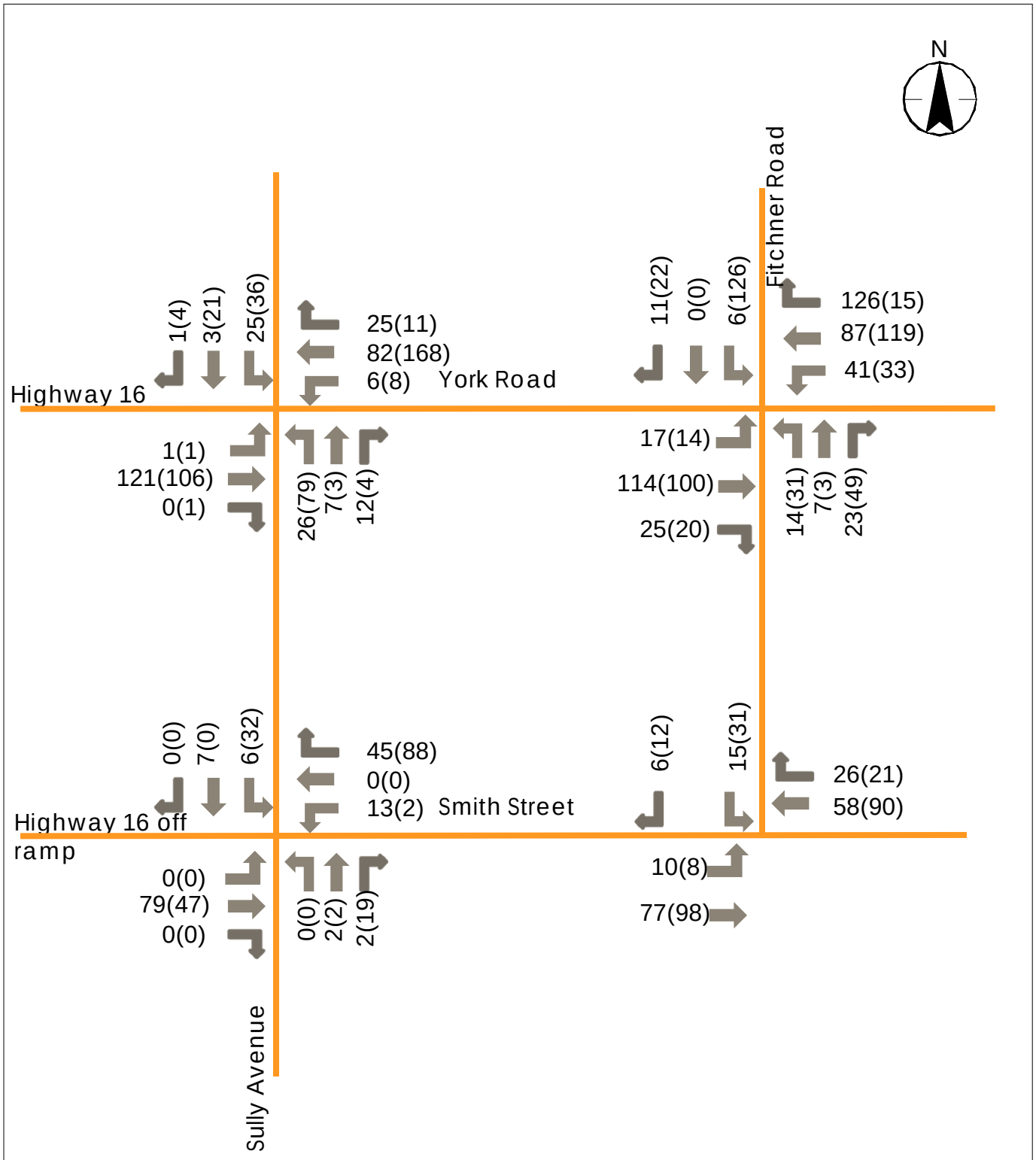

FIGURE 4.4 | HIGHWAY COMMERCIAL TRAFFIC IMPACT ASSESSMENT

2020 Weekday Combined Traffic Volumes

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5.0 INTERSECTION ANALYSIS

Traffic analysis was conducted for the weekday morning and afternoon peak hour time periods at the design year. Level of service (LOS), volume to capacity (v/c) ratio, and 95th percentile queue length are the three performance measures used to describe the quality and efficiency of traffic flow for the purposes of this TIA.

LOS is defined by ranges of average delay sustained by motorists traveling through an intersection. LOS A represents the lowest range of average delay and therefore the best conditions, while LOS F represents the highest range of delay and therefore less than ideal conditions. **Table 5.1** shows the ranges of delay associated with each level of service for signalized intersections.

Table 5.1: Ranges of Delay for Levels of Service at Un-Signalized Intersections

Level of Service	Delay per Vehicle (seconds)	Performance
A	≤ 10	Free flow traffic
B	> 10 and ≤ 15	Reasonably free flow
C	>15 and ≤ 25	Stable flow
D	> 25 and ≤ 35	Approaching unstable flow
E	> 35 and ≤ 50	Unstable flow; operating at capacity
F	> 50	Forced or breakdown flow

V/c ratios provide a quantitative value as to how much of the intersection's capacity to move traffic is used under the given traffic conditions. If this ratio is greater than one, the available capacity has been exceeded and traffic conditions begin to break down. 95th percentile queue lengths represent the longest queue of vehicles that can be expected for a particular movement with 95th percentile traffic volumes.

For the purpose of this analysis, a v/c threshold of 0.85, a LOS threshold of E, and a 95th percentile queue length of 100 metres were used to trigger identification of critical movements for which improvements should be considered. Performance measures below these thresholds is considered acceptable.

The intersections within the study area were analyzed using the computer program Synchro 9. Synchro 9 analyzes both signalized and un-signalized intersections in terms of LOS, capacity, and queues according to the methodology detailed in the 2000 edition of the Highway Capacity Manual (HCM). Synchro 9 outputs are included in Appendix A.

5.1 INTERSECTION CONFIGURATION

As discussed in Section 2.2 of this report, the configurations of the study intersections are shown in **Figure 5-1**. The westbound left movement at Smith Street & Sully Avenue is prohibited by signage, however many vehicles made this movement as observed during the traffic counts. Therefore, this movement was included into the analysis even though it is illegal. All results that follow are based on this configuration.

5.2 ANALYSIS PARAMETERS

The study intersections were analyzed to determine if they would operate at acceptable levels of service with full build-out of the development at the 2020 analysis horizon.

The following parameters were used for the traffic model:

- Weekday morning and afternoon peak hour traffic volumes as shown in **Figure 2.2**, **Figure 4.1** and **Figure 4.4** were used for the analysis;
- Intersection lane configurations as shown on **Figure 5.1** were assumed for the analysis;
- Ideal saturated flow rate of 1750 vehicles per hour;
- 3.7 m lane width;
- If zero vehicles were assigned to a movement through generation, then 5 vehicles were assigned in Synchro;
- Peak Hour Factor (PHF) of 0.75 as observed during the traffic counts; and
- 22% Heavy Vehicles as observed during the traffic counts.

5.3 ANALYSIS RESULTS

5.3.1 Existing Traffic Scenario

Table 5.2 show present day LOS, v/c ratios, and queues during the morning and afternoon peak hour time periods for the study intersections.

Table 5.2: Existing Traffic Analysis Results

Intersection	Intersection Control	Peak	Measure	Eastbound			Westbound			Northbound			Southbound		
				L	T	R	L	T	R	L	T	R	L	T	R
York Road and Sully Avenue	Stop	AM	Volume (vph)	5	76	5	5	54	20	18	6	11	18	5	5
			Level of Service		A			A			B			A	
			V/C Ratio		0.03			0.04			0.04			0.05	
			Queue Length (m)		0			0			1			1	
		PM	Volume (vph)	5	68	5	7	109	5	60	5	5	25	19	5
			Level of Service		A			A			B			B	
			V/C Ratio		0.03			0.05			0.13			0.10	
			Queue Length (m)		0			0			4			3	
Smith Street and Sully Avenue	Stop	AM	Volume (vph)	5	62	5	12		35		5	5	5	6	
			Level of Service		A			A			A			B	
			V/C Ratio		0.00			0.03			0.02			0.02	
			Queue Length (m)		0			0			0			0	
		PM	Volume (vph)	5	42	5	5		68		5	17	29	5	
			Level of Service		A			A			A			A	
			V/C Ratio		0.00			0.05			0.03			0.06	
			Queue Length (m)		0			0			1			1	
York Road & Fitchner Road	Stop	AM	Volume (vph)	5	103			78	123				6		5
			Level of Service		A			A						B	
			V/C Ratio		0.01			0.16						0.02	
			Queue Length (m)		0			0						0	
		PM	Volume (vph)	5	93			106	15				123		14
			Level of Service		A			A						B	
			V/C Ratio		0.01			0.09						0.27	
			Queue Length (m)		0			0						9	

The study intersections operate at LOS B or better, with all volume to capacity measures at 0.27 or less and queues with 9 metres of less. LOS B indicates very good operating conditions with reasonably free flow. Motorists have a high level of physical and psychological comfort at this level. V/c of 0.27 indicates that only 27% of the full capacity of the roadway is being used at these traffic volumes. A 95th percentile queue of 9 meters suggests that, during the highest 5% of traffic volumes, a queue of one or two vehicles may be expected.

5.3.2 Background Traffic Scenario

Table 5.3 shows LOS, v/c ratios, and queues for background traffic with planned adjacent expansions at the analysis horizon at the study intersections.

Table 5.3: Background Traffic Analysis Results

Intersection	Intersection Control	Peak	Measure	Eastbound			Westbound			Northbound			Southbound		
				L	T	R	L	T	R	L	T	R	L	T	R
York Road & Sully Avenue	Stop	AM	Volume (vph)	5	84	5	6	60	22	20	7	12	20	5	5
			Level of Service		A			A			B			B	
			V/C Ratio		0.04			0.04			0.05			0.06	
			Queue Length (m)		0			0			1			2	
		PM	Volume (vph)	5	75	5	8	121	5	67	5	5	28	21	5
			Level of Service		A			A			B			B	
			V/C Ratio		0.03			0.05			0.15			0.12	
			Queue Length (m)		0			0			4			3	
Smith Street & Sully Avenue	Stop	AM	Volume (vph)	5	67	5	13		39		5	5	6	7	
			Level of Service		A			B			A			A	
			V/C Ratio		0.02			0.02			0.01			0.03	
			Queue Length (m)		0			1			0			0	
		PM	Volume (vph)	5	47	5	5		75		5	19	32	5	
			Level of Service		A			A			A			A	
			V/C Ratio		0.00			0.06			0.04			0.06	
			Queue Length (m)		0			0			1			1	
York Road & Fitchner Road	Stop	AM	Volume (vph)	5	114			87	123				6		5
			Level of Service		A			A						A	
			V/C Ratio		0.01			0.16						0.02	
			Queue Length (m)		0			0						0	
		PM	Volume (vph)	5	100			119	15				123		14
			Level of Service		A			A						B	
			V/C Ratio		0.01			0.11						0.28	
			Queue Length (m)		0			0						9	

The study intersections operate at LOS B or better, with all volume to capacity measures at 0.28 or less and queues with 9 metres of less. LOS B indicates very good operating conditions with reasonably free flow. Motorists have a high level of physical and psychological comfort at this level. V/c of 0.28 indicates that only 28% of the full capacity of the roadway is being used at these traffic volumes. A 95th percentile queue of 9 meters suggests that, during the highest 5% of traffic volumes, a queue of one or two vehicles may be expected. This analysis shows that the study intersections operate satisfactorily with background traffic at the analysis horizon.

5.3.3 Combined Traffic Scenario

Table 5-4 shows LOS, v/c ratios and queues for combined weekday traffic during AM and PM peak hours at the 2020 full-build out analysis horizon at the study intersections.

Table 5.4: Combined Traffic Analysis Results

Intersection	Intersection Control	Peak	Measure	Eastbound			Westbound			Northbound			Southbound		
				L	T	R	L	T	R	L	T	R	L	T	R
York Road & Sully Avenue	Stop	AM	Volume (vph)	5	121	5	6	82	25	26	7	12	25	5	5
			Level of Service	A			A			B			B		
			V/C Ratio	0.05			0.04			0.07			0.08		
			Queue Length (m)	0			0			2			2		
		PM	Volume (vph)	5	106	5	8	168	11	79	5	5	36	21	5
			Level of Service	A			A			B			B		
			V/C Ratio	0.05			0.07			0.20			0.16		
			Queue Length (m)	0			0			6			4		
Smith Street & Sully Avenue	Stop	AM	Volume (vph)	5	79	5	13		45		5	5	6	7	
			Level of Service	A			A			A			B		
			V/C Ratio	0.00			0.01			0.02			0.02		
			Queue Length (m)	0			0			0			1		
		PM	Volume (vph)	5	47	5	5		88		5	19	32	5	
			Level of Service	A			A			A			A		
			V/C Ratio	0.00			0.07			0.04			0.06		
			Queue Length (m)	0			0			1			1		
York Road & Fitchner Road	Stop	AM	Volume (vph)	17	114	25	41	87	126	14	7	23	6	5	11
			Level of Service	A			A			B			B		
			V/C Ratio	0.02			0.04			0.11			0.06		
			Queue Length (m)	1			1			3			1		
		PM	Volume (vph)	14	100	20	33	119	15	31	5	49	126	5	22
			Level of Service	A			A			B			C		
			V/C Ratio	0.01			0.03			0.19			0.48		
			Queue Length (m)	0			1			5			20		
Smith Road & Fitchner Road	Stop	AM	Volume (vph)	10	77			58	26				15		31
			Level of Service	A			A						A		
			V/C Ratio	0.01			0.07						0.07		
			Queue Length (m)	0			0						2		
		PM	Volume (vph)	8	98			90	21				15		12
			Level of Service	A			A						B		
			V/C Ratio	0.01			0.09						0.05		
			Queue Length (m)	0			0						1		

The study intersections operate at LOS C or better, with all volume to capacity measures at 0.48 or less and queues with 20 metres of less. LOS C indicates acceptable operating conditions with stable flow. Motorists are relatively comfortable at this level. V/c of 0.48 indicates that 48% of the full capacity of the roadway is being used at these traffic volumes. A 95th percentile queue of 20 meters suggests that, during the highest 5% of traffic volumes, a queue of three to four vehicles may be expected. This analysis shows that the study intersections operate satisfactorily with combined traffic at the analysis horizon.

5.4 ACTIVE MODES ACCOMMODATION

The land use proposed by this development and existing land uses surrounding the proposed development typically do not attract large numbers of active modes participants. The remote area and location between two highways creates challenges for even the most devout active mode seeker. The proposed development of the John Deere dealership does not require accommodation of active modes.

Pedestrian infrastructure does not currently exist in this area. The adjacent highways with speed limits of 80 km/h and 100 km/h make walking beside the traffic unattractive and unsafe. As well, people that desire to cycle have similar hurdles to overcome when accessing the proposed development.

Currently, there are no transit routes west of Gladstone Avenue to accommodate this mode. Typically, pedestrian infrastructure is also required on both ends of a transit trip and would therefore add an additional challenge to make transit accessible to this area.

Should there be interest in the future to extend active modes infrastructure to this area if a subsequently approved development attracts active modes, the land owners should be prepared to add safe and appropriate infrastructure to the proposed development to accommodate these modes of transportation.

5.5 STUDY AREA SAFETY

This study was completed in mid-January when traffic volumes can be lower than normal and heavy truck traffic, particularly associated to construction projects and agriculture, are lower. Observations and traffic volumes may differ if conducted in June. In short, observations made and traffic volumes collected pertaining to this study may present the "best case scenario" at this location.

As noted in Section 2.3.1, there are several existing safety items which the City of Yorkton may want to examine in the near future including:

- Northbound semi-trailers queueing on Sully Avenue to enter Louie Dreyfus Commodities;
- Variation in operating speeds at York Road & Sully Avenue;
- Semi-trailers and smaller vehicles turning at York Road & Sully Avenue and at Smith Street & Sully Avenue and then trying to reach posted speed while impeding other traffic; and,
- Vehicles frequently making the westbound left movement at Smith Street and Sully Avenue.

Although no direct observations were made, informal interviews with users of York Road expressed concern over the speed limit on York Road and number of heavy vehicles turning to access Fitchner Road, Novak Place, and Sully Avenue.

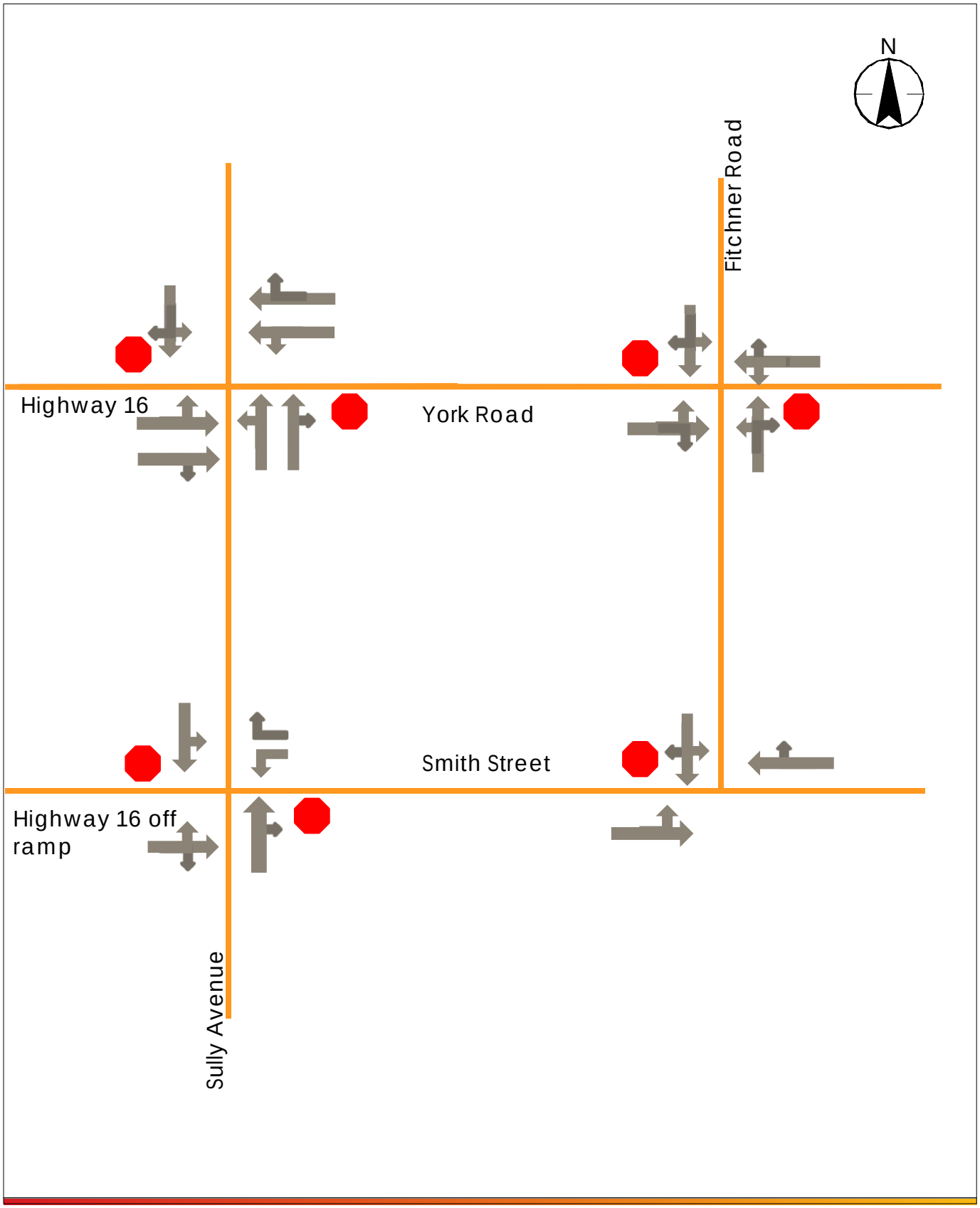

FIGURE 5.1 | HIGHWAY COMMERCIAL TRAFFIC IMPACT ASSESSMENT

Analysis Intersection Configurations

Stantec

111000135
JANUARY 2015

PREPARED FOR: JIM PATTISON DEVELOPMENTS LTD.

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 PROPOSED DEVELOPMENT

6.1.1 Initial Development

Based on the analysis conducted, the roadway network in its current configuration is capable of handling the volumes of traffic generated by the proposed 19.8 acre John Deere development at the 2020 analysis horizon year. Further, ***this initial development does not warrant signalization*** of the intersections at York Road & Sully Avenue nor York Road & Fitchner Road (the Site access).

6.1.2 Full Build-out Development

Based on the assumptions stated and the analysis conducted, the roadway network in its current configuration is capable of handling the volumes of traffic generated by the full build-out of the proposed development at the 2020 analysis horizon year. The full-build scenario ***does not generate sufficient traffic to warrant signalization or auxiliary lanes*** at the intersection of York Road & Sully Avenue, York Road & Fitchner Road (the north access), nor Smith Street & Fitchner Road (the south access). The surrounding roadways are not expected to require additional lanes to accommodate additional traffic, based the assumptions in this study.

It is recommended that this ***TIA is updated at each stage of the development*** to confirm these conclusions. The study is currently based on conservative assumptions that may become inaccurate as the development proceeds and more details are confirmed.

6.2 OTHER RECOMMENDATIONS

While the expected traffic volumes are not expected to create unacceptable operating conditions with current infrastructure, the traffic mix and observed current driver behavior at this location may create safety concerns where high speed traffic is abruptly impeded by slower heavy-vehicle traffic entering and exiting York Road.

It is therefore recommended that the Developer, in partnership with the City and/or adjacent developments, upon initial development commencing, ***construct additional width on York Road at York Road & Fitchner Road intersection to accommodate a flared intersection with painted left turn bays for east and westbound traffic.*** These turn bays will improve safety and the perception of safety at this location, and increase serviceability for the area. This improvement will benefit all adjacent developments and Highway 16 traffic by maintaining the Level of Service through this corridor.

Table 6.1 summarizes the additional trips expected at the intersection of York Road & Fitchner Road by the planned expansions of Harvest Meats and Co-op Cardlock, the planned

development at full build-out, and the expected growth in background traffic (in eastbound and westbound directions only).

Table 6.1: Relative additional traffic volume expected by planned growth

Development	AM Peak Hour			PM Peak Hour		
	Total	Assigned to Fitchner Road		Total	Assigned to Fitchner Road	
Harvest Meats	20	100%	20	20	100%	20
Co-Op Cardlock	75	25%	19	110	25%	3
Background Traffic Growth (EB & WB only, 2.2% *growth*)	181	2.2% growth for five years	20	199	2.2% growth for five years	22
Proposed Full Build-out	160	65%	103	205	65%	133

Further, based on observed current traffic conditions not associated with this development, it is recommended that the City of Yorkton:

- Conduct a full corridor safety review and speed study along York Road, between the off ramp and Gladstone Avenue, with attention also given to vehicular speeds along Smith Street. Consider lowering speed limit on Smith Street from 100km/hr to 80 km/hr or lower once the new intersection is constructed.
- Examine safety and need for prohibiting westbound left turns at Smith Street & Sully Avenue. If the restriction is deemed required, remove infrastructure which currently accommodates the westbound left movement.

Appendix A SYNCHRO OUTPUTS

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	5	76	5	5	54	20	18	6	11	18	3	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	7	101	7	7	72	27	24	8	15	24	4	7
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	99			108			176	230	54	181	220	49
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	99			108			176	230	54	181	220	49
tC, single (s)	4.5			4.5			7.9	6.9	7.3	7.9	6.9	7.3
tC, 2 stage (s)												
tF (s)	2.4			2.4			3.7	4.2	3.5	3.7	4.2	3.5
p0 queue free %	100			100			97	99	98	97	99	99
cM capacity (veh/h)	1358			1346			704	619	941	688	627	947

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total	57	57	43	63	28	19	35
Volume Left	7	0	7	0	24	0	24
Volume Right	0	7	0	27	0	15	7
cSH	1358	1700	1346	1700	690	846	718
Volume to Capacity	0.00	0.03	0.00	0.04	0.04	0.02	0.05
Queue Length 95th (m)	0.1	0.0	0.1	0.0	1.0	0.5	1.2
Control Delay (s)	0.9	0.0	1.2	0.0	10.4	9.4	10.3
Lane LOS	A		A		B	A	B
Approach Delay (s)	0.5		0.5		10.0		10.3
Approach LOS					B		B

Intersection Summary				
Average Delay	3.1			
Intersection Capacity Utilization	21.5%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (veh/h)	0	5	5	5	6	0	5	62	5	12	0	35
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	0	7	7	7	8	0	7	83	7	16	0	47
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	135	131	86	141	135	0	0			89		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	135	131	86	141	135	0	0			89		
tC, single (s)	7.3	6.7	6.4	7.3	6.7	6.4	4.3			4.3		
tC, 2 stage (s)												
tF (s)	3.7	4.2	3.5	3.7	4.2	3.5	2.4			2.4		
p0 queue free %	100	99	99	99	99	100	100			99		
cM capacity (veh/h)	776	712	920	764	709	1029	1501			1389		

Direction, Lane #	NB 1	SB 1	SE 1	NW 1	NW 2
Volume Total	13	15	96	16	47
Volume Left	0	7	7	16	0
Volume Right	7	0	7	0	47
cSH	803	733	1501	1389	1700
Volume to Capacity	0.02	0.02	0.00	0.01	0.03
Queue Length 95th (m)	0.4	0.5	0.1	0.3	0.0
Control Delay (s)	9.6	10.0	0.5	7.6	0.0
Lane LOS	A	B	A	A	
Approach Delay (s)	9.6	10.0	0.5	1.9	
Approach LOS	A	B			

Intersection Summary				
Average Delay	2.4			
Intersection Capacity Utilization	20.8%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	5	103	78	123	6	5
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	7	137	104	164	8	7
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	268				337	186
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	268				337	186
tC, single (s)	4.3				6.6	6.4
tC, 2 stage (s)						
tF (s)	2.4				3.7	3.5
p0 queue free %	99				99	99
cM capacity (veh/h)	1188				617	807

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	144	268	15
Volume Left	7	0	8
Volume Right	0	164	7
cSH	1188	1700	691
Volume to Capacity	0.01	0.16	0.02
Queue Length 95th (m)	0.1	0.0	0.5
Control Delay (s)	0.4	0.0	10.3
Lane LOS	A		B
Approach Delay (s)	0.4	0.0	10.3
Approach LOS			B

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	22.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	5	68	5	7	109	5	60	5	5	25	19	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	7	91	7	9	145	7	80	7	7	33	25	7
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	152			97			218	278	49	236	278	76
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	152			97			218	278	49	236	278	76
tC, single (s)	4.5			4.5			7.9	6.9	7.3	7.9	6.9	7.3
tC, 2 stage (s)												
tF (s)	2.4			2.4			3.7	4.2	3.5	3.7	4.2	3.5
p0 queue free %	99			99			87	99	99	95	96	99
cM capacity (veh/h)	1292			1359			635	578	948	632	578	909

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total	52	52	82	79	83	10	65
Volume Left	7	0	9	0	80	0	33
Volume Right	0	7	0	7	0	7	7
cSH	1292	1700	1359	1700	633	781	629
Volume to Capacity	0.01	0.03	0.01	0.05	0.13	0.01	0.10
Queue Length 95th (m)	0.1	0.0	0.2	0.0	3.6	0.3	2.7
Control Delay (s)	1.0	0.0	0.9	0.0	11.5	9.7	11.4
Lane LOS	A		A		B	A	B
Approach Delay (s)	0.5		0.5		11.3		11.4
Approach LOS					B		B

Intersection Summary				
Average Delay	4.6			
Intersection Capacity Utilization	23.3%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (veh/h)	0	5	17	29	5	0	5	42	5	5	0	68
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	0	7	23	39	7	0	7	56	7	7	0	91
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	89	86	59	112	89	0	0			63		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	89	86	59	112	89	0	0			63		
tC, single (s)	7.3	6.7	6.4	7.3	6.7	6.4	4.3			4.3		
tC, 2 stage (s)												
tF (s)	3.7	4.2	3.5	3.7	4.2	3.5	2.4			2.4		
p0 queue free %	100	99	98	95	99	100	100			100		
cM capacity (veh/h)	838	761	953	790	757	1029	1501			1422		

Direction, Lane #	NB 1	SB 1	SE 1	NW 1	NW 2
Volume Total	29	45	69	7	91
Volume Left	0	39	7	7	0
Volume Right	23	0	7	0	91
cSH	901	785	1501	1422	1700
Volume to Capacity	0.03	0.06	0.00	0.00	0.05
Queue Length 95th (m)	0.8	1.4	0.1	0.1	0.0
Control Delay (s)	9.1	9.9	0.7	7.5	0.0
Lane LOS	A	A	A	A	
Approach Delay (s)	9.1	9.9	0.7	0.5	
Approach LOS	A	A			

Intersection Summary				
Average Delay	3.4			
Intersection Capacity Utilization	22.7%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	5	93	106	15	123	14
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	7	124	141	20	164	19
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	161				289	151
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	161				289	151
tC, single (s)	4.3				6.6	6.4
tC, 2 stage (s)						
tF (s)	2.4				3.7	3.5
p0 queue free %	99				75	98
cM capacity (veh/h)	1305				658	845

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	131	161	183
Volume Left	7	0	164
Volume Right	0	20	19
cSH	1305	1700	673
Volume to Capacity	0.01	0.09	0.27
Queue Length 95th (m)	0.1	0.0	8.7
Control Delay (s)	0.4	0.0	12.3
Lane LOS	A		B
Approach Delay (s)	0.4	0.0	12.3
Approach LOS			B

Intersection Summary			
Average Delay	4.9		
Intersection Capacity Utilization	24.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	5	84	5	6	60	22	20	7	12	20	5	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	7	112	7	8	80	29	27	9	16	27	7	7
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	109			119			195	254	59	201	243	55
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	109			119			195	254	59	201	243	55
tC, single (s)	4.5			4.5			7.9	6.9	7.3	7.9	6.9	7.3
tC, 2 stage (s)												
tF (s)	2.4			2.4			3.7	4.2	3.5	3.7	4.2	3.5
p0 queue free %	100			99			96	98	98	96	99	99
cM capacity (veh/h)	1344			1333			679	598	933	663	607	940

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total	63	63	48	69	31	21	40
Volume Left	7	0	8	0	27	0	27
Volume Right	0	7	0	29	0	16	7
cSH	1344	1700	1333	1700	666	828	686
Volume to Capacity	0.00	0.04	0.01	0.04	0.05	0.02	0.06
Queue Length 95th (m)	0.1	0.0	0.1	0.0	1.2	0.6	1.5
Control Delay (s)	0.9	0.0	1.3	0.0	10.7	9.5	10.6
Lane LOS	A		A		B	A	B
Approach Delay (s)	0.4		0.5		10.2		10.6
Approach LOS					B		B

Intersection Summary				
Average Delay	3.2			
Intersection Capacity Utilization	22.2%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (veh/h)	0	5	5	6	7	0	5	67	5	13	0	39
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	0	7	7	8	9	0	7	89	7	17	0	52
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	145	141	93	151	144	0	0			96		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	145	141	93	151	144	0	0			96		
tC, single (s)	7.3	6.7	6.4	7.3	6.7	6.4	4.3			4.3		
tC, 2 stage (s)												
tF (s)	3.7	4.2	3.5	3.7	4.2	3.5	2.4			2.4		
p0 queue free %	100	99	99	99	99	100	100			99		
cM capacity (veh/h)	762	703	912	752	700	1029	1501			1381		

Direction, Lane #	NB 1	SB 1	SE 1	NW 1	NW 2
Volume Total	13	17	103	17	52
Volume Left	0	8	7	17	0
Volume Right	7	0	7	0	52
cSH	794	723	1501	1381	1700
Volume to Capacity	0.02	0.02	0.00	0.01	0.03
Queue Length 95th (m)	0.4	0.6	0.1	0.3	0.0
Control Delay (s)	9.6	10.1	0.5	7.6	0.0
Lane LOS	A	B	A	A	
Approach Delay (s)	9.6	10.1	0.5	1.9	
Approach LOS	A	B			

Intersection Summary				
Average Delay	2.4			
Intersection Capacity Utilization	21.5%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	5	114	87	123	6	5
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	7	152	116	164	8	7
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	280				363	198
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	280				363	198
tC, single (s)	4.3				6.6	6.4
tC, 2 stage (s)						
tF (s)	2.4				3.7	3.5
p0 queue free %	99				99	99
cM capacity (veh/h)	1176				595	795

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	159	280	15
Volume Left	7	0	8
Volume Right	0	164	7
cSH	1176	1700	671
Volume to Capacity	0.01	0.16	0.02
Queue Length 95th (m)	0.1	0.0	0.5
Control Delay (s)	0.4	0.0	10.5
Lane LOS	A		B
Approach Delay (s)	0.4	0.0	10.5
Approach LOS			B

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	23.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	5	75	5	8	121	5	67	5	5	28	21	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	7	100	7	11	161	7	89	7	7	37	28	7
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			107			239	306	53	259	306	84
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	168			107			239	306	53	259	306	84
tC, single (s)	4.5			4.5			7.9	6.9	7.3	7.9	6.9	7.3
tC, 2 stage (s)												
tF (s)	2.4			2.4			3.7	4.2	3.5	3.7	4.2	3.5
p0 queue free %	99			99			85	99	99	94	95	99
cM capacity (veh/h)	1273			1348			609	555	941	606	555	898

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total	57	57	91	87	93	10	72
Volume Left	7	0	11	0	89	0	37
Volume Right	0	7	0	7	0	7	7
cSH	1273	1700	1348	1700	607	764	603
Volume to Capacity	0.01	0.03	0.01	0.05	0.15	0.01	0.12
Queue Length 95th (m)	0.1	0.0	0.2	0.0	4.2	0.3	3.2
Control Delay (s)	1.0	0.0	1.0	0.0	12.0	9.8	11.8
Lane LOS	A		A		B	A	B
Approach Delay (s)	0.5		0.5		11.8		11.8
Approach LOS					B		B

Intersection Summary				
Average Delay	4.7			
Intersection Capacity Utilization	23.9%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (veh/h)	0	5	19	32	5	0	5	47	5	5	0	75
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	0	7	25	43	7	0	7	63	7	7	0	100
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	96	93	66	121	96	0	0			69		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	96	93	66	121	96	0	0			69		
tC, single (s)	7.3	6.7	6.4	7.3	6.7	6.4	4.3			4.3		
tC, 2 stage (s)												
tF (s)	3.7	4.2	3.5	3.7	4.2	3.5	2.4			2.4		
p0 queue free %	100	99	97	95	99	100	100			100		
cM capacity (veh/h)	829	754	945	777	751	1029	1501			1414		

Direction, Lane #	NB 1	SB 1	SE 1	NW 1	NW 2
Volume Total	32	49	76	7	100
Volume Left	0	43	7	7	0
Volume Right	25	0	7	0	100
cSH	897	773	1501	1414	1700
Volume to Capacity	0.04	0.06	0.00	0.00	0.06
Queue Length 95th (m)	0.9	1.6	0.1	0.1	0.0
Control Delay (s)	9.2	10.0	0.7	7.6	0.0
Lane LOS	A	A	A	A	
Approach Delay (s)	9.2	10.0	0.7	0.5	
Approach LOS	A	A			

Intersection Summary				
Average Delay	3.4			
Intersection Capacity Utilization	23.1%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	5	100	119	15	123	14
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	7	133	159	20	164	19
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	179				315	169
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	179				315	169
tC, single (s)	4.3				6.6	6.4
tC, 2 stage (s)						
tF (s)	2.4				3.7	3.5
p0 queue free %	99				74	98
cM capacity (veh/h)	1285				635	826

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	140	179	183
Volume Left	7	0	164
Volume Right	0	20	19
cSH	1285	1700	650
Volume to Capacity	0.01	0.11	0.28
Queue Length 95th (m)	0.1	0.0	9.1
Control Delay (s)	0.4	0.0	12.7
Lane LOS	A		B
Approach Delay (s)	0.4	0.0	12.7
Approach LOS			B

Intersection Summary			
Average Delay	4.7		
Intersection Capacity Utilization	25.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	5	121	5	6	82	25	26	7	12	25	5	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	7	161	7	8	109	33	35	9	16	33	7	7
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			168			259	337	84	257	323	71
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	143			168			259	337	84	257	323	71
tC, single (s)	4.5			4.5			7.9	6.9	7.3	7.9	6.9	7.3
tC, 2 stage (s)												
tF (s)	2.4			2.4			3.7	4.2	3.5	3.7	4.2	3.5
p0 queue free %	99			99			94	98	98	94	99	99
cM capacity (veh/h)	1303			1273			608	533	898	601	543	915

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total	87	87	63	88	39	21	47
Volume Left	7	0	8	0	35	0	33
Volume Right	0	7	0	33	0	16	7
cSH	1303	1700	1273	1700	598	778	622
Volume to Capacity	0.01	0.05	0.01	0.05	0.07	0.03	0.08
Queue Length 95th (m)	0.1	0.0	0.1	0.0	1.7	0.6	1.9
Control Delay (s)	0.6	0.0	1.0	0.0	11.4	9.8	11.3
Lane LOS	A		A		B	A	B
Approach Delay (s)	0.3		0.4		10.9		11.3
Approach LOS					B		B

Intersection Summary				
Average Delay	3.0			
Intersection Capacity Utilization	23.8%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (veh/h)	0	5	5	6	7	0	5	79	5	13	0	45
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	0	7	7	8	9	0	7	105	7	17	0	60
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	161	157	109	167	160	0	0			112		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	161	157	109	167	160	0	0			112		
tC, single (s)	7.3	6.7	6.4	7.3	6.7	6.4	4.3			4.3		
tC, 2 stage (s)												
tF (s)	3.7	4.2	3.5	3.7	4.2	3.5	2.4			2.4		
p0 queue free %	100	99	99	99	99	100	100			99		
cM capacity (veh/h)	743	688	893	734	685	1029	1501			1362		

Direction, Lane #	NB 1	SB 1	SE 1	NW 1	NW 2
Volume Total	13	17	119	17	60
Volume Left	0	8	7	17	0
Volume Right	7	0	7	0	60
cSH	778	707	1501	1362	1700
Volume to Capacity	0.02	0.02	0.00	0.01	0.04
Queue Length 95th (m)	0.4	0.6	0.1	0.3	0.0
Control Delay (s)	9.7	10.2	0.4	7.7	0.0
Lane LOS	A	B	A	A	
Approach Delay (s)	9.7	10.2	0.4	1.7	
Approach LOS	A	B			

Intersection Summary				
Average Delay	2.2			
Intersection Capacity Utilization	22.2%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	17	114	25	41	87	126	14	7	23	6	5	11
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	23	152	33	55	116	168	19	9	31	8	7	15
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	284			185			541	607	169	559	540	200
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	284			185			541	607	169	559	540	200
tC, single (s)	4.3			4.3			7.3	6.7	6.4	7.3	6.7	6.4
tC, 2 stage (s)												
tF (s)	2.4			2.4			3.7	4.2	3.5	3.7	4.2	3.5
p0 queue free %	98			96			95	97	96	98	98	98
cM capacity (veh/h)	1172			1278			390	362	826	370	396	793

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	208	339	59	29
Volume Left	23	55	19	8
Volume Right	33	168	31	15
cSH	1172	1278	529	515
Volume to Capacity	0.02	0.04	0.11	0.06
Queue Length 95th (m)	0.5	1.1	2.9	1.4
Control Delay (s)	1.0	1.6	12.6	12.4
Lane LOS	A	A	B	B
Approach Delay (s)	1.0	1.6	12.6	12.4
Approach LOS			B	B

Intersection Summary				
Average Delay	3.0			
Intersection Capacity Utilization	34.6%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	SBL	SBR	SEL	SET	NWT	NWR
Lane Configurations						
Volume (veh/h)	15	31	10	77	58	26
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	20	41	13	103	77	35
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	224	95	112			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	224	95	112			
tC, single (s)	6.6	6.4	4.3			
tC, 2 stage (s)						
tF (s)	3.7	3.5	2.4			
p0 queue free %	97	95	99			
cM capacity (veh/h)	715	910	1362			

Direction, Lane #	SB 1	SE 1	NW 1
Volume Total	61	116	112
Volume Left	20	13	0
Volume Right	41	0	35
cSH	836	1362	1700
Volume to Capacity	0.07	0.01	0.07
Queue Length 95th (m)	1.9	0.2	0.0
Control Delay (s)	9.6	1.0	0.0
Lane LOS	A	A	
Approach Delay (s)	9.6	1.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	2.4		
Intersection Capacity Utilization	21.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	5	106	5	8	168	11	79	5	5	36	21	4
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	7	141	7	11	224	15	105	7	7	48	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	239			148			311	418	74	347	414	119
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	239			148			311	418	74	347	414	119
tC, single (s)	4.5			4.5			7.9	6.9	7.3	7.9	6.9	7.3
tC, 2 stage (s)												
tF (s)	2.4			2.4			3.7	4.2	3.5	3.7	4.2	3.5
p0 queue free %	99			99			80	99	99	91	94	99
cM capacity (veh/h)	1192			1297			536	475	912	521	478	850

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total	77	77	123	127	109	10	81
Volume Left	7	0	11	0	105	0	48
Volume Right	0	7	0	15	0	7	5
cSH	1192	1700	1297	1700	534	698	518
Volume to Capacity	0.01	0.05	0.01	0.07	0.20	0.01	0.16
Queue Length 95th (m)	0.1	0.0	0.2	0.0	6.0	0.3	4.4
Control Delay (s)	0.7	0.0	0.7	0.0	13.5	10.2	13.2
Lane LOS	A		A		B	B	B
Approach Delay (s)	0.4		0.4		13.2		13.2
Approach LOS					B		B

Intersection Summary				
Average Delay	4.6			
Intersection Capacity Utilization	26.0%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (veh/h)	0	5	19	32	5	0	5	47	5	5	0	88
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	0	7	25	43	7	0	7	63	7	7	0	117
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	96	93	66	121	96	0	0			69		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	96	93	66	121	96	0	0			69		
tC, single (s)	7.3	6.7	6.4	7.3	6.7	6.4	4.3			4.3		
tC, 2 stage (s)												
tF (s)	3.7	4.2	3.5	3.7	4.2	3.5	2.4			2.4		
p0 queue free %	100	99	97	95	99	100	100			100		
cM capacity (veh/h)	829	754	945	777	751	1029	1501			1414		

Direction, Lane #	NB 1	SB 1	SE 1	NW 1	NW 2
Volume Total	32	49	76	7	117
Volume Left	0	43	7	7	0
Volume Right	25	0	7	0	117
cSH	897	773	1501	1414	1700
Volume to Capacity	0.04	0.06	0.00	0.00	0.07
Queue Length 95th (m)	0.9	1.6	0.1	0.1	0.0
Control Delay (s)	9.2	10.0	0.7	7.6	0.0
Lane LOS	A	A	A	A	
Approach Delay (s)	9.2	10.0	0.7	0.4	
Approach LOS	A	A			

Intersection Summary				
Average Delay	3.2			
Intersection Capacity Utilization	23.1%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	14	100	20	33	119	15	31	5	49	126	5	22
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	19	133	27	44	159	20	41	7	65	168	7	29
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	179			160			473	451	147	509	454	169
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	179			160			473	451	147	509	454	169
tC, single (s)	4.3			4.3			7.3	6.7	6.4	7.3	6.7	6.4
tC, 2 stage (s)												
tF (s)	2.4			2.4			3.7	4.2	3.5	3.7	4.2	3.5
p0 queue free %	99			97			90	99	92	57	99	96
cM capacity (veh/h)	1285			1306			431	453	850	390	451	826

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	179	223	113	204
Volume Left	19	44	41	168
Volume Right	27	20	65	29
cSH	1285	1306	605	424
Volume to Capacity	0.01	0.03	0.19	0.48
Queue Length 95th (m)	0.3	0.8	5.4	20.1
Control Delay (s)	0.9	1.8	12.3	21.1
Lane LOS	A	A	B	C
Approach Delay (s)	0.9	1.8	12.3	21.1
Approach LOS			B	C

Intersection Summary				
Average Delay	8.7			
Intersection Capacity Utilization	39.1%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	SBL	SBR	SEL	SET	NWT	NWR
Lane Configurations						
Volume (veh/h)	15	12	8	98	90	21
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	20	16	11	131	120	28
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	286	134	148			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	286	134	148			
tC, single (s)	6.6	6.4	4.3			
tC, 2 stage (s)						
tF (s)	3.7	3.5	2.4			
p0 queue free %	97	98	99			
cM capacity (veh/h)	659	864	1320			

Direction, Lane #	SB 1	SE 1	NW 1
Volume Total	36	141	148
Volume Left	20	11	0
Volume Right	16	0	28
cSH	737	1320	1700
Volume to Capacity	0.05	0.01	0.09
Queue Length 95th (m)	1.2	0.2	0.0
Control Delay (s)	10.1	0.6	0.0
Lane LOS	B	A	
Approach Delay (s)	10.1	0.6	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	22.7%	ICU Level of Service	A
Analysis Period (min)	15		

APPENDIX E
TRUE Consulting Subdivision Concept Plan
dated December 17, 2014

PLAN VIEW
1: 2000

LAND DEDICATION TABLE			
AREA	HATCH	AREA (ha)	AREA (ac)
ENVIRO./ WETLAND		4.296	10.614
STORMWATER MANAGEMENT BLOCK		1.717	4.243

No.	DATE	DESCRIPTION	BY	APPD

REVISIONS

CONSULTANT SEAL

ISSUED FOR 12/17/2014

SUBDIVISION

TRUE CONSULTING
SUITE 203, 570 RAYMER AVE
KELOWNA, B.C.
PHONE: (250) 861-8783
info@true.bc.ca

MAPLE FARM EQUIPMENT — THE JIM PATTISON GROUP

MAPLE FARM EQUIPMENT DEALERSHIP YORKTON, SASK.

SUBDIVISION CONCEPT PLAN

SCALE	AS NOTED
DESIGN BY	DLP
DRAWN BY	CLS
DATE	DECEMBER 2014
PROJECT No.	1123-011
ACAD FILE	
DRAWING No.	001
SHEET	1 OF 1
REVISION	0

APPENDIX F
TRUE Consulting Stormwater Management Design Brief
dated December 19, 2014

December 19, 2014 Our File: 1123-011

Mr. Gord Shaw, MCIP RPP
Director, Planning & Engineering
City of Yorkton
- sent via email -

Dear Gord:

Re: Stormwater Management Design Brief
Block / Parcel B, Plan 101440448, Extension 3 Development Project
Jim Pattison Developments Ltd.

Further to our pre-design consultation meeting of July 16th, 2014 and subsequent discussions with Mr. Josh Mickleborough, P.Eng., we are pleased to submit the following stormwater management design brief in support of our client Jim Pattison Developments Ltd.'s subdivision application of today's date for the project

1.0 BACKGROUND / SUBJECT LANDS

Jim Pattison Developments (hereafter 'JPD') has purchased approximately 38.85 ha (96.00 acres) of land shown bounded in red at right for development purposes.

As part of JPD's development plan, it is proposed to develop a community detention pond adjacent the eastern site boundary to service the subject lands, with controlled storm flows subsequently outletting to the existing wetland located in the south east corner of the property.

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KELOWNA
203 - 570 Raymer Ave
Kelowna, BC V1Y 4Z5
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info@true.bc.ca | www.true.ca

2.0 DESIGN CRITERIA

Referencing the City of Yorkton's Engineering Design Criteria (draft dated October 2012 received from the City on July 16/14), "…***detention facilities in new development areas are to be designed to manage runoff from a 1:100 year return period***…".

The community pond block location is presented below (shown blue) and the facility will be designed to satisfy the City criteria.

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3.0 Stormwater Management Plan

Stormwater management addresses the prevention and mitigation of stormwater runoff quantity and quality impacts to receiving water bodies and the natural environment associated with land development activities.

3.1 Minor System

The subject lands are currently used for agricultural purposes and in its current state, storm drainage is directed toward boundary roadway ditches on the north (Hwy 16/York Road), west (Sully Avenue) and south (Smith Street) – refer to TRUE drawing #004 (Existing Topography and Drainage Patterns dated July 2014) enclosed.

Phase 1 of the project (the farm equipment dealership) is proposed as a rural development standard with minor system flows conveyed via a new, on site ditch network - refer to TRUE drawing #007 (Storm Servicing Concept Plan dated July 2014) enclosed. As shown on drawing #007, a new ditch network is proposed to be developed adjacent the N, S, E, & W property boundaries conveying flows to the detention pond facility. With this approach, minor storm flows from the subject lands will no longer be tributary to the City of Yorkton's roadside ditches on Hwy 16/York Road, Sully Avenue or Smith Street.

It is noted that should future development proposals on the remainder lands contemplate an urbanized development standard with an underground (piped) minor storm system, such a pipe network will also be able to outlet to the pond facility.

3.2 Major System

Site grading designs will be developed to direct Major system (overland) storm flows to the boundary ditch system concept as presented on TRUE dwg #007, outletting to the detention pond. Subsequent detailed designs will establish the ditch sizing, treatment. Finished floor elevations for all structures will be required to be set at elevations no less than 0.30m above the 1:100 year hydraulic grade line in order to protect and against flooding and property damage.

4.0 Stormwater Management Designs

TRUE Consulting's detailed civil designs will be developed to capture & store all storm waters associated with the full spectrum of rainfall events up to and including the 1:100 year rainfall event, coupled with controlled release rates (at green field / pre-development release rates) to the existing Ducks Unlimited wetlands.

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5.0 Hydrologic Modeling

A preliminary hydrologic model has been prepared for the project and may be summarized as follows:

a) Model Selection

Green field and post development drainage conditions for the subject lands have been analyzed using the Soil Conservation Service TR-20 Unit Hydrograph procedure (SCS-UH), which is considered a reliable method for modeling small urban watersheds. A hydraulic and hydrologic model for the campus was developed using HydroCAD (v. 10.0, 2014) software.

b) Modeling Information

- Drainage catchment and routing diagram shown below.

- Design rainfall events = 1:2, 1:5, 1:10, 1:25 and 1:100 year return periods, with the full spectrum of rainfall event durations analyzed (1, 2, 6,12 & 24 hour durations).

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b) Modeling Information (continued)

- Rainfall Intensity Duration Frequency Curves used per Environment Canada - "Yorkton A" station. Rainfall event intensities and depths are summarized in Tables #1.0 and 2.0 respectively:

TABLE 1 - Rainfall Summary (Rainfall Intensities)

Return Period (Year)	Yorkton, Sask. Rainfall Intensity (mm/hr)				
	Duration (Hours)				
	1	2	6	12	24
2	17.0	11.0	5.0	2.9	1.8
5	26.0	16.0	7.0	4.0	2.3
10	30.0	20.0	8.1	4.5	2.8
25	34.0	27.0	10.0	5.4	3.3
100	49.0	30.0	13.0	7.0	4.5

#

#

TABLE 2 - Rainfall Summary (Total Rainfall Depth)

Return Period (Year)	Yorkton, Sask. Total Rainfall (mm)				
	Duration (Hours)				
	1	2	6	12	24
2	17	22	30	35	43
5	26	32	42	48	55
10	30	40	49	54	67
25	34	54	60	65	79
100	49	60	78	84	108

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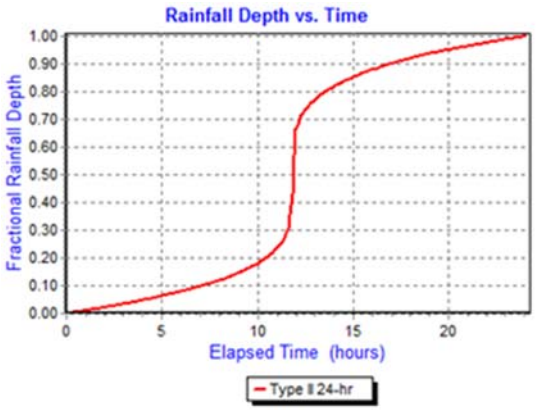
b) Modeling Information (continued)



- A Type II SCS rainfall distribution curve was selected, consistent with Saskatchewan storm shapes; mass curve presented at right:#
- Curve Numbers (CN) were selected from Urban Hydrology for Small Watersheds (NRSC, June 1986).
- Reflecting the property's C3 (Highway commercial) zoning and the fact that future development proposals are currently unknown, post development drainage conditions have been conservatively modeled using curve numbers of 98 for buildings and paved parking surfaces, and 94 for the MFE lot's gravelled equipment storage surfaces – i.e. using a high percentage of impermeable surfaces.
- The above assumptions would be expected to be revisited and updated as specific development proposals take shape in future on the remainder lands.
- An Antecedent Moisture Condition (AMC) of 2 was modeled, representing an average moisture condition.
- Times of concentration for pre development and post development conditions have been modeled at 30 minutes and 20 minutes respectively.

5.1 Geotechnical Considerations

The project geotechnical report authored by AMEC Environment & Infrastructure Limited dated September 12, 2014 is enclosed for the City's review and files. Consistent with local experience, the soil profile was found to be comprised primarily of clays. The site is therefore unsuitable for the use of storm water infiltration measures (perforated pipes, drywells, etc.) and none are proposed.

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5.2 Modeling Results

A summary of the calculated peak pre and post development flows are presented in Table #3 below, with maximum (governing) values shown highlighted in grey.

TABLE 3 - Peak Flows Summary

Rainfall Event		Peak **Pre**-Development Flows (Full Site / Greenfield Condition)	Peak **Pre**-Development Flows (Phase 1 / Greenfield Condition)	Peak Post Development Flows (Phase 1 Area) (waters entering pond)	Peak Post Development Flows (Full Site) (waters entering pond)
Return Period	Storm Duration	cms	cms	cms	cms
		AMC = 2	AMC = 2	AMC = 2	AMC = 2
2 Year	1 Hour	0.336	0.083	0.134	2.784
	2 Hour	0.555	0.137	0.223	3.338
	6 Hour	0.943	0.233	0.359	3.713
	12 Hour	1.128	0.279	0.417	3.621
	24 Hour	1.399	0.346	0.484	3.475
5 Year	1 Hour	1.056	0.261	0.406	4.751
	2 Hour	1.383	0.342	0.538	5.211
	6 Hour	1.934	0.478	0.708	5.406
	12 Hour	2.090	0.516	0.744	5.109
	24 Hour	2.162	0.533	0.729	4.514
10 Year	1 Hour	1.460	0.361	0.555	5.630
	2 Hour	2.194	0.542	0.835	6.703
	6 Hour	2.571	0.635	0.929	6.386
	12 Hour	2.571	0.635	0.906	5.791
	24 Hour	2.965	0.732	0.984	5.547
25 Year	1 Hour	1.902	0.470	0.716	6.510
	2 Hour	3.810	0.941	1.406	9.297
	6 Hour	3.627	0.896	1.292	7.917
	12 Hour	3.481	0.860	1.209	7.036
	24 Hour	3.792	0.937	1.244	6.576
100 Year	1 Hour	3.796	0.938	1.390	9.800
	2 Hour	4.548	1.123	1.663	10.403
	6 Hour	5.439	1.343	**1.908**	**10.408**
	12 Hour	5.110	1.262	1.747	9.176
	24 Hour	**5.825**	**1.439**	1.880	9.052

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Key modeling results are highlighted as follows:

1. For the Phase 1 area, a maximum permissible peak pond release rate has been modeled as 0.938cms, reflecting the peak 1:100 year, 1 hour green field release rate.
2. For the full site area, a maximum permissible peak pond release rate has been modeled as 3.796cms, reflecting the peak 1:100 year, 1 hour green field release rate.
3. In order to restrict peak post development release rates equal to the above maximum permissible release rates, preliminary detention pond active storage volumes have been modelled as 1,500m3 for Phase 1 of the project, and 10,000m3 for the full site build out.
4. It is stressed that that this full build out pond volume of 10,000m3 reflects conservative assumptions with regard to future development of the remainder lands (generally all assumed to be hard surfaced). As such, this ultimate pond volume of 10,000m3 is not a "magic number" requiring rigid implementation in future by the City; rather, future development applicants should be required to model their specific development proposals and develop their requisite incremental pond storage volume requirements accordingly.

6.0 Summary / Closure

The storm water management design brief presented herein has been prepared to satisfy the City of Yorkton's requirements and to assist in the review of JPD's subdivision application. The plan incorporates current storm water management best management practices and satisfies applicable City of Yorkton design criteria. Subsequent detailed modeling and pond design works will be submitted for the City's review and approval in due course.

Trusting this meets your requirements; we remain available to meet or discuss this plan further at your convenience.

Sincerely,
TRUE Consulting

Dave Pritchard, P. Eng.

cc: Mr. Michael Lee, VP – Jim Pattison Developments Ltd.
Mr. Tom Munro - Jim Pattison Developments Ltd.

APPENDIX G
SaskPower, SaskEnergy and SaskTel correspondence

Dave Pritchard

From: Brian Kowalchuk <bkowalchuk@saskpower.com>
Sent: August-22-14 10:36 AM
To: Dave Pritchard
Subject: Budgetary Quote

Good day Dave: Further to our conversation regarding a budgetary cost to provide a 600volt, 600amp, three phase service approximately 70 meters from our existing three phase line to Block B in the NW 03-26-04-W2, west of Yorkton. The cost would be approximately $50,000.00 with the potential for investment from SaskPower upon the receipt of detailed load projection information.

Thank you and please call if I can be of more assistance

Brian Kowalchuk
SaskPower| Business Manager, Customer Relations (Yorkton)
PH. 306-786-1215 |email bkowalchuk@saskpower.com) | saskpower.com

Dave Pritchard

From: RAuckland@saskenergy.com
Sent: September-11-14 2:34 PM
To: Dave Pritchard
Cc: CFenske@saskenergy.com
Subject: Unserved Subdivision Inquiry in Yorkton

Dave

We have facilities on the north side of York Rd that will handle the load for the MFE building

Because of the large load we can apply an investment to the job which world cover all costs. Your cost would be $0.

This is based on the conditions that the load is 8-9 million BTUs and we are only serving the MFE Development Parcel. (Phase 1)

If you need more information please contact me. Thanks.

Rob Auckland
Operations Supervisor

Yorkton Sask Energy Office
40 Palliser Way
Yorkton, Sask S3N 3Z4

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C: 306-641-4245
F: 306-786-2379
RAuckland@SaskEnergy.com

MEMORANDUM

To: **NOTE TO FILE** From: DLP

Date: Aug 11/14 File No. 1123-011

RE: Tel Service – Yorkton JPD Site

Spoke with Larry Shewchuk, Asst Eng at SaskTel Aug 11/14 (tel: 1-306-777-3458). Confirmed the following:

i.) Existing tel plant located at Sully / York Road corner;
ii.) Site may be serviced with standard SaskTel urban charges applicable; and
iii.) SaskTel able to provide fibre high speed internet suitable for farm equipment dealership head office land use.

Aside:

Photo of tel plant located at NW site corner from site visit of July 15/14

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